Governing Shared Mobility

A comparison of the policy goals, governance instruments, and social outcomes achieved in the cities of Bogotá, Paris, and Los Angeles

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I confirm that the work submitted is my own, except where work which has formed part of jointly authored publications has been included. My contribution and the other authors' to this work has been explicitly indicated below. I confirm that appropriate credit has been given within the thesis where reference has been made to the work of others.

- The work in chapter 4 of the thesis has been published as:

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Abstract

The topic of this thesis is the governance of shared mobility, particularly form factors such as ride-hailing and shared bicycles and scooters that have been typically deployed and operated by private-sector companies. The thesis presents the results and analyses of three case studies that exemplify different governance approaches for these services: Bogotá, Colombia, and the use of an umbrella regulation to govern the deployment of ride-hailing services, Paris, France, and the use of non-legally binding codes of good conduct with private operators to govern the deployment of shared moped, bicycle, and scooter services, and Los Angeles, USA, and the use of an operational permit to govern the deployment of shared scooter services. The analyses focused on understanding the goals pursued by these local governments, the governance tools used, and the outcomes achieved when policymakers attempted to govern these technological services. The thesis concludes that cities are pursuing a wide diversity of goals when governing shared mobility deployments. These goals are guided by local circumstances, but they rarely coincide with what the academic literature proposes as the goals that should be pursued by transport policy. It further concludes that there are no preferred policy instruments used by cities to govern shared mobility, and that instrument choice is mainly constrained by the context in which the cities are embedded. Free from contextual constraints, city governments attempt to balance the legitimacy of the instruments against their effectiveness. Ultimately, the thesis proposes plausible causal pathways to explain the observed outcomes in the case of Los Angeles. It proposes that the availability of shared mobility vehicles, their characteristics, and the increased oversight provided by the government for these new modes can explain why outcomes related to equity, road safety, power, and innovation were observed. These explanatory 'mechanisms' can be used to improve future iterations of programmes to better govern the deployment of new technological services in the transport sector.

The thesis makes both theoretical and empirical contributions to our understanding of the governance of the transport sector. It provides new empirical evidence that enhances our understanding of extant theories of how local policymakers and public practitioners select goals and policy instruments to address emerging technological developments in the transport sector. It also provides novel empirical evidence on the causality of transport governance interventions aimed at achieving public policy goals. The thesis also makes theoretical contributions to the academic literature, most notably, it creates a framework for understanding the term "shared mobility," and it showcases a practical approach to exploring causality when evaluating policy interventions through the philosophy of science of Critical Realism.

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1. Introduction

1.1 Background and Rationale

Since the early 2010s, the transport sector has seen a rapid uptake in new passenger vehicle services that, for some authors, have signaled a 'revolution' unlike anything the sector has experienced in over 100 years (Kamargianni et al., 2016; Canales et al., 2016; Slowik and Kamakaté, 2017; Sperling, 2018; Bellantuono and De Bellis, 2023). While different authors describe this revolution differently, most agree that advances in Information and Communications Technology (ICT) have enabled new developments in the transportation space, such as shared, autonomous, and/or electric vehicles. More specifically, the widespread adoption of mobile phones with embedded GPS enabled the development of services that changed how users interact with the transportation system. Specifically, a family of new technology-enabled services that has come to be known as *shared mobility* has generated a shift from owning vehicles (cars, bicycles, and scooters) to consuming mobility services by enabling the sharing of these assets amongst multiple users.

A key characteristic of these new shared mobility services is that they have been predominantly planned and deployed by private sector companies, with little input from governments. This is a new position for governments that used to be the ultimate conductors of the public transport governance network and have been relegated to sometimes observers and sometimes just another player in this new shared mobility governance network.

This shift in role has created uncertainty about how governments should respond to these deployments, as reflected in the varied, and sometimes contradictory, governance approaches that have emerged around the world (from a complete laissez-faire approach to banning them - SUMC, 2019). How different governance approaches to shared mobility affect the outcomes of these services, and how these interact with the goals pursued by governments, has received little attention in academic literature.

The focus of this study is therefore the governance of shared mobility services. I will argue throughout this thesis that studying this topic is important to improve governance practices for these and other technology-dominated mobility services in the future. The aim of this thesis is, therefore, to propose new and improved ways in which policymakers and practitioners can govern the sector in the future.

To achieve this aim, the thesis is divided into four research questions that follow sequentially. These research questions were informed by the gaps I identified during the literature review stage of the thesis, as well as by my own observations as a practitioner and member of shared mobility governance networks in multiple countries worldwide, which have resulted from my professional career spanning 15 years working on transportation, technology, and climate change.

The questions are:

> ***RQ0:*** *How is shared mobility defined?*
> ***RQ1****: What kinds of goals are local governments pursuing, in different contexts, as they try to understand how to steer the direction of private sector shared mobility deployment?*
> ***RQ2****: What governance interventions and instruments have cities deployed when dealing with shared mobility, and how has the context affected implementation?*
> ***RQ3****: How do local governance approaches to shared mobility shape policy outcomes and lead to intended and unintended effects?*

While I was carrying out the literature review for this thesis, it became clear that different authors had a different understanding of what the term 'shared mobility' meant: some used it as a synonym for 'ride-hailing', others for bicycle-sharing, some included casual sharing, while others limited it to services provided by private companies. Overall, few authors described how they interpreted this term in their research, and most simply mentioned it as if it had a universally accepted definition. For this reason, I decided to include an additional research question (RQ0) to provide conceptual clarity regarding the term shared mobility and to build the rest of the thesis on a solid theoretical foundation.

The thesis addresses research questions 1, 2, and 3 sequentially, loosely following the policy cycle framework (Nakamura, 1987). This framework outlines a series of sequential steps in the policymaking process, beginning with agenda setting, followed by policy formulation, law enactment

and implementation, and culminating in policy evaluation. The only step of the policy cycle framework that is not part of the thesis is the "agenda-setting" stage. In other words, the research did not focus on why or how shared mobility became a topic worthy of regulation, though this has been identified as a potential future area of exploration in the conclusions chapter.

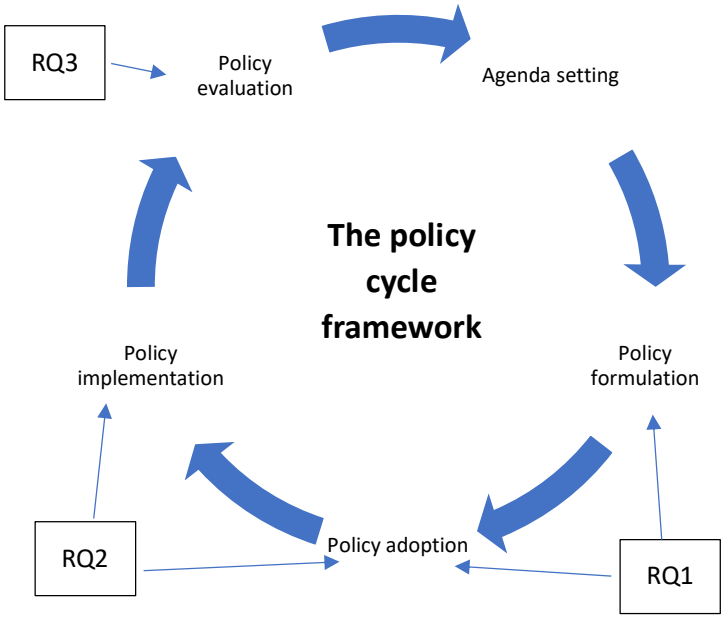

Figure 1: The thesis' research questions overlaid on the policy cycle framework. Own elaboration.

The thesis draws on a wide range of academic fields, including transportation and new mobilities, the sharing economy, public administration, and political science, to investigate how local governments have addressed the issue of shared mobility and the outcomes that some of these approaches have yielded with the objective of critically examining some of the divergent governance approaches used so far to understand how each leads (or not) to desirable social outcomes for the transport sector.

The basis for the thesis was three case studies of city governments that had been confronted by the deployment of shared mobility services by private companies in their jurisdictions:

- Bogotá, Colombia, and the deployment of ride-hailing services,
- Paris, France, and the deployment of shared moped, bicycle, and scooter services, and
- Los Angeles, USA, and the deployment of shared bicycle and, later, scooter services.

These cities were selected because they exemplify distinct ways in which local governments have confronted the deployment of shared mobility services by private companies. Bogotá relied on a national-level umbrella regulation that allowed the operation of luxury taxi services, Paris relied on voluntary commitments between private shared mobility companies and the city (*charters of conduct*), and Los Angeles relied on operational permits with strict guidelines on what the city deemed permissible. Each city, therefore, represents different governance approaches that provide evidence that helped answer the research questions in this thesis. Chapter 3.3 provides more detail about the specific process followed for case selection.

The thesis generates new theoretical and empirical insights that advance our understanding of how to improve the public governance of shared mobility and, more broadly, of public transport services enabled by technology and deployed by private sector companies. The papers presented in this thesis contribute to the academic literature in these fields by drawing on theoretical and empirical insights that 1. Create a working definition of 'shared mobility', facilitating its study and understanding by other researchers and academics. 2. Provide new empirical evidence that helps advance the extant theories of goal setting and policy instrument selection by local governments (broadly, but more specifically in the transport space), and 3. Advances the practice of policy evaluation in the transport sector by taking on a novel theoretical lens (that of Critical Realism) and applying it in a real-world setting, therefore advancing both our understanding of the causality of policy interventions in the transport sector and the practical application of this philosophy of science in transport policy settings.

1.2 A note on framing

In the previous paragraphs, I presented shared mobility as a private-sector imposition on cities. Shared mobility has also been used by local governments as a tool to advance their own goals and agendas. In fact, this is the approach taken by authors such as Desdemoustier et al. (2019); Esposito et al. (2021); and Margherita et al. (2023). In their research, the authors interpret these technological advances as government tools rather than private-sector impositions. By studying shared mobility in

its broader definition (please refer to Chapters 2.2 and 4 for a critical review of the literature on shared mobility), it is indeed clear that there are *public* shared mobility services; public, insofar as their implementation is sanctioned, encouraged, and supported by the public sector. I have therefore decided to focus the research on instances in which private-sector companies have imposed shared mobility services on governments without their prior approval. This aligns with segments of the literature that take a critical approach to the sharing economy, by attaching this societal shift more with corporate practices of greenwashing (or "sharewashing" -Gruszka, 2017, p.99) that seek to increase corporate profits rather than embody the original, evocative values of sharing, such as altruism and environmental sustainability. The reason for this normative choice is that, in my opinion, this private-sector imposition constitutes a clear departure from other privately led, publicly sanctioned public transport services, such as privatized bus or rail services. I delve deeper into this justification in section 5.2.1.

1.3 Thesis outline

This thesis comprises 8 chapters, with its core consisting of four papers that address each research question, three of which have been published in academic journals. Chapter 2 provides a literature review focusing on those segments of academic literature that helped shape this thesis. It focuses on three large areas of literature: shared mobility, governance, and the governance of new mobility. While additional literature was reviewed throughout the time I completed this thesis, this chapter focuses on segments of the literature that address the gaps identified throughout the document. Chapter 3 starts by justifying the use of Critical Realism (CR) as the metatheory of science that guided this research and by providing direct links to explain the selection of methods and the choice of case studies. Chapter 4 presents a study titled: "Technology, Transport, and the Sharing Economy: Towards a Working Taxonomy for Shared Mobility". As noted above, in the early stages of this thesis, the literature review revealed that there was no formal or broadly accepted definition of shared mobility. Although the term has been widely used in academic literature, it has primarily served as an umbrella term encompassing a diverse range of technological innovations. It therefore became

essential to provide conceptual clarity regarding the term "shared mobility," which led to the publication of this first paper. Through a critical assessment of the existing academic literature, the paper proposes a taxonomy of shared mobility services that clearly defines what is within and outside this concept.

Chapter 5 presents a study titled “Governing Shared Mobility: A Comparison of the Public Policy Goals being Pursued in Three Cities”. This paper identifies the goals that the local governments of Bogotá, Paris, and Los Angeles were pursuing when regulating these private shared mobility services. It also analyses the circumstances and motivations that led them to pursue these goals. The study identifies a wide range of goals (34 distinct goals) that the governments of these cities pursued when attempting to regulate shared mobility services. However, only three to four goals tended to dominate most of their actions. There are various motivations for pursuing these goals, ranging from public interest in redressing past inequities to circumstantial motivations, such as appeasing incumbents whose businesses have been endangered by these new technologies. The academic literature converges on sustainability and equitable access as two primary goals to be pursued in transport policy; however, the study's findings suggest that practitioners and policymakers are pursuing a range of other goals that do not neatly fit into these two theoretical categories.

Chapter 6 presents a study titled “A Tale of Three Cities: A Process Tracing Analysis of Policy Instrument Choice When Governing Shared Mobility”, which identifies and classifies the policy instruments that the three local governments studied used to steer the direction of shared mobility services. The study also identifies and analyses the motivations and constraints that the local policymakers had for selecting these instruments over others. Finally, the study uses a process tracing methodology to probe different theories of policy instrument selection (efficacy, legitimacy, and policy styles (Bressers and O’Toole, 2005; Turnpenny et al., 2015; Howlett and Tosun, 2019)) and identify if instrument selection for shared mobility follows these existing theories of instrument selection identified in the academic literature. The study identifies a total of 52 unique instruments

used collectively by the three cities, of which 30 were substantive (directly affecting policy outcomes), 23 were procedural (affecting policy processes), and one was classified as both. The study also documented and classified new instruments that did not exist prior to the advent of shared mobility and were developed specifically to address the challenges faced by private companies deploying new mobility services. In terms of motivations for instrument selection, the study found that local-level selection can be constrained by national structures or the national context; however, when these change, local governments adapt quickly and adjust their instrument selection strategy. When no national policy constraints exist, policymakers aim to select instruments that strike a balance between efficacy and legitimacy. The study identified other motivations for instrument selection that do not fit within existing theories of instrument selection, such as the desire to reclaim some of the power lost as the transport policy space has shifted towards networked governance. The study, therefore, pushes the boundaries of instrument selection theory by exploring the governance of shared mobility as a new area.

Chapter 7 presents a study titled “Examining Causality: A Critical Realist Analysis of Policy Interventions when Governing Shared Mobility”. The study analyses the policy and regulatory interventions implemented by policymakers and practitioners in the city of Los Angeles and evaluates the outcomes observed after these interventions. Using a critical realist lens, it proposes plausible causal pathways that connect the two. The study identifies three “mechanisms” that explain why certain outcomes were observed. These are the ‘*availability mechanism*’ that proposes that the actions that the policymakers in Los Angeles took to increase the availability of shared scooters in certain areas of the city led to an increase in their use that was mediated by structural factors such as the availability of safe infrastructure, price of rides, and social structures. The second mechanism identified in the study is the ‘v*ehicle mechanism*’, which explains that the form factor of a scooter contributes directly to the poor road safety outcomes observed. Finally, the third mechanism is the ‘*oversight mechanism*’ which proposes that the development of new digital tools by the city (specifically the Mobility Data Specification API -Application Programming Interface) led to the

private companies providing bike- and scooter-sharing services having no recourse but to strictly follow the permit language, or risk being penalised by the city.

Finally, Chapter 8 reprises the research questions proposed and summarises how the thesis addressed them, while also identifying the research gaps that were addressed and their implications for policymaking. The chapter also identifies the research's limitations and potential future areas of study.

2. Literature review

2.1 Introduction

As explained in Chapter 1, this thesis draws from multiple streams of academic literature from the fields of transport and public policy. Specifically, this chapter focuses and is organised around the subsets of the academic literature of these fields that pertain to the topic of the governance of shared mobility. Specifically:

1. New mobility and innovations in the transport sector, with a deep dive into shared mobility.
2. Public sector governance.
3. The intersection of both 1. and 2. through the literature that discusses the governance of new mobility and shared mobility.

This chapter does not provide a full account of all the literature that was reviewed for this thesis. Rather, it focuses on those segments of the literature that provide sufficient justification for the gaps in the literature that the thesis addresses. Given that this thesis is comprised of papers that have been published in academic journals, there will be some repetition between the literature review of the thesis and the literature review of each of these academic papers.

2.2 The origins of shared mobility

2.2.1 Introduction

The topic of '*shared mobility'* has started to generate interest in the academic literature in recent years, despite there not being a consensus on what the term encompasses (Le Vine and Polak, 2015). The oldest reference found of the term dates to 1995 (Engels et al.) where the authors proposed to enable real-time hitchhiking by using the (then) newly developed mobile phone network (GSM). To put this into context, that same year was when SMS services first became commercially available. This might be one of the first uses of the term, but the concept of sharing modes and rides between multiple users aided by technology precedes 1995. Alexander (1977) for example, had described a primitive form of ridesharing, a solution similar to Uber, that used the available technology at the time (Figure 2).

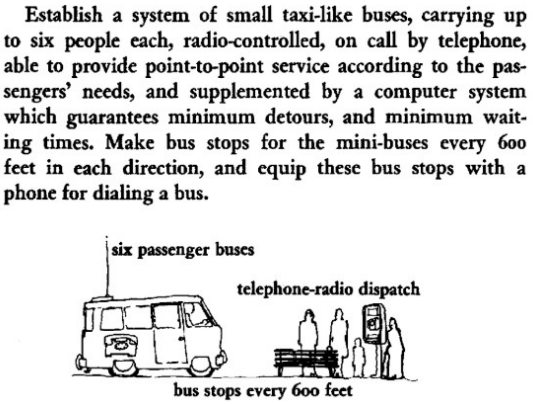

Figure 2: Excerpt from the book "A pattern language: towns, buildings, construction" (Alexander, 1977)

Despite these early visionaries, our modern understanding of the term started to develop only with the appearance of broader concepts such as the '*smart city'* in the early 2000s and the '*sharing economy*' in the early 2010s. As we can see below, interest in the term shared mobility in both academia (Figure 3) and the general public (Figure 4) started to grow in the middle of the decade of 2010, only after these other concepts had already developed.

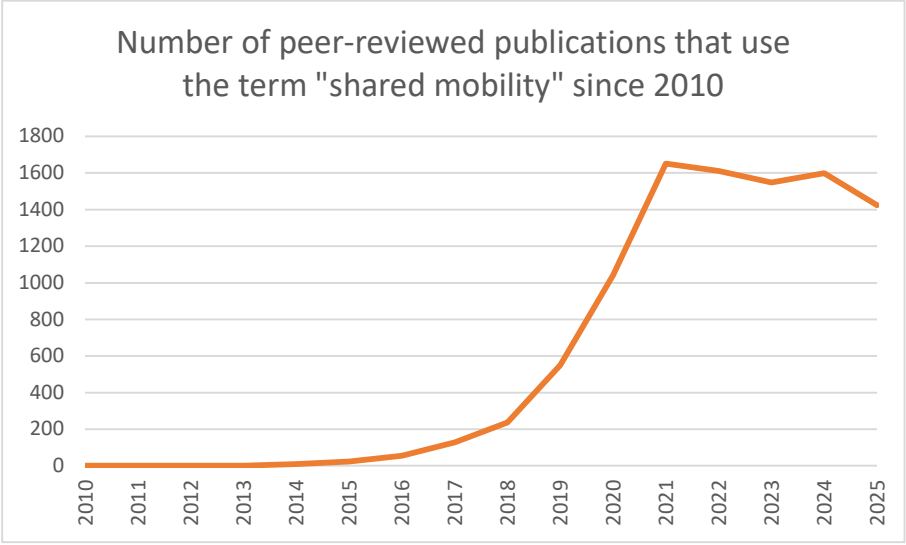

Figure 3: Number of peer-reviewed publications using the term 'shared mobility' from 2010 until December 2025. Source: Author using data from Web of Science

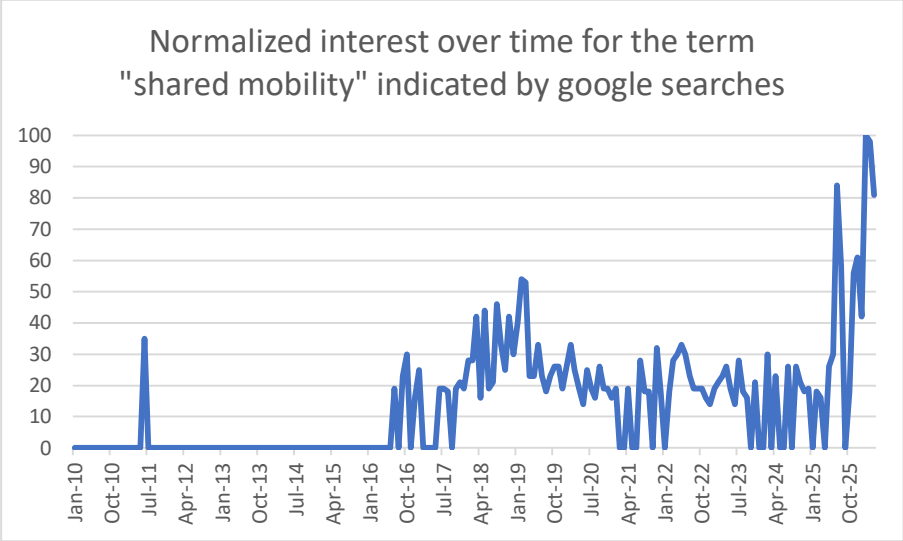

Figure 4: Normalized interest over time for the term 'shared mobility' from 2010 until April 2026. Source: Author using data from Google[1]

In addition to the attention that the term is gaining in academia and in popular culture, Figure 5 shows its multidisciplinary nature. As expected, shared mobility has spurred the most interest among researchers in the field of transportation, though researchers from other fields such as economics, environmental studies, and management have also added to its development.

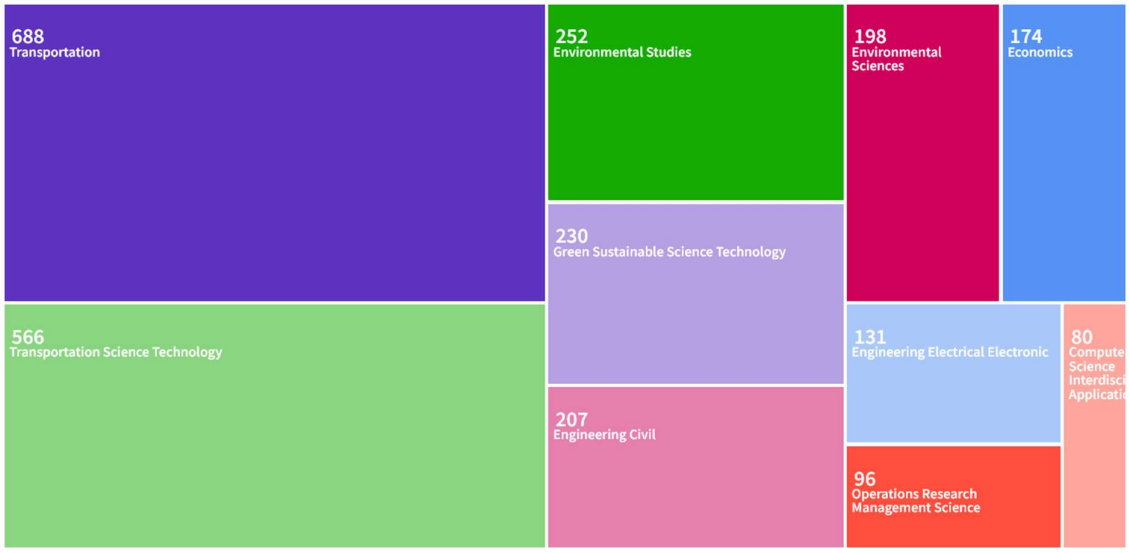

Figure 5: Topics in the literature that discuss "shared mobility" until January 2026. Source: Author using data from Web of Science

[1] Figure 4 shows popularity of each of these terms from searches in the Google search engine during the same period to show how these topics have gained popularity not only in academia. Popularity in Google is defined as "search interest relative to the highest point on the chart for the given region and time", meaning that the peak popularity of each term is shown with a value of 100 (e.g. for "ridesharing" the term was most popular in early 2016).

This chapter tracks the origins of the concept of shared mobility by examining the two main areas of literature that underpin it: technology and transport (section 2.2.2) and the sharing economy (section 2.2.3), which came together in the first paper of this thesis to create a working taxonomy for the term “shared mobility”.

2.2.2 Technology and transport

The history of transport has been closely intertwined with the history of technology. The invention of the wheel, the steam engine, the car, the airplane, the space shuttle, and many others have all been possible thanks to humanity’s use of technology to fulfill its need (and desire) to move. Since the 1950’s, with the advent of the Information and Communication Technology industry (ICT), this relationship has continued to evolve, and today the use of ICT in transport applications (vehicles and infrastructure) is known as ‘Intelligent Transport Systems’ or ‘ITS’ (US DOT, 2016a). Auer et al. (2016) traced the origins of ITS to the late 1960s, when states and regions, academic institutions, and the automotive industry began conducting new research and deployments using ICT in the transport sector. Masaki (1998) goes further back to the early 1930s, identifying broader technological developments such as the radar and the first electric traffic signals as the elements that provided the foundations for what we currently call ITS. These differences in opinion regarding the origin of the concept are also a reflection of the term’s broad nature, as ITS is generally understood to encompass most combinations of “technology, communications and information” (ITS UK, 2016, p.3), and as such, include diverse types of technologies such as driverless vehicles, smart traffic light systems, and electronic ticketing systems, amongst others. Despite such a broad nature, ITS seems to have a clear focus on improving technological hardware (i.e., the supply of transport services using ICT) with the goal of enhancing the experience of stakeholders who directly interact with the transport system, such as end-users and operators, especially when it comes to improving safety (Chowdhury and Sadek, n.d.), and only to a limited extent on pursuing broader societal goals such as sustainability (Levine and Underwood, 1996).

In addition to ITS, the term ‘smart mobility’ has been used since the early 1990s to denote similar, albeit arguably broader, interactions between these two sectors. This term stems from the development of the concept of ‘smart cities’ (Benevolo et al., 2016) and more broadly from the concept of ‘smart’ or ‘smartness’, which generally denotes the use of technology to change how humans interact with the world (Brenner, 2007). Pinpointing a single definition for either smart mobility or smart cities is hard, as these concepts are “fuzzy”, “used in ways that are not always consistent” (Albino et al., 2015, p.4), or “used as evocative slogan(s)” that lack substance and context within the sustainable transport sector (Papa and Lauwers, 2015, p.543). Others note that smart means different things to different stakeholders, including industry, governments, and academia, making it a difficult term to work with (Mosannenzadeh and Vettorato, 2014). Multiple authors (Nam and Pardo, 2011; Mosannenzadeh and Vettorato, 2014; Lyons, 2018) have tried to come up with a single definition, and although they do not overlap entirely amongst them, the consensus seems to be that the concept of smart mobility includes at least a technological component (similar to ITS) but goes beyond it, as it is also concerned with broader implications around sustainability. Other characteristics of smart mobility are that its potential can only be enabled if the needs and capacities of the general public (e.g., smart citizens) and government institutions (e.g., smart governments,- Nam and Pardo, 2011) are taken into account.

Instead of providing a definition, other authors (Benevolo et al., 2016; Cledou et al., 2018) have proposed taxonomies to classify transport solutions within smart mobility. Once again, these do not overlap in the types of solution that they identify, as they include diverse implementations ranging from bicycle lanes to congestion pricing, which adds evidence to support the conclusion that there is no consensus in the literature on the scope of smart mobility (Garau et al., 2016). Where they do overlap, however, is in identifying the three main components of smart mobility solutions: their use of ICT, the importance of people and institutions as users and beneficiaries of smart mobility, and the goals or potential impacts smart mobility might have on sustainability.

Another term that brings together the worlds of ICT and transport and has recently gained widespread acceptance is *Mobility as a Service* (MaaS). MaaS has been defined as "buying mobility services based on consumers' needs instead of buying the means of mobility" (Kamargianni et al., 2016, p.3295). As smart, MaaS promises sustainability (Surakka et al., 2018) and acknowledges the importance of multiple stakeholders in its application (Jittrapirom, et al., 2017). Some of the core elements of MaaS can be included under ITS (such as a e-ticketing systems), while others can be listed under smart (e.g., the importance of multiple actors beyond those who use the system). It differs from the previous terms by proposing a change in the way transport services are consumed, as MaaS implies a "shift from ownership-based to access-based transport" (Jittrapirom et al., 2017, p.15). This is a fundamental change in understanding the interactions between ICT and transport, because technology in this case is understood not only as a means to improve transport hardware (like ITS), or as having impacts beyond its direct sphere of influence (like smart), but as an enabler of changes in how users understand and consume transport services. This shift from selling-buying to sharing-consuming is what Papa and Lauwers (2015) call demand-side innovations. This important change also implies that transformations need to occur at the individual and societal levels to implement MaaS, and that consumers are no longer passive stakeholders who receive or benefit from innovations. They become active participants and promoters of these transformations. Examples of these innovations include the use and sharing of modes which used to be personally owned (e.g., cars, bicycles, scooters -what we will later define as shared mobility) and using data that was previously inaccessible or inexistent to change how users make decisions when consuming transport.

Other authors have also acknowledged that the transport sector may be seeing innovations unlike those in recent history and have therefore coined terms of their own to define them. Sperling (2016), for example, argued that the mobility sector has seen an uptake in the pace of innovations in the past decade leading to '3 revolutions': shared, electric, and autonomous vehicles. Canales et al. (2016) conducted a global survey of transport sector innovations and proposed the term 'new

mobility services', referring to a similar set of innovations that, in addition to the three revolutions, includes new data sources to support planning decisions. While these terms could be encompassed under either ITS, smart mobility, and MaaS due to its connotation to interactions between ICT, transport, people, institutions, sustainability, and demand-side innovations, the fact that they emerged shows that there is little cohesion in the definition and boundaries of these interactions, and how none of these terms is universally accepted (Schade et al., 2014).

2.2.3 The sharing economy

The previous section showed how, thanks to ICT, a shift in the consumption of mobility services (from ownership to usership) started towards the latter part of the decade of the 2010s, and that this, unlike previous ICT-enabled innovations in the transport sector that focused on the supply of the service, has implications on how users demand mobility and therefore requires changes at the individual and societal level. This social change from ownership to usership is also seen in a broader movement that is not exclusive to the mobility space: the 'sharing economy' or 'collaborative consumption', which will be the focus of this section.

The concept referred to by the terms *sharing economy* and *collaborative consumption* denotes a shift from *owning* to *accessing* goods and services such as vehicles, housing, and even short-term labour (Acquier et al., 2017). Other terms that are less frequently used to refer to the same concept are *access-based consumption*, *the mesh*, *connected consumption, access economy,* and *collaborative economy* (Codagnone and Martens, 2016; Eckhardt and Bardhi, 2016). Though most of these terms are used interchangeably, certain differences emerge amongst them when looking closely at the literature. Collaborative *consumption,* for example, is defined as a "set of resource circulation systems which enable consumers to both obtain and provide (…) resources or services through (…) other consumers or a mediator" (Ertz et al., 2016, p.15). Under this definition, activities such as buying a car from a used-car dealership, selling old video games to a reseller, and even bartering, lending, and gift giving can all be part of collaborative consumption. A notable fact from this definition is that technology is completely absent. On the other hand, Botsman et al. (2011),

generally accepted as responsible for popularizing the term collaborative consumption, do include ICT in their definition, which shows how the scope and mechanisms of the term are not widely accepted. Besides collaborative consumption, the term 'sharing economy' is also frequently used in the literature. Walker (2015, p.15) traced the origins of the concept to the "well-established repertoires and rhetoric of local exchanges such as community-supported agriculture (CSA) programs, neighbourhood tool-sharing, time banks, and the like" which attempts to highlight that the concept of sharing is not new, but that there are differences between these historic activities and what we currently call the sharing economy.

One of the main differences between regular sharing and the sharing economy is the use of technology, as the sharing economy relies on "technological infrastructure, "digital connectivity" or "digital platforms" (Schor and Fitzmaurice, 2015; Schor, 2015; Richardson, 2015; Acquier et al., 2017). While sharing has existed for a long time, the advent of ICT has helped change the nature of sharing, as today strangers (instead of acquaintances) can exchange goods, services, and create new social connections through digital platforms (Schor and Fitzmaurice, 2015). Another important difference between regular sharing and the sharing economy is that solutions that fall under this concept can involve corporations (instead of individuals only) that carry out these activities to seek a profit (Belk, 2014). This leads to the use of money-mediated practices such as *renting* instead of actual *sharing,* meaning that "*the so-called sharing economy is not* (actually) *about sharing*" (Eckhardt and Bardhi, 2016). In that sense, the authors proposed that the sharing economy should be called the access economy, since its objective is to access new services mediated by corporations. In line with this understanding, Schor and Fitzmaurice (2015) proposed that the two distinct characteristics of solutions that belong to the sharing economy are their 'market orientation', which can be for or non-for profit, and their 'organizational type' (peer-2-peer or business-to-peer), as can be seen below in Figure 6.

		Organization	
		Peer-to-Peer (P2P)	Business-to-Peer (B2P)
Market Orientation	Non-Profit	P2P Non-Profit Sharing e.g. Food Swaps, Time Banks	B2P Non-Profit Sharing
	For-Profit	P2P For-Profit Sharing e.g. Relay Rides, AirBnB	B2P For-Profit Sharing e.g. Zipcar

Figure 6: Framework for activities that fall under the term "sharing economy" (Schor and Fitzmaurice, 2015)

The seemingly '*grassroots*' and altruistic origins of the sharing economy, exemplified by activities such as gift-giving and the reuse of goods, create tensions with the business- and for-profit nature of some of its exponents. Whereas the sharing economy is sometimes identified with the benefits of altruistic sharing, such as environmental sustainability (e.g. Acquier et al., 2017, Parguel et al., 2017), equity (e.g., and flexible labour - e.g. Gruszka, 2017), in many cases, these original and evocative values are used by corporations to greenwash (or "sharewash" -Gruszka, 2017, p.99) economic practices that are predatory and bad for the environment and equality (Richardson, 2015). Lee (2015, p.17), for example, says that "the sharing economy is just the latest example of insurgent sentiment being used to sell the bona fides of profit-making corporations", and others note that the sharing economy has become a means of "managing labour and other costs cheaply" (Schor, 2015, p.15), leading to an erosion of the full-time employment benefits that workers had secured such as healthcare, insurance and the right to unionize (Morozov, 2013). Companies such as Lyft and Uber, for instance, promise flexibility for workers and high wages (see Figure 7) while concurrently trying to impede their drivers from unionizing on the grounds that drivers are independent contractors (not their employees) (Wiessner, 2018). The reality, however, is not as black-and-white. Since the concept

of the sharing economy encompasses both companies and individuals, and both for-profit and non-profit orientations, some solutions within the sharing economy may indeed lead to more sustainable and equitable pathways, while others might not.

Figure 7: Advertisement for Uber drivers (Uber, n.d.).

Despite these clear differences between sharing and the sharing economy, the concept is still "ambivalent" and "contested" (Acquier et al., 2017, p.2). For this reason, multiple authors (Schor and Fitzmaurice, 2015; Acquier et al., 2017) have proposed taxonomies to define solutions belonging to the term. They coincide in the fact that the sharing economy includes increasing asset utilization by recirculating surplus goods (such as *Zipcar*[2]*, AirBnB or e-bay)* and by using digital platforms to facilitate this activity. Where they do not coincide is in the fact that some propose that these exchanges can be non-contractual and non-monetary (e.g. Acquier et al., 2017), and others (e.g. Schor and Fitzmaurice, 2015), include service and labour exchanges (such as, *TaskRabbit)* as well as building social connections (e.g. *EatWith*[3]), not only the exchange of goods.

2.3 Public-sector governance.

2.3.1 Defining governance

While governance is a term that has existed for several centuries to denote a form of management exercised through or by the government (used, for example, in correspondence between King James V of Scotland and King Henry VIII of England), it was only in the 1980s that the term gained wider

[2] Zipcar is a car-sharing platform where users can gain access through an online platform to cars that are parked throughout the city and pay by the minute, hour or day. The cars are owned by the company, who is also responsible for maintenance and insurance, amongst other responsibilities. It was founded in 2000 by Robin Chase and Antje Danielson.

[3] EatWith is an online platforms where local hosts offer to cook meals for foreign visitors as a way to meet new people and earn money.

popularity (Kjær, 2004). Despite this recent popularity, the term is not well-defined and is used with diverse meanings across sectors, ranging from politics to computer science (Rhodes, 1996; Kjær, 2004; Hall, 2011).

When talking specifically about the use of the term in the realm of public administration and public policy, the term evokes notions of government intervention, and is in many cases used as a synonym for government (Rosenau and Czempiel, 1992). This notion of governance as government is not a coincidence. As indicated above, governance has been used by monarchs in the past and has therefore evolved alongside authoritarian forms of rule, in which the state's role dominated many daily interactions. This form of governance has continued to evolve into a more modern notion where the ruler is not the only one who exercises the authority of the state; rather, this is done through bureaucracy, and elected officials, alongside career bureaucrats who exercise the power provided to them by the sovereign people (Weber, 1978 in Kjær, 2004). Whether the sovereign power of the people is exercised by a single ruler or by a bureaucracy, the distinguishing characteristic of this form of governance is that it is controlled by government; therefore, government can be easily equated with governance. Due to its top-down nature, this form of governance has been identified as a hierarchy (Kooiman, 2003).

As mentioned above, this is still the dominant notion when people think about governance and the role of the government; an idealised view of the public administration where public servants act as uninterested parties exercising the power given to them by the people. This idealised view has been challenged by other ideas, in particular Adam Smith's view that markets are more efficient mechanisms to create and distribute wealth. These ideas introduce a second form of governance, which is independent of government, termed market governance (Rhodes, 1996). Taken to the extreme, Smith's ideas would imply that government is simply not needed. Today, however, we understand that markets are not infallible, and there are many market failures that are not corrected by the 'invisible hand' and therefore require some form of external intervention.

With this understanding and the expanding role of the state as a welfare state after WWII, during the 1970s, a series of reforms called New Public Management (NPM) was pursued by conservative governments around the world. NPM proposed applying private sector management principles to government and led to the shrinkage of government in favour of private provision of public services, as well as to the privatisation of state assets. Other characteristics of NPM included the view that increased competition for and in the market is good, the decentralisation and fragmentation of power, the creation of autonomous agencies that would ideally be separated from political influence (*agencification)*, and increased citizens' empowerment due to closer accountability from the exercise of power to the citizens (Kjær, 2004). These changes, and in particular the fragmentation of power and the surrender of power to non-public actors, led to the creation of networks of power that share responsibilities for the delivery of public goods and services. According to Rhodes (1996, p.658), networks are "made up of organizations which need to exchange resources (for example, money, information, expertise) to achieve their objectives, to maximize their influence over outcomes". Since these networks comprise both public and private sector actors, no single actor can, on its own, steer the direction in which public goods and services are deployed or the outcomes the network will achieve. While government is part of these networks, it's not the only actor; therefore, the notion of *government = governance* is no longer valid. Governance, therefore, has become the action of "managing networks" (Rhodes, 1996, p.658).

2.3.2 Exercising public power through networks

The notion that government is no longer in full control of society's path does not mean it lacks tools to influence it. Indeed, while the government is simply *another* actor in a network, it is still a major one. In fact, Klijn et al. (1995) argue that governments often take the role of 'network manager', giving it the power to both structure the network and influence its members by controlling resources or rules. To do so, governments have a range of instruments at their disposal: both policy and non-policy instruments.

An important segment of the academic literature focuses on classifying these instruments or tools according to common (albeit arbitrary) characteristics. The literature on policy classification identifies two main ways in which policies can be classified (Bailey, 1994): 1. Policy typologies, as developed by Lowi (1972) and Vedung (1998). and 2. Policy taxonomies (e.g. Smith, 2002). The main difference between these two forms of classification is how they approach the process. Policy typologies depend on conceptual propositions of ideal categories, while taxonomies depend on empirical observations. Typologies suffer from many drawbacks, including that their conceptual nature makes them subjective, that the categories that are proposed under them cannot be exhaustive (i.e., empirically it is possible that a real-life case hadn't been considered initially), and that since they are not constructed based on empirical observation, their categories might treat theoretical constructs as real even if they don't actually exist (Bailey, 1994). Taxonomies, on the other hand, have not been widely used as instruments of policy classification since the empirical characteristics of policies are not necessarily evident, and, similar to typologies, the choice of categories under a taxonomy is subjective (Smith, 2002).

As noted, Lowi (1972) is one of the classic examples of policy classification. He theorizes that governments act through the power of coercion and therefore proposes a 2x2 typology along two axes: likelihood of coercion (remote and immediate) and applicability of coercion (individual conduct vs through the environment). This results in four types of policies: distributive, regulative, constituent, and redistributive. When creating this typology, Lowi's objective was to use it as a predictive tool for different forms of politics (i.e., the ways in which policies are enacted and enforced). In that sense, he theorises that politics follow policy. Another well-known example of a policy typology is that of Vedung (1998), who proposes the following policy types: (1) regulations, (2) economic means, and (3) information, or more colloquially "the sticks, the carrots and the sermons" (Vedung, 1998, p.29), which has been adopted and expanded by other authors (e.g. Lascoumes and Le Gales, 2007). Additional examples of policy typologies that follow a path similar to the one proposed by Lowi are cited by Smith (2002), yet he notes that all of them share the same drawbacks

as those noted above. He then proposes a taxonomy for morality policy theory, and this seems to be one of the few examples that explicitly sets out to create a policy taxonomy. Figure 8 below shows a summary of these two approaches.

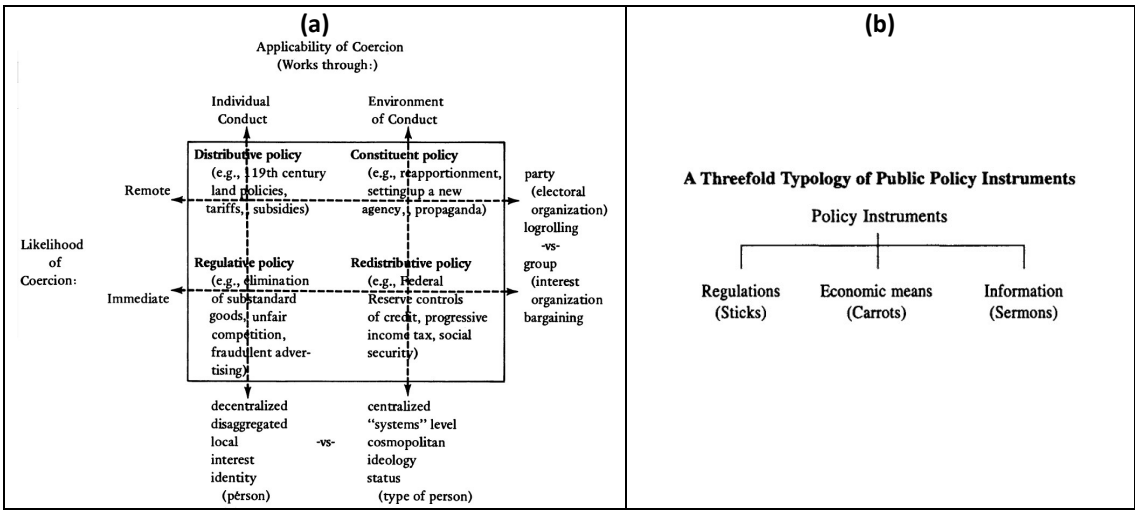

Figure 8: (a) Types of coercion, types of policy, and types of politics (Lowi, 1972) (b) a threefold typology of public policy instruments (Vedung, 1998).

Policy typologies can serve as a starting point for identifying more specific elements of governance, or, as Hood et al. (2007) put it, the "tools of governments". For the authors, the role of government is to "try to shape our lives by applying a set of administrative tools, in many different combinations and contexts, to suit a variety of purposes" (Hood et al., 2007, p.2). Instead of a theoretical, high-level classification schema, such as the typologies presented above, the tools of governance are the tangible instruments governments use to achieve their goals. For this, Hood (1986) and Hood et al. (2007) propose that these instruments can be categorized as detectors (e.g., tools used by governments to "take in information") and effectors (e.g., tools that can be used to "make an impact on the world outside"). Furthermore, they classify the tools according to the resources that the government has (nodality, authority, treasure, and organization – NATO), which leads to a slightly different, yet more specific typology than the one proposed by Vedung. Where Hood's approach really differs from the ones that Vedung and Lowi took is that he identifies specific tools for each

category, marrying a policy typology with a policy taxonomy (see Figure 9).

	Description	Detectors	Effectors
Nodality	"gives government the ability to traffic in information on the basis of 'figureheadedness' or of having the 'whole picture'. Nodality equips government with a strategic position from which to dispense information, and likewise enables government to draw in information for no other reason than that it is a centre or clearing-house. The limiting factor is credibility, and the 'coin' -how government spends this resource - is messages sent and received."	-Unsolicited tenders -By-products -Ear trumpet -Scrutiny of free-media -Direct inquiry	-Supression of information -Direct information propagation -Bespoke messages -Group-targeted messages -Broadcast messages
Aurthority	"gives government the ability to exchange, using the 'coin' of moneys' and subject to a limit of 'fungibility'. Government may use its treasure as a means of trying to influence outsiders or as a way of buying 'mercenaries' of various kinds. In fact, as we will see later, 'cheque-book government' is an instrument in constant use."	-Requisitions -Obligation to notify -Returns -Interrogation and inspection	-Directed tokens -Conditional tokens -Blanketed tokens / open permits / open compacts -Enablements -Constraints
Treasure	"gives government the ability to 'determine' in a legal or official sense, using tokens of official authority as the coin, and subject to a limit of legal standing."	-Rewards -Unsolicited propositions -Advertised rewards -Information exchange	-Customized payments -Contracts -Transfers -Conduits -Open payments -Bounties -Bearer-directed
Organization	"gives government the physical ability to act directly, using its own forces rather than mercenaries. The coin is 'treatments' or physical processing, and the limiting factor is capacity."	-Turnstiles and fixed scanners -Mobile and hidden scanners	-Individual treatment -Marking -Storage and custody -Transportation and distrbution -Processing -Group treatment -At-large treatment

Figure 9: Summary of the NATO typology, based on Hood et al. (2007)

The examples presented above focus on the application of governance through policy. In addition to policy, Rhodes (1996), recognises that governments need skills such as “game playing, joint action, mutual adjustment and networking” to properly exercise their governance power in networks. These skills are not necessarily exercised through policy; rather, they are characteristics of individuals or the institutions that represent government. While the classification methods mentioned above are useful for identifying the more tangible aspects of governance, they are less useful for identifying the intangible aspects of network governance. For this, authors such as Howlett (2004) have created a different classification where he proposes that governance instruments can be divided into either *substantive* instruments, which are akin to the historical government instruments of policy and regulation, and directly affect the policy outcomes, and *procedural* instruments, which are the ones being used by governments in the more modern challenge of network governance (procedural insofar as they attempt to indirectly effect changes in policy processes). The combination of different instruments to address a specific policy issue is often referred to as the “policy mix”. Due to the

novelty of shared mobility, the study of the specific instruments and policy mixes governments use in this space remains nascent (Paulsson and Hedegaard Sørensen, 2020).

Other developments in governance studies include what has been defined as Multi-Level Governance, which started with the changes faced by the European Union in 1992 (Ansell and Torfing, 2023). It has now evolved into the study of the sharing of power across multiple levels of government, such as the national, regional, and local government, but particularly away from central governments (Enderlein et al., 2010). While this is not a framework that I use explicitly in this thesis, the case studies do showcase the complexity of working across government levels that multi-level governance studies aim to analyse.

In addition to classifying policy instruments, the broader academic literature on policy instruments has proposed different theories of how this process occurs. Historically, instrument selection was viewed as a straightforward choice of selecting the right tool for the right job (Turnpenny et al., 2015); in other words, it involved calibrating an instrument's effectiveness for a specific policy problem. But more recently, authors such as Lascoumes and Le Gales (2007, 3,4) have argued that instrument selection is more nuanced and that instrument choice reveals a “theorization of the relationship between the governing and the governed,” reflecting underlying values and knowledge of policymakers about how to exercise social control. Furthermore, policy researchers have acknowledged that instrument choice does not occur in a vacuum; rather, historical, social, political, and economic circumstances must be considered by policymakers before making an instrument choice (Howlett, 1991). The values and context for instrument choice are subject to contestation, making the instrument selection process a pursuit of legitimacy (Bressers and O’Toole, 2005). Actually, both factors (effectiveness and legitimacy) likely play a role in how instruments are selected, as policymakers need to find a balance between an instrument that serves the purpose at hand and one that will also be accepted by other stakeholders in the policy network and therefore actually gets implemented (Capano and Lippi, 2017). In addition to these elements, cost-efficiency and equity

have been identified as additional potential external factors influencing instrument choice (Salamon, 1989). Contemporary literature also identifies 'internal' factors that might influence policy instrument choice (Howlett, 2004; Bressers and O'Toole, 2005; Capano and Lippi, 2017). These include what some authors have termed policy styles (e.g., Simmons et al., 1974; Howlett, 1991), which refer to the distinct ways in which different governments tackle policy problems, and in particular, instrument selection, which might be influenced by factors such as personal or partisan preferences, preferences of national institutions, and historical ways of doing things (Stead, 2018; Howlett and Tosun, 2019; Howlett and Tosun, 2021). This concept is closely related to that of 'path dependence', as conceptualized by Ottosson et al. (2009)'s definition of path dependence as the "historical endurance" of policies. Another internal factor that could affect instrument choice that has been identified in the academic literature is that of 'policy coherence', where some instruments naturally reinforce and "work well with each other" (Howlett, 2004, p.7) because they share common ideas or targets (May et al., 2006). For this study, we focus on the theories of legitimacy, effectiveness, and policy styles, however, we note instances where some of the other theories mentioned above might play a role in the cases we analysed.

2.3.3 Evaluating outcomes in policy processes

Evaluating the causal links between a public policy intervention (i.e., the policy mix) and its outcomes is challenging because numerous confounding factors can influence the observed outcomes (Hills and Junge, 2010; Athey and Imbens, 2017). This is also true in transport sector policy evaluations, where contextual factors (e.g., social, political, environmental) can affect observed outcomes. Typical evaluation methods for transport policies, such as cost-benefit analyses (CBA) or multi-criteria analyses, focus on evaluating the observed outcomes of interventions (i.e., if A then B had a cost/benefit of $X), but don't investigate how the policy interventions themselves led to those outcomes, nor how the context in which they are implemented affected those outcomes (i.e., how did A lead to B, and how did the context in which A and B are in impact that relationship). They are, therefore, not relevant when evaluating how to understand causal relationships in policy

interventions aimed at improving future policy iterations. In addition to this, such methods have been critiqued elsewhere (see Hwang, 2016) due to their difficulty in assigning monetary values to intangible aspects of policy impacts, their difficulty in evaluating the value of policies over time, and their potential to favour regressive policies that value, for example, the time savings of the rich more than those of the poor.

One of the most used tools for evaluating causality is the Randomized Control Experiment. However, carrying out such experiments is oftentimes difficult due to ethical, financial, or political reasons (Athey and Imbens, 2017). Econometric tools are therefore often used to isolate a "treatment" in these experiments (i.e., a policy) and link it causally to its outcomes. However, isolating a single intervention is often difficult, and, as noted above, many confounding variables may be at play in the observed outcomes. For a detailed explanation and critique of the current econometric methods used for evaluating causality, please refer to Athey and Imbens (2017).

2.3.4 Defining goals in transport governance processes

As noted above, the governance process has been mostly seen as a 'top-down', rationalistic, and sequential process in which policy direction is formulated at the top echelons of government and then flows hierarchically to be executed through policy instruments by bureaucrats, finally to be received by firms and individuals (Stopher and Stanley, 2014). There is still a dominant view in the transport literature that the transport policy process is rationalistic and sequential, starting with someone (a policymaker) at the top defining a clear goal or problem to be addressed, which is then translated into action at the local level by a practitioner (Stopher and Stanley, 2014).

This top-down, sequential view of the policy process is modeled by the 'textbook approach' to policy implementation, namely the policy cycle framework (Nakamura, 1987). This framework defines a series of sequential steps in policymaking: agenda setting (or the identification of topics that may require government intervention), policy formulation, the enactment and implementation of laws, and, finally, policy evaluation. While useful as an abstract model of the policy process, it is over-simplistic and does not reflect the complex and uncertain on-the-ground realities of policymaking,

which do not necessarily occur sequentially nor follow a rational logic (Jann and Wegrich, 2007; Stopher and Stanley, 2014; Weible and Sabatier, 2017).

However, the policy cycle framework can provide a starting point for identifying how policies are born, as the creation of policies presupposes either a problem policymakers are trying to solve or a goal they are trying to pursue that has been identified at the agenda-setting stage (Jann and Wegrich, 2007). Policy goals are those abstract ideas, driven by social values, that justify the need for state intervention and guide the creation of policies, and, by happening at the start of the policy process, have a bigger influence on the entire policy development process (Thomas and Schofer, 1970; Cashore and Howlett, 2007). Goals are mostly abstract and express big ideas, such as protecting the environment or promoting public health, that in turn are guided by the values that society shares.

Referring specifically to goal setting in the transport sector, its nature has led to goals of greater prominence in the literature than others, as I explain in the next paragraphs. In general terms, the demand for transport can be described as a 'derived demand'. This means that it exists mostly because of the demand for other activities or goods (e.g., going to work, going shopping, receiving a package). Transport is rarely an objective in itself; rather, it is a means to an objective. Although this notion of derived demand does not always apply (e.g. there might be travel that happens purely for the joy of travel, see, for example, Mokhtarian and Salomon, 2001; Rodrigue, 2006), most trips occurring today still fall under the derived demand category. As such, the goal of transport policy has historically been linked to satisfying this derived demand. The ways to do so, however, have changed throughout the decades. In the early days of the automobile era, when the modern transport planning profession was born (circa 1950), the goal of transport planners was to maximize the existing and future capacity of the vehicle infrastructure, as this reduced the difficulty people had in reaching their main objective (Litman, 2003). The more vehicles that could be moved, the more successful the transport system and its policies were deemed. This resulted in the standardization of metrics such as 'traffic speed', 'vehicle-miles', or more generally 'level of service' (LOS) to evaluate

transport policy; and policy responses such as building or widening roads became the go-to response (Banister, 2002). Over time, and at least in developed countries, it became evident that this practice was not addressing the main (perceived) issue in the transport system: congestion (Goodwin, 1996; Litman, 2003). The objective of transport had to be reevaluated to focus on facilitating the movement of people and goods rather than on vehicles alone (Button and Hensher, 2005). Metrics to evaluate this measure of success were not focused on 'vehicle-miles' anymore, but on 'people-miles' (e.g., the more people that could move using the same space, the better). Although this change might have resulted in a more efficient use of resources (e.g., less energy and space consumed), the metric of person-miles can also lead to perverse outcomes as it assumes that any increase in miles traveled or any increase in the number of people within any space is good (e.g., many people crammed into a small space for several hundred miles would be considered successful). With this in mind, and more recently, the objective of transport policy has been revisited to that of maximising access, an objective that is better aligned with the fact that transport is a derived demand, and its goal should be to facilitate access to a primary objective. As such, metrics such as time to, distance to, or cost to access are becoming the norm.

With this shift towards access as the desirable objective of transport planning, two issues emerge when applying theory to policy practice. The first is that while access brings direct benefits to the individual, fulfilling that access generates unintended costs to society that are not captured in the travel costs each individual pays. This cost is what, in economic terms, is called an 'externality'. The transport sector is the second largest emitter of CO_2 emissions from fuel combustion worldwide (IEA, 2018); road transport is responsible for 1.35 million deaths per year due to crashes, making it the leading cause of death amongst people 5-29 years old, and it is one of the main causes of urban air pollution, which is responsible for another 3.7 million premature deaths (World Health Organization, 2018a). It also has a large spatial footprint, with some American cities dedicating between 40% and 60% of their land to roads and parking, space used mainly by those with private vehicles, who tend to be the better off in society. Although the objective of access is well established and has become a

goal of transport policy, all these externalities have often resulted in an additional objective being pursued by policymakers, specifically sustainability (Eliasson and Proost, 2015).

This is a view that is shared by multiple prominent authors in the academic transport literature (Banister, 2008; Geels, 2012; Holden et al., 2013) and is backed by the large collection of studies that explore the link between sustainability and transport (over 2.9 million results for “sustainable + transport” in Google scholar). In addition, sustainability as an aspiration is now widely accepted as a desirable pathway towards the future, as can be attested by the United Nations’ 2030 Agenda for Sustainable Development that was adopted by all UN states in 2015 and establishes goals intended for all countries (whether developed or developing) to “shift the world onto a sustainable (…) path” (United Nations General Assembly, 2015). Putting this concept into practice, however is tricky, as the term is loaded with many different meanings (Goldman and Gorham, 2006). Understanding what a sustainable transport future might look like, therefore, requires reviewing the definition of sustainability.

The Brundtland Report (which defined the concept of sustainability) proposed that sustainable development is one that “meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland et al., 1987, p.16). This definition was then mainstreamed into practice at the Earth Summit in Rio as the three dimensions of sustainability: environmental, economic, and social (UN Economic and Social Council, n.d.). While these dimensions are generally understood to carry equal weight requiring a balance amongst them (Alexander et al., 2018), the Brundtland report provides more nuance and proposes that the goal of development is to fulfill the ‘basic human needs’, and that anything above this minimum threshold can only be sustainable if the consumption patterns that are achieving it “have regard for long-term [ecological] sustainability.” (Brundtland et al., 1987, p.42). In other words, economic development beyond a minimum threshold can only be sustainable if it is either to fulfill the most basic human needs, or if it is not depleting the limited resources of the planet. For Brundtland et al., therefore, social

sustainability is the primary goal of sustainable development, followed by environmental sustainability, and, lastly, economic development beyond the fulfillment of basic human needs. The report defines the 'basic human needs' as employment, food, energy, housing, water, sanitation, and healthcare.

2.4 Governing new mobility

As explained above, the role of government has shifted from a top-down role towards becoming a member of networks. But when thinking about the challenges posed by shared mobility, it is not simply the shifting role of governments in and of themselves that requires new ways of governing these networks. The services themselves have created new challenges for governments to address, particularly compared with more traditional forms of privately run public transport in the past. These include the way these services have been used by private companies as a way to "evade the costs of highly regulated markets", since the new shared mobility entrants are not typically bound to the same regulations as the incumbents against whom they are competing, at least initially (Witt et al., 2015, p.174). Taking, for example, the taxi and ride-hailing industries, existing taxi companies are typically bound to closed and licensed markets with entry restrictions, labour regulations, vehicle quality standards, and set prices, which have been typically evaded by ride-hailing companies in cities around the world (OECD, 2007; Vignon et al., 2023). New ride-hailing entrants to the market, under the guise of being technology companies rather than transportation operators, have, in many places, attempted to evade these existing regulations. While governments could learn from, and adapt the same regulations they have applied to the taxi industry, research has shown that this has not been easy, and there has been a lag between the deployment of shared mobility services and the deployment of regulations in part because of the resistance of the incoming service providers and the difficulty in distinguishing if these are public or private transport services (de Souza Silva et al., 2018).

Another governance issue that shared mobility has created is the lack of understanding of the impacts these new services have on the goals governments seek to pursue in the transport sector,

such as environmental sustainability and equity (Banister, 2008; Pereira et al., 2017). Some studies have found, for example, that, on a lifecycle basis, ride-hailing produces more CO_2 emissions per passenger-km than private cars, in part due to empty or 'deadheading' miles (Sun and Ertz, 2021). Similarly, shared bikes and scooters have been shown to produce more emissions than their privately owned counterparts, in part because of their shorter lifespans (Cazzola and Crist, 2020). There is, therefore, a tension between governments wanting to support private-sector innovation without knowing whether this might lead to long-term positive policy outcomes across their multiple objectives (Docherty et al., 2018). Relatedly, as discussed in section 2.2.3, the for-profit orientation of private companies delivering shared mobility services differs from the social goals governments are mandated to pursue, which can create tensions during implementation. For this, Moscholidou and Pangbourne (2020) and Moscholidou et al. (2023) argue that state intervention is crucial to hold these private companies accountable for the externalities they impose on society and thereby reduce some of these risks. But the level of state intervention varies across geographies, and the authors note that more targeted interventions toward new mobility services, with clear penalties to hold them accountable, are more likely to be effective in achieving the sustainability goals cities are pursuing. On the other end of the spectrum, authors such as Desdemoustier et al. (2019, p.177); Esposito et al. (2021); and Margherita et al. (2023) argue that governments are using new mobility to help them pursue their goal of making cities "a better place to live in", and should therefore be less preoccupied with the potential negative aspects of these services, and more concerned with how they can be used to serve their own goals. In this regard, Kriukelyte et al. (2024) investigated how policy instruments can indeed affect the business models pursued by private shared mobility companies, and the authors argue that cities (and companies) should be more aware of this role, as it can affect the long-term outcomes of these services.

Other challenges identified in the literature include the uncertainty involved in regulating technologies that are constantly changing (Pangbourne et al., 2018), and the need to understand how governments can take advantage of the vast amounts of data that these new models are

generating ("the most valuable commodity in the smart system" according to Docherty et al., 2018, p.121). Arguably, transport sector policymakers and practitioners have not typically had the capacity to understand and leverage these new data, nor comprehend the rapid and dynamic evolution of the shared mobility space. This is further exacerbated by the fact that data and the market's future evolution are considered commercially sensitive and, therefore, closely guarded by private companies. This leads to information asymmetry that hampers governments' ability to exercise proper oversight and guidance of this market, which could be reduced if governments had greater ready access and capacity to exploit these new data, for example, to better regulate or use them for planning purposes (Levine, 2021).

These challenges show that existing governance infrastructures[4] are not adequate to deal with the challenges of shared mobility. From the literature reviewed, most authors researching the topic (Scholl and Scholl, 2014; Docherty, 2018; Dowling, 2018; Dudley, 2018; Davis, 2018; Docherty et al., 2018; Puche, 2019; Faivre d'Arcier and Lecler, 2019; Valencia-Arias et al., 2025) have argued that new ways of governing are needed to deal with these challenges of incoming technologies in the transport space, but also highlight that more empirical evidence is needed to understand if this 'institutional transformation' indeed is the "most effective and most legitimate" way of governing, noting that the answer to this question might be different within different contexts and under different conditions (Meijer and Bolívar, 2016, p.399). Despite this, Moscholidou et al. (2023) note that even if there is a desire to find new ways to govern the new mobility space, local governments often lack the authority to do so.

In addition to asserting the need for changes in governance, some authors argue that the state should adopt a leadership approach rather than a 'laissez-faire' or enabler approach to overcome the challenges of smart mobility, including shared mobility (Pangbourne et al., 2018). As such,

[4] Johnston and Hansen (2011, p.5) define governance infrastructures as "the collection of technologies, people, policies, practices, resources, social norms, and information that interact to support governing activities (…) [they] support governing activities such as the allocation of scarce resources, collective decision-making, public debate, public mobilization, and the resolution of conflict."

governments should engage more in the design of “goals, pricing structures (and subsidies), coverage and consumer protection” (Pangbourne et al., 2018, p.45). In that sense, “farsighted and proactive (government) leaders (in the transport ecosystem) make a difference” when it comes to delivering better societal outcomes when dealing with the challenges of shared mobility (Davis, 2018, p.119). More recently, some authors have noted the emergence of “algorithmic governance” as the mechanism governments use to exercise their public governance role with the advent of new digital technologies (Katzenbach and Ulbricht, 2019). In the field of public policy, algorithmic governance has been defined as “using algorithms in the governance process” (Gritsenko and Wood, 2022), and some authors have studied how this concept has started to be used in the transportation space, particularly through the use of data standards and automatic regulation through algorithms (Zack, 2019; Rudmark, 2022; Rudmark et al., 2023). Overall, most academic literature acknowledges that governance strategies need to change to address the challenges of smart mobility; however, it does not specify how these strategies should be modified. This thesis, therefore, focuses on understanding how current ways of governing shared mobility have been (or not) successful in guiding shared mobility services towards the social goals governments are pursuing.

3. Methodology

3.1 The philosophical assumptions underpinning this thesis

The field of transport studies has historically been seen as a subset of the engineering discipline, with contributions from other fields such as economics, mathematics, and the natural sciences (Allsop, 2006 in Marsden and Reardon, 2017). A common characteristic of these *pillars* of the field is their often positivist approach to the understanding of the world, which has permeated the study of transport (Richmond, 1990). Examples of this philosophical approach can be seen in some of the most common tools used when planning transport projects (e.g., the gravity model and impedance of travel, which are analogous to physical phenomena) or tools for evaluating transport projects and policies (such as the dominance of rational choice and utilitarianism that lead to the use of tools such as cost-benefit analyses). Although the positivist philosophy of science underpinning the transport field is fairly evident when looking at the techniques and methods used in its application and research, the appropriateness of this philosophy of science for the issues that are trying to be solved in the field is rarely contested (Richmond, 1990; Timms, 2008; Nahmias-Biran et al., 2017).

For this thesis, I have employed Critical Realism (CR) as a novel philosophy of science in the field of transport studies, providing a distinct perspective on the study of transport problems, particularly transport policy issues. CR has rarely been used in transport studies, with only a few authors stating its use in their research (e.g., Næss and Jensen, 2002; Næss, 2015; Melia, 2019; Melia, 2020). CR is especially suited to the exploration of new policy areas where a deep knowledge base has not yet been established, such as in shared mobility. Originally developed by Roy Bhaskar in the 1970s, one of CR's main contributions to the philosophy of science literature is its proposal of a clear separation between ontology and epistemology, effectively solving what has been called the 'epistemic fallacy', which is a conflation between ontology and epistemology typical of positivism (Bhaskar, 1978). This means that, unlike positivist positions, which reduce reality to what can be observed and measured, CR espouses a reality separate from what can be observed with our senses (Bhaskar, 1978). The role

of the scientist, therefore, is to try to uncover this inaccessible reality by theorising about how what we observe with our senses is connected to reality (Bhaskar and Hartwig, 2016).

Since reality is independent of us but cannot be accessed directly by our senses, CR realism proposes that there are three domains of reality (Bhaskar, 1978):

1. The Empirical: what we can directly observe with our senses – *facts/experiences*.
2. The Actual: what happens regardless of our observations of it (e.g. the movement of atoms) - *events*.
3. The Real: where objects of reality exist and have distinct properties which when activated make events happen in the actual and empirical domains – *mechanisms*.

In practice, what this means is that when a scientist makes an observation about a natural or social phenomenon, that observation follows a chain of events that starts when mechanisms are activated in the domain of the *real* which generate events in the domain of the *actual*, and these events might then be directly observed as facts or experiences in the domain of the empirical by the scientist. An example of this understanding of the different domains of reality in a transport policy context is a scientist making an empirical observation of an increase in car crashes in a specific segment of the road network compared to other segments in a given city. This observation falls within the domain of the *empirical*. At the same time, the scientist might not have noticed other phenomena, such as drivers driving faster on this road segment. Since this event occurred but was not observed, it falls within the domain of the *actual*. Finally, CR proposes that both the observed facts (an increase in road crashes) and the unobserved events (faster road speeds in this segment) occur because of the activation of unobservable mechanisms in the domain of the real, conditioned by the context in which they were activated. Since these mechanisms are unobservable, the scientist's role is to propose plausible explanations for the observed phenomenon. In this example, there could be multiple theoretical mechanisms that could be proposed to explain the observed events, such as:

- Mechanism 1 - drunk driving: Drivers are frequenting the pubs near the road segment and then driving while under the influence of alcohol, which leads to more crashes in this specific road segment.

- Mechanism 2—road design: The downward slope and low visibility of the road segment increased driver speeds, which caused more crashes in this specific road segment.

With these hypothetical mechanisms, scientists can continue collecting data to prove or disprove these theoretical explanations. In the example above, the scientist could measure road speeds and compare them across the road network, which would provide supporting evidence for their Mechanism 2 theory. Alternatively, they could analyse drunk driving police records and compare them across the network to determine if there is a higher incidence of drunk driving on this specific road segment, providing supportive evidence for their Mechanism 1 theory. This simple example shows that, for CR, science is not simply the act of observing, documenting, and finding patterns to propose universal theories of how the world works, but rather the act of theorising and testing hypotheses that connect the different domains of reality to provide plausible explanations about why the world is the way we perceive it under different contexts.

The theories provided by scientists in CR realist studies are not formed in a vacuum. These are informed by both existing literature and the scientists themselves. As such, CR accepts that pre-existing concepts and theories held by the scientist influence science; in other words, the act of uncovering reality is concept- and theory-dependent (dependent, not determined, which distinguishes CR from pure constructivist philosophies) (Archer, 2016). This also implies that our understanding of reality under CR is fallible and open to reinterpretation and improvement; in other words, the act of science is never-ending, and a theory can always be improved upon or replaced by a better one. In the example above, someone else could come up with a totally different theory that also fits the empirical observations. This theory-dependent nature of CR makes it a particularly suited philosophy of science to base our understanding of how policy interventions generate change in the real world. Policy interventions are based on underlying assumptions made by policymakers (theories of how the world works) that connect a policy action with a desired and expected social outcome through a plausible causal pathway (Tilley, 2004). CR provides us with a solid philosophical

and methodological foundation for examining these theories and the causal pathways that generate changes in the world we observe.

Another relevant tenet of CR for this study is the existence of *structures*. Structures are those real objects (i.e., part of the domain of the real) that constrain human action. Expanding on the example above, a structure that could contribute to the empirical observation of increased road crashes in the specific road segment is that this particular city is not well-served by public transportation, forcing its citizens to rely on their private automobiles. Though difficult to change, this structure of automobility is not immutable and can be changed by human actions. Structure, therefore, allows for individual agency yet accepts that agency is not unlimited but is rather constrained by these social structures. This is what allows a discipline like transport planning to exist, as individuals have the power to change society and are not solely passive agents in it (Næss, 2015).

While there are many more CR tenets, the ones presented above (the separation of ontology and epistemology, the theory-laden nature of science, and the existence of structure) are the main reasons why this thesis is based on a CR philosophy of science as they provide a useful basis from which to study the novel phenomenon of shared mobility, particularly how different governance approaches are producing different social outcomes. While CR is explicitly mentioned only in Chapter 7, the thesis has been carried out with the ontological and epistemological grounding espoused by CR. This position, therefore, has had a profound effect on the selection of the study design, the cases, and the methods used for this thesis.

While I propose that CR is a suitable philosophical foundation for this thesis, CR has received criticisms that should be noted, given their implications for the results of this thesis. The most relevant critique of CR for this study is the impossibility of judging between competing theories that fit the empirical data presented. In the example above, other plausible mechanisms that could explain the increase in road speeds can be considered, and the scientist must then determine which is the most plausible explanation for what has been observed. Critical Realism solves this by

explaining that the act of science is never-ending and that improved theories can always be conceived. Furthermore, CR explains that proposing mechanisms is always theory-laden; thus, mechanisms are not conceived in a vacuum. However, for critics of CR, this issue (the impossibility of solving the "underdetermination thesis" (Duhem et al., 1991; in Zhang, 2023)) gives the scientist god-like powers to determine what the correct mechanism is. Another relevant critique of CR for this thesis is that CR espouses 'moral realism' (Elder-Vass, 2019); that is to say, morality is also a real object, independent of people's perception of it. In this work, however, I take a more nuanced approach by explaining that my objective is not to find an objective moral truth of what ought to be the goal of transport policy, but that there are certain theoretical objectives that transport policy should pursue as argued by transport researchers (notably environmental sustainability and access for people (Banister, 2008; Pereira et al., 2017)). The thesis, therefore, can take a pragmatic approach to evaluating whether the tools currently used by policymakers are achieving these objectives or not. Lastly, CR has been criticized for its overuse of philosophical arguments (and jargon) with a difficult path to practical implementations. I address this critique in more depth in the following section, where I explain how I translated the abstract elements of CR into a feasible research project.

3.2 Study design

While CR provides an adequate philosophical basis for the study of shared mobility governance, there are no widely preferred or accepted methodological approaches for conducting CR studies (Fletcher, 2017; Hoddy, 2019). In fact, Edwards et al. (2014) describe that the methodological approach for CR studies is "eclectic" since it is often difficult to pinpoint a single method used for CR studies, and method selection varies depending on what is needed to identify the mechanisms that are activated in different situations. This is not necessarily a bad thing, as critical realists take a pragmatic approach to methodological considerations by saying that the research question should guide the research method, opening up the possibility of using mixed methods approaches to uncover reality (Hurrell, 2014).

Despite CR's openness to different methods, certain methods have been preferred in CR studies because they may better align with a CR epistemology. Proposing better theories about how the world works requires an in-depth engagement with phenomena, including the context in which these occur, which favours those methods used when engaging deeply with a topic and its context. These types of studies are called “intensive” (as opposed to “extensive”) because they focus on understanding “how” and “why” a phenomenon occurs by examining and engaging deeply with it (Sayer, 1992). Typical research methods of intensive research designs include case studies, ethnographies, and qualitative analyses (Sayer, 2000). In particular, case studies have been the preferred research design in CR studies, as they are a form of intensive research design that allows scientists to gain an in-depth understanding of a specific phenomenon and its context (Parr, 2015).

This thesis critically examines existing governance approaches in shared mobility and proposes improvements to achieve better social outcomes. This requires engaging deeply with instances where different governance approaches have been used to understand what has and has not worked in various circumstances, as well as what could be improved upon in these existing approaches. My intention with this thesis is not to find a general theory of shared mobility governance that would work everywhere (as this would not be aligned with a CR philosophy), but rather, to propose plausible theories about why outcomes in different shared mobility governance scenarios were achieved to provide insights on how to improve these governance approaches. Since studying governance approaches requires an in-depth engagement with the subject, a case study design is the most appropriate methodological framework for this research. Case studies are a type of research design that “investigates a contemporary phenomenon in its real-world context” especially when it is not possible to separate the phenomenon from its context (Yin, 1994, pp.2, 16). Case studies require an in-depth engagement with the subject of study (in this case, governance approaches to shared mobility) and often rely on multiple sources of evidence to apply triangulation techniques that lead to the convergence of the data gathered (Marks and O’Mahoney, 2014). Furthermore, case studies enable the examination of both context (structures) and causation, both of which are relevant

elements for CR studies. Since this research seeks to explore multiple governance approaches, the formal research design is a multiple-case study (Yin, 1994).

As mentioned above, the unit of analysis for this thesis is the 'governance approach'. This term has not been defined in the academic literature; however, for the purposes of this thesis, it can be understood as the full set of instruments of governance governments use to shape the outcomes of shared mobility services. It can be understood in a similar manner to the term 'policy styles', (as explained in section 2.3.2). However, the concept of governance approach expands on the definition of policy style (which is limited to policies) to encompass all other instruments of governance beyond hard policies, such as persuasion and other forms of 'soft power' (Vuving, 2009).

There are other units of analysis embedded within this concept of 'governance approach', which allow the research questions posed in this thesis to be answered. Notably, the goals policymakers pursue when governing shared mobility (RQ1), the specific governance instruments used (RQ2), and the outcomes achieved by governance interventions (RQ3). These three units of analysis pertain to the domain of the empirical, as they can be observed directly. The methods used in this thesis are, therefore, consistent with what is needed to observe and document these units of analysis (See Section 3.5 for a detailed explanation of the methods used). In addition to these units of analysis, the analytical component of this thesis involves proposing and testing combinations of mechanisms and contexts that provide plausible causal explanations for connecting governance instruments with observed outcomes. Similarly, Section 3.5.4 explains the methods used to accomplish this analytical task. The case studies proposed for this research include documenting and analysing all these elements (policy goals, governance instruments, observed outcomes, and proposed combinations of mechanisms and structures consistent with the observed outcomes). The following diagram, loosely based on Kempster and Parry (2014, p.90), visually represents the overall study design, the units of analysis, and how the relevant CR elements (structures and mechanisms) interact to produce the observed outcomes.

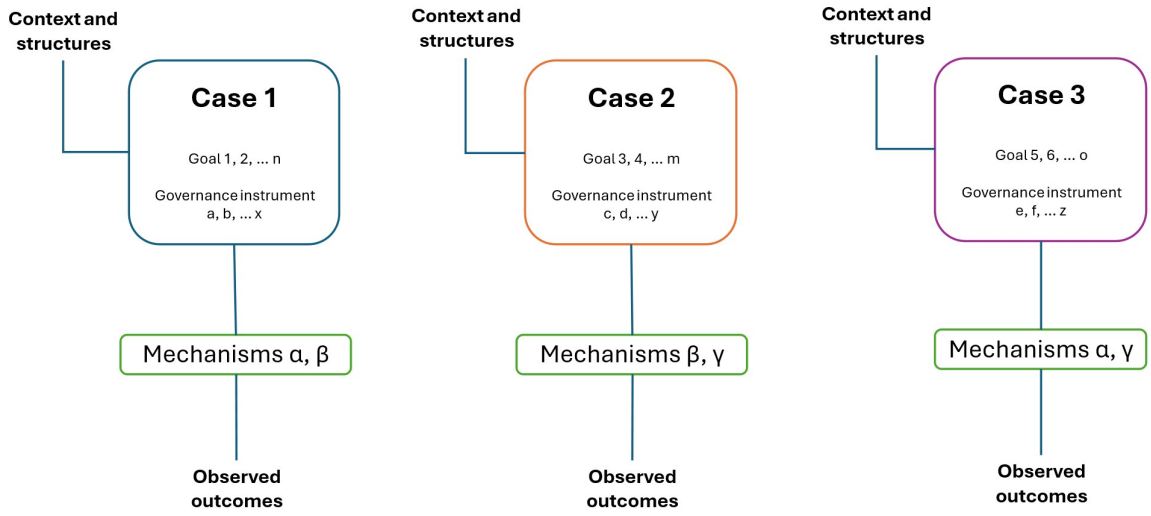

Figure 10: Research design using a critical realist approach. Own elaboration loosely based on Kempster and Parry (2014).

Figure 10 shows how each case study (which represents a different governance approach) can have both similarities and differences in its goals and governance elements, which, mediated by the context and structures in which each case exists, lead to the activation of different mechanisms and ultimately to outcomes that can be observed and measured. An important consideration for this study is that there is no attempt to control for external variables (something that a positivist study might try to do), as having differences both in context and between the governance elements themselves can make it easier to identify which are the dominant mechanisms that lead to the observed outcomes (Ackroyd and Karlsson, 2014).

3.3 Case selection

The cases were selected for this research using a purposeful sampling technique (as opposed to random selection; Palinkas et al., 2015). This means that specific criteria were established, and multiple cases were evaluated against these criteria to narrow down and select the final cases to be analysed in depth. Given that the research is interested in comparing different governance approaches, a 'selection for differences' logic was used (Yin, 1994; Kessler and Bach, 2014). Selecting for differences implies identifying cases that are different from each other instead of trying to find similar cases except in one key variable (something inconsistent with a CR ontology where it is not possible to disentangle the phenomenon from its context in open systems (Kessler and Bach, 2014)). Selecting for differences when the unit of analysis is the governance approach is difficult, as governance approaches encompass elements that are not easily identified unless one studies the case in detail. In other words, it would be necessary to conduct the case studies first to identify governance approaches before applying any selection criteria. Because of this apparent paradox, the selection process for the larger universe of cases that would later be narrowed down was done using existing regulations and policies as a proxy for governance approaches.

The specific regulations and policies identified for this analysis pertained to shared mobility. As noted above, there is no widely accepted definition in the academic literature for the term "shared mobility." It was, therefore, necessary to define this term to assess which policies and regulations would be included in the scoping exercise. The first paper of this thesis (Chapter 4 – which was written prior to the selection of the case studies) proposed a taxonomy of shared mobility services, which was used to identify the types of policies and regulations to be included in the analysis. This taxonomy was created by critically analysing the two strands of the academic literature that form the basis of shared mobility: the interactions between transport + Information and Communications Technology (ICT), and the sharing economy, and combining these to propose a taxonomical categorisation of the existing and potentially future services that belong to the term shared mobility. Given the focus of this thesis on privately operated shared mobility services, the shared mobility

services described in the taxonomy that were used for this analysis were only those that are privately operated:

- Peer-to-Peer car-sharing mediated by a private platform
- Ride hailing / ridesharing
- Privately operated carsharing services
- Privately operated bike- and scooter-sharing services
- Microtransit

With these definitions, an initial scoping of shared mobility regulations was conducted across 31 countries. The 31 countries for this initial scoping were selected based on language and location (countries in the Americas, Europe, and Oceania where English, Spanish, French, or Portuguese is the national language). Since shared mobility policies and regulations are enacted both at the national and sub-national levels, the scoping included national policies and policies enacted in the capital cities of each of these countries[5] or regions where the capital city is located. The logic behind the geographic choice was threefold: 1. I am fluent in the abovementioned languages. 2. I have previously lived and/or worked in these regions, giving me a broad sense of the political and social context. 3. Having lived or worked in these regions, I have easier access to relevant local contacts that might have been involved in the enactment of these policies.

After these criteria were defined, a Google search was conducted to identify which shared mobility services mentioned above were available in the cities and countries specified for the search. For this, a matrix was created with shared mobility services on one axis and cities and countries on the other (see Table 1). Since these services are publicly available and commercial, Google has provided an adequate mechanism to identify their existence. If a service could not be identified in a city or country, it was removed from the matrix. The existence of a shared mobility service in a particular place does not necessarily mean that shared mobility regulations have been implemented, as these services have been deployed in many places without government involvement. As a result, once the

[5] The exceptions to this rule were: Sao Paulo (Brazil), Geneva and Zurich (Switzerland), Los Angeles, New York, San Francisco and Chicago (United States), Sydney (Australia).

various services were identified for all cities and countries, a more in-depth search was conducted to determine the existence of policies or regulations in place. An expansive definition of policies and regulations was adopted to encompass government actions related to shared mobility services or vehicles (for example, an operational permit for a shared mobility service or the prohibition of a specific shared-mobility vehicle type). For this, a combination of newspaper articles that mentioned the existence of policies (found through Google) and official government websites was used. Once this process was complete, 52 policies and regulations were identified in the 31 countries and cities analysed.

Once the relevant policies and regulations were identified, they were categorised based on some of their observable characteristics, notably the scope they covered. This process was purely analytical, and other researchers could come up with different ways of categorising the same policies. After this, four categories were identified, which, as noted above, are indicative or proxies of the different policy styles used in each city:

1. **Umbrella regulations**: Regulations that focus on defining the requirements/characteristics that shared mobility services need to comply with (mostly in the form of technical aspects, e.g., insurance, safety, distinct colours). If shared mobility solutions comply with these requirements, they can operate without restriction. These are typical at the national or state/regional level.
2. **Operational permits**: Unlike umbrella regulations, under which anyone who complies with broad requirements can operate, with operational permits, operators need to request permission from transport authorities and comply with specific requirements such as operational requirements, equity objectives, and data sharing demands. These are typical at the local/city level.
3. **Non-binding agreements:** These regulations take the form of codes of practice/conduct or partnerships, where the government or shared mobility operators jointly agree on expectations of how shared mobility modes are supposed to operate. Unlike operational permits or umbrella regulations, these are non-binding and, therefore, not legally enforceable. They happen exclusively at the local level.
4. **Banned:** Regulations that explicitly ban the deployment of these services or vehicles.

The following table shows how the regulations identified fit into this taxonomy (blank cells indicate that no regulation could be identified for that specific shared mobility service):

Table 1: Taxonomy of shared mobility regulations. Own elaboration. Colours indicate the type of policy according to the policy taxonomy.

		Shared mobility service.			
Country	City	Ride hailing / ridesharing / microtransit	B2P Carsharing	P2P carsharing	B2P Bikesharing and scooter sharing
Argentina	Buenos Aires				Operational permit
Australia	Canberra	Umbrella	Umbrella	Umbrella	Code of practice
Belgium	Brussels		Operational permit		Operational permit
Bolivia	La Paz	Umbrella			
Brazil	Sao Paulo	Umbrella	Operational permit		Umbrella
Canada	Ottawa	Umbrella	Umbrella	Umbrella	Operational permit
Chile	Santiago				
Colombia	Bogota	Umbrella/Banned			
Costa Rica	San Jose	Umbrella			
Ecuador	Quito	Banned			
France	Paris	Umbrella	Operational permit		Code of practice
Ireland	Dublin		Operational permit		Operational permit
Luxembourg	Luxembourg	Banned			
Malta	Valletta				Operational permit
Mexico	Mexico City	Umbrella			Operational permit
New Zealand	Wellington	Umbrella	Operational permit	Operational permit	Code of practice
Nicaragua	Managua	Banned			
Paraguay	Asuncion	Umbrella			
Peru	Lima	Umbrella			Umbrella
Portugal	Lisbon	Umbrella	Umbrella	Umbrella	
Spain	Madrid	Umbrella	Operational permit		Operational permit
Switzerland	Bern	Umbrella			Operational permit
United Kingdom	London	Operational permit	Partnership		Code of practice
United States	Washington, New York, Los Angeles	Umbrella	Umbrella and operational permit	Umbrella	Operational permit
Uruguay	Montevideo	Umbrella			

Based on this categorisation, the decision to select cases for differences, and the selection criteria explained above, the following cases were selected:

1. Umbrella regulation/banned – Colombia's ride-hailing regulations and Bogotá's policy response.
2. Operational permit – Los Angeles' scooter sharing pilot permit programme.
3. Non-binding agreements – Paris' moped, bicycle, and scooter sharing codes of conduct.

Apart from each city representing a different policy style (as indicated by its membership in each of the different taxa), they also have different governance forms. Both Colombia and France are examples of unitary governments, in which the central government holds most of the power, with subnational governments having delegated authority over specific matters. On the other hand, the United States uses a federal system, in which subnational entities (in particular, the individual states) exercise power over local decisions. In this case, power from the state is then delegated to the local authorities. As I will show in sections 6 and 7, this has implications for how each city addresses the issues resulting from shared mobility. Table 2 below presents some additional baseline information to better understand the transport context in each city.

Table 2: Baseline characteristics of each case city

	Bogotá	Paris	Los Angeles
Population[6]	7.9M	2.1M	3.9M
Density[7]	4,872/km²	19,960/km²	3,183/km²
Modal share[8][9][10]	Walking: 32% Public Transport: 39% Car: 7% Others: 22%	Walking: 11% Public Transport: 64% Car: 11% Others: 14%	Walking: 13% Public Transport: 3% Car: 81% Others: 3%

3.4 Data collection

3.4.1 Selection of documents

Given the nature of this research, where elements such as policy goals and instruments were important, the most relevant documents that provided sufficient data to answer the research questions were mainly official documents (Grant, 2019):

- Policy documents
- Minutes and recordings of public/private meetings (e.g., city council meetings)
- Internal memos
- Public statements, reports, and speeches
- Public interviews and other public statements

These were, therefore, the focus of the identification and selection of documents phase of the document analysis (Section 3.5.1). While these were the main types of documents used, others, such as newspaper articles and higher-level policy documents (e.g. constitutions, policy documents that detail the functioning of city governments, etc.), were also useful and provided additional information about the context and potential structures, and helped in the triangulation and to corroborate facts, to produce a general timeline of events, and to provide a broader context for each case (Flick, 2018; Grant, 2019).

[6] Recovered from https://www.citypopulation.de/
[7] Ibid.
[8] Bogotá: recovered from https://transformative-mobility.org/wp-content/uploads/2023/12/Bogota-Deep-Dive_Rev_KP_SK.pdf
[9] Paris: recovered from https://www.sfcta.org/sites/default/files/2023-06/SFCTA_Board_VC%20Melgar%20Paris%20Trip%20Report%20PRESENTATION_2023-06-27.pdf
[10] Los Angeles: National Household Travel Survey, 2017.

As explained in Section 3.3, the initial selection of cases already identified existing policies in the three case cities. Therefore, this was the starting point for identifying all other relevant documents for the analysis. These policy and regulatory documents included references to additional policy documents (mostly in the 'Justification' sections that explain why policy action was needed) that were also relevant to this research. The primary way to search for and locate these documents was through official government websites and government document repositories. Following the same procedure (identifying other relevant documents mentioned in policies identified), additional documents continued to be identified until no additional documents could be found or they were not available or accessible (saturation -Saunders et al., 2018).

Additionally, a Google search was conducted to identify relevant news articles and mentions of additional documents using keywords such as the policy identification number, names of relevant shared mobility companies, and modes (e.g., "shared scooters"). This search was carried out in French, English, and Spanish, accordingly for each case. This led to the identification of additional documents, such as public statements and speeches that were not accessible on the official government websites mentioned above, as well as news articles that provided further context.

All the identified documents were downloaded and organised by date of publication using the software NVivo (QSR International Pty Ltd, 2020). Following this, an initial review of all documents was conducted to ensure none had been overlooked during the initial search. Additionally, this review was used to identify potential interviewees for the semi-structured interviews (Section 3.4.2). Additional documents were identified after this process, and wherever a document was identified that was not publicly available or readily available on official government websites, public information requests to the relevant authorities were submitted (nine successful public information requests in Paris and 15 successful and unsuccessful in Bogotá—there was no need to carry out public information requests in Los Angeles). This entire process led to a collection of 244 documents for Los Angeles, 181 for Paris, and 146 for Colombia (a total of 571 unique documents).

3.4.2 Selection of interviewees

After doing an initial readthrough of all the documents, a list of relevant stakeholders was compiled. The stakeholders were identified purposefully, considering the relevance of the type of insights they could provide, therefore following the principles of conducting elite interviews (Aberbach and Rockman, 2002). The focus here was exclusively on public practitioners and policymakers, as these are the stakeholders who can provide insights into the governance process, including their own theories on how governance instruments are supposed to work. Both policy documents and news articles named relevant stakeholders by name, making it easy to identify potential individual stakeholders for the interviews. Additionally, participants were asked to suggest additional relevant stakeholders for an interview, leading to a snowballing sampling technique that ensured all relevant stakeholders, who might have initially been missed, were also considered for interviews (Marshall, 1996). No further interviews were conducted once it became impossible to identify any additional relevant stakeholders or when data saturation was reached, and no new information was being gathered (Saunders et al., 2018). In three instances, stakeholders declined to participate in the interviews.

In total, 16 one to two-hour-long interviews (four in Los Angeles, four in Paris, and eight in Bogotá) were conducted. I conducted more interviews in Bogotá because the period of analysis spanned eight years (whereas in Paris and Los Angeles the period of study was four years), which meant more stakeholders were involved in the process. Given that the governance processes were mostly conducted at the local (city) level, the focus of the interviewee selection was there as well. However, given the government styles of France and Colombia (unitary governments), policymakers and practitioners from the national governments were also relevant and became foci for the interviews, too. Since all of these were public sector stakeholders, they represent an insider perspective. I noted potential weaknesses of only speaking with public sector stakeholders in the Conclusions section of the thesis (Chapter 8.3). Care was taken to explain to each interviewee that they would remain anonymous to elicit a more natural response. This was particularly relevant, as many of the

interviewees are public figures. Table 3 below provides additional details about the stakeholders who were interviewed, taking care not to provide individually identifiable information, to protect their confidentiality.

Table 3: Interviewed stakeholders in each city, including details on their affiliation.

Case city	Organisation	Area
Bogotá	National Ministry of Transport	Deputy Minister's office
Bogotá	National Ministry of Transport	Deputy Minister's office
Bogotá	National Ministry of Transport	Deputy Minister's office
Bogotá	Mobility Secretariat of Bogota	Transit and Transport Directorate
Bogotá	Mobility Secretariat of Bogota	Mobility Secretary's office
Bogotá	Mobility Secretariat of Bogota	Mobility planning office
Bogotá	Mobility Secretariat of Bogota	Taxi and Public Transport office
Bogotá	Transport Superintendency	Superintendent's office
Paris	Office of the Mayor	Office of Shared Mobility
Paris	Office of the Mayor	Department of Transportation and Public Space
Paris	Office of the Mayor	Department of Transportation and Public Space
Paris	Office of the Deputy Mayor for transport, movements, roads, and public space	Office of the Deputy Mayor
Los Angeles	Los Angeles Department of Transportation	Office of the Director
Los Angeles	Los Angeles Department of Transportation	Office for Innovation
Los Angeles	Los Angeles City Council	Office of Councilmember Ryu
Los Angeles	Los Angeles City Council	Office of Councilmember Bonin

3.5 Data analysis

Having explained the selection process for the three cases, this section focuses on explaining the methods chosen to investigate the research questions.

The main objective of knowledge building using a CR philosophy is to identify and describe the mechanisms and structures that make sense of the world we perceive. As I have argued above, CR provides an adequate philosophical standing point from which to study shared mobility governance problems. However, some authors have seen implementing critical realism to applied research as difficult, as the original CR texts from Bhaskar are hard to access and there is little practical guidance on translating the philosophical tenets of CR into applicable research methods (O'Mahoney and Vincent, 2014). As a result, some authors have argued, for example, that CR is a "philosophy in search of a method" (Yeung, 1997, p. 51). Despite this perception, authors such as Pawson and Tilley (2004) with their Context-Mechanism-Output (CMO) provide some practical guidance on how to carry policy evaluations based on (amongst others) a CR philosophy of science. In fact, Bhaskar (and Hartwig, 2016)[11] himself provided a general outline of how to translate the philosophical tenets of CR into applied research with his DREI(C) and RRREI(C) models.

The RRREI(C) model stands for Resolve, Redescribe, Retroduce, Eliminate, Identify, and Correct. It is Bhaskar's proposal to investigate social problems through clear and sequential methodological steps. This is the general methodological structure followed for this thesis. Table 4 below explains each of these steps in more detail and presents how each of the research questions maps directly into the model and provides more detail about the steps taken to conduct each step.

Table 4: The RRREIC Model in Critical Realism

Name		**Description**	**Research question**	**Actions taken**
R	Resolve	Resolve is the act of describing complex	***RQ1**: What kinds of goals are local governments pursuing, in different*	As part of the documentation of each of

[11] Bhaskar died while writing this book and it was completed by Hartwig.

		events into their basic constituent parts.	*contexts, as they try to understand how to steer the direction of private sector shared mobility deployment?* ***RQ2****: What governance interventions and instruments have cities deployed when dealing with shared mobility and how has the context affected implementation?*	the three case studies, the goals and governance actions taken by policymakers and practitioners were described in detail.
R	Redescribe	Redescribe is reinterpreting the observations in a theoretically meaningful way by, for example, applying existing theories of how an event has been proposed to happen (also referred to as abduction).	***RQ2****: What governance interventions and instruments have cities deployed when dealing with shared mobility and how has the context affected implementation?*	The observed governance instrument selection actions were reinterpreted using extant theories of policy instrument selection to analyse if there was a good fit.
R	Retroduce	Retroduction is imagining what reality must be like for us to be perceiving a phenomenon in the way we are perceiving it (proposing plausible mechanisms and structures).	***RQ3****: How do local governance approaches to shared mobility shape policy outcomes and lead to intended and unintended effects?*	Plausible mechanisms were proposed that could fit the observed outcomes in the case of Los Angeles.
E	Eliminate	Eliminate competing hypotheses of mechanisms and structures based on the understanding of what is more plausible.		
I	Identify	Identify the combination of mechanisms and structures that best describes the observations.		
C	Correct	Correct previous theories given the new findings and start the process over.	***RQ2****: What governance interventions and instruments have cities deployed when dealing with shared mobility and how has the context affected implementation?*	Based on the results obtained, propose expansions to existing theories of policy instrument selection and causality in policy interventions.

			***RQ3**: How do local governance approaches to shared mobility shape policy outcomes and lead to intended and unintended effects?*	

To develop the RRREI(C) model for this research, five main methods were used:

1. Document analysis
2. Semi-structured interviews
3. Content analysis
4. Abduction using a process-tracing method
5. Retroduction.

The following sections explain in more detail how and why each of these was used to conduct the research.

3.5.1 Document and content analysis

Document analysis is a research method that is used to systematically find, select, synthesize, and analyse documents such as policies, newspaper articles, minutes of meetings, but also non-static text documents, including images and audio, amongst others (Prior, 2009; Bowen, 2009). Since an important part of the knowledge that city governments have is stored in documents, they provide a good source for data that can help understand not only the facts and actions carried out by individuals and organisations, but also the different interests, motivations, and interpretations that individuals and organisations give to events (Prior, 2009). Furthermore, documents related to policy implementation can be used as a source for theories about the policy process, a critical element in CR studies (Corbin and Strauss, 2008). Other suggested uses for documents include providing information on context, which can provide important information about the possible structures present in the phenomenon of study (Bowen, 2009).

When it comes to documents produced by organisations (i.e., official documents), there are broadly two categories in which these might fall: informal/internal and formal/external. Internal documents provide an internal perspective of the organisation and can include memos, drafts, and proposals, whereas external documents are intended for external audiences and, therefore, represent an official stance by

an organisation (McMillan and Schumacher, 2010). Hodder (2018) notes the importance of understanding the context and audience of each type of document, as this will have implications for how it is analysed.

While the analytical element of document analysis is widely addressed in the academic literature, the initial steps of identifying and selecting documents are not (methodology texts such as Corbin et al., 2008; Prior, 2009; Bowen, 2009; McMillan and Schumacher, 2010; Hodder, 2018 all focus on the "analysis" of document analysis, but mostly only mention the need to identify and select documents to carry out analysis on them). This lack of methodological guidance may occur because document selection is highly specific to each study and may not be easily replicated or systematised.

Content Analysis (CA) is the process by which texts are interpreted to make valid and replicable inferences from them (Krippendorff, 2004). Content Analysis starts from data collection and moves into four distinct stages of analysis: decontextualization, recontextualization, categorisation, and compilation (Bengtsson, 2016). In the decontextualization phase, the data is split and coded into discrete units. Codes can emerge directly from the data (e.g., inductively), or they can be pre-established based on existing theory or literature (e.g., deductively). In the recontextualization phase, the identified codes are compared with the entire text to ensure that all instances requiring coding have been coded. In the categorisation phase, themes and categories that span multiple codes are identified. Finally, in the compilation phase, the themes and categories are explained, whether to describe the phenomenon (manifest content analysis) or to identify the hidden meaning in the analysed text (latent content analysis).

Content analysis is not directly linked to any specific philosophical current, and therefore its application in any type of study, particularly CR studies, is less problematic than that of other markedly positivistic or constructivist methods (Bengtsson, 2016). However, content analysis follows either a deductive or

inductive reasoning process and is, therefore, only useful in the early stages of CR studies as a mechanism to identify themes that can be converted into theories, which can later be analysed with abduction and retroduction.

Once the documents described in the previous section had been identified and categorised in NVivo, a more thorough read-through of them was conducted. During this process, the texts were inductively coded to identify instances in which goals, governance instruments, and outcomes were mentioned (Thomas, 2003). The choice of these broad categories was directly linked to the research questions. Since the method used here was inductive coding, these definitions of goals, instruments, and outcomes were broad, ensuring an expansive view of the text, which could later be refined and narrowed if needed.

Documents that were not relevant to the research topic (for example, multiple documents from Los Angeles included only public comments received during council session meetings, which were not relevant to the research) were excluded from coding. The coding process was also done using NVivo. The result was a set of themes that provided a good starting point for understanding the possible goals, instruments, and expected outcomes of the different governance interventions in each city. Figure 11 below shows the general coding structure used for the three cases, noting that the outcomes differed across cases and that no coding structure was therefore used.

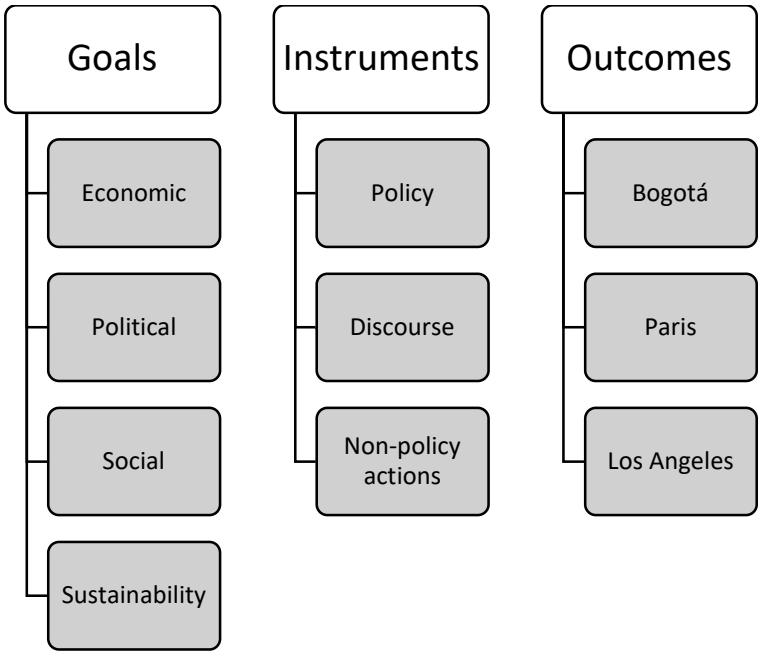

Figure 11: Coding structure

3.5.2 Semi-structured interviews

Interviews are a widely used method in qualitative research, as they allow researchers to develop a nuanced, "rich and detailed" understanding of a social phenomenon (Rubin and Rubin, 2012). They are among the preferred methods in case study methodology, precisely because of the level of detail they can help uncover (Yin, 1994). While there are different types of interviews (e.g., focus groups, internet interviews, casual conversations, in-depth interviews – see Alsaawi (2014)), it is the in-depth interview, which is the preferred type for CR studies since this type allows researchers to gain the types of deep insights that are needed to identify the context, mechanisms, and structures present in a specific phenomenon (Gubrium and Holstein, 2002; Mukumbang et al., 2020). Furthermore, in-depth interviews allow the researcher to test initial theories (as possible mechanisms) by presenting them to the interviewee and allowing them to improve or refute them (Manzano, 2016).

Broadly, there are three types of in-depth interviews: unstructured, semi-structured, and structured, which differ in both practical and conceptual aspects (Mueller and Segal, 2015). Due to the nature of the research topic and the adoption of critical realism, which requires both a set of preset initial theories,

and also the flexibility to dig deeper or shallower into topics depending on the way the interview is going, semi-structured interviews were used for this research. Furthermore, structured interviews are more prone to a researcher testing out previously identified hypotheses, whereas semi- and unstructured interviews, due to their open nature, are more adequate for the discovery of previously unidentified elements and to elucidate new theories (Sjöberg, 1997 in Gubrium and Holstein, 2002). Again, something that is adequate to the theory-testing nature of this research.

As explained above, for CR researchers, interviews are viewed as a tool for theory building and refinement. For Pawson and Tilley (2004), for example, in interviews for realist evaluation (which is based on CR), the topic of an interview is neither the subject nor the subject matter, but rather the theory that the researcher is exploring. In that sense, a realist interview is one in which the researchers share the theory they are testing with the interviewees, giving them opportunities to either prove or disprove it.

A semi-structured interview guide was developed based on the initial understanding and early hypotheses regarding each case's goals, tools, and causality (the interview guides have been added as an Annex to the thesis, which also includes a deeper explanation on how each question ties to these hypotheses). These initial theories were developed after the content analysis was completed. The interview guides focused primarily on gathering insights into these hypotheses and probing the interviewees for other plausible explanations for their choice of different governance instruments. Once the interviews had been conducted, they were transcribed manually, and the content analysis process described above was carried out.

3.5.3 Process tracing

Process tracing is defined by Thomas (2003, p.823) as a “fundamental tool in qualitative analysis” used to systematically analyse data against hypotheses and research questions. This process is consistent with the Redescription stage (second ‘R’ in the RRREI(C) model) which is also sometimes referred to as

abduction in the CR literature. In short, it refers to reinterpreting the observed data in light of existing theories in the literature. Specifically, for this research, a Theory Testing Process Tracing (PT) methodology was used to analyse how well the instrument selection theories that had been identified in the literature fit the new empirical data that were collected for each case (Beach and Pedersen, 2013).

The process consisted of using some of the empirical evidence collected through the document analysis and interviews, and analysing if this evidence is necessary or sufficient to prove, disprove, weaken, or strengthen an existing theory (Van Evera, 1997; Bennett, 2010; Collier, 2011). The academic literature on theories of instrument selection in the transport sector is non-existent; therefore, the theories used for this process were broader theories of instrument selection in government, identified in the literature review.

Collier (2011, based on Van Evera, 1997) presents a summary of the different tests that are carried out for a PT study: “straw-in-the wind,” “hoop test,” “smoking gun,” and “doubly decisive.” These are heuristics used to identify pieces of evidence that strengthen/weaken or prove/refute one of the theories under test. For this study, the empirical evidence used to test the theories consisted of explanations for why policymakers selected different policy instruments in each city. An example of this process is a policymaker explaining in an interview that their sole motivation for adopting policy instrument A was that it was how things were typically done in that city. This would provide strong evidence to strengthen the theory of policy styles (e.g., ‘it’s the way government always does things here’) as an explanation for why policymakers select certain governance instruments over others.

3.5.4 Other analytical methods

This chapter explains the methods used for the thesis, primarily the data collection component. Additional methods were used to analyse the collected data. These include retroduction (the third ‘R’ in the RRREI(C) model), location-based measures to quantify changes in access, quantitative analyses of changes in road safety, and qualitative descriptive methods to evaluate changes in metrics such as power

and innovation. To avoid repetition, and given that these methods were only used in the fourth paper (Chapter 7), a more in-depth explanation of the methodology is included there.

3.5.5 Summary

The table below shows how the different methods and theoretical frameworks explained in the literature review map onto the research questions.

Table 5: Summary of the methods and theoretical frameworks used throughout the thesis

Research Question	Methods	Theoretical framework
RQ0: How is shared mobility defined?	Critical analysis of the academic literature	• Smart mobility • The sharing economy
RQ1: What kinds of goals are local governments pursuing, in different contexts, as they try to understand how to steer the direction of private sector shared mobility deployment?	Document and content analysis	• Theories of goal setting • Goals in transport policy
RQ2: What governance interventions and instruments have cities deployed when dealing with shared mobility, and how has the context affected implementation?	• Document and content analysis • Process tracing	• Instrument classifications • Theories of instrument selection
RQ3: How do local governance approaches to shared mobility shape policy outcomes and lead to intended and unintended effects?	• Document and content analysis • Retroduction • Location-based measures to quantify changes in access • Quantitative analysis of road safety changes • Qualitative descriptive analysis	Causality in policy interventions.

The following sections present the four papers that compose the core of this thesis and expand on some of the methods presented in this section, as well as provide an expansion to the literature review.

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4. Paper 1: Technology, transport, and the sharing economy: towards a working taxonomy for shared mobility

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Technology, transport, and the sharing economy: towards a working taxonomy for shared mobility.

Abstract: In recent years, there has been a growing interest in studying the interactions between the fields of digital technology and transport, and multiple terms to describe these interactions have been used, including "smart mobility", "new mobility", "3-revolutions" and "Mobility-as-a-Service", amongst others. While these terms encompass a wide range of technology-transportation interactions, all of them include shared mobility as one of them. Despite this agreement, there is still no broadly accepted definition in the literature of what the term "shared mobility" means or what type of technology-transport interactions it encompasses. The aim of this paper is to propose such a definition based on a review of the two bodies of literature that underpin the concept of shared mobility: (1) the interactions between digital technology and transport, and (2) the broader concept of the sharing economy. Though these two elements are sometimes mentioned together in the literature as relevant to shared mobility, to the authors' knowledge they have not yet been combined in a published study to attempt to formalize a definition. The lack of formal literature on the subject might be due to the different disciplines that underpin the topic of shared mobility: while the interactions between digital technology and transport are mostly studied within the transport discipline, the topic of the sharing economy is mostly approached from the disciplines of management and business.

Drawing from literature pertaining to these two fields, this paper proposes a working taxonomy for the term "shared mobility" adapting a previous typology put forward by Schor & Fitzmaurice (2015) that identifies solutions that belong to the "sharing economy". The proposed taxonomy suggests that solutions belonging to shared mobility can be classified according to three categories: their market orientation (for or not-for profit), the type of solution (services or assets), and their transaction type (peer-2-peer, business-2-consumer, or government-2-consumer). The paper also reviews the fragmented

literature of existing shared mobility solutions to bring the diversity of terms that have been used to describe these in line with the proposed taxonomy.

Having a formally defined and broadly accepted terminology for shared mobility is important, as this is a term that is used not only in the academic literature, but also by policymakers and in policy documents. The literature reviewed carried out for this paper suggests that different people use the term shared mobility in diverse ways to refer to a diverse set of solutions. The proposed taxonomy can therefore be used by public and private policymakers and academics alike to speak a common language when referring to, planning for, and evaluating shared mobility solutions.

Keywords: shared mobility; definition; taxonomy; smart mobility; sharing economy

4.1 Introduction

The topic of "shared mobility" has sparked interest in the academic literature in recent years despite there not being a consensus on what the term encompasses (Le Vine and Polak, 2015). Without a broadly accepted, formal definition, assessing the real benefits or drawbacks of shared mobility as a sustainability strategy becomes challenging, as different authors and policy evaluators may have a different understanding of what shared mobility means, or even which mobility solutions belong to this term. The oldest reference to the term found by the authors dates to 1995 (Engels et al., 1995), where the authors propose a real-time hitchhiking solution by using the (then) newly developed mobile phone network (GSM). To put this into context, that same year was when SMS services first became commercially available. This might be one of the first uses of the term, but the concept of sharing vehicles and rides between multiple users aided by technology precedes 1995. Alexander (1977) for example, had described a primitive form of what today would be called "*ride-sharing"* or *"demand responsive transport"* using the available technology at the time:

> (…) a system of small taxi-like buses carrying up to six people each, radio-controlled, on call by telephone, able to provide point-to-point service according to the passengers' needs, and supplemented by a computer system which guarantees minimum detours, and

> minimum waiting times. Make bus stops for the mini-buses every 600 feet in each direction, and equip these bus stops with a phone for dialling a bus (Alexander, 1977, p.112).

Despite these early visionaries, the more modern understanding of the term started to develop only until the appearance of broader concepts such as the 'smart city' in the 1990s (Albino et al., 2015) and the 'sharing economy' in the early 2010s (Schor and Attwood-Charles, 2017). As Figure 12 below shows, the use of the term "shared mobility" started to grow in academic publications by mid-2010 – only after these other concepts had already been developed.

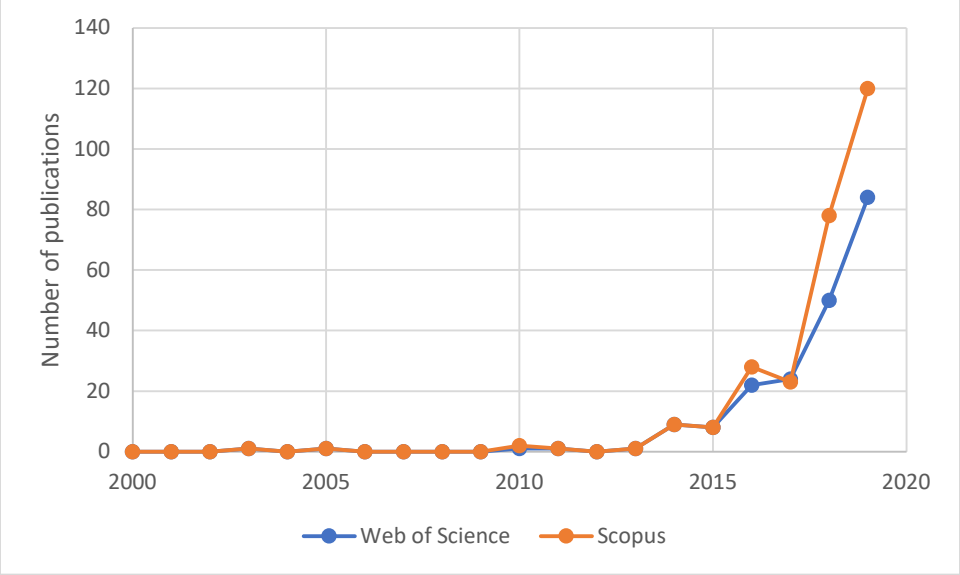

Figure 12: Number of peer reviewed publications from 2000-2019 that mention the term "Shared Mobility" in their title, abstract or keywords, using data from Web of Science and Scopus. Search carried out on April 2020.

The concept of shared mobility has also seen an increased interest by public policymakers, as it is seen as a strategy to, for example, improve environmental outcomes (Shaheen & Cohen, 2019), reduce car ownership (Shaheen & Chan, 2016), or improve connectivity and access to opportunities by low-income populations (Kodransky and Lewenstein, 2014).

To overcome this obstacle, this review tracks down the origins of the concept of shared mobility to the two main areas of literature that underpin it: (1) technology and transport, and (2) the sharing economy. Based on these two bodies of literature, the paper subsequently proposes a working taxonomy of shared mobility that can be used both in academia and by public policymakers, allowing for a common understanding of this term.

4.2 A brief history of the intersection between transport and digital technology: making sense of 'new mobility'

Technology has always been an intrinsic part of transport: the invention of the wheel, the steam engine, the car, the aircraft, the space shuttle are all technological advances that have allowed humans to move further and faster. Despite this longstanding relationship, when the industry of Information and Communication Technology (ICT) started to be developed in the decade of the 1950s and elements of ICT started to be used in the transport sector such as through vehicle loop-detectors and variable message signs, a more specialised link between transport and digital technologies was created forming what today is known as Intelligent Transport Systems' or 'ITS'. Auer et al. (2016) traced the origins of ITS to the late 1960s when states and regions, academic institutions, and the automotive industry started to conduct new research and deployments using ICT in the transport sector. Masaki (1998) goes further back to the early 1930s, identifying broader technological developments such as the radar and the first electric traffic signals as the elements that provided the foundations for what today is currently known as ITS. Such differences in opinion regarding the origin of the concept reflect its broad nature, as ITS is generally understood to encompass most combinations of technology, communications and information applied in transport (ITS UK, 2016), and as such, can include diverse types of technologies including driverless vehicles, smart traffic light systems and electronic ticketing systems, amongst others. Despite this broad nature, today ITS is generally understood to have a focus on using ICT to improve the safety and efficiency of transport systems (Chowdhury and Sadek, 2003), and as a way to improve their

operating capacities (Auer et al., 2016). ITS is therefore mainly concerned with those who interact directly with transport systems (e.g. operators and users), and less focused on pursuing broader societal goals such as sustainability (Levine and Underwood, 1996).

From the early 1990s, the term 'smart mobility' has also been used to denote more specific interactions between these two sectors. This term stems from the development of the concept of 'smart cities' (Benevolo et al., 2016) and before this from the concept of 'smart' or 'smartness', which generally denotes the use of technology to change how humans interact with the world (Brenner, 2007). Defining smart mobility or smart cities is complex, as the concepts are "fuzzy" and inconsistent (Albino et al., 2015), or "used as evocative slogan(s)" that lack substance and context within the sustainable transport sector (Papa and Lauwers, 2015, p.543). Furthermore, smart can mean different things to different stakeholders, including the transport industry, governments, and academia, making it a difficult term to work with (Mosannenzadeh and Vettorato, 2014). Multiple authors have tried to come up with a single definition for smart mobility (Nam and Pardo, 2011; Mosannenzadeh and Vettorato, 2014; Lyons, 2018). Although definitions differ on some points, they tend to agree that the concept of smart mobility involves technological components (similar to ITS) but also goes beyond technology, as it is also concerned with improving sustainability goals, whether these are environmental, economic or socially related. Other characteristics of smart cities and smart mobility identified in the literature include the fact that smart cities forcibly lead to a new category of "smart citizens" (Vanolo, 2014) whose active participation and buy-in of the smart city concept is needed to fulfil its social and environmental promises, as well as "smart governments (Nam and Pardo, 2011) which are seen as fundamental to the implementation of smart city initiatives.

Other authors have proposed taxonomies to help identify transport solutions that belong to smart mobility (e.g. Benevolo et al., 2016; Cledou et al., 2018). As with the definition attempts, these taxonomies have fundamental differences between them as Benevolo et al. (2016) take a wide approach

to smart mobility that includes solutions that could benefit from ICT such as bike lanes and park and ride facilities, while (Cledou et al., 2018) narrow their scope to solutions that exclusively include ICT as a fundamental element such as journey planners and traffic monitoring. These examples add further evidence to support the suggestion that there is a lack of consensus on the scope of smart mobility (Garau et al., 2016). The fact that these taxonomies diverge and include such a broad range of solutions supports the conclusion that smart mobility is fuzzy and lacking in clarity. These taxonomies do however agree on four core elements of smart mobility solutions: their use of ICT; the importance of people (through participation and intellectual capacities/capital), the acknowledgement of the importance of public institutions as promoters, users and/or beneficiaries of smart mobility; and finally, the goals or potential impacts that smart mobility might have on sustainability.

Another term which brings together the worlds of ICT and transport and has been widely adopted in the transport research community is Mobility as a Service or MaaS. This term first appeared in the literature in 2011 with an upward trend in number of publications starting in 2015 (based on searches in Scopus and Web of Science). MaaS has been defined as “buying mobility services based on consumer’s needs instead of buying the means of mobility” (Kamargianni et al., 2016), and as such refers to an innovation in the way users access their mobility needs, rather than to a new technological development (e.g. a new invention). MaaS includes a suite of different technologies and services bundled together that allow a user to seamlessly use multiple modes of transport under a single service or subscription (similar to a mobile phone contract) which includes a single interface, user information, payment and infrastructure (Finger, 2015).

Similar to smart technologies, MaaS promises sustainability (Surakka et al., 2018) and acknowledges the importance of taking into account stakeholders beyond only those who interact directly with transport systems (Jittrapirom et al., 2017). While some of the core enabling technologies of MaaS can be categorized under ITS (such as e-ticketing systems), the fact that its definition explicitly

mentions other stakeholders as beneficiaries of its services actually bring it closer to smart mobility. Where MaaS differs from ITS and smart is that it proposes a change in the way transport services are consumed; MaaS implies moving away from ownership of the means of transport (e.g. owning a car) to a world where having access to these means (e.g. using a car) becomes the norm (Jittrapirom et al., 2017). This shift reflects a fundamentally different to the interactions between ICT and transport that smart and ITS proposed, as technology under MaaS is understood not only as a means to improve the operation of transport systems (like ITS), or as having impacts beyond its direct sphere of influence (like smart), but as an enabler of changes in how users understand and consume transport services. This change reflects what Papa & Lauwers (2015) call a “demand-” or “consumer-” centric innovation. The consumer-centric ICT + transport interactions proposed under MaaS are therefore markedly different from the techno-centric innovations of ITS, which see technology as a tool that improves transport service delivery, as MaaS implementations take into account the needs and active role of consumers, therefore tailoring technological solutions to fulfil those needs. In other words, under MaaS users of transport system are no longer seen as passive stakeholders that receive innovations; they are now becoming active participants in and leaders of technological transformations and shape how they are designed and deployed. Examples of these innovations include using and sharing transport modes that were previously personally owned (e.g. cars, bicycles, scooters) and providing consumers with data that was once inaccessible to them such as new routing and mode options, empowering them to make active decisions when consuming transport. A notable drawback of this consumer-centric evolution of technological transport services that has been noted by some authors is that users are increasingly seen as consumers that should be encouraged to use the service as much as possible since the financial returns of MaaS companies depend on higher use (Docherty, 2018). While increasing mobility is not necessarily a negative issue, it evokes notions of citizens surrendering their will to consumerism and capitalistic interests (Papa and Lauwers, 2015).

Other authors have also noticed changes in the relationship between technology and the transport sector in recent history, leading them to propose terms of their own to define them. Sperling (2018), for instance, argued that the mobility sector has seen an uptake in the pace of innovations in the past decade, called the '3 revolutions': shared, electric and autonomous vehicles. Canales et al. (2016) conducted a global survey of transport sector innovations and proposed the term: "new mobility services" which, in addition to the three revolutions, include a fourth element of new sources of data to support planning decisions. While the technologies and services proposed under these terms could be englobed under either ITS, smart mobility, or MaaS, the fact that they emerged shows that there is still no consensus on a single definition that encompasses all interactions between ICT and transport (Schade et al., 2014).

4.3 Defining the "sharing economy"

While the transport sector is seeing changes in the way its services are being accessed (from owning to consuming), this transformation is not exclusive to the sector – it is also found in a broader social movement known as the "sharing economy" or "collaborative consumption".

The concepts of the sharing economy or collaborative consumption denote a shift from owning to accessing goods and services such as vehicles, housing and even short-term labour ("gig work") (Acquier et al., 2017). Other terms that are less frequently used for the same concepts are access-based consumption, the mesh, connected consumption and collaborative economy (Codagnone and Martens, 2016). Although most of these terms have been used interchangeably in the literature, small differences distinguish them. Collaborative consumption, for example, is defined as a "set of resource circulation systems which enable consumers to both obtain and provide (…) resources or services through (…) other consumers or a mediator" (Ertz et al., 2016, p.15). Under this definition, activities such as buying a car from a used-car dealership, selling old video games to a reseller, and even bartering, lending, and gift giving would all be considered part of collaborative consumption. A notable fact from this definition is

that technology is completely absent, though not precluded. Botsman & Rogers (2011), who are generally accepted as popularizing the term collaborative consumption, do include ICT in their definition, which shows how the scope and mechanisms of this term are not widely accepted. Besides collaborative consumption, the term 'sharing economy' is also frequently used in the literature. Walker (2015) traced the origins of the concept to historical and existing practices such as local exchanges (e.g. tool sharing within neighbourhoods) or time-banks (Walker, 2015, p.15) which highlights that the concept of sharing is not new, but that there are now new services that use mobile technologies to expand the scope of these original sharing activities (regular sharing) and therefore a new concept of a sharing economy has emerged.

One of the main differences between regular sharing and the sharing economy is the use of technology, as the sharing economy relies on "technological infrastructure, "digital connectivity" or "digital platforms" (Schor and Fitzmaurice, 2015; Richardson, 2015; Acquier et al., 2017). While regular sharing has existed for a long time, the advent of ICT has helped change the nature of sharing, allowing strangers (instead of acquaintances or people within a local community) to now exchange goods, services and create new social connections through digital platforms (Schor and Fitzmaurice, 2015). Another important difference between regular sharing and the sharing economy is that applications that fall under this concept can (and often do) involve corporations, rather than individuals, being involved in such activities in order to seek a profit (Belk, 2014).

While there are clear differences between sharing and the sharing economy, this latter concept is still not widely accepted nor defined (Acquier et al., 2017). For this reason, some authors have proposed typologies and taxonomies to define services belonging to the term sharing economy (Schor and Fitzmaurice, 2015; Acquier et al., 2017). Most of these taxonomies agree in the fact that sharing economy services support an increased utilization of underutilized goods and services by recirculating

surplus goods (e.g. increasing utilization of cars which would otherwise be parked through services like Zipcar or Turo) and that they use digital platforms to facilitate this activity. They differ however in a basic characteristics of these services which is their commercial nature (e.g. for or non-for profit) (Schor and Fitzmaurice, 2015; Acquier et al., 2017). In that sense, Schor & Fitzmaurice (2015) proposed that the two distinct characteristics of solutions that belong to the sharing economy are their "market orientation", which can be for or not-for profit, and their "organisational type" (peer-2-peer or business-to-peer).

		Organization	
		Peer-to-Peer (P2P)	Business-to-Peer (B2P)
Market Orientation	Non-Profit	P2P Non-Profit Sharing e.g. Food Swaps, Time Banks	B2P Non-Profit Sharing
	For-Profit	P2P For-Profit Sharing e.g. Relay Rides, AirBnB	B2P For-Profit Sharing e.g. Zipcar

Figure 13: Typology of services that fall under the term "sharing economy" with examples (Schor and Fitzmaurice, 2015)

4.4 How has shared mobility been defined so far?

As with the terms "smart mobility" and "sharing economy", the definition of shared mobility is still a debated subject. Overall, there is a lack of literature that focusses on proposing a definition or on identifying the boundaries of the term. (Le Vine and Polak, 2015, p.407) declared the topic of terminology in shared mobility "vexed" and acknowledged that there is no consensus on its boundaries. In the literature reviewed sometimes shared mobility is understood literally as the "sharing of mobility resources"(Santi and Ratti, 2017, p.329). The authors mention sharing a ride (e.g. carpooling) or sharing

a vehicle (e.g. car-sharing) as examples of shared mobility, but do not introduce a more formal definition. As with the concept of “smart”, a lack of engagement with the boundaries of a term can lead to different interpretations by different users, diminishing its usefulness. Other authors use the term “shared mobility” in their research, but do not provide a definition (e.g. Muñoz and Cohen, 2017). This seems to be the most common approach in the literature, as the term is freely used without providing any explanation as to what it means (Laporte et al., 2015; e.g. Clewlow et al., 2017; Zhang, 2018).

From the literature reviewed, only two authors propose an explicit definition of the term: Shaheen et al. (2015, p. 4) define it as “the shared use of a vehicle, bicycle, or other mode” and Santos (2018) proposed a taxonomy to delimit its boundaries. Santos’ taxonomy includes four models of shared mobility implementations: (1) peer-to-peer car rental (e.g. Turo, easyCar club), (2) short-term car rental (e.g. Zipcar, Co-wheels), (3) driver services (e.g. Uber, Lyft, Didi) and (4) on-demand shared rides (e.g. Uberpool, OlaShare). Although both definitions acknowledge that ‘shared use’ is a central element of shared mobility, there is ambiguity in whether sharing services (e.g. sharing a ride) is or not part of the term since both definitions have a marked focus on the sharing of vehicles, not sharing services. Additionally, Santos’ taxonomy exclusively focuses on cars or larger motorised vehicles – excluding other potential forms of shared mobility such as bicycles or e-scooters, which Shaheen et al. do consider in their definition.

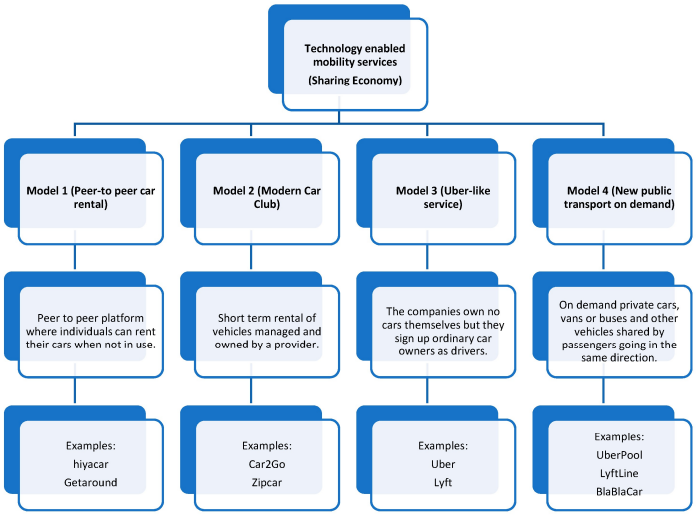

Figure 14: A taxonomy of shared mobility models proposed by Santos (2018).

Outside of academia, other stakeholders have also delved into the topic of shared mobility and proposed their own definitions. The U.K. government for example, defines shared mobility as “models based on shared ownership or use of vehicles” that are “enabled by digital platforms” (DfT, 2018). The US government has at least two different definitions used by agencies that have oversight over the transport sector: the Federal Transit Administration defines it as “shared transportation services” that include asset sharing, service sharing and even commercial delivery (US FTA, 2016); and, The Department of Transportation defines it as the shared use and access of vehicles (US DOT, 2016), but does not explicitly mention service sharing nor delivery. Unlike the U.K.’s definition, the US ones do not include shared ownership as an element of shared mobility.

Moreover, other types of organisations have also proposed their own definitions. The ‘Shared Used Mobility Center’, a public-interest organisation dedicated to sustainable mobility, defines shared mobility as “transportation services and resources that are shared among users, either concurrently or one after another” (SUMC, n.d.). Under this definition, public transportation and taxicabs are forms of shared mobility, meaning that the ICT aspect is not essential to their understanding of the concept. After

an effort of external consultations with academia, industry and governmental organisations as well as a literature review, SAE International published a standard called “Taxonomy and Definitions for Terms Related to Shared Mobility and Enabling Technologies”. Here, shared mobility is defined as “the shared use of a vehicle, motorcycle, scooter, bicycle, or other travel mode; (…) that provides users with short-term access to a travel mode on an as-needed basis” (SAE International, 2018, p.7). Again, this definition does not explicitly mention the need for ICT, though the title of the standard implicitly acknowledges technology as an enabler of shared mobility (e.g. “shared mobility and enabling technologies”). As with most of the previous definitions, there is no explicit mention of sharing services, only sharing vehicles which also excludes the sharing of other mobility assets, such as parking spaces or bicycle corrals.

Other authors have identified examples of shared mobility implementations such as shared bicycles, airplanes, and more recently electric kick-scooters (e.g. Laporte et al., 2015; Raviv and Tzur, 2016; Shaheen, 2016). Yet, these studies do not provide definitions of shared mobility mainly due to their focus on specific topics within each of those modes (e.g. assessing sustainability implications of shared bicycles, operational aspects of carsharing, or social motivations for sharing modes). Despite these studies, and perhaps owing to the nascent nature of the field, there is yet no clarity on the impacts on sustainability of shared mobility. With respect to environmental sustainability, some forms of shared mobility such as car-sharing (US)/car-clubs (U.K.) or bike-sharing have the potential to achieve CO_2 reductions because their use might result in users postponing the purchase of a private car, whilst others such as ride-hailing (e.g. Uber, Lyft) might have a negative environmental impact by inducing users to take more trips, or reduce their share of trips taken by more sustainable modes such as public transport, walking and cycling (Nijland et al., 2015; Shaheen and Chan, 2016). When looking at the social pillar of sustainability, shared mobility in the form of ride-hailing has been shown to improve access to opportunities for disadvantaged communities such as Black and Latinx communities in Los Angeles (Brown, 2018); but it has also been shown to be used mostly by higher income populations (Kodransky

and Lewenstein, 2014), which shows that the potential social benefits are not distributed equally and are context specific. While these are just a few examples, due to the differences in the nature and types of shared mobility services that exist today, and considering that many of these services are privately led – which means that accessing data to quantify their impacts is difficult- it is still hard to assess shared mobility against sustainability outcomes (Santos, 2018).

4.5 The 'sharing economy' meets 'smart mobility': working taxonomy of shared mobility.

Why a taxonomy?

While definitions are undoubtedly useful tools to create a common understanding of a term or concept, as shown in the previous section they can be ambiguous, open to interpretation, and easily contested. Classifying elements that fall under a specific concept might be a better way to create this needed common understanding, as classifications are less ambiguous, can be more exhaustive, and delineate clearer boundaries within what is inside and outside the scope of a term or concept.

In the realm of classification, two methods stand out: taxonomies and typologies. The difference between these two lies in the fact that typologies classify objects (social or physical) into ideal conceptual categories or mental constructs, while taxonomies classify objects according to their inherent characteristics or properties (Smith, 2002). Since typologies depend on ideal mental constructs, they suffer from the same drawbacks as a definition. Shared mobility as a concept already exists and has been implemented in real-world applications, and therefore finding common and uncommon characteristics within existing applications might be a better way to classify and define the already accepted, yet implicit boundaries of the concept.

A taxonomy for shared mobility services

Since the building blocks of shared mobility are found both within the sharing economy and the ICT + transport interactions denoted (amongst others) by smart mobility, this section builds upon these two tranches of literature to propose a taxonomy and boundaries of shared mobility.

Shared mobility can be framed within the transport literature as being part of the concepts of ‘smart mobility’ or ‘mobility as a service’, and to a lesser extent as part of the broader concept of ‘ITS’. As discussed in the previous sections, one of the main components that these three concepts have in common is that they are all enabled by ICT. This inclusion of ICT as a core element of shared mobility implies that only applications that are enabled by, and therefore intrinsically linked to ICT, can be considered as being part of shared mobility. This means that, while there are services that have existed for several years (such as public transport, regular taxi services, or car rentals, amongst others, which could be understood as being part of shared mobility), the fact that their existence is not dependent on technology, rules them out as belonging to the concept of shared mobility. Using this same logic, services such as ridesharing (analogous to public transport), ride-hailing (analogous to taxi services), or car sharing (analogous to car rentals) can only happen because they are enabled by ICT, and particularly, mobile phones, digital/social platforms, and internet connections, and therefore they belong to the concept of shared mobility. This does not mean, however that their non-ICT counterparts could not benefit from technological innovations, as they indeed have done, but simply that their existence is not dependent on these and are therefore not considered as belonging to the concept of shared mobility.

The other element that both ‘MaaS’ and ‘smart’ have in common is the fact that their objectives go beyond the inclusion of ICT as a way to facilitate or improve the use of transport systems (as is the case with ITS); these concepts incorporate and are concerned with the broader implications and requirements that these ICT/transport interactions will have on people, institutions and sustainability, and furthermore explicitly require that these are present. This however is not a unique or a distinguishing characteristic of shared mobility, as this recognition could also be true for other forms of transport such as the examples given above. What this characteristic does, though, is provide a link between the concepts of ‘smart’ and the ‘sharing economy’, as both of these recognize the need to

consider broader social implications, in particular the relevance of people and institutions in the fulfilment of their sustainability promises.

Using this link between the worlds of the sharing economy and smart transport, an adaptation taxonomy of Schor & Fitzmaurice's (2015) sharing economy typology is presented in Figure 7 to help classify existing and new shared mobility services according to their transaction type (whether they are peer-2-peer, business-2-consumer, or government-2-consumer) and their market orientation (for- and not-for- profit). Based on observations of existing implementations, this adapted taxonomy proposes the new category of government-2-consumer, as there are shared mobility services that can be government-led, like docked bike-sharing systems. It also updates the terminology to "consumer" instead of "peer", to bring it in line with the literature of MaaS and to acknowledge the commercial nature of these services. Finally, this adaptation also proposes a distinction between the sharing of 'assets' (e.g. sharing a vehicle) or the sharing of 'services' (e.g. sharing a ride), which is a clear distinction that is lacking in most of the definitions so far, and is evident in existing implementations.

			Transaction type		
			P2P (peer-2-peer)	**B2C (business-2-consumer)**	**G2C (government to consumer)**
Market orientation	**Non-profit**	**Asset**	***(1)* Casual asset sharing** *(e.g. between acquaintances)*	**N/A**	***(7)* Public vehicle sharing** *(e.g. public bike-sharing, publicly sponsored car sharing)*
		Service	***(2)* Vehicle (e.g. car-) pooling** (e.g. Mobicoop[12])	**N/A**	***(8)* Public ride sharing** *(e.g. public on-demand transit)*
	For-profit	**Asset**	***(3a) P2P vehicle-sharing*** (e.g. Getaround, Turo, Spinlister etc.)	***(5a) Private vehicle-sharing*** (e.g. Car2Go, Zipcar, Mobike, Lime)	***N/A***

[12] Mobicoop in France is a community run site that facilitates connections between drivers and passengers without a commission and survives on donations.

			***(3b)* P2P Other mobility assets**: (e.g. JustPark)	***(5b) Private* other mobility asset-sharing**: (e.g. SpotHero)	
		Service	***(4) Ride-hailing/sharing*** (e.g. Uber, Lyft, Via etc.)	***(6) Microtransit / demand responsive transport*** (e.g. Chariot, Bridj)	***N/A***

Figure 15: Taxonomy for shared mobility

Eight distinct types of shared mobility implementations were derived in this proposed taxonomy. Their names were decided based on the commonly used terminology where possible, and where not, new terms were proposed. Examples of existing services were also included. The terms identified are the following:

(1) **Casual asset sharing**

(2) **Vehicle-pooling**

   (a) e.g. 'Car-pooling' (Ben-Akiva and Atherton, 1977; Teal, 1987; Montero, 2019), 'Van-pooling' (Kircher and Wapensky, 1978; Maxwell and McIntyre, 1979).

(3) (a) **P2P vehicle sharing**

   (a) e.g. P2P car sharing (Shaheen et al., 2018).

   (b) **P2P other mobility asset sharing**

(4) **P2P ridesharing** (Rayle et al., 2016; Shaheen, 2018; Wang and Mu, 2018).

(5) (a) **Private vehicle sharing**

   (a) e.g. 'Car-sharing' (Kent and Dowling, 2013; Wagner and Shaheen, 2016; Novikova, 2017), 'Bike-sharing' (Lan et al., 2017; McKenzie, 2018), 'Scooter-sharing' (Clewlow, 2018).

   (b) **Private other mobility asset sharing**.

   (b) E.g. 'parking space sharing' (Xiao et al., 2009)

(6) **Microtransit** (Wilhelms et al., 2017) and **on-demand transit** (Chebbi and Chaouachi, 2015) **/ demand-responsive transport** (Brake et al., 2004)

(7) **Public vehicle sharing**

   (a) e.g. “public bike-sharing” (Parkes et al., 2013)

(8) **Public ride sharing**

4.6 Conclusion

There seems to be a growing interest in the interactions between technology and transport in the extant literature, however the understanding of shared mobility, as an element of these interactions, is still ambiguous. While the benefits of shared mobility have been asserted by both private and public sector stakeholders, a lack of a broadly accepted and shared definition of the term leaves the evaluation of its impacts on sustainability to individual interpretation. The relative novelty of this concept is also evident, as few studies have tried to evaluate shared mobility against sustainability goals, and their results are yet inconclusive.

Realizing the importance of concretely defining the concept of shared mobility, this paper reviews the two bodies of literature that underpin it: (1) the interactions between technology and transport, and (2) the broader concept of the sharing economy. Following this review, it proposes a working taxonomy of shared mobility that can be used by other authors as well as private and public sector stakeholders to have a common language that delimits the scope of the concept for their own studies and interventions. Unlike previous attempts at defining shared mobility, the proposed taxonomy explicitly acknowledges the fact that not only vehicles can be shared, but also other types of mobility assets and services.

In summary, shared mobility services can be organised based on their market orientation (for- or not-for profit) and their transaction type (peer-2-peer, business-2-consumer, or government-2-

consumer), empirical characteristics that can be observed from existing shared mobility implementations.

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5. Paper 2: Governing shared mobility: a comparison of the public policy goals being pursued in three cities

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Governing shared mobility: a comparison of the public policy goals being pursued in three cities.

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Abstract: Shared mobility services such as shared scooters, bikes, and ride-hailing services have transformed the urban mobility landscape in recent years. In this paper we identify the goals that local governments are pursuing when regulating these private services. We also analyse the circumstances and motivations that led to the pursuit of these goals. For this, we carried out three in-depth case studies of cities where private companies had deployed shared mobility services: Bogotá, Colombia; Paris, France; and Los Angeles, USA. We found that there is a wide range of goals (34 distinct goals) that the governments of these cities are pursuing when attempting to regulate shared mobility services. However, only between three and four of these goals tend to dominate most of their actions. We also identified a mix of motivations for the pursuit of these goals: from the public interest of redressing past inequities, to circumstantial motivations such as appeasing the incumbents that have seen their businesses endangered by these new technologies. The academic literature converges on sustainability and equitable access being two of the primary goals to be pursued in transport policy, but our findings suggest that practitioners and policymakers are pursuing a range of other goals that do not fit neatly into these two theoretical categories.

Keywords: Shared mobility, new mobility, smart mobility, governance, policy, goals

5.1 Introduction.

Policy is one of the main tools available to governments in their mandate to govern society and direct transport futures, and transport policy has a profound effect on our everyday lives. However, surprisingly the recent academic literature rarely engages with studying the processes that lead to transport policy formulation and implementation, the issues policymakers are trying to solve, or the goals they articulate for transport policy (Marsden and Reardon, 2017). An important sector of the academic literature assumes that sustainability should be the de facto goal for transport policy (e.g., Banister, 2008; Eliasson and Proost, 2015; Bardal et al., 2020), but rarely, if at all, do these authors question this assumption, or if there are other goals that are actually being pursued by policymakers on the ground. In fact, Marsden and Reardon (2017), who did a review of the two main policy journals in the field in the period of 2011-2015, could not find a single paper that focused on studying the goals pursued by transport policy.

In addition to the lack of focus in recent scholarship around the goals of transport policymaking, in recent years there has been an flurry of new Information and Communications Technologies (ICT) developments in the transport sector that, for some, have come to signal a transport *revolution* (Sperling, 2018). This revolution has been spearheaded by private sector companies who have deployed new mobility services such as shared mobility (e.g., ride-hailing and scooter-sharing -see Castellanos et al., 2021 for a more comprehensive taxonomy), with no consultation with public policymakers and practitioners. This presents a stark departure from the way in which transport had been traditionally planned in the past in which governments played a prominent role (e.g., through planning and executing investments in public transport, providing operational permits for bus routes, or defining and regulating air routes). This break has led to a shift in the balance of power in the transport sector; in particular, in terms of the power to identify and pursue public goals. There is now a growing role for private sector stakeholders for whom profit rather than the public good is the main goal (Docherty, 2018). With little

control over the goal-setting process, this revolution has meant that public policymakers have had to figure out how to steer the deployment of these new technologies towards the pursuit of public goals. This reconfiguration is not confined to the transport sector as more generally governments are increasingly part of broader governance networks rather than acting as the main conductor of governance (Rhodes, 1996).

Using case studies, in this paper we explore what kinds of goals local governments are pursuing in different contexts as they try to figure out how to steer the direction of private sector shared mobility deployments. We challenge the notion that sustainability is the main underpinning principle that guides the actions of policymakers and public practitioners, and we show how local context and local issues are an important driver in the goal-setting process in the transport policy space. We do this by exploring the local dynamic in three cities that have responded in different ways to the deployment of shared mobility services by private companies in their jurisdictions. We selected these cases after studying how a longer list of city governments had approached the issue of shared mobility and after proposing a taxonomy of these approaches. Each of the three cases therefore is an example of a taxa within our proposed taxonomy:

- Bogotá, Colombia and the deployment of ride-hailing services,
- Paris, France and the deployment of shared mopeds, bicycles, and scooter services, and
- Los Angeles, USA, and the deployment of shared bicycles, and later, scooter services.

Through documentary analysis of policy documents, news articles, and transcripts of public debates, and data collected through interviews with key stakeholders in each case city, we identified the goals that public sector stakeholders used as justification when taking actions to govern these shared mobility implementations and we investigate how and why these goals were adopted. The paper contributes to a better understanding of the transport policy process, particularly in relation to the deployment of shared mobility services by private companies.

The scope of the cases we researched spans from 2015 to 2020, just before the start of the Covid-19 pandemic. We therefore acknowledge that the context in which this research was carried out is different to the current one. During the pandemic, the lines between public and private provision or privatised transport were blurred for example with governments around the world providing direct subsidies to transport operations. However, the challenges that arise from the deployment of private sector mobility services with no input from government will continue to be present as private companies continue to develop and deploy new technologies using public infrastructure, such as with autonomous vehicles or delivery robots. We therefore expect that the findings from this paper will continue to be relevant in a post-pandemic reality.

The paper is organised as follows: In section 2, we discuss the role of goals and goal-setting in transport policy development by using two well-known frameworks of how policies evolve: the 'policy cycle' framework (Nakamura, 1987) and Cashore and Howlett's (2007) taxonomy of policy measures. In section 3, we explain how we selected the three cases mentioned above. In section 4, we present a general overview and timeline of each case. In section 5, we provide an analysis of the empirical results of our study and identify the different goals that were pursued in each case. And, finally in section 6 we discuss our findings, specifically how the cases showed that the local political context plays an important role in the goal-setting process, and we show how concerns of sustainability play a more modest role than what the literature suggests. We also discuss some limitations of our findings and identify potential future areas of research.

5.2 Literature review

5.2.1 Policymaking in the transport sector: challenges of shared mobility

Historically, the transport policymaking process has been mostly seen as a 'top-down', rationalistic, and sequential process in which goals and policies are formulated at the top echelons of government and then flow hierarchically to be executed by bureaucrats, finally to be received by firms and individuals

(Stopher and Stanley, 2014). There is still a dominant view in the transport literature that the transport policy process is rationalistic and sequential , starting with *someone* (a policymaker) at the top defining a clear goal or problem to be addressed which is then translated into action at the local level by a practitioner (Stopher and Stanley, 2014). This can be seen for example in urban mass transport systems in which implementation decisions are made by national or local governments, and investments and deployments are carried out locally by public and/or private sector actors (Kavanagh, 2016). Even in places where public transport has operated with little government intervention (e.g., market-provided public bus services in Latin America), governments have retained a certain level of control over decision making and goal-setting by issuing operational permits that indicate and restrict where a public transport route can operate.

This top-down, sequential view of the policy process is modelled by the '*textbook approach'* of policy implementation which is the policy cycle framework (Nakamura, 1987). This framework defines a series of sequential steps of policymaking beginning with agenda setting, followed by policy formulation, the enaction and implementation of laws, and finally policy evaluation. While useful as an abstract model of the policy process, it is over-simplistic and does not reflect the complex and uncertain on-the-ground realities of policymaking which do not necessarily occur sequentially nor follow a rational logic (Jann and Wegrich, 2007; Stopher and Stanley, 2014; Weible and Sabatier, 2017).

However, the policy cycle framework can provide a starting point from which to identify how policies are born, as the creation of policies presupposes that there is either a problem that policymakers are trying to solve or a goal they are trying to pursue that has been identified at the agenda-setting stage (Jann and Wegrich, 2007). Policy goals are those abstract ideas, driven by social values, that justify the need for state intervention and guide the creation of policies, and by happening at the start of the policy process, have a bigger influence on the entire policy development process (Thomas and Schofer, 1970; Cashore and Howlett, 2007). Goals are mostly abstract and express big ideas such as protecting the environment,

or promoting public health that in turn are guided by the values that society shared=s and cannot be translated directly into policy action but require intermediate and more concrete steps such as 'objectives' and 'settings´ (Cashore and Howlett 2007). For this paper, we adopted this definition of goals. For example:

- Value -> The desire to see humans survive (Rapoport, 1953)
- Goal -> Improve health of the population
- Objective -> Increase the number of people cycling to work
- Setting -> Create 100 kms of protected cycle lanes connecting housing to the central business district.

Thomas and Schofer (1970) note the importance of goals in the transport policy planning process. Despite this importance, in their systematic review of papers in the two most prominent transport policy journals between 2011 and 2015, Marsden and Reardon (2017) found no articles which focused on the study of policy goals, and only four that focused on either objectives or settings. This shows that the recent academic literature is not paying the attention that goal setting arguably deserves.

Goals are closely linked to public values[13], and are therefore high-level, abstract, normative, and contestable. As such, the goal selection process is political and shaped by multiple actors including public, private, civil society and international actors, and the media (Bryson et al., 2014). Goal selection might also be shaped by path-dependence where decisions made today are constrained by decisions made in the past, by local/national policy styles, or because different levels of government might have a different perception of what goals need to be pursued (Stead, 2018a). These factors can mean that contradictory goals and policy actions are adopted, which create tensions both within and across different countries and sectors (Bryson et al., 2014; Stead, 2018a; Kronsell and Mukhtar-Landgren, 2020). In fact, the increasing private sector involvement in public service provision since the 1980s (see

[13] Here we follow Bozeman's (2007, p.13) definition of public values: "*A society's "public values" are those providing normative consensus about (a) the rights, benefits, and prerogatives to which citizens should (and should not) be entitled; (b) the obligations of citizens to society, the state, and one another; and (c) the principles on which governments and policies should be based*".

McLaughlin et al., 2002) has meant the government is now one amongst many other actors involved in the agenda and goal-setting process, which is now more networked and less hierarchical (Rhodes, 1996). However, there is still an expectation that governments will act on behalf of citizens to pursue the social goals that have been democratically identified via voting (Adam and Groves, 2007; Bryson et al., 2014) and is seen to have a specific role as "a guarantor of public values" (Jørgensen and Bozeman 2007, p.373)

The involvement of other non-governmental actors in setting policy goals has been particularly marked in the transport sector due to the dominant role of private sector companies in the development and deployment of new transport technologies, which has accelerated in recent years as a result of the 'revolutions' (Sperling 2018) of shared, electric and autonomous mobility and the 'smart mobility transition' (Docherty et al. 2018). High-profile examples include the deployment of ride-hailing services by companies like Uber and Lyft; and the emergence of dockless bike-sharing companies; and scooter-sharing companies which have been many times deployed in public places (streets and sidewalks) without consultation with local governments. In these ways, the goals of the transport sector are no longer necessarily developed through democratic process, and are increasingly driven by private profit (Farnham and Horton, 1996 in Boyne, 2002; Papa and Lauwers, 2015; Docherty, 2018). In this respect, Mukhtar-Landgren and Paulsson (2021) argue that governments should pro-actively seek to govern new modes of transport in pursuit of democratically defined public goals. The issue of shared mobility has risen to the top of transport policy agendas around the world, shown by the number of regulations developed for ride-hailing and scooter sharing in many cities around the globe (see SUMC, 2019) forcing governments to make decisions and take actions to either enforce their role as guarantors of the public good and public goals, or to allow private sector companies to co-opt this historic role.

5.2.2 Defining the goals of transport policy

Defining a single goal for any policy sector is difficult, as goals can be time- and context-specific, normative, and aspirational. Furthermore, a single policy can often aim to tackle multiple goals at the

same time. For transport, improving equitable *access* to necessities is seen as an increasingly important goal in the literature and policy spaces (Pereira et al., 2017). The goal of access is well suited to the nature of the transport sector, as transport exists to access a separate desire or need (Salomon and Mokhtarian, 1998). While a few authors have challenged this notion by showing that travel can be a valued activity in and of itself (see for example Mokhtarian and Salomon, 2001), transport still mostly exists to fulfil a separate desire or need.

Despite its role as facilitator of access to a primary demand, transport generates costs and negative impacts both to the individual and to society. These include, for example, the cost of fuel or a transit fare to the individual, local air pollution and greenhouse gas emissions from fuel combustion that cause health burdens and global warming, deaths from traffic crashes, time losses caused by traffic congestion, amongst others. For this reason, some authors have proposed that the main goal of transport policy should be to manage the negative impacts of transport activities (McTigue et al., 2018) or to decide what should be "allowed (…) or limited, for the public good" (Pangbourne, 2021). Managing the negative impact of human activities is "closely aligned with contemporary notions of sustainability" (Gössling et al., 2018, p.303); a view that is shared by other prominent authors (Banister, 2008; Geels, 2012; Holden et al., 2013) and is backed by the large number of academic studies that discuss the links between sustainability and transport (over 2.9 million results for "sustainable + transport" in Google scholar). In fact, sustainability is now widely accepted as a desirable goal -and not only in the transport sector (see United Nations General Assembly, 2015). However, operationalising sustainability is difficult, as it is a loosely defined term loaded with many different meanings, leading to different interpretations (Goldman and Gorham, 2006; Dobranskyte-Niskota et al., 2007; Litman, 2011).

Banister (2008) provides an example of how to do this translation. He calls for a new sustainable mobility paradigm with the objectives of reducing the need to travel, encourage mode shift, and improve efficiency of the transport system. Banister suggests that sustainable mobility should be a de-facto goal

to be pursued by transport stakeholders but doesn't explore if this broad goal is actually being implemented by policymakers and public practitioners. Furthermore, by proposing this as the goal for transport policy, Banister takes an idealistic position that fails to take into account the range of other local factors that might shape policy goals. Banister's is but one interpretation of what sustainability means in the transport sector. An useful framework is the one provided by (Litman, 2007) who reviewed multiple definitions of sustainable mobility and concluded that the "sustainability triad" (economic, environmental, social) could be used to organize the objectives of sustainable mobility. For this paper, we use these three categories as our definition of sustainability and use them to organise our results.

Other authors have taken a more pragmatic approach to identifying the goals of transport planning (e.g., CATS, 1962). In their report, the authors note that by looking at how people behave, they could distil the goals[14] that a transport system should pursue. The objectives they identified include greater speed, increased safety, and lower operating costs, amongst others. These were discussed with an advisory committee who found them to be satisfactory. This therefore exemplifies a rational approach to goal setting grounded on experience. Talvitie (1999) takes a similar, pragmatic, and rational approach by looking at the objectives being pursued by OECD countries when implementing road transport policies, which while quite diverse, were distilled into broad categories that could fit within the access and sustainability ones we identified above. Other studies from the grey literature (e.g., Dornbusch, 1993; World Bank, 1996) have all proposed variations of goals for the sector (or more broadly economic policy in the case of Dornbusch) that do not intersect neatly between each other, showing the normative and value-driven nature of goal-setting, and how goals might differ depending on context. However, some or all these goals could arguably still be valid today and could fit within the broad categories of

[14] Note that the authors use the term goals to mean objectives under our definition.

sustainability and access, as the authors intended to encompass a somewhat universal understanding of what should be pursued by transport policy.

5.3 Methods

In this paper we looked at how three city governments in Europe, North, and South America responded to the emergence of shared mobility services, and the goals that guided their responses. Since goals are abstract, cannot be observed directly, and are not always explicitly identified by practitioners and policymakers, we assumed that goals are embedded in the governance actions taken by these actors. For this reason, we used a case study methodology using methods such as semi-structured interviews and documentary analysis that allowed us to identify both the governance actions taken and the goals ascribed to these. Specifically, through interviews we were able to inquire about the normative, and abstract ideas and assumptions that policymakers use to guide their policy response, and how the context in which the cases were embedded affected these ideas.

5.3.1 Case selection

We selected cases that showed a plurality of policy styles to deal with the issue of shared mobility. We refer to policy styles as the broad mix of tools that governments use to steer the direction of the transport sector (Howlett and Tosun, 2019b). However, policy styles are not easily observed without deeply engaging with the different tools that governments use. We therefore focused on comparing the more visible and accessible aspect of a policy style: policies and regulations. Policies and regulations are publicly available and can give a general sense of the policy style that governments use. In selecting cases we were interested in looking for commonalities and differences between the goals being pursued in different contexts and under different policy styles.

We conducted a google search for the existence of shared mobility services such as car-sharing, ride hailing, bike- and scooter sharing, and microtransit (Castellanos et al 2021) across countries in the Americas, Europe, and Oceania where English, Spanish, French, or Portuguese was the national

language, as those are the languages understood by the research team. We identified a total of 31 countries that fit these criteria and then used a combination of newspaper articles and official government websites to search for policies that had been enacted by national and subnational governments to regulate these services in all these countries. When examining subnational government policy, we focused primarily on capital cities. However, in the United States, due to the large number of regulations enacted by different US city governments, we examined multiple cities including Washington DC, New York, and Los Angeles. In Brazil, we chose to focus on Sao Paulo instead of Brasilia since no regulations appeared to be enacted in the latter. The existence of a shared mobility service does not mean the existence of shared mobility regulations as these services have mostly been deployed without government involvement. We were therefore able to identify a total of 52 regulations in the 31 countries analysed.

Once we had identified the relevant regulations, we developed a taxonomy based on shared characteristics of the regulations. We identified four distinct taxa which describe the scope of each regulation:

5. **Umbrella regulations**: Regulations that focus on defining the requirements/characteristics that shared mobility solution need to comply with (mostly in the form of technical aspects, e.g., insurance, safety, distinct colours). In these cases, shared mobility solutions can operate without restriction if they comply with these requirements. These are typical at the national or state/region level.
6. **Operational permits**: Unlike umbrella regulations where anyone who complies with broad requirements can operate, under operational permits operators need to request permission from transport authorities and comply with specific requirements such as operational requirements, equity objectives, and data sharing demands. These are typical at the local/city level.
7. **Non-binding agreements:** These regulations take the form of codes of practice/conduct or partnerships, where expectations of how shared mobility modes are supposed to operate are either expressed by the government or are jointly agreed with shared mobility operators. Unlike operational permits or umbrella regulations, these are non-binding and are therefore not legally enforceable. These happen exclusively at the local level.

8. **Banned:** Regulations that explicitly ban the deployment of these services.

The following table shows how the regulations identified fit into this taxonomy (blank cells indicate that no regulation could be identified for that specific shared mobility service):

Table 6: Taxonomy of shared mobility regulations

		Shared mobility service.			
Country	City	Ride hailing / ridesharing / microtransit	B2P Carsharing	P2P carsharing	B2P Bikesharing and scooter sharing
Argentina	Buenos Aires				Operational permit
Australia	Canberra	Umbrella	Umbrella	Umbrella	Code of practice
Belgium	Brussels		Operational permit		Operational permit
Bolivia	La Paz	Umbrella			
Brazil	Sao Paulo	Umbrella	Operational permit		Umbrella
Canada	Ottawa	Umbrella	Umbrella	Umbrella	Operational permit
Chile	Santiago				
Colombia	Bogota	Umbrella/Banned			
Costa Rica	San Jose	Umbrella			
Ecuador	Quito	Banned			
France	Paris	Umbrella	Operational permit		Code of practice
Ireland	Dublin		Operational permit		Operational permit
Luxembourg	Luxembourg	Banned			
Malta	Valletta				Operational permit
Mexico	Mexico City	Umbrella			Operational permit
New Zealand	Wellington	Umbrella	Operational permit	Operational permit	Code of practice
Nicaragua	Managua	Banned			
Paraguay	Asuncion	Umbrella			
Peru	Lima	Umbrella			Umbrella
Portugal	Lisbon	Umbrella	Umbrella	Umbrella	
Spain	Madrid	Umbrella	Operational permit		Operational permit
Switzerland	Bern	Umbrella			Operational permit
United Kingdom	London	Operational permit	Partnership		Code of practice
United States	Washington, New York, Los Angeles	Umbrella	Umbrella and operational permit	Umbrella	Operational permit
Uruguay	Montevideo	Umbrella			

Based on this analysis, we chose the following three cities as the focus of our study:

4. Umbrella regulation/banned – Colombia's ride-hailing regulations and Bogotá's policy response.
5. Operational permit – Los Angeles' scooter sharing pilot permit programme.
6. Non-binding agreements – Paris' moped, bicycle, and scooter sharing codes of conduct.

5.3.2 Data collection

We collected a wide range of documentary evidence from each case study, including policies, regulations, meeting transcripts (e.g., city council debates), minutes of meetings, as well as newspaper articles, and op-eds. We also carried out interviews with policymakers and practitioners who had been directly involved in the implementation of shared mobility regulations.

We started our documentary analysis from the documents identified above in Table 6. We then branched out using official government websites and document repositories to identify any other relevant

documents. At the same time, we conducted an online search in Google for any relevant news articles using keywords such as the policy identification number, names of relevant shared mobility companies, and modes (e.g., “shared scooters”). This search was carried out in French, English, and Spanish accordingly for each case. We collected documents until no additional documents could be found or they were not available or accessible (saturation -Saunders et al., 2018). We organised the documents by date of publication using nVivo (QSR International Pty Ltd, 2020). We then carried out an initial readthrough which helped us identify any additional documents we might have missed after the initial search, as well as relevant stakeholders for potential interviews (purposeful sampling of elite stakeholders -Palinkas et al., 2015). We then searched for any additional documents identified in this readthrough, and wherever we identified a document but were unable to find it in official government websites, we submitted public information requests to the relevant authorities. This led to a collection of 244 documents for Los Angeles, 181 for Paris, and 146 for Colombia (a total of 571 unique documents).

We then carried out a more thorough readthrough of these documents, and we coded them inductively for instances where transport goals were mentioned (Thomas, 2003). Since we were using inductive coding, our definition of a “goal” was broad and referred to high-level ideas that were mentioned as justifications for actions taken by government officials (for example, road safety, equity, or affordability). We didn’t code documents that were not relevant for our purpose (for example, there were multiple documents in Los Angeles that only included public comments received during council session meetings that we did not code). The coding process was done using NVivo.

Once we had done this more thorough reading, and having already identified potential stakeholders for interviewing, we created a semi-structured interview guide to probe for additional goals that could not be easily identified in the documents. We chose to use semi-structured interviews to allow the interviewees more freedom to express their own understanding of our research topic while still allowing us to keep the interviews focused by providing guiding prompts. Due to their open nature, semi-

structured interviews are more adequate to discovery of previously unidentified elements and therefore were an appropriate choice for our research (Sjöberg, 1997 in Gubrium and Holstein, 2002). As we were carrying out the initial interviews, we asked participants to suggest additional relevant stakeholders to interview leading to a snowballing sampling technique to ensure relevant stakeholders that we could have initially missed were also considered for interviews (Marshall, 1996). We stopped seeking interviews once we couldn't identify any additional stakeholders, or when we had reached data saturation and no new information was being collected. In three instances stakeholders declined to be interviewed. In total, we conducted 16 one to two-hour long interviews (four in Los Angeles, four in Paris and eight in Bogotá). We transcribed and coded these interviews also using nVivo.

Once we had coded both interviews and documents, we organised the coded goals into four categories: Economic, Environmental, Political, and Social goals. In the following section we present and discuss the goals we identified for each case.

5.4 Results

We identified a total of 34 unique goals that we grouped into the four categories mentioned above. Most of the goals (24) were shared by at least two of the three cities. Ten goals were unique to a single city. Bogotá had the fewest number of goals (16), while Los Angeles had the most (29). Figure 16 shows an overview of all 34 goals identified.

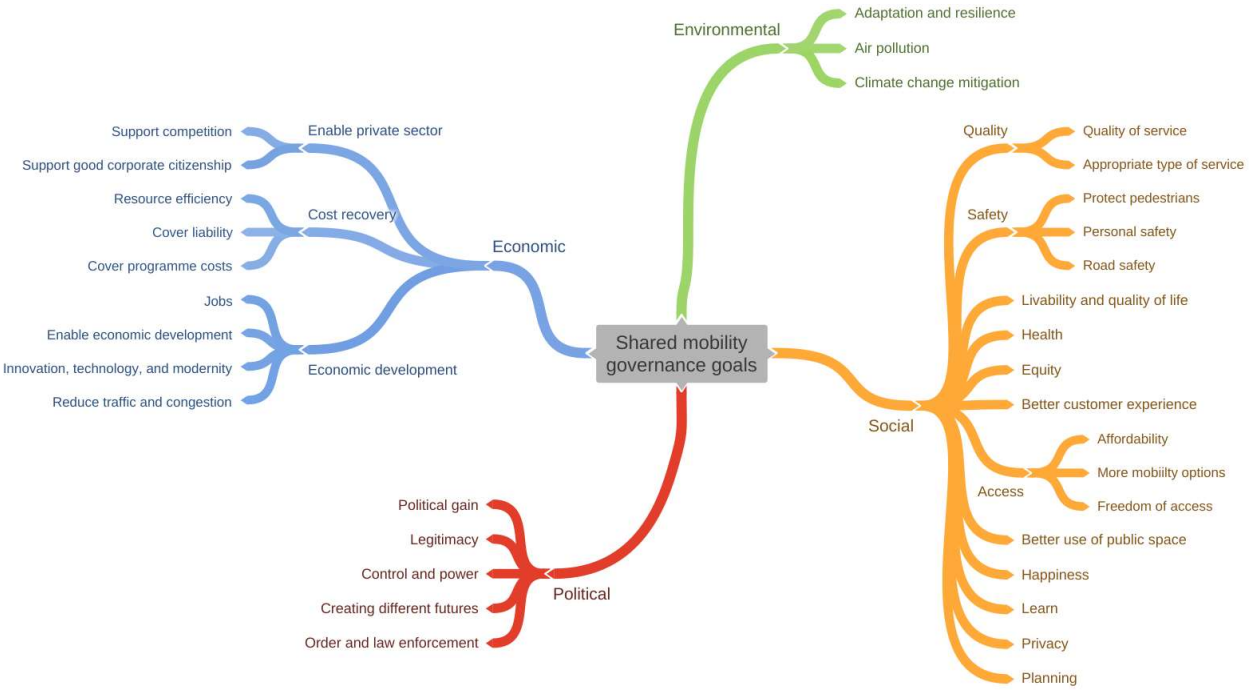

Figure 16: Shared mobility governance goals. Created using Coggle (CoggleIt Limited, n.d.).

While we identified these 34 goals either through our documentary analysis or the interviews, it was the interviews that allowed us to gain a better understanding of their relative importance. Through the interviews we realised that not all goals were equally relevant or perceived as equally important by the interviewees, but rather there were some goals that they perceived as having a greater influence or importance in the governance actions that these stakeholders took. By interviewing multiple individuals and corroborating their perceptions of the relative importance of certain goals between themselves and with the documents analysed, we carried out a triangulation process to identify certain goals that we termed *dominant goals*, as those that were relatively more important and dominated most of the governance actions taken. These have been marked in bold on the diagrams presented for each case below. In the following sections we do a deep dive into each of the three case studies by providing a general context for each city, followed by a summary of the goals we identified, and finally a discussion of why and how the dominant goals influenced governance actions.

5.4.1 Regulating ride-hailing services in Bogotá, Colombia

In September of 2013, the multinational company Uber started operating ride-hailing services in the city of Bogotá. Before this date, the individual public transport sector was dominated by a long-established, privately-operated taxi industry that had been highly regulated via a series of national and local laws and regulations. These laws clearly defined the goals for the sector as: providing freedom of access, quality, and safety to users (Ministerio de Transporte de Colombia, 1996). In addition to this traditional taxi industry, after the 1991 constitution, the law established a 'special individual transport' category, similar to taxis, but that was meant to serve the transport needs of specific groups of users such as students, employees, or tourists. Locally, these special services were called 'white cars' or 'white (number) plates', as regulations require them to be painted white to distinguish them from other services. Unlike regular taxis, white cars could not be hailed on the street, and their use requires the previous signing of a contract between the driver/owner and the users. The ownership model for both the taxi and white car industry is characterized by a fragmentation of ownership where most owners drive the vehicle themselves or engage with a driver who then has to pay them a daily set rate. In turn, owners then pay a fee to the companies who own the right to operate taxi services; it is estimated that most vehicle owners own between one and five vehicles (Rodríguez and Acevedo, 2012; La República, 2020). Uber decided to provide its services using these white cars that were affiliated to already registered companies, effectively allowing them to circumvent existing taxi regulation even if their service was for all intents and purposes, identical to that of regular taxi services. Later, in 2014, Uber started providing services through private car owners. Both forms of operation were explicitly prohibited by the law (Colombian presidency, 2015). Uber was the first ride-hailing service to operate in the country, however other companies followed suit in the following years. Still, Uber remained the visible face of ride-hailing services.

Uber's operations in Bogotá led to a series of governance actions at diverse levels of government: from the government of Bogotá using its authority to regulate individual transport services, to the national government through its three branches (executive, legislative and judicial) looking to either regulate or stop these services. Figure 17 below shows the goals we identified for these governance actions. As a reminder, goals marked in bold are those that we identified as dominant goals.

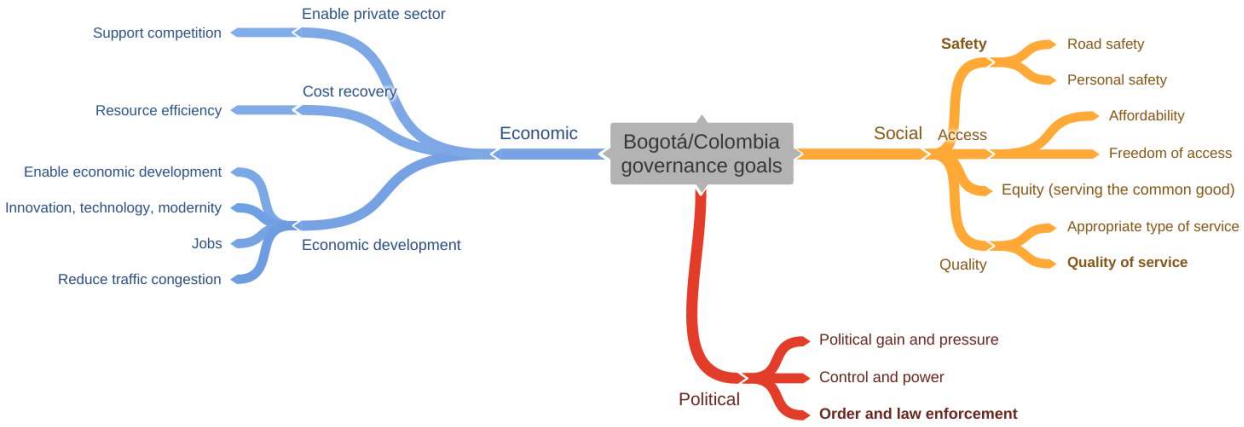

Figure 17: Governance goals being pursued by public sector stakeholders in Bogotá (local level) and Colombia (national level). Own construction based on documentary analysis and stakeholder interviews.

We identified three dominant goals shaping government responses to ride-hailing in Colombia. These were: (i) Order and law enforcement, (ii) quality of service, and (iii) safety.

Regarding the first goal of order and law enforcement, since the way ride-hailing operations were being done fell outside of the existing regulatory frameworks for taxis or white cars, the government could have either done nothing (laissez faire) or attempt to regulate these services. Practitioners belonging to the executive branch mentioned in interviews how they viewed that the responsibility to regulate these services belonged to the legislative branch since the existing laws did not consider a ride-hailing service, and their role was to follow the law, not create laws. In the period between 2015 and 2020 the legislative branch introduced a total of 10 bills that aimed to regulate ride-hailing services, but all of them failed to become laws. Without a new service typology, practitioners had no other recourse other than declaring ride-hailing services illegal since they did not fit into the existing typologies of taxis or white cars. As a

practitioner with the Ministry of Transport expressed in one of the interviews conducted: "*under our current legal framework, when we say that Uber is illegal, what we are saying is that Uber is not an* [authorized] *transport company".* This interpretation of Uber falling outside the scope of Colombian law created a de facto constraint on any action that either the national or local governments could attempt, since there was no legal framework that would allow any type of regulation. Another high-level official again with the Ministry of Transport mentioned in one of the interviews how "*The Ministry never said no (…) to the use of new technologies. But, while the current legal framework for* [individual] *public transport is in place, we have to respect it… It's our duty".* This shows how practitioners perceived that their hands were tied when it came to regulating these services until congress acted, and their only option was using the existing enforcement mechanisms that the law already provided to try to stop these illegal services. This then led to the government imposing financial sanctions against Uber, and local governments directing transit agents to try to stop these services on the street. The goal of order and law enforcement can therefore be seen as an imposed goal that resulted from external factors outside the control of government practitioners.

The first goal led to the second and third goals of quality of service and safety. Practitioners interviewed agreed that the two most prominent perceived benefits of ride-hailing services when compared to existing taxis were safety and quality. Taxi services in Bogotá were seen as dangerous, as there had been multiple media reports on muggings inside taxis (AFP, 2013). Furthermore, a constant complaint by taxi users was that drivers would refuse to take them to certain places in the city, especially during peak hours, and that taxis were dirty and drivers disrespectful (El Espectador, 2012). When Uber came along, they marketed their service as solving these issues by using GPS and vetting drivers to address the safety concerns, and by using higher-end vehicles with trained drivers. Since practitioners could not directly regulate ride-hailing services, they opted instead to try and improve the legally sanctioned taxi service to address the quality and security concerns of users. This approach led to the national government

adapting the existing taxi regulations to provide for a '*premium'* taxi service which would operate under the same legal structure as a regular taxi service but would incorporate different features including newer vehicles and the use of technological platforms for payment and hailing. Most ride-hailing companies, including Uber, decided not to apply to this new regulation, and continued operating outside of the legal framework. Bogotá also saw that improving taxi services was one of their only recourses to address the issue of ride-hailing since it, again, didn't have any legal mechanism to regulate these services. The city therefore used the new directive from the national government to launch their 'smart taxi initiative' and in an interview given to a national newspaper in 2017, the then Secretary of Mobility in Bogotá said that their goal was not to counter Uber, but to have people regain trust in the existing taxi services (El Tiempo, 2017).

While improving existing services could be seen as a positive goal, the legal constraints on regulating ride-hailing services were not the only reason why improving the quality of existing taxi services became a dominant goal for policy in both the local Bogota government and the national Colombian government. Multiple stakeholders mentioned in interviews how the existing taxi industry holds (and often exerts) its power through industry groups. Multiple taxi industry groups exist in the country representing different interests; taxi owners, taxi companies, or taxi drivers. A high-level political representative from the Ministry of Transport explained in one of our interviews that: "*the situation is very complex because there are three stakeholders and each of them wants something totally different (…) their interests go in opposite directions*". This made it difficult for government to identify a single goal that these different interest groups were pursuing. On the other hand, there was consensus within them as they saw the arrival of ride-hailing services as a threat to their existing market dominance and were content with the interpretation the governments had adopted of ride-hailing being an 'illegal' service as this maintained the status-quo. Whenever an announcement was made by the national government of an attempt to regulate ride-hailing services, the taxi industry trade groups either threatened or carried

out general strikes. We identified a total of six general strikes called for by different representatives of the taxi industry in the period of study which led to political either withdrawing potential regulations, or backlash to whomever was in power at the time. Local taxi regulations in Bogotá restrict the number of taxis to 50.000, creating a medallion-type system (locally known as a "cupo" or quota), with medallions being traded in the secondary market for as much as two to three-times the cost of a new vehicle (El Colombiano, 2023); since ride-hailing vehicles (whether white cars or private vehicles) were not subject to this quota, taxi owners felt that legalising ride-hailing was unfair to them who had already paid for the right to own a taxi. A high-level practitioner with the city of Bogotá said in one of the interviews: "*(…) there's always a tension, a pressure… on the (possibility of a) strike. On everything that it means… that you will always have a fear of tackling the problem head on because the taxis… the taxi strikes have completely paralysed Bogotá".*

This threat, combined with the political power that the industry groups hold by mobilising their members to vote for different candidates during election periods, led to an understanding within government officials that it was politically unviable to take any actions that could be seen as favouring ride-hailing services and detrimental to the taxi industry, as this could lead to an unfavourable political climate during elections. This included any attempt at making ride-hailing services legal. In fact, the President of the Republic at the time (who was seeking re-election) met with taxi industry representatives and made a commitment to combat 'illegal' services, referring specifically to Uber (Ospina, 2014; Taxibiris, 2014). This sentiment was explicitly transmitted to government officials, and as one interviewee would put it: "*we received an indication from the top to 'not create issues for us'*", meaning that the status quo in which ride-hailing services had been interpreted as illegal was preferable, and the only possible actions from government were ones that would not "rattle the boat"; specifically this was interpreted as actions that would improve the safety and quality of existing taxi services, leading to these becoming two dominant goals in the country.

In summary, the goals pursued by public sector stakeholders in both the local Bogotá government and the national Colombian government were imposed on them by a series of events that prevented the creation of a regulatory framework that would allow the adoption of clear rules under which ride-hailing services could operate, even if congress tried to act and the executive branch agreed with the creation of specific regulations (at least at the beginning of the process). With no regulatory framework, government stakeholders had to declare these services illegal, and therefore to the goal of order and law enforcement. The difficulty in creating this regulatory framework was exacerbated by the political pressure exercised by the taxi industry groups which saw the legalisation of ride-hailing as a threat to their own interests. This then led to a strategy by the governments of betterment of the existing taxi industry, which therefore led to the adoption of the other two goals of safety and quality of service. As of 2023, there is still no specific regulation for ride-hailing in the country, and ride-hailing companies are operating under a legal vacuum.

5.4.2 Regulating shared micromobility services in Paris, France

Paris has a relatively long history of publicly-authorised shared mobility services going back to the implementation of its public bike sharing system Vélib' in 2007, and the later addition in 2011 of the Autolib' electric car sharing system. While these systems were privately operated, they were set up through public tendering (or commission) with a contract existing between the city and private operators.

In 2013, drawing on the perceived success of these transport sharing systems, mayoral candidate Anne Hidalgo promised in her policy platform to create an electric moped sharing service (Hidalgo, 2013). She noted that such an improvement in transport services was a step towards Paris becoming a more "bright, fluid and pleasant" city, and that it would create public value, as well as contribute to improving population health in the city (Hidalgo, 2013, p.61). Once elected, Mayor Hidalgo explained the proposed system that was to be called 'Scootlib' in more detail to the city council, announcing that she planned for

it to operate in the same way as Vélib' and Autolib', i.e. to be run by a private operator with a public tendering process and strict measures for safety, fares, design, and operations (Paris City Council, 2014).

At the same time as the mayor's office was making these announcements, the private company CityScoot was planning the launch of its privately led shared moped rental service that would operate out of existing car parks, effectively allowing them to function without needing a contract from the city. CityScoot was the first of a series of at least 7 similar ventures that were deployed by private sector companies in Paris between 2014 and 2020, which included not only mopeds, but also bicycles, and e-scooters, and that were deployed without any intervention by the city government. In response to these deployments, the city government took multiple governance actions which resulted first in the adoption of a code of good conduct with all operators, and later a public tender leading to a direct contract with the city for three scooter operators in 2020. The national government also had to intervene and incorporate a new category of vehicles and services in their national mobility law (Loi d'Orientation des Mobilités – LOM) to allow such actions at the local level.

We identified four dominant goals in the case of Paris: (i) better use of public space, (ii) protecting pedestrians, (iii) reducing air pollution, and (iv) providing more mobility options.

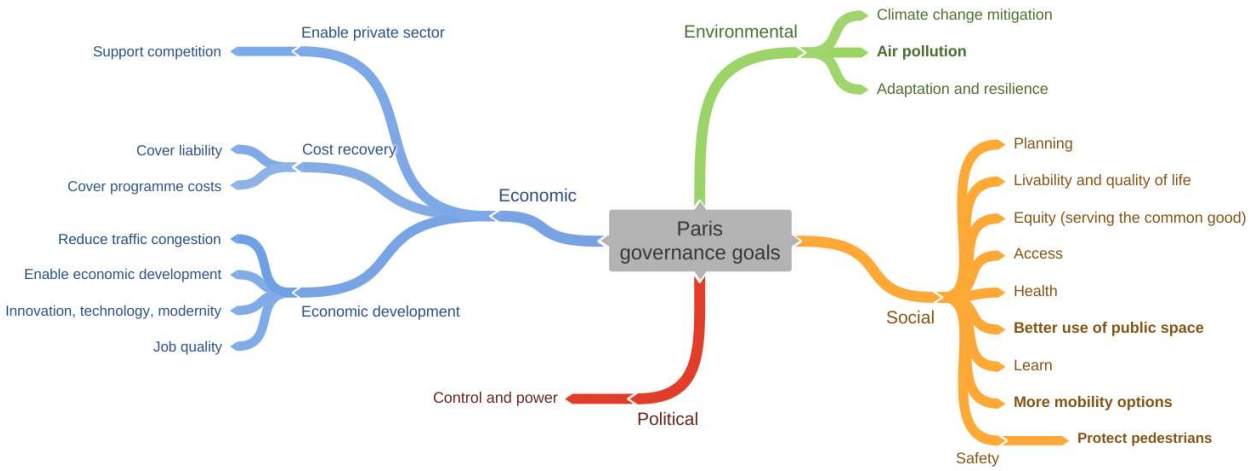

Figure 18: Governance goals being pursued by public sector stakeholders in Paris. Own construction based on documentary analysis and stakeholder interviews.

In 2017 in the span of only three months, four bikesharing companies started deploying their vehicles in the city with no consultation with the government, and multiple other companies announced their plans to follow suit (Le Point, 2017). These announcements led to the city of Paris calling for a meeting with all interested operators. In the report of the meeting, the mayor's office noted that they welcomed the boom of bicycle operators as cycling was an essential part of their strategy to reduce pollution, however they would not stand for a private economic model that left the city with all the "negative externalities" such as trying to clear the public right of way from abandoned bicycles, as had been seen in other cities around the world. Practitioners interviewed echoed this sentiment of fear, noting how they had been following what some of these companies had done in other places around the world, where they had massively deployed vehicles to later abandon them on the streets. Similarly, some members of the city council, and specifically some of the government coalition parties noted the 'anarchic nature' of these new services and councilmembers showed concern about how these vehicles had started to invade sidewalks all over the city creating issues with pedestrians, baby strollers, wheelchairs, and street cleaning services (Paris City Council, 2017). The press also took note and copied the expression of 'road anarchy' to refer to the situation on the city's streets (Bontinck, 2018). A series of road incidents exacerbated the safety and street clutter concerns of the Paris government: "*Every week there is a new situation: a disabled person prevented from circulating on a sidewalk, a mother and her child jostled while crossing the street, a woman hit in a garden and the victim of several broken bones in her hand. My role as Mayor is to defend these victims and prevent others from becoming victims too".* Noted Mayor Hidalgo in a press conference announcing changes in the regulations for these services (Hidalgo, 2019). A high-ranking officer with the office of the Deputy Mayor for public space confirmed that they perceived street clutter and safety as a major concern of the locals: "*we were facing different wills of Parisians. There is the one who, and I think this is the most important, at least for the (…) political leaders in Paris, is to 'securize' and give a more quiet, and nicer public space to everyone. So, the most important*

for the political leaders on this is to be sure that this kind of new mobilities are not impacting the pedestrians, and the security of all the users of the public space". Although it is hard to ascertain if these were real or perceived fears, this nevertheless led to the government adopting the goals of better use of public space and protecting pedestrians as central to their governance response to shared mobility services.

The next dominant goal we identified in the city was that of improved air quality. This goal can be easily traced to Mayor Hidalgo's policy platform where she noted that, if elected, she would push for improvements in air quality as one of her main priorities (Hidalgo, 2013). This policy priority very quickly became a reality with the City Council's approval of the Road Vehicle Pollution Control Plan in 2015 and the Climate-Air-Energy Territorial Plan in 2018. These plans make it clear that a cleaner air is one of the priorities of the administration and Mayor Hidalgo herself mentioned that: "*The need to act with force and determination (against air pollution) is no longer debatable (…) I've made this fight one of my priorities*."(Mairie de Paris, 2015). Since she was elected on this platform, we can conclude that this is a goal that was democratically chosen by the citizens of Paris.

When analysing policy documents, we can see how the last goal of providing more mobility options is often used as a shorthand for reducing car usage and is therefore closely related to the previous goal of improving air quality and to the environmental goal of mitigating climate change by reducing CO_2 emissions from the transport sector. Looking at it through the lens of Cashore and Howlett's framework, providing more mobility options is an objective rather than a goal, however it has become such a prominent objective that it tends to be used as a heuristic for those environmental goals. In a council session from 2018 the then deputy mayor for urbanism explained how: "*The objective that we share with the (national) Government is to promote digital tools, in particular multimodal information and ticketing services that facilitate multimodality for the benefit of fluidity of journeys and providing alternatives to private vehicles*."(Paris City Council, 2018). In fact, this goal was identified as a key one in

2013 when only the Scootlib' project was starting to be considered in council. The council issued a declaration encouraging the executive to launch a feasibility study and specifically mentioned the "*efforts of the City of Paris to, since 2001, allow a diversification of modes of transport in Paris.*"(Paris City Council, 2013). This shows that governance actions linked to shared mobility services were seen to be supportive of providing more options to Parisians from early on and has been a goal that has transcended multiple mayoral terms. Like the air quality goal, providing more mobility options was part of candidate Hidalgo's policy platform.

5.4.3 Regulating scooter sharing services in Los Angeles, USA.

The state of California is amongst the places with the longest history of shared mobility services, as many companies such as Sidecar, Uber, and Lyft emerged from the Silicon Valley area in the early 2010s. Los Angeles in particular has been a city of experimentation for many of these companies, as its regulatory environment has been seen as progressive when it comes to technology (Singer, 2022). In August 2016, the city government published its strategy to deal with mobility innovations where it presented itself as a "*platform for transportation innovation*" since it wanted to take advantage of technological advances in transport such as shared mobility and autonomous vehicles (A. Hand, 2016, p.i). In the strategy, shared mobility was identified as a scalable opportunity to move away from the traditional model of individual car ownership, and as such was perceived positively because it could be integrated into the other public transport services offered by the city, such as buses and rail. During the development of its strategy, the city launched its public bikesharing system MetroBike in partnership with the county (through Metro, the county's transport planning agency and operator of the bus and rail system). While dockless bikesharing systems were already being deployed in other parts of the world, such as in China, these systems had not been permitted to operate in the city until the council decided to allow a pilot project in September 2017. This initial pilot project later evolved into one of the largest permitted scooter-sharing operation in the world with 37.000 permitted vehicles. The figure below shows the goals identified for this case study.

We identified (i) innovation, technology, and modernity, (ii) control and power, (iii) equity, and (iv) road safety as the dominant goals for the governance of dockless scooter sharing services in the city.

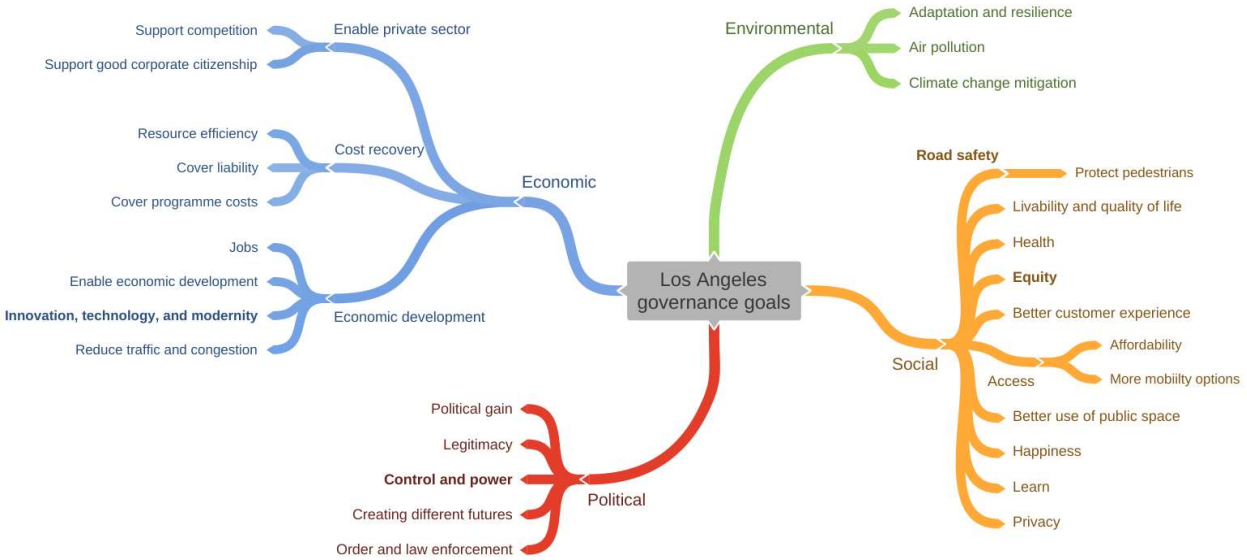

Figure 19: Governance goals being pursued by public sector stakeholders in Los Angeles

Regarding the first goal, the push for innovation and technology came directly from the political leaders in the city:

"*It was very much within the mayor's brand to, um, to really think about how innovation, you know, leads to economic development, workforce development (…) at the same time there was a competitive spirit about who is going to be the innovative council member, really shepherding in this new technology*" - Interviewee from the Los Angeles Department of Transportation (LADOT).

This in turn can be seen as underpinned by broader normative values that are part of the American culture. As another LADOT staffer stated during an interview:

"*Now, on the political layer in the United States, innovation is in and of itself seen as an American value. And you can observe, you know, the race to be the most innovative mayor in America. The most innovative governor in America... with really not a lot of care or consideration given to what you... what... what that innovation gets you in return*".

This therefore exemplifies how broad social values, norms, or expectations are integrated into governance actions mainly because they resonate with politicians' constituencies, but there is little

consideration given to what impact they might have on those theoretical goals for the transport sector of sustainability and access. In fact, multiple plans and policy documents that guide the policy response to shared mobility in Los Angeles mention factors such as a need to "leverage technology", or to position the city as a "platform for mobility innovation" (A. Hand, 2016), showing how innovation and technology are seen as inherently positive when governing the mobility sector in Los Angeles.

The second dominant goal of control and power stems from previous experiences of stakeholders involved in the governance of this mode. In particular, the emergence of ride-hailing services 10 years prior without close control and oversight from government was seen as a wrong strategy by some of the interviewees. The arrival of bike- and scooter-sharing services in the city was therefore perceived as a new opportunity for the government of Los Angeles to pursue a different strategy that allowed government to exert more control over these deployments. For example, an interviewee from LADOT mentioned how "(…) *all of us who have been in transportation, who had had a front row seat to watching Uber and Lyft come in, the ways they came in, and the way they pre-empted local government, we had all been thinking about ways to try and level the playing field so that we did not… we did not end up in the same place".*

The third goal of equity is closely related to another goal which is that of providing more mobility options for residents of the city. Equity has multiple dimensions (racial, economic, gender, environmental, amongst others), however it is the racial and economic dimensions which seem to be the focus for the city. LADOT mentioned in one of their planning documents how "*(t)he use of one vehicle per person to get around this vast metropolitan region is no longer viable, creating structural inequality (…)*" (A. Hand, 2016), linking a lack of mobility options directly with the topic of economic inequality. Furthermore, a LADOT staffer noted in an interview that "t*here are countless examples across multiple different arenas of both racial, and... and also gender inequities when it comes to transportation (and therefore) another goal that we have, is to correct racial inequities".* LADOT therefore understood that

they could play a role in redressing past racial inequalities by taking actions that would benefit racial minorities in the scooter sharing program, such as by forcing operators to deploy vehicles in certain areas of the city that are predominantly inhabited by racial minority groups.

Equity is an goal that transcends LADOT and is for example mentioned as one of four key goals in other planning documents the city has published such as their sustainability plan (Garcetti, 2019). Looking at transcripts of council sessions, it was evident that equity as a goal was being defended by certain council members who represented impoverished areas of the city and can therefore be seen as a goal that represents the will of certain constituencies and that is democratically chosen. In one of the committee sessions, for example, LADOT staff responded to questions from certain councilmembers around the equity design of the scooter sharing program by saying: "*we also wanted to provide equitable outcomes: we wanted to make sure that these new choices benefited everybody and not just the neighbourhoods in Los Angeles where people already have lots of choices on how to get around".* Showing how the governance actions taken by LADOT are trying to directly respond to the desires of these constituencies.

Like equity, road safety is a goal that is identified in a range of different planning documents in Los Angeles, most notably in a road safety planning document (Vision Zero plan) which has the explicit objective of eliminating traffic deaths by 2025. An LADOT employee stated in an interview that: "*We're a vision zero city… and safety is a key concern. Especially in Los Angeles, you know, we're a big city so our numbers are really big: 250 people killed every year on the streets that we manage and operate- and about half of them are people walking and biking. So, safety is always front of mind for us*." This concern with safety flows hierarchically from the leadership of LADOT as another LADOT staffer mentioned in one of the interviews how the arrival of a new general manager in 2015 led to the prioritization of Vision Zero through new investments to tackle road safety, which then in turn percolated to some of the governance actions taken for the scooter program, such as educational campaigns for riders to promote safer behaviours or capping the speed of the vehicles in certain pedestrian areas.

5.5 Discussion

In the current section we summarize the goals presented in Chapter 5.4 and we identify and discuss common themes and differences between all three cases.

Table *7* below summarises the goals being pursued by each analysed city to better compare them side-by-side. The ⊗ symbols denote the dominant goals.

Table 7: Missing and shared goals between cases. An X denotes a goal included in the case. A shaded cell denotes a goal missing from a case. An ⊗ symbol denotes a 'dominant goal'.

			Bogotá	Paris	Los Angeles
Economic	Cost recovery	Cover liability		X	X
		Cover programme costs		X	X
		Resource efficiency	X		X
	Economic development	Enable economic development	X	X	X
		Innovation, technology, modernity	X	X	⊗
		Jobs	X	X	X
		Reduce traffic congestion	X	X	X
	Enable private sector	Support competition	X		X
		Support good corporate citizenship			X
Environmental	Adaptation and resilience			X	X
	Air pollution			⊗	X
	Climate change			X	X
Political	Control and power		X	X	⊗
	Creating different futures				X
	Legitimacy				X
	Order and law enforcement		⊗		X
	Political gain		X		X
Social	Access	Affordability	X		X
		Freedom of access	X	X	
		More mobility options		⊗	X
	Better customer experience				X
	Better use of public space			⊗	X
	Equity		X	X	⊗
	Happiness				X
	Health			X	X

	Learn			X	X
	Liveability and quality of life			X	X
	Planning			X	
	Privacy				X
	Quality	Appropriate type of service	X		
		Quality of service	⊗		
	Safety	Personal safety	⊗		
		Protect pedestrians		⊗	X
		Road safety	X	X	⊗

5.5.1 Similar challenges but different goals

As explained in the preceding section, there is usually no single goal that shapes governance actions by public sector stakeholders when dealing with shared mobility services. On the contrary, our case studies suggest that governments tend to be pursuing multiple goals in parallel. These multiple goals are sometimes reinforcing (e.g., the goals of health and air quality naturally reinforce each other), and sometimes competing (e.g., the goal of private innovation might seem contrary to the goal of exerting stronger government control). Despite the wide range of identified goals, we were able to observe that most of the goals being pursued are shared between the three cases. There are, however, a few exceptions of goals that are completely missing or that were identified in only one of the cases.

A notable absence from the cases we studied was that of sustainability as a broad goal or theme. While stakeholders in all three cases were pursuing elements of sustainable transport, none of them mentioned sustainability as a single goal or concern. This can indicate two things: 1. As identified in the literature, sustainability is a very broad concept that is difficult to put into practice and therefore stakeholders pursue those elements of sustainability which are easier for them to understand and act upon. And 2., that practitioners are more concerned with their immediate context rather than with global issues such as sustainability and climate change. This second point is clearly exemplified by the Bogotá case where we couldn't identify a single goal related to environmental sustainability. This shows

that there is still work to be done to bridge the apparent consensus in the academic community about the importance of sustainability for the transport sector, and the on-the-ground realities of policymaking in this space which might not yet see these global concerns as the main goal they should pursue.

Other indications that local conditions play greater role in transport governance goals is the dominant goal of racial and economic equity in the Los Angeles case, which was hardly a concern in Bogotá and only minimally present in Paris. The importance of this goal, however, was perceived as somewhat novel by the participants, and in fact was almost seen as an afterthought when the regulations were being discussed: "*one of the things I'm most focused on is the equity provisions of the program. And I really want to make sure they're successful- and those were almost sort of a last-minute addition during our first go-round*" commented a Los Angeles councilmember in a committee meeting transcript. Racial equity is a topic that has recently become more prominent in the political agenda throughout the United States but is less prominent in places like Bogotá or Paris (Altman, 2020). The fact that Los Angeles was considering how to adjust somewhat tardily their governance actions to address racial equity concerns shows that the broader social context in the United States is driving local action, and that it is not necessarily a goal that is shared broadly amongst public sector actors in other contexts.

A last example of the role of local context driving goal selection is the strong emphasis in Colombia on service quality (which was largely missing from Paris and Los Angeles). As explained in section 5.4.1, a major perceived concern of taxi users was the poor quality and safety issues of these services. Service quality is something that directly affects and is perceived by the end-users of taxi services, whereas global concerns such as climate change or abstract notions such as control and power, are more removed from the direct perception of the users. This, mixed with the political difficulty of going against the incumbent taxi industry groups, drove the government to make service quality a dominant goal.

The safety goal was the only dominant goal that was shared between the three cases. In Paris, the interpretation of safety was somewhat narrow with the specific goal of protecting pedestrians, while in Bogotá and Los Angeles safety was understood more broadly as personal or road safety. While road safety could be interpreted as being part of a broader sustainable transport definition and some sustainable transport definitions do include explicit mentions of it (e.g., Rahman and Van Grol, 2005; HLAG, 2016), the literature seems to focus more on the environmental and access goals when discussing sustainable mobility.

5.5.2 Political will and politics

All three cases showed that political will plays a significant role in the definition of goals, and that once these have been defined at the political levels of government, they flow down and get implemented by practitioners. The Los Angeles case highlights however that goals are not understood equally by different practitioners, and that more internal government alignment is needed to ensure a similar level of understanding by those involved in the implementation of policies. A staffer from one of the council offices in Los Angeles noted in one of the interviews that while they had some general understanding of the high-level goals that they wanted to pursue, the council together with LADOT had to define what those goals meant in practice: "*what does this actually mean for the city? (…) how do we shape it to meet the city's mobility objectives? So, you know, which meant that we had to define what those were (...) so we had to kind of, uh, figure out what were our objectives around equity and (…) what were we willing to accept when it came to things like safety issues".* This alignment is especially important with the deployment of new technologies such as shared mobility, since as the quote highlights, the introduction of these technologies can have impacts that are not yet understood by public sector stakeholders, and therefore having a shared understanding of the goals that government is trying to pursue can help them shape policy responses.

Since political will plays such an important role in goal setting, the power to set goals is concentrated among politicians and decision-makers which makes them potentially vulnerable to external pressure from third parties who could stand to win or lose with any governance action. This was very clear in the case of Colombia where the taxi industry exerted their power directly with the president to avoid any changes in regulation, which ultimately ended up playing a role in the governance response to ride-hailing by making practitioners cautious about "rattling the boat". We also observed external political pressure in Los Angeles where the lobbying arm of most of the shared mobility companies was trying to influence the process either directly by meeting with councilmembers or in council meetings, or indirectly by trying to surpass the authority of the local government and going directly to the state government to pre-empt any regulatory action at the local level (see Zipper, 2019). Perhaps since the goal-setting power is more dispersed in Los Angeles than in Colombia (a single president in Colombia contrasted to 15 councilmembers in LA), the external pressures seemed to have played a bigger role in Colombia. Paris, on the other hand, was a good example of a potential new approach to goal setting for shared mobility in which this role is shared by government and those who will be affected by regulation. The city used a transparent process of using public-private working groups that have the mandate to define goals and non-binding regulatory agreements to guide the deployment of these new services.

5.6 Conclusions

The goal of this paper was to identify the goals that practitioners and policymakers are pursuing when addressing the deployment of shared mobility services in their jurisdictions. We identified 34 different goals that public sector stakeholders indicated that they are trying to achieve when executing governance actions with respect to shared mobility. However, we concluded that most of these goals were not being actively pursued, and only between three and four goals in each case dominated most of their actions. Of these dominant goals, only safety was a goal that was shared amongst the three cases analysed, while the other dominant goals seemed to stem from context-specific circumstances.

This plurality of goals we identified coupled with the geographic diversity of the three cases can support the transfer and improvement of policies in different contexts (i.e., different social, cultural, economic, and political contexts) and governance styles, as policymakers facing similar challenges can explore what these cities have done so far. However, in line with a qualitative case study methodology, our intention was not to seek a generalisation of goal-seeking in shared mobility, but rather to provide evidence that can support or contradict a theoretical proposition (Yin, 1994). We therefore provided evidence that shows that the theoretical goals identified in the academic literature of access and sustainability are not being solely pursued by practitioners and policymakers in a real-world context, but they are rather pursuing a range of other goals that do not fit neatly into these two theoretical categories.

Amongst these, we identified a series of goals related to power and politics that show that public sector stakeholders are not always acting in the best societal interest, but are also pursuing either political gain, or are trying to revert perceived power grabs from the private sector. We also showed how political will has an oversized effect on the goals being pursued in all three cases, and in most of the goals we identified, it was high-level political individuals who were the ones responsible for defining and articulating these goals. This political clarity later led to alignment of governance actions at the lower levels of government. In the Paris and Los Angeles cases, this political will does seem to align with the notion that the goal setting process is a democratic one, since these goals were clearly stated in the policy platform of both mayoral candidates, and therefore citizens had a say in their selection.

We also saw instances of path-dependency where actions taken in the past ended up constricting goal setting in the present. This can be particularly evident in this policy arena of shared mobility, as many of the policies that currently govern the transport sector were created at a time where shared mobility did not exist. This also shows an additional challenge of the governance of shared mobility, which is the fragmented nature of governance power which is shared between multiple instances of government.

Further studies could apply a multi-governance lens to the study of shared mobility to analyse the relationships and power distribution between multiple levels of government.

We hypothesised that goal setting in a context of shared mobility was more challenging than goal setting in past transport projects. While this seems to be the case, it would be more accurate to say that goal *pursuit* is the more challenging activity. Public sector goal setting for shared mobility is happening in the same context and with the same tools as it was done in the past, and influence from private sector stakeholders in the goal-setting process does not seem to have changed (e.g., lobbyists continue working both upfront and behind the scenes to influence governance actions and goals as they have done in the past). What has changed is that once these goals have been set, governance actions are being taken to curb the private sector actions that have happened before any government action has taken place.

Our intention for this paper was to identify the goals being pursued, and we were therefore intentionally vague about specific governance actions being taken. We intend to address these actions more deeply in a subsequent paper. It would also be interesting to analyse to what extent the goals we identified in this paper actually ended up being successfully pursued, which would require conducting a post-facto analysis of the outcomes that were achieved in each case. Other further areas of study could include expanding the analysis to other cities that pursued other governance actions or include cities that did not take any action to see if the profit goal dominated the conversation. The scope of the paper did not address the way the shared mobility conversation ended up arriving at the top of the policy agenda, but this would also be an interesting area of study that could shed additional light on the goal setting process.

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6. Paper 3: A Tale of Three Cities: A Process Tracing Analysis of Policy Instrument Choice When Governing Shared Mobility

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A Tale of Three Cities: A Process Tracing Analysis of Policy Instrument Choice When Governing Shared Mobility.

Abstract: During the past 15 years, shared mobility services such as ride-hailing and scooter-sharing have been deployed in cities worldwide. These deployments, typically done by private companies, have led to a wide range of policy responses by city governments, which have started to gain more attention in the academic literature. In this paper, we identify and classify the policy instruments used by three city governments to steer the direction of shared mobility services. We also identify and analyse the motivations and constraints of local policymakers in selecting these instruments over others. Finally, we also employ a process-tracing methodology to assess whether existing theories of policy instrument selection fit the shared mobility policy space. To do this, we conducted three case studies of cities where private companies had introduced shared mobility services: Bogotá, Paris, and Los Angeles. We selected these cases since each had a distinct policy response to the deployment of shared mobility services. For each city, we conducted a documentary analysis complemented by interviews with policymakers and practitioners. Overall, we analysed 571 documents and carried out 16 interviews. Through this process, we identified a total of 52 unique instruments used collectively by the three cities, of which 30 were substantive (directly affecting policy outcomes), 23 were procedural (affecting policy processes), and one was classified as both. We also documented and classified new instruments that did not exist before shared mobility and were developed specifically to address the challenges of private companies using technology to deploy new mobility services. We identified that instrument selection at the local level can be constrained by national structures, but when these change, local governments adapt quickly and change their instrument selection strategy. We also found that when no national policy constraints exist, policymakers try to select instruments that balance the efficacy of the instrument against its legitimacy. We identified other motivations for instrument selection that do not fit within existing theories of instrument selection; these include the desire to reclaim some of the power lost as the transport policy space has moved towards networked governance. Our study is relevant to both city and national governments worldwide, which are facing the challenge of governing the deployment of new and 'smart' mobility services by private-sector companies, by providing them with a better understanding of existing tools and motivations for policy instrument choice in this policy space. It also provides researchers in this space with new evidence to support instrument selection theories of legitimacy and efficacy. It also identifies new areas for theory development, showing how existing theories do not have explanatory power for some of our findings.

6.1 Introduction

During the past decade, cities worldwide have seen an increase in the number of privately operated shared mobility services being deployed in their jurisdictions, including ride-hailing since the early 2010s and bike- and scooter-sharing in the latter years of the decade. These services, together with their publicly sanctioned counterparts, have come to be known as 'shared mobility' services (Castellanos et al., 2021), and have created new challenges for city governments, as, unlike previous mobility interventions (e.g., public transport, road building), in many cases, they are almost exclusively planned and executed by private-sector organisations with little to no input from the city governments in whose jurisdictions they are deployed. This shift in who controls the planning, deployment, and operations of mobility services has altered the power balance in mobility policy, leaving city governments with reduced control over the mobility system's goals and direction. Without direct control, city governments must find ways to indirectly influence the direction of these services to ensure that the profit-oriented model of these companies does not undermine the social goals of urban mobility policy, such as sustainability and equitable access (Banister, 2008; Pereira et al., 2017; Castellanos et al., 2023).

Exerting indirect influence over society is not a new role for governments, especially in democratic societies, where governments can attempt, but not force, individuals and firms to act differently. In fact, there is a rich literature that discusses the different *tools* or *instruments* that governments use to influence both individuals and firms to act in different ways; however, due to the novelty of shared mobility deployments, there is still a dearth of literature that identifies the policy instruments used in this new policy space, nor that examines the reasons why governments chose these policy instrument mixes (Kriukelyte et al., 2024). Most academic studies so far have focused on either the impacts of shared mobility (e.g., Docherty et al., 2018; Cazzola and Crist, 2020; Sun and Ertz, 2021) or on studying policy tools in the broader 'smart' mobility space (Paulsson and Hedegaard Sørensen, 2020; Kronsell and Mukhtar-Landgren, 2020; Mukhtar-Landgren and Paulsson, 2021). Studying the instruments

governments use in specific policy arenas is important, as instrument selection can reveal underlying theories of government influence and serve as a starting point for evaluating the efficacy of these theories in achieving social outcomes. In other words, studying policy instruments can help improve the government's efficacy in achieving its goals.

Given these gaps in the current understanding, our main goal in this paper is to identify the motivations for policy instrument selection in the novel policy area of shared mobility and test the fit of existing theories of policy instrument selection. We hypothesise that, while shared mobility is a novel policy area, its integration into the broader transport policy area will lead to the application of typical and previously documented theories of instrument selection. Confirming or denying this hypothesis can help governments and researchers of smart mobility policies improve the crafting of policy mixes in this space. Our specific research questions are therefore:

1. What policy instruments have city governments deployed when dealing with shared mobility?
2. How has the context in which these policy instruments are being deployed influenced their selection?
3. What are the underlying motivations for policy instrument selection in shared mobility, and are these motivations explained by existing theories of policy instrument selection?

To this end, we conducted three case studies of cities where private companies had introduced shared mobility services: Bogotá, Paris, and Los Angeles. We selected these cases since each had a distinct policy response to the deployment of shared mobility services. For each city, we conducted a documentary analysis complemented by interviews with policymakers and practitioners. Overall, we analysed 571 documents and carried out 16 interviews. We first introduce the literature on policy instruments and instrument selection, specifically emphasising transportation policy and shared mobility (Section 6.2). We then explain the research methods we followed (Section 6.3). We then identify and

describe the policy instruments local governments use when confronted with shared mobility deployments, along with the reasons for their use. We also describe a novel instrument, developed independently by policymakers in the three cities, which was seen as promising for addressing future governance challenges of new mobility: data standards (Section 6.4). Then, in Section 6.5, we interpret the reasons that governments used to select the instruments in the light of three instrument choice theories to identify how well they fit the policy area of shared mobility: efficacy, legitimacy, and national policy styles (Bressers and O'Toole, 2005; Turnpenny et al., 2015; Howlett and Tosun, 2019). Finally, in section 6.6, we provide concluding remarks and suggest potential areas of further research.

6.2 Literature review

In this section, we present our findings of the review we conducted to better identify gaps in the literature on policy instrument choice, specifically in shared mobility and transport more broadly. First, we provide an overview of existing definitions and classifications of policy instruments; second, we identify how these classifications have been used in the shared mobility, smart cities, and transport academic literature (related to Research Questions 1 and 2); then, we explore the most prominent theories of policy instrument selection (related to Research Question 3; finally, we identify some of the gaps in the academic literature that this paper intends to cover.

In recent years, public governance has become the task of managing networks of private and public actors who share responsibility for delivering public goods and services (Rhodes, 1996; Kjær, 2004). The task for governments has become to attempt to influence the behaviours of the individuals and firms that belong to these governance networks to guide society toward social goals (Weber, 1978,. Governments achieve this by using "administrative tools" or *instruments* such as policies and regulations (Hood et al., 2007, p.2). Policy instruments are understood as those "*technical and social (devices), that organize specific social relations between the state and those it is addressed to*" (Lascoumes and Le Gales, 2007, p.4). The mobility sector is a good illustration of a governance network. Over the last

decades, for example, public bus services have been deregulated in cities around the world, and their operation has been delegated to private-sector companies (Meyer and Gomez-Ibanez, 1991; Bayliss, 1997; Fernandez and Muñoz, 2007). This shift from public to private provision has led to the creation of new transport governance networks, in which governments now face the task of influencing multiple private companies and other stakeholders (such as civil society organisations) to achieve their policy outcomes (Marsden and Docherty, 2019). More recently, private-sector companies have deployed shared mobility technologies in cities around the world (e.g., ride-hailing, bike-, and scooter-sharing services) without government involvement in the planning and deployment of these services, creating uncertainty and difficulty for governments when trying to manage these new shared mobility governance networks (Moscholidou et al., 2023).

As we argued above, governments use instruments to influence governance networks. However, due to the novelty of shared mobility, the study of the specific instruments governments use in this space remains nascent (Paulsson and Hedegaard Sørensen, 2020). The approach so far has been for authors to incorporate the topic of shared mobility within the broader trend of 'smart mobility' or 'smart cities', which encompasses more comprehensive technological innovations in the transportation space, and to identify the challenges and instruments for governing this broader network. For example, Desdemoustier et al. (2019, p.177) argue that governments see smart cities as a policy instrument itself that helps them pursue their goal of making cities "a better place to live in". Esposito et al. (2021) build upon this interpretation to argue that regional governments adapt the 'smart city' instrument to fit their own interpretation of what their region needs. Further, Margherita et al. (2023) and Esposito et al. (2024) show that indeed local governments pursue different objectives under the banner of 'smart cities' as instruments. This segment of the literature, however, 1. does not directly focus on the transportation space, and 2. assumes that city governments control the deployment of 'smart city' initiatives. As we argued above, this is not the case of shared mobility, where technological services are deployed by

private-sector entities. Furthermore, as an imposition on local governments, we do not view shared mobility as an instrument in and of itself, but rather as an external factor that cities must manage to pursue their own goals.

Beyond the smart cities and policy instruments literature, we identified only a handful of authors who have specifically investigated instruments in smart or shared mobility (Mukhtar-Landgren and Smith, 2019; Paulsson and Hedegaard Sørensen, 2020; Mukhtar-Landgren and Paulsson, 2021; Kriukelyte et al., 2024). The tendency has been for this literature to use one of the existing policy instruments classifications (e.g., Hood, 1986; Lascoumes and Le Gales, 2007) to organise the instruments they have empirically observed in smart mobility deployments, mainly those emerging in the Nordic countries. Arguing that smart mobility is an "emerging—and radically new—policy area", Mukhtar-Landgren and Paulsson (2021, p.146) suggest that the policy instruments that governments use can help define and clarify the boundaries of this new policy area. Furthermore, Mukhtar-Landgren and Smith (2019) propose that the choice of instruments (in this case, Mobility-as-a-Service in Norway and Sweden) depends on the role the government sees for itself: either as a promoter, an enabler, or a partner in new private-sector technological deployments. Only Kriukelyte et al. (2024) investigate the interaction between shared mobility and policy instruments; however, their focus is on how policy instruments affect the business models of shared mobility companies. The authors identify relevant instruments used in shared mobility and note distinctions similar to those we highlight in this paper, specifically between the roles of national- and local-level policies. This paper thus provides a good starting point for our more systematic documentation of policy instruments and for the analysis of how governments adapt their instrument selection strategies to the services imposed on them by these private companies.

Given the limited number of studies on shared mobility policy instruments, we also examined the broader literature on transport and policy instruments to identify gaps and better understand how academics in this field have linked the two. While richer, it is still limited. A few authors have proposed

their own classifications of government instruments specific to the transport governance network (e.g., Hull, 2008; Santos et al., 2010; Mercier et al., 2016). These multiple studies indicate that no single classification of policy instruments for the transport sector is widely accepted or consistently applied in academic literature. Considering this, for this paper, we use a simple taxonomy following Howlett (2004) to classify the instruments we identified empirically in our case studies: **substantive** instruments, which are akin to the historical government instruments of policy and regulation and directly affect the policy outcomes, and **procedural** instruments, which are the ones being used by governments in the more modern challenge of network governance (procedural insofar as they attempt to indirectly effect changes in policy processes). Adopting Howlett's taxonomy prevented us from creating another classification in the transport policy literature.

As described above, the literature on policy instruments for the transport sector is limited and mostly descriptive. While the transport literature has not examined the reasons behind instrument choice, the broader academic policy instruments literature has, and proposed different theories on how this process occurs. Historically, instrument selection was viewed as a straightforward choice of selecting the right tool for the right job (Turnpenny et al., 2015); in other words, it involved calibrating an instrument's effectiveness for a specific policy problem. But more recently, authors such as Lascoumes and Le Gales (2007, 3,4) have argued that instrument selection is more nuanced and that instrument choice reveals a "theorization of the relationship between the governing and the governed," reflecting underlying values and knowledge of policymakers about how to exercise social control. Furthermore, policy researchers have acknowledged that instrument choice does not occur in a vacuum; rather, historical, social, political, and economic circumstances must be considered by policymakers before making an instrument choice (Howlett, 1991). The values and context for instrument choice are subject to contestation, making the instrument selection process a pursuit of legitimacy (Bressers and O'Toole, 2005). Actually, both factors (effectiveness and legitimacy) likely play a role in how instruments are selected, as policymakers

need to find a balance between an instrument that serves the purpose at hand and one that will also be accepted by other stakeholders in the policy network and therefore actually gets implemented (Capano and Lippi, 2017). In addition to these elements, cost-efficiency and equity have been identified as additional potential external factors influencing instrument choice (Salamon, 1989). The contemporary literature also identifies 'internal' factors that might influence policy instrument choice (Howlett, 2004; Bressers and O'Toole, 2005; Capano and Lippi, 2017). These include what some authors have termed policy styles (e.g., Simmons et al., 1974; Howlett, 1991), which refer to the distinct ways in which different governments tackle policy problems, and in particular, instrument selection, which might be influenced by factors such as personal or partisan preferences, preferences of national institutions, and historical ways of doing things (Stead, 2018; Howlett and Tosun, 2019; Howlett and Tosun, 2021). Another internal factor that could affect instrument choice that has been identified in the academic literature is that of 'policy coherence', where some instruments naturally reinforce and "work well with each other" (Howlett, 2004, p.7) because they share common ideas or targets (May et al., 2006). For this study, we focus on the theories of legitimacy, effectiveness, and policy styles, however, we note instances where some of the other theories mentioned above might be playing a role in the cases we analysed.

Based on the literature reviewed, we identified some gaps that our study seeks to address. Our study is, to our knowledge, the first to specifically and systematically investigate, identify, and classify policy instruments in the shared mobility policy arena. Furthermore, we could not identify any studies in the academic transport literature that focused on better understanding the underlying reasons and motivations for governments to use certain instruments over others for the governance of shared mobility. Our study, therefore, goes beyond the description of the empirically observed instruments used in shared mobility governance to investigate why government officials selected these instruments and the factors that led to different policy mixes across contexts. Marsden and Reardon (2017) showed that

the literature on transport governance rarely engages with these types of analyses, yet they identify it as a clear area of necessary academic exploration.

The study of policy styles has been conducted almost exclusively at the national or regional level (e.g., the US or EU), and more recently has begun to expand to include different sectors of the economy. But, studying how national styles interact with local instrument selection has rarely been done (Howlett and Tosun, 2021; Lesnikowski et al., 2021). Our study helps fill this gap by focusing specifically on the city policy context and examining how national policy styles may influence local instrument choice.

In the following section, we explain the methods we used in our study.

6.3 Methods

6.3.1 Research design

For this paper, we conducted three case studies of cities where private companies had introduced shared mobility services: Bogotá, Paris, and Los Angeles. We selected these three cities after analysing a broader set of policy responses, as part of a broader research project, from cities in Europe, the Americas, and Oceania.

	Bogotá	Paris	Los Angeles
Population[15]	7.9M	2.1M	3.9M
Density[16]	4,872/km²	19,960/km²	3,183/km²
Modal share[17][18][19]	Walking: 32% Public Transport: 39% Car: 7% Others: 22%	Walking: 11% Public Transport: 64% Car: 11% Others: 14%	Walking: 13% Public Transport: 3% Car: 81% Others: 3%

In total, we analysed 52 distinct regulations in 31 countries where services such as ride-hailing, bike-sharing, scooter-sharing, and on-demand transit had been deployed. After analysing these policy

[15] Recovered from https://www.citypopulation.de/
[16] Ibid.
[17] Bogotá: recovered from https://transformative-mobility.org/wp-content/uploads/2023/12/Bogota-Deep-Dive_Rev_KP_SK.pdf
[18] Paris: recovered from https://www.sfcta.org/sites/default/files/2023-06/SFCTA_Board_VC%20Melgar%20Paris%20Trip%20Report%20PRESENTATION_2023-06-27.pdf
[19] Los Angeles: National Household Travel Survey, 2017.

responses, we created a taxonomy of policy styles[20] under which all the different policy approaches we had identified could be organized:

1. **Umbrella regulations** which focus on defining broad requirements that, if complied with, allow the unrestricted operation of shared mobility services.
2. **Operational permits** that narrowly define requirements for operation of shared mobility services and require prior government authorization before deployment.
3. **Non-binding agreements** which create operational guidelines, but that are not legally enforceable
4. **Banning** of shared mobility services.

From the broader list of cities, we then selected Bogotá, Paris, and LA as examples of each of the three first taxa of our taxonomy:

- In the case of Bogotá, the national government of Colombia implemented an **umbrella regulation** that applied to ride-hailing services across the country and therefore covered the city of Bogotá.
- In the case of Paris, the local government achieved the signature of **non-binding agreements** (charters of good conduct) with local e-moped, bike-, and scooter-sharing operators, where aspects such as safety, sustainability and data were agreed upon between the parties but were not legally enforceable.
- Finally, in the case of Los Angeles, the city adopted a pilot of an **operational permit** in which scooter-sharing operators that complied with certain legally binding requirements would be allowed to operate in the city.

[20] Here we refer to 'policy styles' as the mix of policy instruments governments use to govern a sector (Howlett and Tosun, 2019).

Each case therefore exemplifies a different way of governing the deployment of shared mobility services and can help shed light on different instruments used by governments to address a similar issue.

We also used additional criteria to aid in the selection of cases, such as the research team's familiarity with the broader political context in each city and the availability of relevant data to answer the research questions (for example, in each of the selected cases transcripts of city council sessions were readily available). Furthermore, the research team has a working knowledge of French, Spanish, and English, which further helped to narrow the case selection.

While we used a comparative case study research design, our case selection logic was not focused on the replicability of the results (as suggested by Yin, 1994) but rather on theoretical abstraction. This means that we did not select similar cases with only slight differences to test specific variables and see if changes in these variables would lead to differences in instrument selection. Rather, we selected cases that differed significantly from one another. In that sense, the broader political, social, and economic context of each city was less relevant and was therefore not used as a case-selection criterion. This approach is consistent with our research question #3, as it allowed us to test if extant theories of instrument choice have broad explanatory power.

6.3.2 Data collection

For each of our three cases, we then conducted an in-depth documentary analysis using publicly available information that included official documents (policies, plans, contracts, lawsuits), statements from public sector officials (including press releases, interviews, op-eds), meeting transcripts (including city council or national congressional debates, meetings, and sessions), and news articles. The primary method for searching and locating these documents was through official government websites and government document repositories, as well as Google searches using keywords such as the policy identification number, names of relevant shared mobility companies, and modes (e.g., "shared scooters"). This search was carried out in French, English, and Spanish, accordingly for each case. Where

we identified information gaps, we carried out public/freedom of information requests for known and potentially unknown documents. We collected relevant documents produced starting from the first deployment of each shared mobility service in each city (2013 in Bogotá, 2014 in Paris, and 2017 in Los Angeles) through 2020. The reason for this time range was to eliminate any impact the COVID-19 pandemic might have had on each city's policy response. The data was collected between 2021 and 2022. We collected documents until no additional documents could be found or they were not available or accessible (saturation -Saunders et al., 2018). We organised the documents by publication date using the software nVivo (QSR International Pty Ltd, 2020). We then carried out an initial readthrough which helped us identify any additional documents we might have missed after the initial search and relevant stakeholders for potential interviews (purposeful sampling of elite stakeholders -Palinkas et al., 2015).

6.3.3 Data analysis

Once we had collected these data, we carried out a process of inductive coding (Thomas, 2003). The process consisted of conducting a more detailed read-through of the documents and labelling sections that mentioned either the use of a policy instrument or justifications for its use. Since we employed an inductive coding process, the definitions of *policy instruments* and *justifications* were fluid and circular (i.e., we refined the definitions of instruments and justifications through multiple read-throughs of the documents). We also carried out this coding process using the software nVivo. With an initial list of instruments and general ideas of why they were selected, we complemented the documentary analysis by conducting semi-structured stakeholder interviews, where we were able to gain a deeper understanding of the thinking and processes that led to the adoption of the different policy instruments used by the three local governments. Initially, we carried out interviews with the key policymakers and practitioners in each of the cities that we had identified in our documentary analysis and then asked interviewees to suggest other relevant actors for interview (snowballing sampling technique -Marshall, 1996). We stopped the process when we had reached data saturation or when we could no longer

contact additional potential interviewees. Since we had already completed the documentary analysis prior to the interviews , we created semi-structured interview guides that probed into some of the initial *light-theories* that we had identified (Kessler and Bach, 2014). This allowed us to directly confront our interviewees about whether those initial light-theories were correct and provide them with the space to clarify, deepen, or correct our initial thinking. We then transcribed the interviews and repeated the inductive coding process, which led to the identification of additional instruments and explanations for the motivations behind these choices. This approach is consistent with our research methods which follow a Critical Realist philosophy of science (Bhaskar and Hartwig, 2016). Overall, we reviewed 571 documents (244 for Los Angeles, 181 for Paris, and 146 for Colombia) and conducted 16, 1-2 hour-long virtual stakeholder interviews (eight in Colombia and four each for Paris and Los Angeles).[21]

We then applied a *Theory Testing* Process Tracing (PT) methodology to analyse how well the most instrument selection theories that we had identified in the literature and selected to analyse (legitimacy, efficacy, and national policy styles) fit the new empirical data that we collected in each of our three cases (Beach and Pedersen, 2013). Theory Testing PT is a methodology used to test different pieces of empirical evidence and analyse if this evidence is necessary or sufficient to prove, disprove, weaken, or strengthen an existing theory (Van Evera, 1997; Bennett, 2010; Collier, 2011). Collier (2011, based on Van Evera, 1997) presents a summary of the different tests that are carried out for a PT study: “straw-in-the wind,” “hoop test,” “smoking gun,” and “doubly decisive.” While we do not use these names in this

[21] The number of documents reviewed for Los Angeles is significantly greater to the numbers for the other two cities because Los Angeles systematically collects and transcribes public comments received during city council meetings. While we reviewed these transcripts, we ultimately discarded them due to them not being relevant to our research. Regarding the number of interviews, the policy process and analysis we carried out in Paris and Los Angeles was relatively short (only 3-4 years) whereas the process and time-frame we analysed in Bogotá took over a decade. This means that there were more people involved throughout this period in Bogotá, accounting for the difference in number of people interviewed. As explained in the text, however, we were satisfied with having reached data saturation in all three cases and we estimate that we would not have gained additional relevant data with more interviews or more documents.

paper, we clarify when our evidence strengthens/weakens or proves/refutes one of the theories under test, which is what each of these tests attempts to do.

In our study, the empirical evidence we were putting under test consisted of the explanations of what motivated policymakers to select different policy instruments in each city. We, therefore, used the results from the second inductive coding process (the one that included both the documentary analysis and results from our interviews) to see if these explanations strengthened/weakened (*straw-in-the-wind* and *hoop* test) or proved/disproved (*smoking gun* and *doubly decisive* tests) the theories under test. An example of this process can be seen in a policymaker's explanation during one of our interviews that their sole motivation for adopting policy instrument A was that it was the customary approach in that city. This would provide strong evidence that would strengthen the theory of policy styles as an explanation for policy instrument choice. Out Theory Testing PT process, therefore, presents evidence that can help improve or refute the existing theories we put to the test.

6.4 Results

The following sections provide a condensed historical account of the deployment of the shared mobility services that we studied in each of the three cities of interest. Our period of study extends from the initial deployment of each shared mobility service in each of our study cities until 2020. We have kept the narrative portion of these accounts short to provide a high-level introduction to the context of each case, and have captured most of the relevant information as timelines of events in figures Figure 20, Figure 21, and Figure 22. In each timeline, we capture both events and policy instruments used; however, due to space constraints, we have not captured in these timelines all the events and instruments identified. We then summarise all the instruments we identified in all cases in section 6.4.4. Then, in section 6.4.5 we describe what we identified as a '*structuring instrument*', which is the instrument used in each case that served as the foundation under which the policy mix was built on.

Finally, in section 6.4.6, we present the results of our identification of the motivations that policymakers used to justify their selection of these instruments.

6.4.1 Governing ride-hailing services in Bogotá

In September 2013, Uber, a then-new multinational private company, deployed its ride-hailing services in the city of Bogotá. Ride-hailing services are a form of shared mobility in which users can request a car and driver to take them to their destination. These services normally work using mobile phone apps instead of the classic street-hailing action but provide essentially the same service as a traditional taxi.

The 1991 Colombian constitution and laws that govern the transport sector in the country identify public transport as an “essential public service” that can be provided by authorised private entities under close direction, regulation, and control by the State (Congress of Colombia, 1993). Traditional taxi services had indeed been historically provided by private entities under close regulation by local governments. Unlike traditional taxi services, however, Uber started providing its ride-hailing services using what was locally known as ‘white cars’, which were vehicles that were authorised to provide private transportation online (such as for hotel guests or students). Unlike taxis, these vehicles had to be authorised to operate by the national (not local) government, could not be hailed on the street, and had to, amongst others, be painted white. Since white cars were not authorised to provide regular taxi services, in May 2014, the local government of Bogotá declared ride-hailing services illegal and decided to use the existing legal framework to try to impound vehicles that were providing this illegal service.

This was just the beginning and first example of the government of Bogotá using an available policy instrument to steer the direction of ride-hailing services in the city. For the next years, and until today (although our research focused only on the 2013-2020 period), the city and national governments have employed a vast arsenal of policy instruments to try to pursue the goals they see for the transport sector; from ‘blunt’, substantive instruments such as lawsuits, to procedural ones such as working groups with the private sector, all arguably achieving limited success considering that even in 2023, these

services are still considered to be operating in a legal vacuum (Jaramillo and Laya, 2023). Figure 20 presents a timeline of the most relevant events in the 2013-2020 period since the first deployment of ride-hailing services in the country, where we identified most of the policy instruments used.

Figure 20: Timeline of events since deploying the first ride-hailing services in Bogotá until 2020. Please note that the shades of blue are used to distinguish events happening in different years. At the same time, sections underlined in orange denote procedural instruments and sections underlined in green denote substantive instruments.

6.4.2 Governing shared micromobility services in Paris

French cities were some of the pioneers of modern shared mobility with their public bikesharing systems. Specifically, Paris has offered its Velib' services since 2007 and, later in 2011, it added a public car-sharing system called Autolib'[22]. Like taxis in Colombia, these public transport services were operated by private companies. Still, they were closely regulated by the local government through a contract between the private operators and the city. This public-private arrangement changed in 2014 when a private company called CityScoot decided to deploy a fleet of shared mopeds in the city. Unlike the Velib' and Autolib' systems, however, this new service did not go through a public tendering process nor contract, and its launch was done without coordination with the city who, at the time, was planning its own electric moped sharing system: Scootlib'. In 2017 and 2018 multiple other private companies followed this same model with the deployment of their own fleets of mopeds, bicycles, and electric scooters. Give this proliferation, the city used multiple of its available policy instruments to influence their operations. During these years, a national law (Law 82-1153 from 1982) guided the provision of public transport services and established the need for a contract between public transport operators and the cities in which they operated. However, with the deployment of these shared mobility services which were operating in a legal vacuum, the city had little recourse but to use procedural instruments such as non-binding charters of good conduct to steer these services towards its goals for the transport sector. Figure 21 shows a timeline of the events since the registration of CityScoot in 2014, until the signing of contracts with three electric scooter sharing operators in 2020 using a new policy instrument created in the new Mobility Orientation Law (LOM) of 2019 (which replaced Law 82-1153) that allowed the city to charge these companies for the use of public space. Despite these efforts, the city ultimately held a referendum in 2023 that led to the banning of these services in the city (BBC, 2023).

[22] It should be noted that Autolib was discontinued in 2018 after financial losses claimed by the company that used to operate it. The system had both successes and failures in its goals, as noted by Barlow et al. (2022).

Figure 21: Timeline of events since deploying the first shared micromobility services in Paris until 2020. Please note that the shades of blue are used to distinguish events happening in different years. At the same time, sections underlined in orange denote procedural instruments and sections underlined in green denote substantive instruments.

6.4.3 Governing shared scooter services in Los Angeles

The city of Santa Monica, a neighbouring town of Los Angeles, saw the birth of scooter-sharing services in September 2017 when the private company Bird deployed a fleet of these vehicles throughout the city. Riders could unlock a scooter for a fee and then ride it and drop it off at their destination. Since these vehicles did not have to be docked to a station and could be left anywhere, they were called “dockless”. At the time, other companies had deployed similar services using bicycles instead of scooters in many places worldwide. However, the city of Los Angeles had not permitted the operation of those services inside its borders. This changed in October 2017 when Council member Ryu introduced a motion that instructed the Los Angeles Department of Transportation (LADOT) to carry out a pilot program to test the deployment of these services in the city and to create a feasible regulatory framework based on the lessons gained from the pilot. In the following months, other companies, such as Ofo and LimeBikes, announced their intentions to deploy their vehicles in different areas of the city. Council member s were starting to receive complaints from their constituents about these vehicles and fearing what they had observed in other places around the world where dockless bikes had been left abandoned as their parent companies went out of business, Council member Englander introduced a motion to issue a moratorium on these services until LADOT would issue its pilot program. After this initial hurdle, the city did run a one-year pilot program that started in March 2019 and guided the permitting of 37.000 of these vehicles.

Figure 22: Timeline of events for the Los Angeles Dockless Vehicle Pilot Program since the deployment of the first scooter-sharing services in Santa Monica until 2020 (we included a relevant event in 2021 for information purposes). Please note that the shades of blue are used to distinguish events happening in different years. At the same time, sections underlined in orange denote procedural instruments and sections underlined in green denote substantive instruments.

6.4.4 Summarising the instruments of shared mobility governance

Table 8 and Table 9 below summarise the instruments we identified in each of the three cases. As explained in the literature review section, we used Howlett (2004) as our framework to classify these as either substantive (directly affecting policy outcomes) or procedural (indirectly affecting policy processes through the coordination of governance network actors). We identified a total of 52 instruments, of which 30 were substantive and 23 were procedural. To identify these instruments, we carried out an inductive coding process, as explained in the Methodology section.

Table 8: List of substantive instruments identified in each case.

	Substantive instruments	**Definition**	**Bogotá**	**Paris**	**Los Angeles**
1	Authorisations	Explicit authorisation by the legislature for the executive to take a specific action.	X		X
2	Bans or prohibitions	When a government officially declares that a shared mobility service cannot be provided in its jurisdiction.		X	X
3	Charters of good conduct	Non-binding documents that attempt to regulate the operation of shared mobility services.		X	
4	Competency definitions	When a legislative body delegates the power to the executive branch to define the competency of a public entity to do something as defined in a law.	X		
5	Concession contracts	When the government establishes the specific contracting mechanisms that cities need to use to engage shared mobility operators.	X		
6	Document validation	When government staff checks the validity of the documentation given to them by a shared mobility operator.	X		
7	Enforcement authority	When a legislative body gives the government the power to enforce a law or regulation.	X	X	X
8	Ethnography or user observation	Directly observing how users are behaving to better inform policy processes.	X		
9	Fare definition	When the government establishes user fares specific to shared mobility	X	X	X

		services, or part of their services (e.g., a differential “low-income” fare).			
10	Fee collection	Collecting fees for activities that a private shared mobility operator needs to do, such as registering the company to allow it to provide a shared mobility service.	X		
11	Laws, norms, and regulations	Legislative or executive documents that define the expected actions of public and private entities.	X	X	X
12	Lawsuits	Using the judiciary branch to resolve a dispute between actors.	X		
13	Legal interpretations	When government officials provide their own interpretation to existing laws or regulations, with the objective of stretching the existing legal framework to suit their policy goals.	X	X	
14	Monetary incentives	When governments provide financial resources in exchange for a desired behaviour.	X		
15	New projects and investments	Projects or investments separate from the specific policy at hand (e.g., the creation of a bike lane to effect a change in rider behaviour)		X	X
16	Non-monetary incentives	Intangible benefits (e.g., the “taxi-driver day” created in the city of Bogotá) to incentivise certain behaviours by shared mobility operators.	X		X
17	Operations	Direct provision by the government of a shared mobility service.			X
18	Operational fees	Monetary compensation paid by a private company for the right to operate a shared mobility service.			X
19	Permits	Direct authorisation from the government to a private company to operate a shared mobility service.	X	X	X
20	Pilot programs	A time-bound way to regulate shared mobility services with the specific object of experimenting with different forms and levels of regulation.			X
21	Plans and strategy documents	Official documents outlining the government’s thinking on shared mobility.	X	X	X
22	Real-time data management	Use of novel data gathering tools to improve the policy process.	X	X	X

23	Registrations	Requirement to register the shared mobility vehicles directly with the government.		X	
24	Resolutions	The end of the legislative process when council resolves that the city should take a specific action.			X
25	Requests for proposals (RfPs)	A government document inviting the provision of a service or good.		X	
26	Sanctions	Penalties imposed by the government on shared mobility operators for not complying with existing policies and regulations.	X	X	X
27	Surveys and information gathering[23]	Research conducted to improve the policy process and design.	X	X	X
28	Tax exemptions or new taxes	Tax exemptions or new taxes to seek certain behaviours from shared mobility companies.	X		
29	Technical studies	Studies commissioned by the government to investigate and advise on a topic related to shared mobility.	X	X	X
30	Technical and digital tools	Use of digital tools to improve the policy process.	X	X	X

The table above shows how all three cities used a large mix of substantive instruments to govern the deployment of shared mobility services. Bogotá used a total of 21, Paris a total of 16, and Los Angeles a total of 18 instruments. Certain instruments were used across all three cities, including plans and strategy documents, technical studies, sanctions, permits, laws, fares, and enforcement authority. Bogotá was the city that used the most unique instruments, most of which are specific to Colombian law, such as document validation (homologation) and competency definitions. We also saw how Bogotá and the national Colombian government turned to the judicial system by suing shared mobility companies to exert the power they understood had been given to them by the law. Paris and Los Angeles took alternate routes that relied on other, less coercive instruments, such as issuing operational guidelines or using investments that would support the operation of shared mobility companies, such as transforming

[23] Please note we classified "surveys and information gathering" as both a substantive and procedural instrument as it affects both the policy outcome and the policy process.

on-street automobile parking spaces into shared micromobility parking corrals. All three cities also relied on digital tools that were developed specifically for the deployment of shared mobility, showing an evolution in the instruments that governments use to adapt to new challenges and take advantage of new technologies. Paris was the only city that used charters of good conduct that relied on the private operators' voluntary compliance.

Table 9: List of procedural instruments identified in each case.

	Procedural instruments	Definition	Bogotá	Paris	Los Angeles
1	Committees	Inter-institutional government committees created to study an issue stemming from shared mobility operations.	X		
2	Consultant hiring	When the government seeks external consultants to carry out certain activities that are deemed outside the competence of current staff, or to bring in a more neutral third party into negotiations with the shared mobility operators.	X		X
3	Council motions	The start of the legislative process, when a Council member asks the city to take a specific action.			X
4	Debates	A process where the legislature is called upon by one of its members to discuss issues related to shared mobility, but no legal or regulatory output is expected.	X	X	
5	Education and trainings	Providing education campaigns or trainings aiming to change the behaviour of operators or users.	X	X	X
6	Engagement with other levels of government	When the executive branch reaches out to other areas of government for information or support.	X	X	X
7	Engagement with universities and NGOs	When government entities reach out to universities or non-	X		X

		governmental organisations for information or support.			
8	Events	Public events used to express the government's opinion of a specific topic.		X	
9	Expressions of wishes	The legislative body expressing its desires on action to be taken by the executive, but with expected no legal or regulatory output.		X	
10	External funding requests	Finding sources of funding external to government budgets (e.g., research grants).			X
11	Guidelines	Non-binding indications about how certain topics should be handled (e.g., parking of shared mobility vehicles).			X
12	Inter-government memos and requests	Documents used by the a government institution to reach out to other areas of government for information or support.	X	X	X
13	Laissez-faire approaches	Officially expressing that the executive branch will not take action.	X		X
14	Letters	Similar to memos, but directly issued by a government official instead of an institution.	X	X	X
15	Meetings and feedback from the private sector	Meetings held by the government to gather direct feedback from shared mobility operators.	X	X	X
16	Peer engagement	When government entities reach out to their peer entities in other cities for information or support.		X	X
17	Political negotiation	Behind-the-scenes arrangements between different levels of government to pursue certain goals or negotiation tactics.			X
18	Public participation	Receiving input from the citizens that might affect the policy process.	X	X	X
19	Public statements and press releases	Official documents intended to inform the public of the position a government institution is taking on shared mobility.	X	X	X

20	Requests to operators	The government expresses its (non-binding) wishes to private operators.		X	
21	Staffing and capacity development	Increasing staffing levels to deal with shared mobility operations.			X
22	Storytelling	Participating in non-official spaces (such as podcasts) to express why the government is acting the way it is.			X
23	Surveys and information gathering	Research conducted to improve the policy process and design.	X	X	X

We can see from Table 9 above, how all three cities employed many procedural instruments, with 13 instruments in Bogotá, 13 in Paris, and 18 in Los Angeles. Of these, six instruments were used in all three cases. All three cities relied on information gathering and negotiation across multiple channels, including meetings with private operators, other levels of government, peers, and research institutions, underscoring the networked nature of the shared mobility policy space. Other instruments used exclusively by Paris included requests to operators and expressions of their wishes in council meetings. These procedural instruments show the limited recourse to substantive instruments given the city's lack of a national legal framework.

6.4.4.1 Data standards

Of all the instruments we identified, data standards were the only ones that we had not previously identified in the literature. We therefore make a special call-out in this sub-section to elaborate on it.

All three cities developed a data-sharing standard to automatically collect operational data from shared mobility services. Los Angeles created its Mobility Data Specification (MDS) and made it a central part of its operational permit, requiring operators wishing to deploy shared micromobility devices in the city to comply. Likewise, Paris developed its Service Interface for Vehicle Use (SIVU) standard, developed together with the shared micro-mobility operators and included in the charters of good conduct signed

with them. Finally, Bogotá developed its own data standard to comply with the national government's regulations for premium taxi services, and required taxi companies to comply through a local Decree.

All three city governments felt that the existing instrument menu was insufficient to carry out their desired governance tasks and, therefore, saw the collection of new data as fundamental to tackling the challenges of shared mobility. In Paris, a practitioner with the Office of Transport and Public Space explained in one of our interviews that:

> "*In terms of data, it very quickly became apparent the importance of collecting data on these new uses* [since for micromobility] *we didn't have any suitable sensors, no surveys with significant historical depth. So, the idea that emerged quite quickly was that we had to have access to the data that was produced by the operators, since it was obviously a service based on digital infrastructure and data*".

This quote shows how local policymakers understood that the nature of the problem that they were trying to govern was fundamentally different (based on digital data) from other issues they had faced in the past, and therefore, developing new and more appropriate policy instruments was a necessity. However, Los Angeles did not only perceive MDS as an effective tool to support their broader instrument mix; it also experimented with using the standard as a mechanism to update the policy mix faster than what could be done previously. As a LADOT directive commented in one of our interviews

> "*We have this living language in the regulation that says: 'thou shalt comply with the Mobility Data Specification, or any version thereafter' right? which created a living breathing rule that we had the discretion to continue to change*."

This instrument, therefore, gave LADOT the power to quickly experiment and iterate on the use of other instruments in its quest to find the most effective instrument mix.

However, the creation of this new instrument did not come easily. While all three cities perceived that this new instrument was an effective one to tackle the policy problems created by shared mobility, its deployment became a power struggle with some of these private operators: "*if we can't audit the data in real time out in the field, then it's not reliable for regulatory purposes* (…) *this is basically… it's a fight*

over whether government is entitled to the truth", mentioned a staffer from one of the council offices of Los Angeles in one of our interviews who explained that some companies were resisting the authority of the city to enforce the use of MDS. This suggestion was reinforced by another LADOT executive team member who bluntly argued that not having access to real time operational data was like "*bringing a knife to a gun fight*". These quotes show that even if the city was convinced of the efficacy of MDS, it was still necessary for them to demonstrate the legitimacy of this instrument, as its interpretation could be easily contested by the private companies that it would affect.

6.4.5 Identifying the 'structuring instruments'

Despite the vast number of instruments used by each city, from the interviews we conducted, we concluded that not all instruments carried the same weight in the minds of the policymakers and practitioners who enacted these. In each case, our interviewees identified certain instruments that we have defined as 'structuring instruments', which served as a foundation for all other instruments (the policy mix) to be built upon. With this foundation in place, all other policy instruments used ('supportive instruments') naturally synergised with each other. In the case of Bogotá, we identified two structuring instruments that evolved over time. Initially, driven by the understanding that ride-hailing services were illegal, the structuring instrument was *enforcement*. This means that the other instruments used by the government at this time, such as defining the competence of different entities, lawsuits, and sanctions, were all in support of the enforcement instrument. Later, a *national decree* regulating luxury taxis became the structuring instrument, and similarly, the new supportive instruments used showed coherence among them. In Paris, the structuring instrument was the *charter of good conduct*, which was not legally binding but allowed for an organised operation of shared micro-mobility services. In Los Angeles, the *permit* served as the structuring instrument that allowed multiple scooter-sharing companies to operate within the city, providing clear guidelines and boundaries for their scope of action.

6.4.6 What led to the adoption of structuring instruments?

At the time of the arrival of shared mobility services, neither the Colombian nor the French legal systems provided any instruments that allowed city governments to manage these services. In both cases, national governments issued new national-level laws to update their legal systems and create new instruments that were more suitable for their local governments' challenges with shared mobility services. While these new laws were being adopted, Paris and Bogotá were already facing challenges with the deployment of shared mobility services and therefore had to act without a national legal framework. In this context, acting meant employing existing policy instruments that allowed them to counter the problems that they were already facing.

For Bogotá, the lack of a national law meant using the city's existing enforcement power to stop what it interpreted as an illegal service. A local policymaker during the time when ride-hailing services appeared mentioned in one of our interviews how:

> "(…) *the role that the Secretary* [of Mobility] *has is to exercise control, right? Especially since Uber arrived in Colombia, in Bogotá, without having an operating license (…) the Secretary* [of Mobility] *must exercise control and ensure that the norm is complied with.*"

Through this interpretation of the illegality of shared mobility, the city was constrained in its instrument selection choice and, therefore, decided to use a range of substantive enforcement and control instruments that reinforced the selection of its structuring instrument of enforcement power. These included directing the police to stop ride-hailing vehicles, monetary sanctions, and lawsuits against ride-hailing companies.

In the case of Paris, instead of declaring these services illegal, the government created a new governance tool which became its structuring instrument: the Charter of Good Conduct. The competence of the mayor's office to create these charters was not defined in law, meaning that they were not legally binding. This further meant that their effectiveness relied on the voluntary compliance of private micro-mobility operators, leading the government to rely heavily on procedural instruments, such as regular

meetings with the operators and public statements from government officials. Again, all these supportive instruments were synergistic with each other, as they were built upon the structuring element of the Charter. The charters were therefore used to circumvent the lack of a legal framework and at least provide the city with an adequate mechanism to keep the situation on the streets from escalating out of control (as government officials feared could happen based on their observations of shared micro-mobility services in other parts of the world). A policymaker with the Deputy Mayor for Public Space's office mentioned in one of our interviews that:

> "*At the very beginning (…) we started working on charters of good behaviour, since* [shared micromobility] *was not something that we could really regulate…* [it became] *a dialogue that we put in store with the operators in order to share the city's vision on how these new mobilities could be integrated in the public space, and as well, it was a way to better understand these new modes*."

This quote illustrates how, like Bogotá, Paris' instrument choice was constrained by the lack of a national-level legal framework. Still, unlike the Bogotá case, this constraint led the government to innovate in creating an instrument that provided an adequate (though not ideal, in their view) way of addressing the issues they were facing.

Once the national governments of Colombia and France had successfully created a new legal framework that allowed new instrument selection at the local level, Paris and Bogotá quickly pivoted their instrument selection strategies. In the case of Bogotá, enabled by the new structuring instrument of the national decree that allowed the regulation of ride-hailing services as *premium taxi services*, the local government pivoted from a substantive instrument selection strategy to combat illegal ride-hailing services to one in which procedural instruments became more prominent. In this regard, the local government utilised instruments such as non-monetary incentives and training to enhance existing taxi services, enabling them to compete with ride-hailing companies. In the case of Paris, the new national mobility law (LOM) allowed the local transport authority to issue titles to private companies for the use of public space, making this the new structuring instrument. This, therefore, led to a shift in strategy

from procedural to more substantive instruments, as noted by a practitioner with the mayor's office of Paris in one of our interviews:

> *"(B)efore the […] LOM, free floating was not really […] recognized. The LOM, article 41, recognizes that free-floating fleets are doing an occupancy of the public space. So, [this] gave us some tools in order to be prescriptive, to organize these new mobilities. But before that, it was difficult to justify that just a bike or an e-scooter that was on the public space… why they should pay for a fee? why we should regulate them? Because they [the legal instruments] didn't exist before.".*

Again, although the choices for both governments were more agreeable to the local policymakers, they were still constrained by the new legal framework dictated by the national government.

Unlike Paris and Bogotá, Los Angeles didn't depend on a higher level of government (e.g., State, or Federal) to create a regulatory framework for shared mobility. The city had the power to create one itself through the city council and was, therefore, free from the type of national-level structural constraints that both Bogotá and Paris had. In this case, the council created a temporary solution allowing the legal operation of shared scooter services in the city. Still, it did not feel they had enough information to create an adequate instrument mix for their specific case. This, therefore, led to the use of a pilot program as the structuring policy instrument. The pilot program would allow them to experiment with different policy mixes as they learned how the new technology could be managed (governed). A senior staff member of LADOT commented during one of the transportation committee council meetings at the early stages of the pilot program development that:

> "*It's important for us to continue to evolve with technologies as they are presented to the city and evaluate them. Understand the different levers that we have, to manage and to learn from them so that we can make recommendations to this policy committee about how that should grow*".

The quote, supported by some of the strategy documents that LADOT published and we reviewed, as well as additional information gathered from our interviews, indicates that Los Angeles' choice of policy instruments was motivated by a desire to learn and educate themselves through experimentation.

Specifically, the practitioners leading the pilot process at the time felt that they needed to replicate some of the strategies the private companies deploying these services were using, notably to iterate and improve as quickly as possible.

6.5 Discussion

In this section, we interpret the instrument selection strategies employed by policymakers and practitioners in each city using the theories of policy selection that we identified in the literature review, specifically national policy styles (Section 6.5.1) and legitimacy vs. efficacy (Section 6.5.2).

6.5.1 National policy styles

As explained in the results section, Colombia's lack of a national legal framework led the city of Bogotá to select enforcement as its structuring instrument. The city resorted to selecting an instrument it knew and was comfortable with, rather than innovating in its instrument design or selection strategies. On the other hand, faced with similar constraints, Paris' strategy was to innovate in policy instruments. Instead of reverting to established instruments, Paris decided to devise a method that was not even legally defined to pursue its own goals.

However, from our analyses (exemplified by the quotes presented above – e.g. "[we must] *ensure that the norm is complied with*" in Bogotá and "[shared micromobility] *was not something that we could really regulate*" in Paris), the policymakers in both cases understood that their instrument choice was constrained and influenced by their own circumstances. This is consistent with the findings of Kriukelyte et al. (2024), where they noted that local conditions create variations in policy approaches to shared mobility. In both cities, instrument choice at the local level was constrained (and therefore guided) by national historical trajectories, institutions, national-local relationships, and laws that created an environment in which local policymakers felt they needed to do things a certain way. This provides supportive evidence for theories of policy styles, particularly for path dependency (Howlett and Rayner, 2006). Yet, these two diverging instrument selection strategies show that policy styles are merely part of

the contextual *structure*[24] that constrains policymakers' choices. However, what ultimately guided instrument selection in each case was the agency of individual policymakers and their willingness to innovate (or not) in their instrument selection strategies when faced with a restrictive policy context. This concept of path dependency in policy styles is espoused by Levi (1997), who explains that routinization (Capano and Lippi, 2017) occurs when the perceived costs of taking a different path are too high. The costs in these cases are those perceived by policymakers and practitioners directly involved in the governance of these services. In Bogotá, the cost was perceived as trying to innovate in an environment of outdated national policies, whereas in Paris, the cost was perceived as inaction in the face of the real problem of already having scooters on the streets.

We didn't find any evidence in the Los Angeles case that national or state policy styles played a role in its instrument selection strategy. However, the city faced a potential challenge that could have altered its instrument selection strategy when the California State Assembly was discussing a bill (AB 1112) that had the objective of modifying California's vehicle code to add a definition for shared mobility devices and dictate what local authorities could do in terms of regulation of these services. The bill eventually failed, but it would have constrained the options available to the local policymakers for governing these services.

6.5.2 Efficacy and legitimacy

Following the changes in Colombia's national policy context, which allowed for a shift in the instrument selection strategy, the local government of Bogotá began working closely with the incumbent taxi operators to help them improve their service, enabling them to operate under the new premium category and better compete with ride-hailing services. This starkly contrasts with the pre-national regulation time, where substantive legal instruments were their preferred choice. So, while the local

[24] We use the term "structure" here in the critical realist sense. That is, structures are real objects that limit or enable the scope of action of social agents.

government still saw ride-hailing services as illegal, the newly created regulation allowed the city to remove themselves from what had become a difficult legal and public opinion debate, to focus on something that they perceived was more under their control and a more effective tool to improve the quality of the individual public transport services for users (which was one of their main policy goals – see Castellanos et al., 2024). In other words, still constrained by national policy, policymakers in Bogotá were attempting to pursue an instrument selection strategy that would lead to more effective instruments to achieve their policy goals, providing supportive evidence for efficacy theories of instrument selection.

In the case of Paris, the city government had been vocally advocating for the new public space-occupancy fee instrument to the national government because it felt it was the most effective one to tackle their situation (in other words, they saw this as the most suitable instrument for their situation). At the same time, the legitimacy of this instrument was something that the local government did not have to focus on, as it stemmed from the lengthy consultative process undertaken by the national government to adopt the LOM (a process that took multiple years). This suggests that when given the choice, local policymakers can more easily focus on designing instruments with efficacy in mind, and this, in turn, provides a strong indication that efficacy is what dictates instrument selection in shared mobility.

Los Angeles' motivation was to learn quickly to create the right instrument mix for the policy issue at hand (efficacy). Yet, local policymakers had to grapple with the need for swift action, as shared scooters were already being deployed on the streets. This led to policymakers' constituents demanding quick and effective action that they understood as responsive to their demands (for example, the problem of users parking these vehicles on the sidewalks of heavily pedestrian areas, such as Hollywood Boulevard, which created a perception of chaotic deployment and pedestrian safety issues). This meant that any governance action taken by policymakers had to seem both effective and legitimate in the eyes of the local citizens. Furthermore, the city was innovating in the creation of a novel instrument (data standards

– explained in section 6.4.4.1 above) which created friction against some of the companies operating these vehicles because of the potential overreach of the local government with respect to individual privacy laws at the State level (see, for example, the lawsuit from Uber that we noted in Figure 22). Los Angeles's actions regarding this instrument, therefore, had to be seen as legitimate not only in the eyes of the citizens it served, but also to the eyes of the private companies it was attempting to govern. In other words, instrument innovation was not just a technocratic process but required consensus building, which was achieved by LA using multiple procedural instruments such as meetings with the operators, interviews with the press, and political negotiation. This shows the difficult balancing act that policymakers are trying to handle by adopting effective policy instruments that are seen as legitimate. This further provides evidence of the explanatory power of the theories of efficacy and legitimacy.

In the Los Angeles case, as structural constraints did not burden the city, we observed how local policymakers and practitioners were guided by a need to balance efficacy and legitimacy when selecting policy instruments. Similarly, in Bogotá and Paris, efficacy seemed to be the dominant explanation for their instrument selection strategies, especially as legitimacy was already given by the existing regulatory and policy processes followed by the national governments. These cases, therefore, provide compelling and supportive evidence of the explanatory power of the theory of efficacy and legitimacy.

6.5.3 Redressing power imbalances created by network governance

In addition to providing new evidence for and against theories of instrument selection, the three cases showcased a contrast with some of the prevailing literature on policy instruments in smart cities. As noted in the literature review, authors who straddle these two domains view the ‘smart city’ as a policy instrument used by local governments to pursue their goals. In contrast, in the cases that we analysed, shared mobility is not a decision made by local governments, but rather an imposition made upon them by private companies. This turns the selection of instruments less into an expression of the goals being

pursued by cities, and more into a mechanism to manage the tensions created by the pursuit of goals that don't align with those that cities seek (most likely profit – (Martin, 2016)).

This imposition by external actors clearly exemplifies how the transition to network governance has shifted the power balance away from public sector entities. However, these entities are using instruments such as cooperation with other cities, NGOs, and academia to regain some of this power. In this sense, instrument selection was not only focused on identifying the most effective and legitimate instruments to address the problems created by shared mobility, but also on regaining some of the power lost to the private sector during the transition to network governance. The use of cooperation as a policy instrument, therefore, takes on a new meaning, as it was employed by all cities to 1. manage conflict and 2. reassert their role as policy conductors, rather than mere spectators. This is a stark difference from the conclusions of Mukhtar-Landgren and Smith (2019), who propose that public actors see a more positive role for themselves in smart mobility transitions (enabler, promoter, or partner) and use policy instruments accordingly, rather than to reassert their own power in this policy space.

6.6 Conclusions

For this paper, we sought to investigate the policy instruments that city governments use when dealing with the deployment of shared mobility services by private companies and test their reasons for selecting these instruments against theories of instrument selection.

We identified multiple instruments used to govern the nascent shared mobility policy space (52 total). We then classified these as substantive or procedural instruments following Howlett (2004) typology. Drawing from the literature reviewed, the distinction between substantive and procedural instruments reflects broader changes that have been happening in the transport policy space, specifically, the shift from top-down governance to a more networked governance approach characterised by the need for governments to interact with new players such as private companies, research institutions, and civil society organisation (Rhodes, 1996; Kjær, 2004). While not exhaustive due to the limitations of

conducting detailed case studies, this list of instruments provides a first (to our knowledge) identification of policy instruments used specifically for governing the shared mobility governance space. It can, therefore, serve as a solid starting point for other researchers to build upon.

We found evidence suggesting that, in the shared mobility policy space, local governments' selection of policy instruments is highly constrained by contextual factors beyond their control. These contextual factors are related to larger *structures* (in a Critical Realist sense) created by past policy decisions of higher-level governments (national or state) when shared mobility deployments did not exist. Since structures only constrain actions, local governments are demonstrating their agency through a policy mix of traditional and innovative instruments to circumvent the constraints imposed by past policy decisions.

Another conclusion from our research is that these contextual factors are not immutable and that, as they change, so do the policy mixes used by local governments. Factual and counterfactual examples of these can be seen in our three cases: as national regulations caught up in France and Colombia, the instrument selection strategy used by the local governments of Paris and Bogotá changed noticeably, and both governments started using different instruments to the ones they had used before the national regulations were enacted. On the other hand, Los Angeles maintained a consistent instrument mix throughout our research period as it did not face any changes in the larger policy framework dictated by the government of the State of California (although there was indeed a failed attempt at modifying it).

The policy styles literature proposes that policy mixes are influenced by a preference for doing things a certain way because of historical trajectories or existing institutions and have, therefore, been shown to be similar and consistent over time. However, our results suggest that when addressing the governance of shared mobility, local governments do not follow policy styles; rather, their instrument selection strategies are mostly guided by finding a balance between the efficacy and legitimacy of the instruments they are selecting (constrained by their context).

In the literature review, we had also identified additional potential theories of instrument selection (efficiency, equity, and policy coherence). While our study didn't focus on these because they are not identified in the literature as the main drivers of instrument selection, we can still add some relevant commentary on our appreciation of them. For example, we identified instances in which equity may have played a role in selecting certain instruments over others. This is particularly evident in Los Angeles, where equity was one of the city's goals. This led to the choice of instruments such as non-credit card payments. However, we would argue that, since equity was a goal, this choice of instruments reflects policymakers in LA's view that it was an effective means to achieve their goals, rather than a choice made for equity reasons. Additionally, contrary to what the literature on policy coherence has identified so far, where common ideas or targets are the main drivers of policy coherence, our study suggests that the novel concept that we introduced in this paper of 'structuring instruments' can be, themselves, drivers of policy coherence within a single domain. Additional research will be needed to assess whether common ideas or structuring instruments are the main drivers of policy coherence. Finally, we didn't identify any instances where efficiency was seen as a driver of instrument choice.

Another relevant conclusion from our study was that the cities we studied felt the existing policy instruments they had used were insufficient to guide the direction of this space. Therefore, all cities experimented with new digital instruments. These digital instruments were perceived as more effective and almost existential in addressing the new challenges of shared mobility. But they also became a signal of a deeper power struggle that shows some of the difficulties that local governments face when governing in a fragmented policy network and, therefore, sheds light on another motivation of instrument choice: reclaiming power lost through network governance. The need to regain some of the power they had relinquished to private companies again doesn't fit within the theories of instrument selection that we tested and is, therefore, an interesting area of exploration given the expansion of governance networks where power will continue to shift away from governments.

6.7 Relevance for policymaking

Our study can inform the live policy debate on shared mobility by providing public policymakers and practitioners with more information about how others have approached the governance of this policy space. Local governments can look at the list of 52 distinct policy instruments we identified and use this as a sort of menu of options to choose from and craft their policy mixes. The identification and documentation of the data standards instrument will allow other governments facing similar challenges to those presented by shared mobility to understand how it could support them in pursuing their own goals. Related, we introduced the concept of 'structuring instruments,' which can help guide the creation of new policy mixes by assisting governments in clarifying which instrument can serve as the structure from which other policy instruments can attach to and, therefore, deliver a coherent policy mix.

By showing that, in this policy arena, legitimacy and efficacy are the driving forces behind instrument selection, our study supports policymakers to be more strategic about their instrument choices and explicitly craft policy mixes that balance these two competing forces. This is important because we didn't find evidence from our interviews that policymakers and practitioners were consciously trying to achieve this balance and that it seemed to be more of an unconscious tendency, perhaps mediated by experience.

Overall, we hope that our study can empower local governments to design more effective policies as they continue to grapple with the advent of new technological services in the mobility sector, even beyond shared mobility.

6.8 Limitations of our study

Despite our best efforts, our study has some limitations, particularly in the interpretation our interviewees gave to different events. Their perspectives, though mostly coherent between each other, reflect a biased perspective of the events. We tried to limit this effect by using triangulation techniques that helped us corroborate the interviewees' opinions with other more objective sources such as policy

documents or news pieces. We were also careful to let the interviewees know that their interviews would be kept anonymous and that we would only use unattributed quotes to strengthen certain arguments. This should have hopefully led to more liberty for our interviewees to speak freely without any potential negative impacts on themselves. Yet, we acknowledge that interviewee bias could have influenced our results.

Additionally, while we suggest that the results observed could have implications for policymaking in the transport sector and across other policy domains, this is just a theoretical appreciation, and additional evidence and studies will need to be carried out to test this hypothesis. In particular, while we suggest that some of the instruments we identified could be used as a menu of options by others, we also showed that context plays an important role. Therefore, policymakers must use care to tailor instruments to their own circumstance. We, therefore, do not claim that the results shown here could be generalised to other areas. However, our results do help strengthen and weaken existing theories that could be put to the test through subsequent studies in other sectors.

In the same line, our case selection strategy was guided by clear selection criteria, but as explained in the methodology section, was also influenced by the characteristics of the research team. A different research team might have decided to select different cases which would have potentially led to different conclusions. We tried to account for this by acknowledging that replication was not the objective of our case selection strategy. Our focus was theoretical abstraction which led us to the selection of a process tracing analysis methodology. We, therefore, expect that this choice has diminished the potential implications of selecting different cases.

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7. Paper 4: Examining Causality: A Critical Realist Analysis of Policy Interventions when Governing Shared Mobility

Examining Causality: A Critical Realist Analysis of Policy Interventions when Governing Shared Mobility in Los Angeles.

7.1 Introduction

What effect do policy interventions have on the outcomes achieved by shared mobility services, such as ride-hailing and scooter sharing? This question guides our paper. Shared mobility services, which have often been implemented by private-sector companies and have proliferated in cities during the past 15 years, have seen a plurality of policy responses by city governments worldwide; from a laissez-faire approach where companies are left to deploy these services freely, to more hands-on approaches where cities take an active role in regulating how these services are operated. One such approach was the one taken by the city of Los Angeles during the 2017-2020 period, in which policymakers and practitioners in the city worked together to implement a pilot program to better understand how regulating different aspects of shared mobility services would impact some of the outcomes that the city had set out to achieve, including equity and environmental sustainability. In this paper, we analyse the policy responses taken by policymakers and practitioners in the city and the outcomes observed after this period, to propose plausible causal pathways connecting the two. While multiple attempts have been made to explain whether some of these shared mobility services are inherently good or bad for social outcomes such as environmental sustainability or equity (see, for example, Hollingsworth et al., 2019; Dill and McNeil, 2021), our paper is the first attempt, to our knowledge, to propose a plausible causal pathway between policy interventions and social outcomes in the shared mobility space.

For this paper, we understand causality as the result of the set of conditions that interact with each other to produce an event in the real world (whether that event was observed and measured or not)(Steinberg, 2007). However, examining causality in policy interventions in open settings is seen as "quite challenging", given the potential number of confounding factors that might play a role in generating the observed events (Athey and Imbens, 2017, p.3). Carrying out experiments such as randomised controlled trials to understand the importance of a single variable in the outcomes observed in policy settings is often unfeasible due to financial or ethical constraints, and because of the difficulty of isolating variables in such open settings (Bruns-Smith, 2022). Furthermore, such experiments follow a traditional positivist model of scientific inquiry, which, in our view, is incompatible with social settings such as the public policy realm. Simply observing correlations and attempting to statistically determine the significance of these correlations in relation to the observed outcomes focuses on the question of '*does this work?*' (e.g., if A then B), but it does not get deeper into questions that are relevant to the advancement of policy theory, such as "what works, for whom, and in what circumstances?" (Tilley and Pawson, 2000).

An alternative approach to examining causality in public policy is that proposed by the philosophy of science of Critical Realism (CR). CR provides both a mental framework and practical tools that help systematise the process of identifying causation in complex, open systems where context, existing social structures, agency, and cultures all can affect the outcomes of a policy intervention (De Souza, 2016). The literature of CR is dominated by philosophical discussions, but there are examples of applied CR in the realms of nursing, organisations, education, ICT, and public policy (Edwards et al., 2014b; De Souza, 2016; Fletcher, 2017). Few researchers, however, have explicitly used CR in the academic literature in transport studies (see, for example: Næss and Jensen, 2002; Melia, 2020; Melia, 2020), with only Melia using it in a transport policy setting.

This paper employs a CR lens to analyse causality in the policy responses to the deployment of shared scooter services in the City of Los Angeles. We proposed plausible *mechanisms*[25] to explain what led to the outcomes observed in some of the goals that city officials had proposed for its regulatory pilot program (equity, road safety, power, and innovation). We propose three mechanisms that have explanatory power over these outcomes: the availability mechanism, the vehicle mechanism, and the oversight mechanism. In line with a CR philosophy, we propose these as the best current explanation that could be improved upon with additional data or better theories.

The paper is organised as follows. In Section 7.2, we provide an overview of the academic literature of critical realist policy evaluation and its links to the transport policy space. We also outline the fundamental premises of critical realism, acknowledging that this philosophy of science is not yet widely recognised in transport studies. In Section 7.3, we explain the methods used in our study, with special emphasis on the aspects relevant to a critical realist study. In Section 7.4, we use a mix of quantitative and qualitative data to summarise and present the outcomes of the policy interventions taken by the city of Los Angeles to govern the shared scooter services that were deployed during the period of 2019-2020. In section 7.7, we conduct a critical realist analysis that connects the policy interventions with the outcomes we described in section 7.4, and we propose three mechanisms that explain these outcomes. Finally, in Section 7.8, we provide some concluding remarks and identify future areas of exploration.

7.2 Literature review

During the 2010s, private companies began leveraging advances in technology to introduce new mobility services in cities worldwide, which have come to be known as '*shared mobility*' (Castellanos et al., 2021b). These services include ride-hailing, bike-sharing, and, more recently, scooter-sharing services. The deployment of these services by private companies presented new challenges for public

[25] In Critical Realism, mechanisms are the objects of reality that when activated generate events in the domain of the actual (i.e., that happen and could be observed).

policymakers and practitioners, including determining whether a policy response was necessary. Some national and local governments banned these services, others allowed them to operate with no interventions, while others reacted by adopting different types of policy responses: from unenforceable charters of good conduct to strict operating requirements, all with the goal to steer the outcomes of these services to those social outcomes pursued by government (Castellanos et al., 2025).

A significant segment of the academic literature on shared mobility has examined the role of various shared mobility services in achieving social outcomes. Multiple studies, for example, have looked at whether ride-hailing, bike-sharing, or scooter-sharing are good or bad for: the environment (Hollingsworth et al., 2019), and accessibility or equity (McNeil et al., 2018; Dill and McNeil, 2021). While these are all relevant research questions, shared mobility services are never deployed in a vacuum. Whether they lead to positive or negative social outcomes is not an inherent characteristic of these services, but rather their outcomes depend on the context in which they are deployed; a bike-sharing service might lead to an improvement in air quality in dense urban environments where car trips are replaced by bicycle trips, but it might not have the same effect in more rural settings. Furthermore, some authors (e.g., Shaheen and Cohen, 2018) have proposed that policy can shape the outcomes of shared mobility services , yet, to our knowledge, no academic studies have investigated the causal links between policy interventions and observed outcomes in this space.

Evaluating the causal links between a public policy intervention and its outcomes is challenging due to the numerous confounding factors that can influence those observed outcomes (Hills and Junge, 2010; Athey and Imbens, 2017). This is also true in transport sector policy evaluations, where contextual factors (e.g., social, political, environmental) can affect observed outcomes. Typical evaluation methods for transport policies, such as cost-benefit analyses (CBA) or multi-criteria analyses, focus on evaluating the observed outcomes of interventions (i.e., if A then B had a cost/benefit of $X), but don't investigate how the policy interventions themselves led to those outcomes, nor how the context in which they are

implemented affected those outcomes (i.e., how did A lead to B, and how did the context in which A and B are in impacted that relationship). They are, therefore, not relevant when evaluating how to understand causal relationships in policy interventions aimed at improving future policy iterations. In addition to this, such methods have been critiqued elsewhere (see Hwang, 2016) due to their difficulty in assigning monetary values to intangible aspects of policy impacts, their difficulty in evaluating the value of policies over time, and their potential to favour regressive policies that value, for example, the time savings of the rich more than those of the poor.

Critical Realism (CR) is a philosophy of science that provides useful tools to examine the causality of policy interventions, especially in new policy areas where a deep knowledge base has not yet been established (Ongaro and Yang, 2025). The basic premise of CR is that reality exists independently of our observations of it. However, only under specific circumstances does reality manifest as events that can be seen by our senses. The role of the scientist is therefore to try to uncover reality by theorising about how the things we observe with our senses are connected to this underlying reality. These connections are called mechanisms. Scientists, therefore, propose and submit to test theories of how causal mechanisms, under specific circumstances,[26] explain what we observe. Theory, therefore, plays a crucial role in CR. This theory-dependent nature of CR makes it a particularly suited philosophy of science to base our understanding of how policy interventions generate changes in the real world. Policies are based on underlying assumptions (theories) that connect a policy action with a desired and expected social outcome through a plausible causal pathway (Tilley, 2004). CR provides us with a solid philosophical and methodological base to examine these theories and the actual causal pathways that generate changes in the world we can observe.

[26] In CR terms, context refers to the social structures that enable or constrain social actions.

A good starting point for examining causal pathways in public policy under a CR lens is, therefore, those initial theories that policymakers had when designing a policy intervention, as these provide an expected causal pathway between a policy intervention and the anticipated social outcome. Pressman and Wildavsky (1984, p.xxiii) note that “Policies imply theories. Whether stated explicitly or not, policies point to a chain of causation between initial conditions and future consequences”. Whenever a policymaker proposes an intervention, it reveals (explicitly or not) a theorisation about how the world works and how certain interventions might lead to some desired outcome (Lascoumes and Le Gales, 2007). Starting with theories creates a practical problem for research, as these are often unstated at the design stage, and policies change as they are being implemented, leading to a change in the underlying theories. Beyond being unstated, theories can also be implicit or “unsystematic”, but yet form an important part of the way policies are developed (Chen, 1989, p.381). For Pawson (2013), realist policy evaluation is the task of “articulat(ing) and refin(ing) those theories”, which is what we have set out to do in this paper. Despite its promise, CR has rarely been used in transport research (Næss and Jensen, 2002; Næss, 2015; Melia, 2020).

7.3 Methods

7.3.1 Data collection

2017 was the year in which private companies first deployed shared mobility services in Los Angeles. After 2017, the local government of the city (both the city council and the Department of Transportation) implemented multiple governance measures, culminating in the deployment of a pilot programme of an open permitting process for shared mobility operators, which lasted until March 2020. Through the pilot programme, the city allowed multiple private companies to deploy their shared bicycles and scooters in different areas of the city, provided they complied with specific regulations related to insurance, equity, and data sharing, amongst other conditions. Our study, therefore, focuses on data generated during the 2017-2020 period.

For our case study, we collected a mix of qualitative and quantitative data that we used to test different theories of causality. We collected both primary and secondary data that included newspaper articles, reports, policy documents, lawsuits, open datasets, and meeting transcripts (for example, from city council sessions). In total, we reviewed 244 documents that we coded inductively (Thomas, 2003). For a deeper description of the methods we followed for this documentary analysis, including the selection of Los Angeles as a case study, please refer to Castellanos et al. (2024).

We also conducted four 1–2-hour-long semi-structured, in-depth interviews with policymakers and practitioners who were intimately involved in the development of the regulations. In-depth interviews are the preferred type of interview for CR studies, as they enable researchers to gain the in-depth insights necessary to identify and describe the context and mechanisms present in a specific phenomenon (Gubrium and Holstein, 2002; Mukumbang et al., 2020). Furthermore, in-depth interviews enabled us to test our various theories and gain a deeper understanding of the participants' motivations during the policy intervention. Specifically, policymakers and practitioners shared insights into their own theories on how they expected the policy intervention to work. While interviews are a widely used method in the social sciences, the type of theory-probing interviews that we carried out is specific to CR studies (Manzano, 2016).

7.3.2 Data analysis

As explained in the previous section, one of the main objectives of knowledge building using a CR philosophy is to identify and describe ways in which the mechanisms and context[27] interact with each other to explain the world that we perceive. Since, according to critical realists, we cannot directly observe mechanisms, we must theorise about what these are and how they lead to our observations. CR has been criticised for being a "philosophy without a method" (Yeung, 1997) given the little guidance on

[27] Please note that we are using the word "context" to facilitate the understanding of a non-Critical Realist audience. When we use the word context we are more specifically referring to "structures" in CR terms.

how to apply it to research problems. Acknowledging this, CR scholars have attempted to provide more guidance on how to make this philosophy of science applicable to real world problems (Edwards et al., 2014; Fletcher, 2017). Others (e.g., Sayer, 2000, p.19; Hurrell, 2014) note that the choice of methods in CR studies "depend(s) on the nature of the object of study and what one wants to learn about it", and therefore clarify that the lack of methodological guidance is not a weakness, but rather a strength.

Bhaskar (2016) himself proposed a set of methods that are consistent with the premises of CR. This set of methods is called the RRREI(C) model, which stands for Resolve, Redescribe, Retroduce, Eliminate, Identify, and Correct. Table 10 below explains each of these in more detail. Given space constraints we only provide a high-level description of these, but for a deeper explanation, please refer to Bhaskar and Hartwig (2016). We do note, however, that as clarified by Archer (2016), CR studies are theory-laden, and are therefore always informed by pre-existing theories. This means that the RRREI(C) model does not pretend to compete against other (e.g., positivist or constructivist) approaches to knowledge generation, but it rather takes advantage of existing knowledge, regardless of its philosophical source.

Table 10: The RRREI(C) model in more detail

R	Resolve	Resolve is the act of describing complex events into its basic constituent parts.
R	Redescribe	Redescribe is reinterpreting our observations in a theoretically meaningful way by, for example, applying existing theories of how an event has been proposed to happen (also referred to as abduction).
R	Retroduce	Retroduction is imagining what reality must be like for us to be perceiving a phenomenon in the way we are perceiving it (proposing plausible mechanisms and structures).
E	Eliminate	Eliminate competing hypotheses of mechanisms and structures based on our understanding of what is more plausible.
I	Identify	Identify the combination of mechanisms and structures that best describes our observations.
C	Correct	Correct previous theories given the new findings and start the process over.

We followed the RRREI(C) model for our study by first Resolving the events that occurred in the city of Los Angeles and describing their basic constituents. This meant that during the inductive coding stage of the documentary analysis, we focused on identifying and describing the four units of analysis that create the causal pathways between the goals that policymakers set out to achieve through their pilot programme and the outcomes that were ultimately observed and that resulted from the programme (goals, policy instruments, outcomes, and context):

Figure 23: Units of analysis that create a causal connection between expected goals and observed outcomes.

Since we used an inductive coding process on the data collected, our definitions of goals, policy instruments, outcomes, and context were broad. We defined goals as those high-level ideas that, to the policymakers' eyes, justified the need for a regulation. Policy instruments were those "administrative tools" that the government used to attempt to modify the behaviour of the shared mobility companies (Hood et al., 2007, p.2). Outcomes were instances in which changes were observed after the period of the pilot programme had concluded. Finally, context referred to elements outside the immediate scope of the pilot regulation, such as previously existing laws.

After Resolving the basic constituents of the events, we then Redescribed these by creating sequential line diagrams (as the one shown above in Figure 23) using the elements we had Resolved and the initial hypotheses that we had gleaned from the interviews to create potential causal pathways. A potential causal pathway could be in the form of: 'When Policy Instrument A is used, given the context B of Los Angeles, the scooter operators reacted in a way which ultimately led to outcome C being observed, which was different to Goal D that the city had expected'. Then, based on our own theories, which in

turn were informed by the literature review, we Retroduced the Resolved elements to propose new causal pathways that were not directly identified from the interviews and that were based on our own hypothesis of why the outcomes were observed. Finally, we Eliminated the combination of mechanisms that did not explain the observed outcomes. We did not carry out the C in the RRREI(C) model given that this is, to our knowledge, the first analysis of causality in shared mobility, however we have provided comments regarding possible future areas of exploration and theory correction in Section 7.8 of this paper.

The RRREI(C) method resulted in our proposal of three plausible mechanisms that explain the outcomes that we observed and described in Los Angeles: the Availability mechanism, the Vehicle mechanism, and the Oversight mechanism. The following section presents our resolution (first 'R') of the observed phenomenon, which in other words describes the basic elements of the series of complex events that happened in Los Angels during the study period.

7.4 Results

The city of Los Angeles ran a pilot programme that permitted the operation of up to 37,000 shared bicycles and scooters on its streets between April 2019 and March 2020. The pilot program consisted of a set of requirements that the companies that received permits had to comply with. These included technical requirements (e.g., fleet size, maintenance, data sharing, parking), insurance, community engagement, and equity. Companies had to pay a $20,000 application fee and a one-time $130 fee for every vehicle deployed, limited to 3,000 vehicles. After evaluating 11 proposals, eight companies were given permits to operate, which resulted in over 17.000 vehicles effectively deployed in the city (highest monthly average). During this period, riders took a total of 9,844,939 trips using shared bicycles and scooters. Figure 24 compares micromobility ridership within the City of Los Angeles with ridership in the

rail and bus system of the County of Los Angeles. During the period, shared micromobility trips were equivalent to approximately 3% of LA Metro ridership[28].

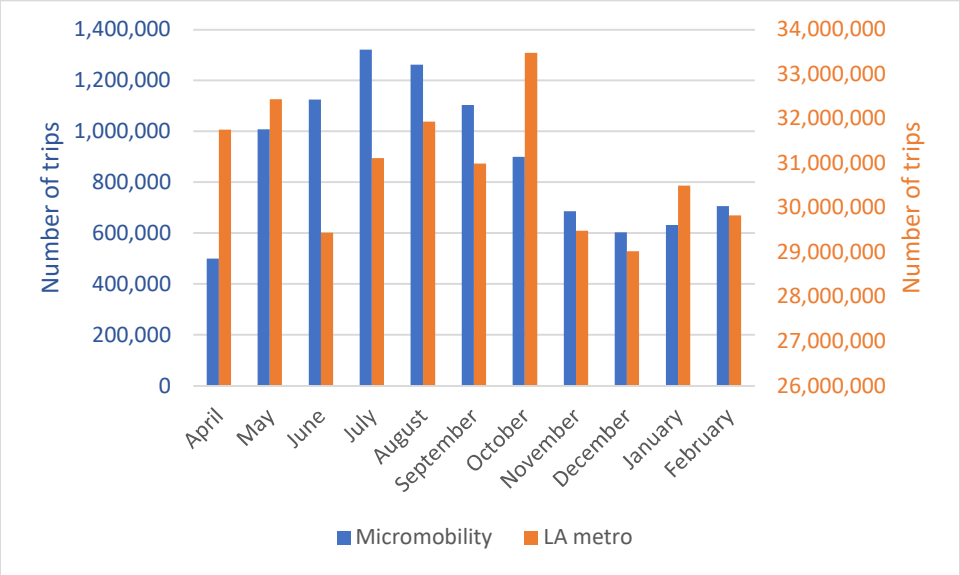

Figure 24: Total trips and daily average trips per month (source: authors using data from LADOT).

7.5 What did the programme set to achieve?

Through the documentary analysis, interviews, and inductive coding process, we identified the goals that policymakers and practitioners set to achieve in the regulatory pilot program. These goals were not always explicit, so the interviews allowed us to probe into what policymakers perceived as the main or '*dominant goals*' that were guiding their policy actions (Castellanos et al., 2024). These included goals that are broadly shared within the sustainable transport community such as equity, and road safety, but also others that reflect local social values and dynamics such as the wish to be an innovative city or attempting to regain some of the power that the city had lost with the advent of privately operated mobility services (such as ride-hailing). In an evaluation of the pilot programme commissioned by LADOT that covered the same time period, Costagliola et al. (2020), using policy documents, also noted the city had set the goals of access for people of colour, and better quality of life, which for us fall within the

[28] Please note we are only using this as a rough comparison to provide context, since the geographic areas of the City of Los Angeles and the County of Los Angeles are different.

broader goal of equity. For the rest of this paper, we will refer to these four goals (equity, road safety, innovation, and regaining power) as we conduct the critical realist analysis. In the following section we combine quantitative and qualitative data to evaluate if these outcomes were achieved at the end of the programme or not.

7.6 Outcomes of the programme

7.6.1 Equity

The policymakers from the LA City Council in conjunction with the practitioners from LADOT embedded multiple policy instruments within the pilot programme aimed at improving access and incentivizing the use of micromobility vehicles by historically marginalised or disadvantaged communities. These included a 70% per vehicle permit fee discount and an increase from 3,000 to 10,500 permitted vehicles for companies that deployed these in disadvantaged communities (DACs). Furthermore, the permit required that operators include a non-smartphone payment and reservation option for potential users who do not own smartphones or credit cards, and to develop community engagement and equity plans to explain how they would engage with lower-income users. Even with these requirements, the perception of the staff within LADOT and council offices was that these instruments had not resulted in their expected outcomes. For example, a staff-member of one of the council offices who was deeply involved in the discussions around the permit commented in one of our interviews that: "*I don't know that anything that we did was particularly effective* (to incentivise use by marginalised populations). *Transportation equity is an emerging practice area,* [despite it] *being a problem forever."*

The operational data corroborates the perception of policymakers and practitioners. Figure 25a below shows that there was a correlation between where companies were deploying their vehicles during the mornings and where a scooter was unlocked by a user to start a trip (scooters were picked up at night by the companies and then redeployed the following day). This is represented on the map with the bright

green colour. At the same time, the companies were deploying their vehicles mostly in more affluent areas, which therefore led to more trips in these areas (represented on Figure 25b as a light blue colour). The notable exception is the area around downtown Los Angeles, an area dominated by more families living below the federal poverty line, and where the companies were deploying a higher proportion of their vehicles. The dark red colour on Figure 25b shows that users were taking more trips in this area. This, however, does not necessarily mean that the trips around downtown Los Angeles were being done by lower income or marginalised populations. A more likely explanation is that the amenities in the area such as museums and markets were attracting tourists and other more affluent users. In places like the San Fernando Valley and just south of Downtown Los Angeles, which are home to people with lower incomes, both deployments and number of trips were low. These data are again corroborated by surveys carried out by LADOT during the duration of the programme where scooter users self-identified as having higher incomes.

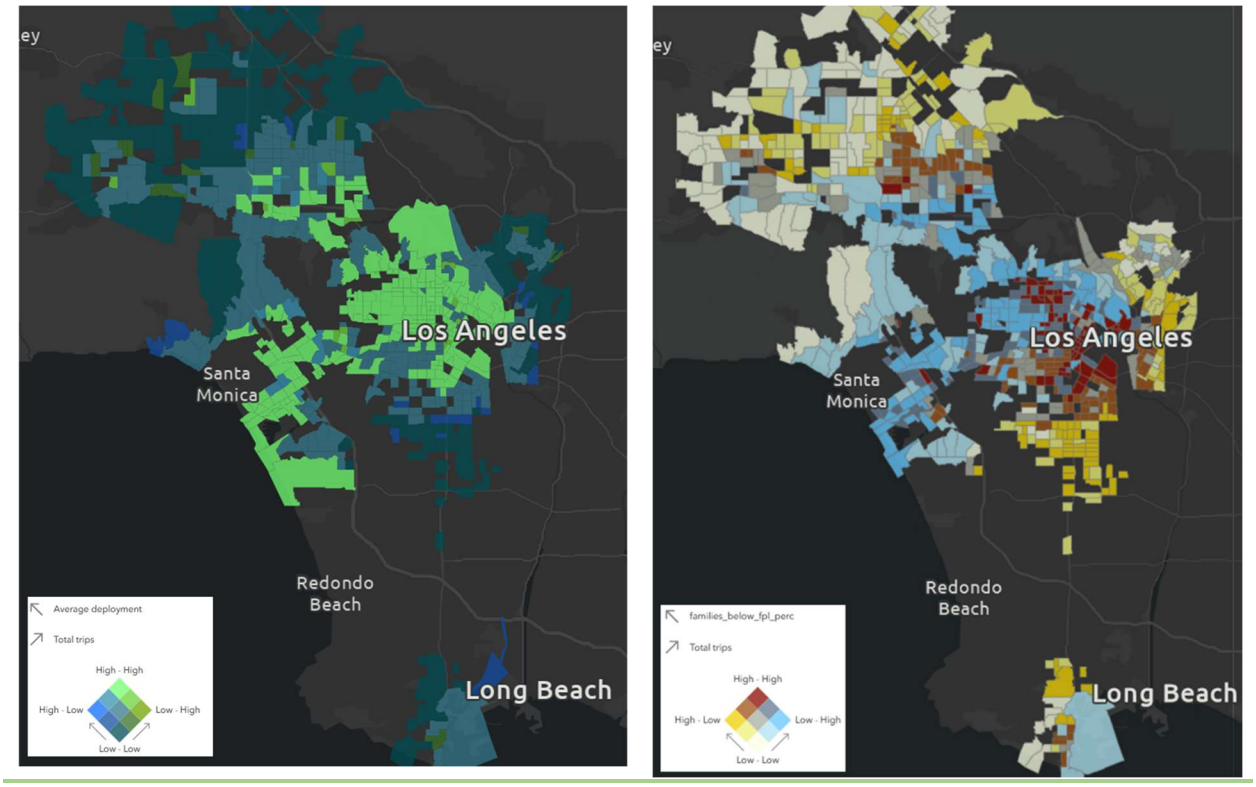

Figure 25 - a: Relationship between average deployment of vehicles and total trip counts throughout the pilot programme. b: Relationship between total trip counts and families living below the federal poverty level. Own construction using data from City of Los Angeles (2020)

7.6.2 Road safety

Los Angeles had committed to becoming a vision-zero city by 2025 (Garcetti, 2015). This means that it intended to eliminate traffic deaths by this date. To support this objective of eliminating traffic deaths, LADOT implemented multiple measures during the shared mobility pilot programme such as only allowing riders over the age of 18 to register, the use of sidewalk stencils to discourage sidewalk riding, automatic speed limiters limiting vehicle speed to 15mph, and a new protected bike lane on 7th street where a large number of scooter trips were being recorded.

During the period of the pilot programme, Costagliola et al. (2020) reported 407 scooter-involved collisions in LA, of which 80% involved other motorised vehicles, and only 3% involved pedestrians. 45 of these collisions led to severe injuries and 175 led to visible injuries. No deaths were reported. With 9.84 million trips and a mean trip distance of 0.97 miles, there were approximately 9,549,591 miles ridden in scooters during the pilot programme. This results in a ratio of 4.7 severe injuries and 18.32 visible injuries per 1 million miles travelled. By comparison, the total daily vehicle (excluding non-motorised vehicles) miles of travel in the Los Angeles county area in 2019 was 268.9 million, or approximately 98 billion miles per year (Caltrans, 2020). During the same time the pilot programme ran, there were a total of 64,515 crashes, with 788 killed & 93,200 injured victims, of which 3765 were severe injuries and 18,292 were visible injuries. This results in a ratio of 0.38 severe and 0.19 visible injuries per 1 million miles (University of California, Berkeley, 2023). By comparing the ratios of severe and visible injuries for both scooters and other vehicles, we see that the ratios for scooter riders are higher. Due to the comparably low number of miles ridden in scooters with other vehicles, the death rate cannot be compared. At the same time, the data shows that most scooter-related incidents involved other motorised vehicles. While a comparison against bicycle data could be considered more apt given the closer similarities between both types of vehicles, unfortunately, there is no readily available data on vehicle miles traveled for bicycles.

7.6.3 Power

Though the concept of power is difficult to define, for our study, power was understood by our interviewees as the local government regaining the authority to enforce regulations. There was a perception that the city government had previously relinquished its power to implement and enforce regulations for providers of city services when ride-hailing (e.g., Uber) and house rental companies (e.g., AirBnB) started providing their services in Los Angeles without oversight from the government. One of our interviewees who held a directive role in LADOT described the pilot programme as "*(…) a way for the city to regain the regulatory… the ability to effectively regulate for the public interest that* [the city government] *had somehow lost* […since] *with AirBnB and Uber, those were really tough lessons the city had to learn from*","

Since the emergence of ride-hailing, cities around the world have tried, with different levels of success, to regulate these services (Herrman, 2019). In the case of Los Angeles, ride-hailing services are regulated at the state level by the California Public Utilities Commission, which establishes the requirements for operation such as insurance, reporting, and accessibility. Given that the regulation is decided at the state level, the city of Los Angeles is pre-empted from regulating these services any further. On the other hand, micromobility services are not regulated at the state level, although there were unsuccessful attempts to enact state level regulations which would have partially over-ridden the local ones (see California Senate Bill AB 1112 of 2019). As such, the city of Los Angeles had the option to regulate these services, as it indeed ended up doing through the permit programme.

While legally, the city had the power to regulate these services, city practitioners felt that they needed additional tools to effectively wield this power. In a podcast recording from 2019, the then General Manager for LADOT mentioned how lack of access to detailed data from ride-hailing operations made it difficult for the city to effectively regulate these services (Kapsis, 2019). To overcome this issue now with

shared scooters, the city implemented its Mobility Data Specification (MDS). MDS is a data standard that allows companies operating shared mobility services in Los Angeles to send standardised data to the city that was used, amongst other things, to inform, enforce, and evaluate the regulations established in the pilot programme. With access to detailed operational data through MDS, LADOT was able to enforce some of the technical requirements of the permit, such as the number of scooters deployed in different areas of the city, effectively regaining some of that regulatory power it had previously lost by not having access to these data.

7.6.4 Innovation

Being innovative is a normative value that underpinned some of the governance actions taken by LADOT. A foundational planning document commissioned by LADOT mentioned innovation as a goal the city wanted to pursue:

> "*LADOT must position itself as a platform for mobility innovation that supports greater mode options by providing data, mobility, and infrastructure as a service to all Angelenos*" (A.Z. Hand, 2016, p.i).

The traditional view in policy circles has been that the public sector is not innovative due to, amongst other factors, an aversion to risk and a lack of incentives to innovate by public sector managers (Arundel and Huber, 2013). This perception was shared by the participants in our study and other policymakers. One of LA's council members remarked in a transportation committee session that "*government is really slow to respond to emerging technologies, particularly in the transportation field*." They suggested that they wanted to ensure that the shared micromobility pilot programme could address this by proposing an innovative way to allow LADOT to respond faster to future mobility innovations.

All the stakeholders we interviewed agreed that MDS was the most important innovation that LADOT had introduced during the pilot programme. Furthermore, over 60 cities worldwide are now also using

this standard, which indicates that others agree with the value of this innovation (Open Mobility Foundation, 2021). MDS represents a significantly different product and process from what LADOT had done before, without access to data, and we can therefore conclude that the goal of innovation was successfully achieved.

7.7 Analysis

In the previous section, we presented data that allowed us to evaluate whether the goals that the city had set out to achieve with its pilot programme had been achieved. In this section, we use a CR lens to propose plausible theories of why the outcomes presented above could have happened. For this, we start from the theories that our interviewees had of how they expected the different elements of the pilot program would work (Redescribe in the RRREI(C) framework). Where the data does not fit those initial hypotheses, we then propose plausible causal pathways that better fit the observed data. These new hypotheses are either based on additional academic literature referenced in the text or on a circular deductive-inductive-insights process (referred to as retroduction) that better explains the data observed (Greenhalgh et al., 2019).

7.7.1 Proposed mechanism 1: Availability mechanism

As shown above, the pilot programme included a series of measures that were meant to incentivise the use of these vehicles by historically marginalised communities. LADOT theorised that what the companies most cared about was the number of vehicles they could deploy in the city, and therefore they saw large vehicle caps as the biggest lever they had to achieve their equity goal. In one of the interviews we conducted, a senior LADOT official explained their thinking behind the vehicle caps: "*We were playing around with* (vehicle) *caps. That was, frankly, a negotiating tactic (…) if this is the issue* (the companies) *care about, then let's use this lever for equity*". So, while LADOT included other policy levers within the design of the program to try to encourage scooter use by marginalised communities such as

non-smartphone and non-credit card payment options, it was really the number of permitted vehicles that they believed would help them achieve their goals.

However, another senior official with LADOT explained in one of our interviews that circumventing these caps became easy for the companies: "*the data that we used to define DACs sometimes included areas like East Hollywood, when the companies wanted to be in regular Hollywood. And so, they were like 'OK, cool. If we expand two streets over, then we can also put more scooters in this tourist zone'.*" Which shows that those initial theories of how the companies would react to this specific policy lever of vehicle caps were flawed.

Based on the evidence presented, we propose that one of the main mechanisms that led to the use of micromobility vehicles by historically marginalised populations was the availability of the vehicles where these populations needed them the most. The causal pathway is therefore: if there are vehicles available where and when people need them and/or want to use them, this will lead to higher uptake. This decision, however, is contingent on higher-level structures (context) which effectively constrain the users' decisions. We propose that these structures are:

1. The availability of protected infrastructure where people can ride these vehicles safely and that connects them to their desired destinations (Cervero et al., 2013).
2. The overall economic structure, where the price of a ride can or cannot be afforded by the rider (McNeil et al., 2018).
3. The social structure that incentivises or not the use of the vehicles, such as the perception that scooters are used by certain populations (i.e., the wealthy, as evidenced by the user perception surveys carried out by Costagliola et al. (2020)).

This causal pathway is represented by the right-hand section of Figure 26 (to the right of the dotted line).

But the availability of the vehicles is entirely dependent on the decisions made by the companies. We therefore propose that the companies' decisions were influenced by three factors:

1. The ambiguous permit language, which allowed the companies to circumvent the original intent of the vehicle caps by deploying additional vehicles than they would have been allowed to but not in areas where historically marginalised populations live.
2. The fact that LADOT had a clear and unambiguous enforcement mechanism in MDS, which made it possible for them to enforce the actual deployment of vehicles; something that would have been virtually impossible through visual inspection alone. This meant that companies had no way of 'cheating' the permit language by deploying more vehicles in areas where they perceived a higher demand, or fewer vehicles in areas with lower perceived demand.
3. The limited funding and operational capacities of each company, which led to none of them deploying the number of vehicles that they had been permitted, and deploying these where they perceived the biggest demand for their product would be.

The decisions made by the companies were also constrained by higher-level structures (context). Here, we first identify the financial and economic structure in which the companies were immersed in; notably, the fact that at the time, most of these companies were backed by venture capital funds which led to them seeing market expansion/domination as the main goal: "*you had kind of like this gold-rush mentality from the companies…*" explained a senior official with LADOT about the mindset that these companies were in during deployment. This structure, therefore, led to the companies wanting to deploy as many vehicles as financially possible to show their investors that they were dominating the Los Angeles market, especially due to the LA permit allowing them to deploy additional vehicles if they met certain conditions.

The other structure that we identified is the legal structure that exists within Los Angeles that allowed the creation of the permit programme itself. Notably, the fact that the city was not pre-empted by any federal- or state-level regulations to create the permit. The left-hand section of Figure 26 (to the left of the dotted line) summarises the companies' decision-making process.

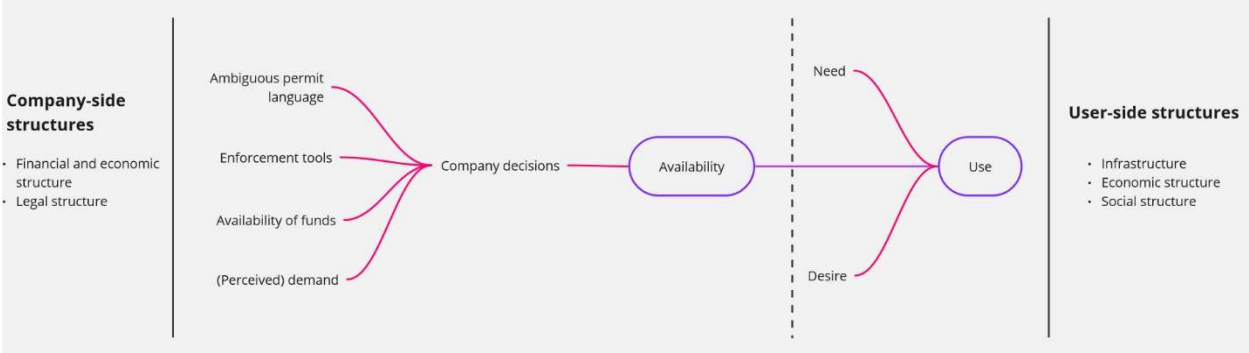

Figure 26: The 'availability' mechanism. Purple ovals represent outcomes. Fuchsia lines and accompanying text represent the elements that lead to the mechanism. Source: own construction using Miro (RealTimeBoard, Inc, n.d.).

7.7.2 Proposed mechanism 2: the vehicle mechanism

The proposed *availability mechanism* is connected to the safety outcomes that were observed. In a sense, if there are no rides, then there would be no injuries. However, injuries themselves are mediated by other circumstances, too. While LADOT implemented multiple governance tools to try to make scooter use safe (including education campaigns and in-app reminders to, for example, wear helmets), we showed in Section 7.6.2 that the safety outcomes observed during the pilot programme were poor in comparison to the safety outcomes observed in other modes of transportation. However, the number of incidents between scooter-riders and pedestrians was comparatively low, which hints at the fact that some of the actions taken by LADOT were successful when measured by this narrow metric.

Figure 27 below shows what we have identified as the 'vehicle' mechanism. Here, we propose that the nature of the vehicles themselves, with their small wheels and narrow base, is what leads to higher injury rates than other modes (Paudel et al., 2020). This fits the evidence that shows higher injury rates in incidents that don't involve other motor vehicles. However, given the fact that most incidents do

involve other motor vehicles, we propose that safe infrastructure plays a bigger role in overall safety outcomes, since lacking segregated infrastructure, riders are forced to ride on the road where incidents with other vehicles are more likely (DiGioia et al., 2017). Additional evidence to this effect comes from an official with LADOT whom we interviewed who acknowledged that the quality of the infrastructure is not ideal for these types of vehicles "*Pavement quality is bad. So, it doesn't feel great to ride on the pavement, but we don't want them to be on the sidewalk*". This again shows that the specific nature of the vehicles, mediated by the infrastructure, is playing an important role in the observed safety outcomes.

Another element that provides supportive evidence to the 'vehicle' mechanism is the use of speed governors mandated by LADOT that forced scooter riders to ride under 15mph. LADOT officials knew that changing the infrastructure was not something that was in their immediate control (at least within the timeframe of the permit), meaning that the lack of protected riding infrastructure would likely lead to scooter riders using the sidewalks. A senior LADOT official explained in one of our interviews that:

"*The thing that makes a simple error into a tragedy is speed differential. So, going 15, 30 mph on an electric scooter in and of itself isn't a problem if you're next to cars, but if you're next to somebody walking… um… then that's really not going to work (…and) we are still in 'Phase 1' of bike infrastructure in Los Angeles*".

For LADOT officials, limiting the speed of scooters travelling next to pedestrians was an action that they hypothesised would lead to lower numbers of pedestrian/scooter-rider incidents, which fits our observations. Further evidence that shows that speed governors could have aided in a low number of conflicts is the fact that users were taking rides in places with a relatively high pedestrian traffic, yet pedestrian/scooter-rider incidents were still low. One of our interviewees explained that: "*while there are parts of this city, particularly in The Valley, where there aren't a lot of people walking, the places*

where these companies wanted to be, were the places that had the densest sidewalks". So, expectedly, the number of potential conflicts between pedestrians and scooter riders was high, however the actual number of collisions was relatively low.

There were other safety elements included in the permit language such as only allowing riders 18 years or older who already had a drivers' license. While we did not find evidence that this rule was enforced, it could have played a role in the safety outcomes since, in theory, riders would be aware of the general rules of the road. We did find some media reporting that showed underage riding in the city and it described it as a cultural phenomenon (Kubzansky, 2018). Given that we don't have any evidence that this rule was enforced, we discarded it as a plausible explanation of the safety outcomes observed (represented by the greyed-out text in Figure 27). We did include the broader social trend of scooter use by younger populations (as indicated by the user surveys conducted by LADOT) as a broader social structure that could have influenced the safety outcomes.

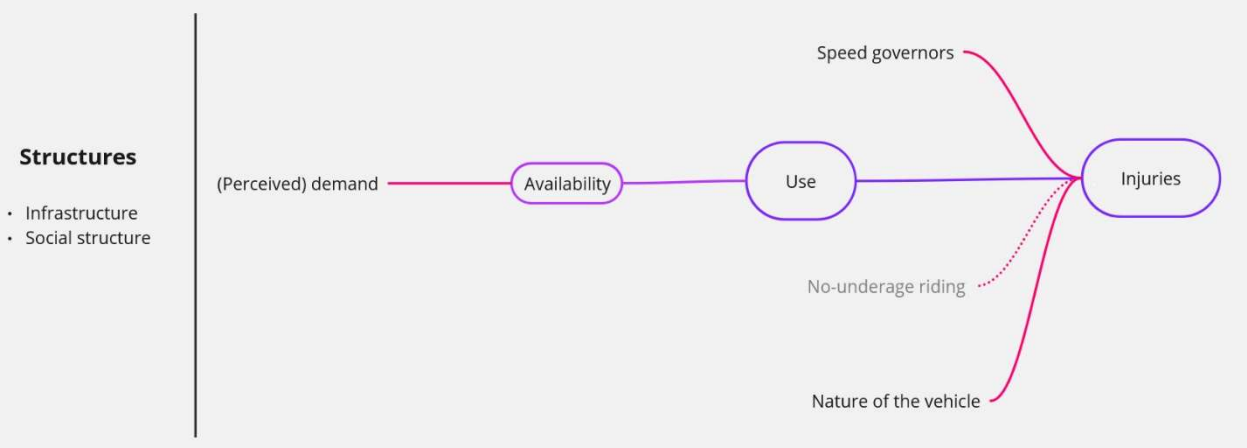

Figure 27: The 'vehicle' mechanism. Purple ovals represent outcomes. Fuchsia lines and accompanying text represent the elements that lead to the mechanism. Greyed out text and dotted lines represent 'eliminated' elements of mechanisms. Source: own construction using Miro (RealTimeBoard, Inc, n.d.).

7.7.3 Proposed mechanism 3: the oversight mechanism

LADOT saw MDS as a way to "*change the dynamic of the relationship between the public and private sector*" (LADOT, 2019). Specifically, LADOT officials had a distrust of shared mobility companies stemming from what had happened in the past with ride-hailing companies like Uber and Lyft:

"*We knew from our colleagues at the airport that* (ride-hailing) *companies were being dishonest about how many trips they were making in order to avoid paying fess (…) there was a business reason for* (these) *companies to lie*" (Interviewee from LADOT).

Therefore, MDS became the governance instrument that the government could use to ensure that companies were complying with its regulations by ensuring that the data being reported could be closely scrutinised and audited, effectively limiting the possibility of companies lying about their numbers.

On the other hand, MDS was seen by some of the shared mobility operating companies as a way for them to reduce compliance costs, not only in Los Angeles, but in other cities in which they were operating (Zipper, 2019a). However, this perception was not shared by all companies. Even though sharing data through MDS was a requirement of the permit, one of the companies that had applied to deploy their vehicles (Jump) refused to share the requested MDS data, citing privacy concerns. This led to LADOT revoking Jump's permit, a decision that was unsuccessfully appealed. Subsequently, Uber (who owned Jump) filed a lawsuit against LADOT on March 2020 for using MDS which they claimed put riders' privacy at risk (Uber Privacy & Security team, 2020). The lawsuit was later dropped since Jump was no longer operating in the city. So, while MDS was the tool that allowed LADOT to enforce its permit, MDS existence would not have been possible without the broader legal structure present in California where the legitimacy of MDS could be proven in a court of law. In Castellanos et al. (2025) we showed that

legitimacy was an important driver of effective policy implementation in shared mobility, and therefore being able to proof the legitimacy of MDS made the tool more effective in its intended effect.

Another element that made MDS possible was the support that the city council gave to LADOT's plans. During one of the transport committee council sessions, one council member commented that:

> "*I think LADOT has done an excellent job in seeing the opportunity that these devices have presented for achieving our mobility and our environmental goals, while thinking long term about how we should regulate potentially disruptive new technologies on our street (…) this proposed program that they're working on here is not just a framework for scooters (…) it's a roadmap for implementing regulations on all kinds of potential technologies, from drones to AVs to TNCs (…) and we need to ensure that this framework works city-wide and anticipates the future because it is our toolkit so that we don't get caught blindsided by the next hot thing, because tech moves a lot faster than we do, so this is an opportunity to be thoughtful proactive and global.*"

This quote summarises the general sentiment of most councilmembers about MDS and shows how the council and LADOT were aligned in the longer-term vision for what both MDS and the specific scooter regulations could do for future transport technologies deployed in the city. This alignment again gave MDS the legitimacy for LADOT to incorporate it within the scooter permit programme, and to face the above-mentioned lawsuit.

One last element that seems to have played an important role in the development of the MDS innovation was the ability and foresight of LADOT staff to plan for long-term developments. Multiple stakeholders we interviewed mentioned how the development of MDS was not originally done to govern shared micromobility; rather, it had been developed as a plan for the rollout of autonomous vehicles: "*We were thinking about things like autonomous vehicles… that was the obsession of the time, back in 2015, 2016*", explained a senior official with LADOT. Staff at the time were therefore thinking about how to use innovative data standards to improve the way LADOT could regulate new technologies deployed in the city. This foresight led to LADOT securing the resources to put this vision into paper, which is what ultimately led to the creation of the "Urban Mobility in the Digital Age" playbook, which laid the

groundwork for MDS. Ultimately, shared micromobility was a chance opportunity LADOT had to put their plans into practice.

Figure 28 below summarises the proposed 'oversight' mechanism that led to the innovation and power outcomes.

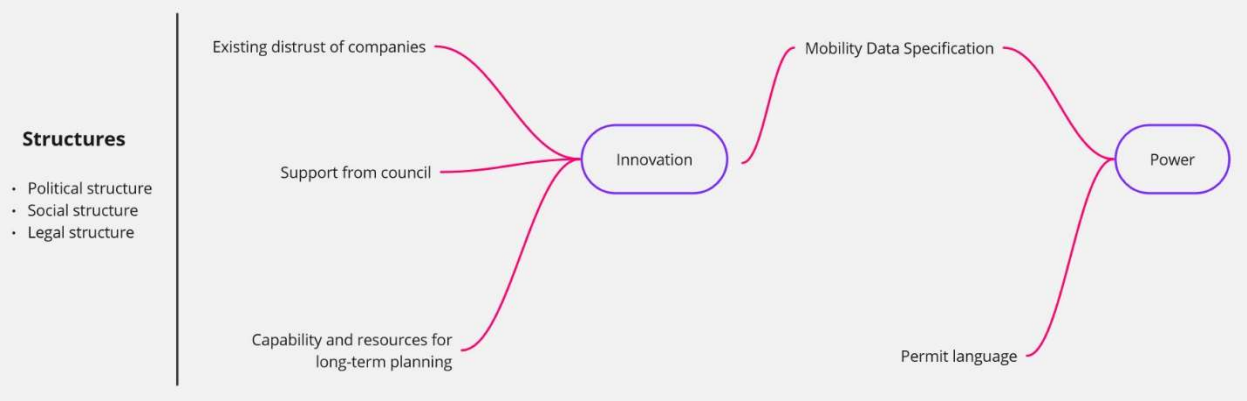

Figure 28: The 'increased government control' mechanism. Purple ovals represent outcomes. Fuchsia lines and accompanying text represent the elements that lead to the mechanism. Source: own construction using Miró (RealTimeBoard, Inc, n.d.).

7.8 Conclusions and policy implications

Bhaskar (2016, p.67) proposed that the role of science is to explain the 'why' of things that happen. This, in contrast to the traditional view of positivist science, where redescriptions of phenomena are the dominant goal: "(…) *science comes to be seen as something wonderful again. It tells us about a world that we did not previously know and about the currently unknown causes of known phenomena; that is, why (and also how) things work in the world that we do know*." In this paper, we therefore sought to explain why the permitting of 17.000 shared micromobility vehicles in Los Angeles led to both positive and negative, and expected and unexpected social outcomes. For this, we embraced a critical realist

position and carried out an applied critical realist study to uncover the mechanisms that led to these outcomes.

Although Bhaskar proposed critical realism in the decade of the 1970s, its use in applied studies is still nascent; something especially true for transport studies, where just a handful of authors have used it as a general philosophy of science, and only one has used it to explore causation of policy implementation (Melia, 2019). Our study is therefore pioneering this philosophy of science for transport studies, but more importantly the applied techniques developed by Bhaskar in transportation policy studies to achieve the goal he saw for science: uncovering the mechanisms that cause observable outcomes. Transport policy evaluations have been dominated by tools such as cost-benefit analysis (CBA) and multi-criteria decision analysis (MCDA) (Browne and Ryan, 2011), and our study is therefore one of the few that applies a critical realist lens to a policy evaluation to better understand the causal pathways that connect policy goals, tools, and outcomes. Our study, therefore, contributes to the methodological literature of transport policy evaluation.

Using both quantitative and qualitative data, we evaluated if the city had been successful in achieving the goals it had set out for its scooter pilot programme. Our evaluation showed that the city was successful in achieving its power and innovation goals, but was unsuccessful in achieving its equity and road safety goals. We then proposed three mechanisms that explained these results: the ‘availability’, ‘vehicle’, and ‘oversight’ mechanisms. To identify these mechanisms, we followed the RRREI(C) framework for critical realist studies which helps evaluate the observed evidence against proposed or hypothesised mechanisms. We therefore showed how the available evidence, both quantitative and qualitative, fits our proposed descriptions of these mechanisms and is therefore a plausible causal explanation of the outcomes observed. An important observation of exploring causality using a critical realist approach is that future studies can (and should) revisit these results to correct the mechanisms

we proposed. As such, our results should be seen as new theories of causality for transport policy, but these can always be improved or debunked with new data or alternative explanations.

An important element of applied realist studies, and something that Pawson (2013) pushes for in realist evaluation studies (which are influenced by critical realism), is the learning aspect of evaluations. In other words, he proposes that evaluations should have an impact in the evolution of programmes. To this regard, we see the findings of our study as an important step in improving future policy programmes seeking to govern new mobility services.

Our proposed mechanisms show that policymakers wishing to govern shared mobility services should pay close attention to ensuring that the policy levers that they are going to use cannot be distorted by private operators. In particular, policymakers should:

1. Have a clear and incontestable enforcement tool such as MDS.
2. Explore potential misapplications of the language that they include in permits to improve the way the regulations are written.

Furthermore, policymakers and public practitioners can look at our study and experiment with different combinations of levers that can shape the mechanisms we are proposing to improve the outcomes they are pursuing, especially considering their own context and existing structures. Our results should give policymakers a good starting point to understand what policy instruments will and will not be effective within their own contexts. In that way, we see our results as a starting framework for governing new mobilities.

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8. Conclusions

8.1 Introduction

Some authors have argued that the rate of innovations in the transport sector has increased during the past decade (Sperling, 2018). This was the starting point for this thesis, in which I proposed that the way in which public municipal policymakers and practitioners have attempted to govern the transport sector in the past, and specifically the instruments that they have used, are not adequate for the new challenges that these technological innovations (but specifically shared mobility) are giving rise to. The goal of this thesis was, therefore, to critically examine the current approaches to the governance of shared mobility to evaluate strengths, weaknesses, successes, and failures and to propose improved ways in which the governance of the sector can be conducted in the future when other (new) technological innovations arise. The starting hypothesis for this thesis was that these innovations, but especially shared mobility services, which have been almost exclusively developed and deployed by private companies with little input from the public sector, require a shift in the goal-setting and governance instrument selection strategies used by public policymakers and practitioners to govern this policy area towards desirable social outcomes. To examine this hypothesis, this thesis used a multi-case study design and a mix of methods, including document and content analysis, interviews, and process tracing to document and analyse three case studies of cities that had been confronted by the deployment of shared mobility services by private companies: Bogotá, Colombia and the deployment of ride-hailing services, Paris, France, and the deployment of shared mopeds, bicycles, and scooters, and Los Angeles, USA, and the deployment of shared bicycles and scooter services. These cases were selected because they showcase three approaches to the problem of private companies deploying shared mobility services without prior approval from city governments. The analyses focused on understanding the goals pursued, the governance tools used, and the outcomes achieved when public policymakers and practitioners attempted to govern these technological services, which they saw as disruptive to the transport status quo.

The papers that compose this thesis used the results from these analyses to answer three research questions:

> ***RQ1****: What kinds of goals are local governments pursuing, in different contexts, as they try to understand how to steer the direction of private sector shared mobility deployment?*
> ***RQ2****: What governance interventions and instruments have cities deployed when dealing with shared mobility and how has the context affected implementation?*
> ***RQ3****: How do local governance approaches to shared mobility shape policy outcomes and lead to intended and unintended effects?*

For this concluding chapter, Section 8.2 revisits the research questions, explains the key findings from each study, and outlines the contributions that help fill some of the gaps identified in the academic literature. Chapter 8.3 focuses on identifying the research's limitations. Chapter 8.4 proposes future areas of exploration in the emerging field of shared mobility governance, and Chapter 8.5 provides some closing words for the thesis.

8.2 Discussion and contributions to the academic literature

The current section revisits the original research questions proposed in Section 1.1 and explains how these were answered throughout the papers presented above. It also explains each paper's main contributions to the academic literature and proposes ways in which the findings can be used by public policymakers and practitioners to improve the governance of shared mobility interventions.

8.2.1 Research *Question 0 – How is shared mobility defined?*

While conducting the literature review for this thesis, it became clear that, although there has been increasing interest in shared mobility, most authors have focused either on technical aspects or on the potential outcomes of the services that comprise this umbrella term. Only a couple of authors have attempted to define the concept of shared mobility or to classify what services belong within its boundaries (Shaheen et al., 2015; and Santos, 2018 - See Chapter 2 for more detail). There was a clear gap in the literature that merited the inclusion of an additional research question in this thesis, defined as Research Question 0: “How is shared mobility defined?” So far, the literature has mostly used the

broader term of “smart mobility” to include the concept of shared mobility alongside many other diverse technologies (such as electric vehicles or autonomous vehicles). The literature reviewed showed that the concept of shared mobility was “fuzzy” and lacking form. The lack of a shared definition within academia was deemed problematic because it can lead to different understandings among authors and readers of what shared mobility means and which services and technologies it encompasses. This is especially troublesome due to the broad diversity of services and technologies that are generally understood to belong to shared mobility, from bike-sharing to ride-hailing and car clubs – all of which are very different and can lead to diverse social outcomes (e.g., in terms of emissions, time-savings, road safety). This issue is exacerbated by the fact that, due to its roots in social practices such as sharing and bartering, the concept of shared mobility evokes amongst stakeholders in this practice area notions of sustainability and social equity (as demonstrated by Noy and Givoni, 2018). However, academic research has shown so far that these sustainable and social goals are not always achieved by these shared modes (see, for example: Nijland et al. (2015); or Shaheen and Chan (2016)). Another important consideration that relates to shared mobility is that these services have been primarily deployed by private companies whose main goal is to maximise their profit, normally, by selling more of their services and could therefore benefit from the confounding of these goals with the services they sell (Docherty, 2018).

While creating a working taxonomy of shared mobility was not part of the original plan for this thesis, clarifying the concept of shared mobility became both important to fill a gap in the literature and a necessity to build a thesis on solid conceptual grounds. Through a critical analysis of the different strands of the academic, policy, and grey literature that underpin the concept of shared mobility, I proposed a taxonomy of shared mobility services that clearly delineates and brings the different terms and solutions that exist and have been defined in the literature under a single framework as shown below in Figure 29. The taxonomy effectively defines shared mobility (thus answering the research question) and helps

organise and reduce the complexity of the current universe of shared mobility solutions and potential future evolutions.

			Transaction type		
			P2P (peer-2-peer)	**B2C (business-2-consumer)**	**G2C (government to consumer)**
Market orientation	**Non-profit**	**Asset**	***(1)* Casual asset sharing** *(e.g. between acquaintances)*	**N/A**	***(7)* Public vehicle sharing** *(e.g. public bikesharing, publicly sponsored car sharing)*
		Service	***(2)* Vehicle (e.g. car-) pooling** (e.g. Mobicoop[1])	**N/A**	***(8)* Public ride sharing** *(e.g. public on-demand transit)*
	For-profit	**Asset**	***(3a) P2P vehicle-sharing*** (e.g. Getaround, Turo, Spinlister etc.) ***(3b)* P2P Other mobility assets**: (e.g. JustPark)	***(5a) Private vehicle-sharing*** (e.g. Car2Go, Zipcar, Mobike, Lime) ***(5b) Private* other mobility asset-sharing**: (e.g. SpotHero)	***N/A***
		Service	***(4) Ride-hailing/sharing*** (e.g. Uber, Lyft, Via etc.)	***(6) Microtransit / demand responsive transport*** (e.g. Chariot, Bridj)	***N/A***

Figure 29: Taxonomy of shared mobility services (Castellanos et al., 2021).

The expectation is that the taxonomy can be of value to stakeholders from the public, private and academic communities to reach a common understanding of what solutions are encompassed within the term shared mobility and, therefore, remove an initial barrier when using the term for research (especially studying the impacts of different shared mobility services) or policy formulation. Thus far, in the three years since the publication of the taxonomy, the paper has been cited in over 70 other academic publications (as identified in Scopus), mainly as a foundational definition on which authors elaborate to expand the understanding of shared mobility. Most authors who have cited the paper use it as it was intended: a baseline definition that clarifies what is in and out of the concept of shared mobility, therefore allowing for deeper studies on subjects such as user behaviour with respect to shared mobility (Si et al., 2023; Elnadi et al., 2024; Abouelela et al., 2025), and to study the impacts of shared

mobility on sustainability (Martinez et al., 2024; Chen et al., 2025; Thomas and Cabrera Serrenho, 2025), amongst others. The cited literature extends beyond transport journals to include those focused on sustainability, technology, and entrepreneurship.

8.2.2 Research Question 1 - What *kinds of goals are local governments pursuing, in different* contexts*, as they try to understand how to steer the direction of private sector shared mobility deployment?*

To answer this question, the thesis drew on different strands of the academic transport literature that address the lack of empirical inquiry into the actual goals local governments pursue when governing the transportation space. Specifically, Marsden and Reardon (2017), who reviewed the two main policy journals in the field for 2011-2015, could not find a single paper that focused on the goals pursued by transport policy (please see Chapter 4 for more details). With this realisation, the thesis explored the policy literature that discusses how policy goals are set, and used Cashore and Howlett (2007) taxonomy of policy measures to identify the goals that the governments in the three case study cities had pursued in the governance of shared mobility. Furthermore, the thesis explored the literature on theoretical goals proposed for the transport sector, noting that there were two fields within the literature: those who propose sustainability as a broad goal (e.g., Banister, 2008), and those who propose equitable access (e.g., Pereira et al., 2017). To better organise the results from the empirical inquiry, the thesis used the sustainability triad (environmental, economic, social), and added a new category (political), that encompasses those goals that didn't fit neatly into the original three categories.

The research findings suggest that city governments (represented by public policymakers and practitioners in the transport policy area) are pursuing a wide range of goals when governing shared mobility services. Within the specific cases that served as the basis for this research (Bogotá, Paris, and Los Angeles), this thesis identified 34 distinct goals. Despite the large number of goals identified, most were shared across the three cases, with only a few exceptions: goals that were completely missing from one city or identified in only one of the cases. Of the 34 goals identified, only three to four of them

tended to dominate most of the policy actions policymakers and practitioners took. The dominant goals identified were:

- Bogotá: 1. Order and law enforcement, 2. Quality of services, and 3. Safety
- Paris: 1. Air pollution, 2. Improved access, 3. Better use of public space, and 4. Safety.
- Los Angeles: 1. Innovation, technology, and modernity, 2. Control and power, 3. Equity, and 4. Safety.

The goals identified are not exhaustive nor necessarily representative of the whole universe of possible goals being pursued by city governments in this policy area (as this is not the goal when conducting case studies - Yin, 1994), but given that most of them were shared amongst the three cities and the careful methodological consideration we took in selecting the cases, it is reasonable to assume that other cities can relate to aspects of the analyses carried out. In that sense, the plurality of goals identified, coupled with the geographic diversity of the three cases, can support the transfer and improvement of policies in different contexts (i.e., different social, cultural, economic, and political contexts) and governance styles, as policymakers facing similar challenges can explore what these cities have done so far.

Something noteworthy about these results is that only the goal of “safety” was shared across the three cases. However, the contextual differences between cases provide a more nuanced understanding of this finding. Bogotá’s government was mainly focused on safety from a personal perspective (i.e., protecting taxi users from muggings that had become newsworthy before the advent of ridehailing). Paris, on the other hand, was mostly concerned about pedestrian safety, as pedestrians had to learn to navigate urban sidewalks that were now also used by shared bicycles and scooters. Finally, Los Angeles was primarily concerned about the safety of scooter riders, believing that the vehicles were inherently less safe than other modes of transportation. Despite these differences, it is worth exploring, through

additional empirical inquiries, whether safety is a goal pursued in other instances of transport governance.

It should also be noted that while the goal of order and law enforcement pursued in Bogotá, and the goal of control and power pursued in Los Angeles could be, on the surface, deemed similar, the reality is that Los Angeles was focused on regaining the power it had perceived lost when the first wave of shared mobility services was launched on its streets through companies such as Uber and Lyft. On the other hand, Bogotá was mostly focused on strictly following the existing laws, as it had resigned itself to not having the power to govern these services (something that Paris showed was not necessarily true, given it was able to pursue non legally sanctioned ways to govern these services through its non-binding codes of conduct).

The most significant contribution of this study was the collection of empirical data that can enhance our collective understanding of the goals cities pursue when governing shared mobility (in particular) and the broader transport policy space. The empirical data collected demonstrate a disconnect between what academia considers the aspirational goals of transport policy (sustainability and access) and the on-the-ground reality of transport policymaking. The research results showed that policymakers and practitioners are pursuing a wider array of goals, some of which did not fit within these two aspirational and theoretical categories proposed by the academic literature. An example of this is the goals documented in the three cities related to redressing the power imbalances stemming from the increasing role of private companies in the governance of the mobility sector, which were evident in their pursuit of control and power in the three cases.

The analyses conducted in the research also provided new insights into what motivates public policymakers and practitioners to govern shared mobility services. In particular, the findings suggest that these actors are mostly motivated by local circumstances and context (whether this refers to racial

equity in Los Angeles, air pollution in Paris, or quality of service in Bogotá), but less so by global concerns such as environmental sustainability- something which would be hard to identify by simply looking at the academic literature (over 2.9 million results for “sustainable + transport” in Google scholar).

The results also highlighted the significant role that specific actors play in shaping public goals in shared mobility. The will and perspectives of high-level politicians or bureaucrats mostly shape goal selection in the case studies. Once goals have been defined at these higher echelons of government, they then flow down and get implemented by practitioners. Since the power to define goals is concentrated in high-level politicians and decision-makers, they are potentially vulnerable to external pressure from third parties who could stand to gain or lose with any government action. The role of politics in transport policymaking became evident through the research, as some of the goals being pursued in these cities were motivated by electoral motives or by normative understandings by certain stakeholders on the correct balance between private and public power in the transport policy space. Since the case selection process for this thesis was not intended to identify representative cases that could be extrapolated to the entire universe of shared mobility governance instances, it would be interesting to identify additional cases that might adopt a more participatory approach to goal-setting.

The evidence provided to answer this first research question can have implications for the study and application of transport governance to the shared mobility policy area and to transport policy more broadly. As explained above, the study addresses the lack of empirical evidence related to goal-setting in transport policy research. The new evidence provided reveals the disconnect between the academic understanding of what should guide transport policymaking vs. what is actually guiding transport policymaking. This insight should open the door to additional empirical research in other contexts and sub-areas of transport policy to contrast these theoretical goals with the on-the-ground realities of policymaking. The new insights provided on the motivation of policymakers when selecting governance goals in the transport policy arena can help create new strategies (either from outside or inside

government) to push for goals that are more aligned with what academia understands should be pursued.

8.2.3 Research Question 2 - What governance interventions and instruments have cities deployed *when dealing with shared* mobility*, and how has the context affected implementation?*

The literature review identified a clear gap in the academic literature regarding policy tools in the transport policy arena (see chapter 2.3.4 for more detail). Only a handful of authors have delved into this topic (e.g. Hull, 2008; Santos et al., 2010; Mercier et al., 2016) and have proposed different taxonomies to classify some empirically observed instruments used in transport. Other authors (Mukhtar-Landgren and Smith, 2019; Paulsson and Hedegaard Sørensen, 2020; Mukhtar-Landgren and Paulsson, 2021; Kriukelyte et al., 2024) have started to explore instrument use in the smart mobility space or in smart cities (e.g., Desdemoustier et al., 2019; Margherita et al., 2023; Esposito et al., 2024). In these few studies, the authors have identified and studied specific instruments; however, they have not conducted a comprehensive or systematic overview of the instruments used in this topic, nor have they engaged with the reasons why some instruments are used over others in this space.

The policy academic literature, on the other hand, has a rich history of exploring both the policy instruments used in other policy arenas, as well as what motivates policymakers and practitioners to use certain instruments over others. From this, the thesis adopted Howlett's (2004) framework for policy instruments that classifies these into either **substantive** instruments, which are akin to the historical government instruments of policy and regulation and directly affect the policy outcomes, and **procedural** instruments, which are the ones being used by governments in the more modern challenge of network governance (procedural insofar as they attempt to indirectly effect changes in policy processes). Furthermore, the thesis explored the existing theories that propose the mechanisms that lead policymakers to select an instrument over and other and used these to test whether they had explanatory power in the policy arena of shared mobility.

The results of the document analysis and interviews from the third paper: "*A Tale of Three Cities: A Process Tracing Analysis of Policy Instrument Choice When Governing Shared Mobility*", present the systematic documentation of the policy instruments used in the three case studies as each government was deploying a different tool-selection strategy. As noted above, the academic literature on the topic is very limited, with only one author (Kriukelyte et al., 2024) explicitly studying the interactions between shared mobility and policy instruments. To the author's knowledge, this is the first comprehensive list of policy instruments for shared mobility conducted in the academic literature. In this exercise, the paper identified 52 unique instruments used collectively by the three cities, of which 30 were substantive (directly affecting policy outcomes), 23 were procedural (affecting policy processes), and one was classified as both. The paper introduced the novel concept of 'structural instruments', which refer to those instruments that serve as a foundation for all other instruments (the policy mix). These structural instruments, therefore, guide each government's policy selection strategy. An example of this is Los Angeles' permit (a substantive instrument), which was the main scaffolding from which all other instruments identified in this case derived. This concept, along with the evidence supporting it, contradicts a leading theory of instrument selection, policy coherence, which holds that common ideas or goals are the primary drivers of the policy mix (May et al., 2006). Researchers in other policy areas can apply the concept of structural instruments to assess its applicability and whether it provides better explanatory power than policy coherence. Furthermore, by understanding and embracing this concept, policymakers can craft policy mixes that are more coherent and effective through reinforcing policy instruments. This is particularly relevant when policymakers are structuring new policy mixes, as the cases studied suggest that this policy selection strategy was not conducted in a structured manner, but rather seemed to be a response to specific events or new challenges identified and was therefore not entirely coherent.

Another relevant contribution to the literature from the third paper was the identification and documentation of a novel use of digital tools in each of the three case cities: data standards. This procedural tool enabled the real-time or near-real-time collection of data generated by shared mobility vehicles, such as location data. Each city developed its own data standard independently, suggesting that this new tool is being used specifically to address perceived challenges public practitioners face stemming from shared mobility deployments. In recent years, there has been growing interest in the academic literature about the use of data standards for mobility applications, and in particular MDS (see for example: Zack, 2019; Rudmark, 2022; Rudmark et al., 2023), this study therefore adds additional evidence showing how these new tools are being used by cities around the world to achieve their policy goals. Documenting this tool and explaining how it was used in each case will allow other governments facing similar challenges to shared mobility to understand how it could support them in pursuing their own goals.

Another relevant contribution of the paper to the literature was the contrasting evidence it provided against one of the dominant theories in instrument selection in the political science literature: the theory of policy styles. Policy styles refer to the ways in which governments tend to follow similar instrument-selection strategies across domains and over time (Stead, 2018; Howlett and Tosun, 2019). Theories of policy styles suggest that historical trajectories and existing institutions shape policy styles. This conceptual theory has been used almost exclusively at the national level; therefore, this study is one of only a few that have applied it to local government (Howlett and Tosun, 2021; Lesnikowski et al., 2021). The paper provided evidence that, at the local level, instrument selection is highly constrained by the context (or, in critical realist terms, structures which are those objects of reality that constrain or enable the scope of individuals). These structures effectively constrain the choice of available instruments to tackle the challenges of shared mobility. These structures were primarily shaped by past decisions of national governments, resulting in national laws that pre-empted local governments from

making specific policy choices when faced with shared mobility deployments. While structures are generally perceived as immutable or permanent (Melia, 2020), two cases (Bogotá and Paris) demonstrated that changes in these structures led to adjustments in instrument selection strategies by local governments, providing compelling evidence that these structures likely play a significant role in instrument choice. Since Los Angeles was not subject to the same national/state policy constraints, it provided a window into what instrument selection could look like when not constrained by policy structures. In this case, policymakers sought to strike a balance between selecting instruments that were effective in addressing the perceived issues they faced and those that were considered legitimate by other stakeholders within the shared mobility governance network. This insight could support policymakers as they craft policy mixes within the shared mobility governance network, where the entry of new participants may require giving greater weight to the legitimacy component at the expense of effectiveness.

This insight also provides some evidence on how the different government arrangements might affect the deployment of shared mobility services. In particular, as discussed in section 3.3, both France and Colombia are examples of unitary governments in which the national government holds most of the power (in this case, regulatory power), which must be explicitly delegated to local authorities. In both cases, the explicit delegation of power had not occurred when the shared mobility services were deployed, leaving a legal vacuum that remained unaddressed for multiple years. On the other hand, in Los Angeles, where a federal system is in place, the local government has greater regulatory power without needing express delegation from the federal or state government. In this case, we showed how the state could have pre-empted the local government from exercising this regulatory authority but ultimately decided against it. This can help policymakers better plan their strategies by anticipating potential blocks (pre-emptive measures) or a lack of authority to govern these services.

8.2.4 Research *Question 3 - How do local governance approaches to shared mobility shape policy outcomes and lead to intended and unintended effects?*

The literature reviewed showed a dominance of economics-based measures used to evaluate the effects of transport policies. In particular, cost-benefit analyses (CBA) or multi-criteria analyses, which focus on evaluating the observed outcomes of interventions (i.e., if A then B had a cost/benefit of $X), but don't investigate how the policy interventions themselves led to those outcomes, nor how the context in which they are implemented affected those outcomes (i.e., how did A lead to B, and how did the context in which A and B are in impacted that relationship). They are therefore not relevant to evaluating how to understand causal relationships in policy interventions aimed at improving future policy iterations. The main aim of this thesis, as stated in section 1.1 was to propose new and improved ways for policymakers and practitioners to govern the shared mobility sector in the future. As such, there was a need to explore new ways of evaluating policy interventions that went beyond quantifying their monetised cost, and that gave insights into what part of an intervention works, for whom, and in what context (Pawson and Tilley, 1997).

The results of the research presented in the fourth paper: "Examining Causality: A Critical Realist Analysis of Policy Interventions when Governing Shared Mobility" sought to explain if the dominant goals that had been identified for the case of Los Angeles in the second paper that composes this thesis had been achieved once the city had implemented its pilot permitting programme of 17.000 shared micromobility vehicles. Evaluating the achievement of goals, specifically assigning different parts of the city's governance actions to these goals, allowed me to achieve the main aim of this thesis. As a reminder, the dominant goals identified for Los Angeles in the second paper were: (1) equity, (2) road safety, (3) control and power, and (4) innovation. The evaluation showed that the city was successful in achieving goals (3) and (4), but it was unsuccessful in achieving goals (1) and (2).

These results indicate that the governance tools employed by Los Angeles were only adequate for pursuing certain goals, but not others. This insight is particularly relevant for policymakers seeking to craft more effective policy mixes, as it provides a clear indication of which instruments will and will not be effective within their specific contexts. However, and in line with the Critical Realist philosophy of science that guided most of this thesis, observing and documenting correlations is only partially useful when seeking to improve policy programmes or, generally, conducting research. For Critical Realists, explaining "why (and also how) things work in the world that we do know" is what science should be pursuing (Bhaskar and Hartwig, 2016, p.67). As such, the only way to propose potential improvements in governance actions when addressing shared mobility is to examine the causality of which interventions, and which parts of those interventions, effectively led to the observed, expected, and unexpected outcomes.

Examining causality in critical realist studies involves identifying the invisible mechanisms that the researcher has hypothesised are affecting reality and leading to the observed outcomes. Since mechanisms are invisible, they are theoretical constructs that the researcher proposes to explain observations. Roy Bhaskar, who first proposed Critical Realism, also suggested a set of methods to help identify mechanisms. The paper followed this procedure, proposing three novel mechanisms that, based on the evidence collected, explain the observed results above. These were the *availability*, *vehicle*, and *oversight* mechanisms. The availability mechanism aligns with the observation of unsuccessful outcomes in the equity goal, the vehicle mechanism explains the safety outcomes, and the increased government control mechanism explains the power and innovation outcomes. By focusing on mechanisms, and by carrying out an intensive study on these, the paper fills a clear gap in the literature on transport policy evaluations, proposing a new focus on examining causality and moving away from the oft-used, positivist informed methods such as Cost-Benefit Analyses.

Additionally, as mentioned in the paper, to the best of my knowledge, critical realism has been applied only once in the transport field as a methodology to explain the effect of policies on observed outcomes (Melia, 2020). Melia's study was an inspiration for my own thesis. We both followed the RRREI(C) steps and we both used similar data sources and methods to reach our conclusions. In fact, the diagrams I used in the fourth paper to simplify the causal mechanisms I had identified were directly inspired by Melia's own diagrams. A clear area of differentiation between both studies is Melia's proposal of the existence of a "transport social structure", which I didn't include explicitly in my work, and simply referred to transport social structures as part of the broader social structures that influenced the decisions made by the policymakers in the Los Angeles case. This thesis therefore directly builds upon Melia's pioneering work of using CR in transport policy settings, providing additional examples (and demystifying) of how this philosophy of science can be applied in real-world policy situations.

The paper explains how the proposed mechanisms and structures, as seen in the case of Los Angeles, worked together to achieve the observed outcomes. This effectively provides a clear roadmap of the levers that could be adjusted from the instruments used to change the set of outcomes in a future programme iteration or potentially in other policy settings. Policymakers and public practitioners can review the study and experiment with different combinations of levers to shape the mechanisms proposed to improve the outcomes they pursue. In that way, we see these results as a starting framework for governing new mobilities.

8.2.5 Additional *contributions to the academic literature*

As explained above, the primary goal in selecting the three cases that form the backbone of this thesis was to showcase a range of approaches and contexts related to the similar problem of governing shared mobility services deployed by private companies. Selecting these cases required an expansive look at how many more cities worldwide had dealt with this issue from a regulatory perspective (assuming that

regulations are the most visible aspect of governance). This exercise led to the proposal of a taxonomy of regulatory approaches to shared mobility:

1. Umbrella regulations: Regulations that focus on defining the requirements/characteristics that shared mobility solutions need to comply with (mostly technical aspects, e.g., insurance, safety, distinct colours).
2. Operational permits: Under operational permits, operators must request permission from transport authorities and comply with specific requirements such as operational requirements, equity objectives, and data sharing demands.
3. Non-binding agreements: These regulations take the form of codes of practice/conduct or partnerships, where the government or shared mobility operators jointly agree on expectations of how shared mobility modes are supposed to operate. Unlike operational permits or umbrella regulations, these are non-binding and, therefore, not legally enforceable.
4. Banned: Regulations that explicitly ban the deployment of these services.
5. Laissez-faire: No regulations or attempts to govern, even when shared mobility services are present.

The cases selected, therefore, correspond to taxa within this taxonomy: Bogotá's approach is an example of an umbrella regulation, Los Angeles' is an example of an operational permit, and Paris' is an example of a non-binding agreement.

While there is a rich literature that has proposed regulatory classifications (mainly outside of the transport discipline, such as Hood, 1986; Vedung, 1998; Salamon and Elliot, 2002). To the author's knowledge, this is the first time that a taxonomy of shared mobility regulations has been proposed in the literature. Therefore, it can be considered a significant contribution to the academic literature and a necessary methodological step in addressing the research questions.

While the literature on this topic is still nascent, new research was published after the key design decisions for this study were made. Specifically, Sáenz-Leandro (2026) did a comparative study of ride-hailing regulations in Colombia, Chile, and Costa Rica to analyse differences in their approaches. Similarly to this thesis, the author concluded that the "rigid nature of existing regulatory frameworks prior to the entry of ride-hailing platforms" was a determining factor in the policy responses that these three governments pursued (Sáenz-Leandro, 2026, p.10). The author, however, was more interested in how private companies exploit regulatory "frictions" arising from these rigid frameworks to pursue their own goals. It is interesting from this research, which took a similar approach (comparative case study), yet a different framework (that of policy friction - Tsing, 2005) to the one I took for this thesis, that the conclusions were similar, in particular the fact that the goals that shared mobility companies pursue contrast, and sometimes oppose, those of the government, and that the existing 'rigid frameworks' (or what I referred to as the structures in CR terms) played an important role in how these services are eventually regulated.

Another strand of the literature that also came out after key research design decisions had been made is the one taken forward by authors such as Margherita et al., (2023) and Esposito et al., (2024) who take an opposing normative standing to the one I took with respect to how private sector companies impose their services on cities (see Section 1.2). These authors, on the other hand, propose that these new technologies are instruments that cities themselves can use to pursue their own goals and are therefore not impositions on them. In their research, the authors explore the types of goals cities are proposing as justification for pursuing "smart city" initiatives in Belgium and conclude, similarly to this thesis, that cities are pursuing a diverse range of goals, including economic development and environmental conservation. Similar to Sáenz-Leandro (2026), these authors adopted a different methodological approach and analytical framework, yet reached conclusions similar to those of this thesis. This provides some reassurance that the methodological choices made were adequate to pursue the research

questions, and that the results of this thesis are additive, complementary, and reinforcing of the newest literature in the field.

8.3 Research limitations

Several challenges were encountered while conducting this research. The first major limitation was that the thesis focused exclusively on understanding the perspectives of public policymakers and practitioners; however, as I have discussed throughout this document, private companies deploy shared mobility services. Engaging with private companies that were targeted by the public sector's governance practices was part of the original research plan. However, during the research period, a decision was made to focus solely on the government's point of view, mainly because of the additional complexity that planning, transcribing, and analysing private-sector interviews would have entailed. Engaging with private sector stakeholders would have expanded the project's scope of work beyond what seemed reasonable for a PhD. The impact this decision might have had was mainly evident in the last paper, where private-sector engagement could corroborate or refute the proposed mechanisms and provide relevant insights for identifying other plausible mechanisms. However, private companies likely also played a role in selecting goals and instruments. Understanding their perspectives would have enriched the analyses and provided alternative or additional explanations on how these processes were shaped.

Similarly, another limitation of the study was the lack of engagement with the end-users of these services. Conducting interviews with end-users was not part of the original research plan, and it would also have entailed additional effort beyond the time and effort typically required for a PhD. Understanding how end users are ultimately affected by the governance processes regulating shared mobility would provide additional relevant data to identify other potential mechanisms. However, to overcome this limitation, in the last paper I used surveys that LADOT had already conducted.

Related to the limitation of not engaging with end-users, another important limitation of the study was the failure to explore in greater depth how public participation shaped different elements of the cases,

notably the goal and instrument selection processes. Of the three case studies, only Los Angeles had an established process for seeking written public input during instrument selection. While these documents were identified during the data collection phase, a determination was made not to include them as part of the analysis, given that they did not represent the views of the public policymakers or practitioners (which was what the study sought to analyse). Neither Bogotá nor Paris had an explicit mechanism for seeking written public participation during the goal or instrument selection processes; however, this does not necessarily mean it was absent. Rather, it suggests that it was not documented and therefore wasn't included during the data collection phase. Exploring how public participation shapes the different processes during the policy formulation process of shared mobility would be an entirely different undertaking beyond the scope of what was determined for this PhD, but a worthwhile endeavour that could be undertaken in future research.

Another relevant limitation concerned the study period. As shown in the first paper, the topic of shared mobility is expanding. This research took over five years to complete, during which time new research and changes in policies and governance approaches occurred in the case cities. Furthermore, the COVID-19 pandemic also had consequences that were acknowledged in the research papers. To address these issues, I had to decide on the study timeframes, which inevitably left certain elements out of scope. I commented on new developments where relevant (for example, in the second paper, I discussed more recent updates in both Bogotá and Los Angeles). However, the topic is so dynamic that it would have been impossible to cover all developments outside of the selected timeframe. In fact, even though the Paris case was presented in the study as a successful case in the way the city approached the governance of shared scooters, in April 2023 the city held a referendum that resulted in the banning of this service from the city’s streets.

Lastly, on the practical level, the type of data that informed this thesis was not always readily available. For example, three stakeholders originally selected for interviews declined the invitation. This was not

unexpected, as this policy area remained active throughout the research period, and stakeholders may have felt that participating in the research could affect their reputations or current jobs. One of the people who declined to be interviewed mentioned that their position on the topic had been made clear by the media during the time they were involved in one of the policy processes. They, therefore, had nothing new to add. Furthermore, other data sources were not easily accessible. I carried out multiple freedom of information requests, but not all of them were successfully responded. While these situations were not ideal, in all three cases, data saturation was reached (i.e., no new information was being gleaned from additional interviews or documents), and not being able to interview these three stakeholders or accessing additional documents likely had minimal impact on the overall research process.

8.4 Future areas of study

An interesting expansion of the current research could be to explore how and why the topic of shared mobility rose to the top of the policy agenda in the case cities, but not in others where governments took a laissez-faire approach. Such a study could follow a methodology similar to that used in this thesis, with documentary analysis complemented by in-depth interviews. This exploration could yield interesting findings on how private-sector companies influence the agenda-setting stage of the policy cycle, findings that could be transferable to other domains facing similar private-sector influence (such as housing and short-term rentals like Airbnb). Furthermore, exploring whether there are links between the way the agenda has been set and the goal-setting and instrument-selection processes could shed further light on other external (structural) forces shaping these processes beyond those identified in this thesis. A potential difficulty in this research could be the numerous influences exerted upon policymakers, both in front of and behind the scenes.

An additional potential area of further study would be conducting a similar CR evaluation to the one we conducted for Los Angeles in the Bogotá and Paris cases. This would require additional data collection,

specifically on the outcomes observed in these two cases. Conducting such a study could lead to the identification of additional mechanisms, both additive and contradictory, that could further enhance some of the conclusions of this thesis and increase its overall applicability in other cities. Additionally, conducting more case studies in cities with different characteristics and approaches to shared mobility governance could be an interesting future area of research. This would enable further exploration of the theories proposed in this research, as well as the mechanisms and structures identified. Pawson and Tilley (1997) and Pawson (2013) offer a method called Realist Synthesis, which takes elements from and (in my view) is compatible with Critical Realism, which would be useful in using additional cases on the topic and building stronger theories. Furthermore, this method could be used to analyse specific governance tools used in shared mobility governance and expand the analysis to other domains that utilize those same tools. This would allow us, for example, to generate theories that are more broadly applicable to transportation or even governance.

The approach taken in the Los Angeles evaluation in the fourth paper examined causality by looking at outcomes and tracing them back to the governance instruments responsible for those outcomes. A different approach to causality could be to start with the instruments and investigate causal pathways to identify the outcomes they achieve. This could be an interesting area of exploration, providing policymakers with additional evidence on the most effective instruments to use in different circumstances, thereby supporting the creation of new, more coherent policy mixes.

An interesting conclusion from the second paper is that policy goals evolve as circumstances change. While an interesting conclusion, I didn't explore how this could be translated either into policymaking or into further theories of goal setting, and therefore, this could be a relevant area for future research. A way to explore this research question would be to again use a Critical Realist lens to investigate the causal pathways that lead to the adoption of different and changing policy goals, and to compare these with existing theories of goal setting. In other words, something similar to what I did in the third paper in

which I used the method of abduction to inform new theoretical developments. While I exposed the motivations that different policymakers and practitioners pursued, leading them to different goals, as well as the changing circumstances that compelled them to change the goals they pursued, this could be further expanded into a theoretical abstraction exercise to improve existing theories on goal setting.

As mentioned above, one limitation of the research was the lack of engagement with private-sector stakeholders. A relevant and natural extension of this work would be to conduct interviews with these companies, especially since I have argued throughout this thesis that they now wield more power in shared mobility governance networks than they did in the past. Since they are such an important stakeholder in this network, their perspectives would be complementary in proving or disproving some of the theories proposed here. In a similar vein, other actors within the network could also provide valuable additional insights. Some of these were identified in this research, and the second and third papers showed how engagement with some of them (such as universities and NGOs), supported the legitimacy of the governance actions that city governments were taking. A natural extension of this research could therefore be to interview these actors to better understand how their work supported the observed outcomes.

The fourth paper looked at the outcomes achieved in Los Angeles. However, some of these outcomes have deep consequences for people living in places where shared mobility services are being deployed. A more critical examination of the impacts of shared mobility services on historically marginalized populations, particularly the impact of the goals and instruments used that result from the clash between private and public sector objectives, would be an important area of inquiry, and it could provide additional emancipatory evidence and tools in the pursuit of a more just transport system.

8.5 Final words and recommendations to policymakers

As noted above, this study delved into the intricacies of governing shared mobility. While it only ‘scratched the surface’, it identified some of the main issues policymakers face, as well as potential

starting points to improve the governance of this sector in the future. Succinctly, I would summarise my main recommendations as follows:

1. Public policymakers and practitioners should take care when buying into private-sector discourses on new technologies. Private companies have the incentive to portray their technological developments as a "win-win" for society and themselves, this study has shown that this is not always the case, and that there is still a need to better understand how and if these technologies provide a net gain to society.
2. There should be a clear acknowledgment of what are the goals that policymakers are trying to achieve when governing new technologies. If these are not identified and clearly stated, there is a risk that competing, unstated goals cannibalize those that are effectively positive for society. Furthermore, and linked to point number 1 above, the for-profit motive of private companies can overtake those that governments should pursue.
3. This study presented an initial identification of governance tools used in the shared mobility space, and an evaluation of the effectiveness of some of these tools in pursuit of public goals. Policymakers should confront their initial "hunches" about how they expect their policy interventions to work with what I have presented in the study. This exercise can help clarify and elicit critical thinking about the intended and unintended outcomes of different policy interventions. Since this is still a nascent area, yet governance tools are used across policy areas, policymakers should engage with this broader literature to improve their own policy processes.

I hope that this study will be just a starting point for other researchers wishing to support the creation of better social outcomes for the transport field.

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9. Appendices

9.1 Ethics approval

Outlook

LTTRAN-147 - Approval

From ResearchEthics <researchethics@leeds.ac.uk>
Date Mon 17/01/2022 16:26
To Sebastian Castellanos Vanegas [ts13jscv] <ts13jscv@leeds.ac.uk>
Cc Susan Grant-Muller <S.M.Grant-Muller@its.leeds.ac.uk>; Katy Wright <K.J.Wright@leeds.ac.uk>; ResearchEthics <researchethics@leeds.ac.uk>

Dear Sebastian

LTTRAN-147 - Governing for sustainability in an era of shared mobility

NB: All approvals/comments are subject to compliance with current University of Leeds and UK Government advice regarding the Covid-19 pandemic as well as any local restrictions where the study is being carried out regarding in-person data collection and travel.

I am pleased to inform you that the above research ethics application has been reviewed by the Business, Environment and Social Sciences (AREA) Faculty Research Ethics Committee and on behalf of the Chair, I can confirm a favourable ethical opinion based on the documentation received at date of this email.

Please retain this email as evidence of approval in your study file.

Please notify the committee if you intend to make any further amendments to the original research as submitted and approved to date. This includes recruitment methodology; all changes must receive ethical approval prior to implementation. Please see Ethics and ethical review – Research and Innovation Service (leeds.ac.uk) or contact the Research Ethics Administrator for further information (researchethics@leeds.ac.uk) if required.

Ethics approval does not infer you have the right of access to any member of staff or student or documents and the premises of the University of Leeds. Nor does it imply any right of access to the premises of any other organisation, including clinical areas. The committee takes no responsibility for you gaining access to staff, students and/or premises prior to, during or following your research activities.

Please note: You are expected to keep a record of all your approved documentation, as well as documents such as sample consent forms, risk assessments and other documents relating to the study. This should be kept in your study file, which should be readily available for audit purposes. You will be given a two week notice period if your project is to be audited.

It is our policy to remind everyone that it is your responsibility to comply with Health and Safety, Data Protection and any other legal and/or professional guidelines there may be.

I hope the study goes well.

Yours sincerely,

George
On behalf of Matthew Davis, Chair, AREA FREC

9.2 Interview guides

		Paris		
		Topic	**Prompt**	**Logic**
Warm-up	**1**	I'd like us to talk about the advent of companies such as CityScoot, and later some of the dockless bikes and scooter companies. CityScoot came to the city around 2014 while you were <INSERT POSITION>.		Start easing them into the topic and refreshing their memories.
	a		What was your first reaction when these services showed up?	
Tools and theories	**2**	Let's talk a bit about some of the events that happened when these services showed up.		Exploring theories of regulation
	a		What sort of actions did you and your team discuss? Did these services align with your overall vision for the city, or were they something that produced nuisance and therefore needed regulation?	
	3	There were multiple meetings with the operators throughout the process		Get them talking.
	a		What was the general tone of the meetings?	

	b		What did you hope to accomplish with these meetings? Please use specific examples. CR Alternative: Since there was no regulation in place, were you hoping the operators would be open to discussing ways of self-regulation	Exploring logic behind intervention: theory/goals
	4	You signed "codes of good conduct" with the operators		
	a		Can you remember how it was decided that this was the path that you were going to take?	Exploring logic behind intervention: theory/goals
	b		What did you hope to accomplish with these codes?	Exploring logic behind intervention: theory/goals, potential mechanisms
	c		How were the specific measures in these codes decided (e.g., speed limits, insurance, maintenance, data)? *[clarifying prompt*] Were these proposed by you, or was it of mutual accord?	Exploring logic behind intervention: theory/goals
	d		Would you consider this approach successful? / What changes in the way the operators behaved did you observe?	Exploring outcomes

	e		Would you have done things differently?	Exploring alternative explanations/different mechanisms.
	f		Regarding the data requirements, how were you expecting to use the data? Has this been the case? Are you using data differently?	Exploring logic behind intervention: theory/goals
	g		It seems to me that lacking any other form of regulation you were hoping to secure the buy-in of the operators through these meetings and codes so they would self-regulate. Would you agree?	CR prompt: articulate the CMO configuration explicitly, inviting dis/agreement.
	h		What made you think that operators would be willing to self-regulate? (especially since the codes were not legally binding)	Exploring context/structure.
	i		Would you consider this approach successful? / What changes in the way the operators behaved did you observe?	Exploring outcomes
	j		Would you have done things differently?	Exploring alternative explanations/different mechanisms.
	5	Another of the actions that your team took was establishing public space occupancy fees (redevence).		

	a		How did the operators react to this? *[clarifying prompt]* Was this something that was agreed upon by them?	Exploring mechanisms and outcomes.
	b		Was your intention to make operators rationalize their deployments since the city had too many vehicles already? How would these fees allow you to accomplish this?	CR prompt: articulate the CMO configuration explicitly, inviting dis/agreement.
	c		Would you consider this approach successful?	Exploring outcomes
	6	You started an education campaign to inform scooter users about the dangers of this mode.		
	a		Do you think informing the users was sufficient to change their behavior? / how did the users react to this?	CR prompt: Exploring goals and mechanisms.
	b		To what extent do you think the campaign met its goals? What could have been done differently?	Exploring outcomes and alternative explanations
	c		How were you expecting to do enforcement given the large numbers of users and rides that were happening?	Exploring outcomes and alternative mechanisms

	7	**(optional)** Can you talk to me about the dedicated parking spaces you created for bikes and scooters.		
	a		Were you hoping that users would use these even if it was inconvenient for them? / How did the users react to this?	CR prompt: articulate the CMO configuration explicitly, inviting dis/agreement.
	b		To what extent do you think these parking spaces meet theit goals? What could have been done differently?	Exploring outcomes and alternative explanations
	8	**(optional)** One of the actions you took that caught my attention was the op-ed you wrote for the newspaper La Libération in November 2018.		
	a		What were you hoping to achieve with this?	Exploring goals and mechanisms.
Goals and context	**9**	Now thinking about all these actions together,		
	a		What would you say you were trying to achieve with them? What were your overall goals?	Exploring goals/intended outcomes

	b		Here's what I think was happening: The council was being pressured into protecting the right of way, which led you to implement many measures to keep sidewalks clear. Do you agree?	CR prompt: articulate the CMO configuration explicitly, inviting dis/agreement.
	c		What made you think you could achieve these goals with these actions?	Exploring context/structure.
	d		What were some of the challenges you faced when trying to achieve these goals?	Exploring context/structure.
	e		Was there something about Paris that you think made it particularly suited to this type of approach (e.g., policy, politics, staff, others?)	Exploring context/structure.
	f		Did you establish any metrics of success? What were these measures of success?	Exploring goals/intended outcomes
	g		Is there something in particular that you feel went well in your handling of the scooter situation?	Known, unknown and unintended outcomes
	h		Looking back at how things are right now, would you consider your goals were achieved? Would you have done things differently?	Alternative mechanisms/theories

	i		I propose that the goals of any transport intervention should be first and foremost to support access to necessities, insofar this access is respectful of the environment. How do you think this framing aligns with your own goals?	Exploring goals/intended outcomes
Closing	**10**	Is there anything else you would like to mention about the actions that you took after these services showed up?		
	11	Are there any other people that you recommend I talk to?		

		Los Angeles		
		Topic	**Prompt**	**Logic**
Warm-up	**1**	I'd like us to talk about the advent of shared bike and scooter companies. Bird showed up in Santa Monica in 2017, and closely after Ofo and Lime deployed bikes in Griffith Park and in Councilmember Buscaino's district while you were <INSERT POSITION>.		Start easing them into the topic and refreshing their memories.
	a		What was your first reaction when these services showed up?	
Tools and theories	**2**	Let's talk a bit about some of the events that happened when these services showed up.		Exploring theories of regulation

	a		What sort of actions did you and your team discuss? Did these services align with your overall vision for the city, or were they something that produced nuisance and therefore needed regulation?	
	3	Before proposing a way to move forward to council, you researched deployments in other cities and held a roundtable with the industry.		Get them talking.
	a		What was the general tone of this roundtable?	
	b		What did you hope to accomplish with the roundtable? Please use specific examples.	Exploring logic behind intervention: theory/goals
	4	I would like to understand a bit better how your draft rules and regulations were created. Other than the roundtable, your strategy document, meetings you held with other cities (roundtable in Austin, on Aug 2, 2018), and meetings you held with the companies seemed to all have played a part in them.		
	a		Can you remember how it was decided that a pilot regulation was the way to go?	Exploring logic behind intervention: theory/goals

	b		What did you hope to accomplish with a pilot regulation?	Exploring logic behind intervention: theory/goals, potential mechanisms
			Can you talk a bit about how these (and other) previous actions informed some the specific measures in your regulation (e.g., speed limits, fleet caps, insurance, maintenance, data)? [clarifying prompt] Were these mostly proposed by you, or was it of mutual accord with the operators?	Exploring logic behind intervention: theory/goals
	d		Would you consider this approach successful? / What changes in the way the operators behave did you observe?	Exploring outcomes
	e		Would you have done things differently?	Exploring alternative explanations/different mechanisms.
	f		Regarding the data requirements, how were you expecting to use the data? Has this been the case? Are you using data differently?	Exploring logic behind intervention: theory/goals
	g		MDS has been controversial. I've heard LADOT officials mentioning in interviews that they didn't want to relive the Uber and Lyft experience where private companies were sidestepping the public sector. Was MDS a way to regain some of the control that had been relinquished to private companies? if no, what was then the goal?	CR prompt: articulate the CMO configuration explicitly, inviting dis/agreement.

	h		You requested deployments in specific communities in the interest of equity, yet these deployments didn't end up happening as you had intended it. Why do you think that is?	Exploring context/structure.
	i		You instituted caps that were large compared to those instituted by other cities. You were trying to use these caps as incentives for the companies to change their behavior to support your goals, but no company ever reached the cap. Where do you think this expectation went awry? / How did the operators react to the caps?	CR prompt: articulate the CMO configuration explicitly, inviting dis/agreement.
	j		Would you have done things differently?	Exploring alternative explanations/different mechanisms.
	5	You started an education campaign to inform scooter users about good riding behavior and parking etiquette		
	a		Do you think informing the users was sufficient to change their behavior? / How did the users change their behaviour?	Exploring goals and mechanisms.
	b		To what extent do you think the campaign met its goals? What could have been done differently?	Exploring outcomes and alternative explanations
	c		How were you expecting to do enforcement given the large numbers of users and rides that were happening?	Exploring outcomes and alternative mechanisms

	6	One of the big challenges you seem to have faced was enforcement, especially since LADOT doesn't have enforcement power.		
	a		The MDS data you were receiving seemed to have played an important role in enforcement of the companies. Were you expecting the companies to comply with the regulations because you had the data? *[clarifying prompt]* Did they actually comply because of this?	CR prompt: articulate the CMO configuration explicitly, inviting dis/agreement.
	b		Were you expecting to use MDS data to also enforce user behavior? / Did the use of MDS affect at all how users were behaving?	Exploring goals and mechanisms.
	7	**(optional)** Can you talk to me about the stencils and then dedicated parking spaces you created for scooters.		
	a		It seems inconvenient for users. How did you expect users to react? / How did users react to this?	CR prompt: articulate the CMO configuration explicitly, inviting dis/agreement.
	b		To what extent do you think this deployment meet its goals? What could have been done differently?	Exploring outcomes and alternative explanations

	8	While council seemed to be amenable to your recommendations, they did pass a moratorium for companies to hold off until the pilot rules and regulations were ready. Despite the moratorium, operators were still deploying. You issued a cease and desist letter to Bird, but they didn't comply.		
	a		Was there an enforcement mechanism for these letters? How did you expect the companies would comply without an enforcement mechanism?	Exploring mechanisms and theories of governance.
	9	One of the actions you took that caught my attention was openly discussing your work on MDS in multiple news outlets.		
	a		Were you hoping to receive popular support to your plans by doing this?	CR prompt: articulate the CMO configuration explicitly, inviting dis/agreement.
Goals and context	**10**	Now thinking about all these actions together		
	a		Most of them point to you trying to make these services equitable for citizens, but at the same time respect the public right of way. Were there any other major goals you were trying to achieve?	CR prompt: articulate the CMO configuration explicitly, inviting dis/agreement.
	c		What made you think you could achieve these goals with these actions?	Exploring context/structure.

	d		What were some of the challenges you faced when trying to achieve these goals?	Exploring context/structure.
	e		Was there something about LA that you think made it particularly suited to this type of approach (e.g., policy, politics, staff, others?)	Exploring context/structure.
	f		NelsonNygaard did an evaluation for you. Were all the metrics of success established in this report things that you were intending to measure from the start, or did these came about after the fact?	Exploring goals/intended outcomes
	g		Is there something in particular that you feel went well in your handling of the scooter situation?	Known, unknown and unintended outcomes
	h		Looking back at how things are right now, would you consider your goals were achieved? Would you have done things differently?	Alternative mechanisms/theories
	i		I propose that the goals of any transport intervention should be first and foremost to support access to necessities, insofar this access is respectful of the environment. How do you think this framing aligns with your own goals?	Exploring goals/intended outcomes
Closing	**11**	Is there anything else you would like to mention about the actions that you took after these services showed up?		

	12	Are there any other people that you recommend I talk to?		

		Bogotá		
		Topic	**Prompt**	**Logic**
Warm-up	**1**	I'd like us to talk about the advent of ridehailing companies such as Uber, and later others such as CabiFy, Mi Águila. Uber came to Bogotá in September 2013 while you were <INSERT POSITION>.		Start easing them into the topic and refreshing their memories.
	a		What was your first reaction when these services showed up?	
Tools and theories	**2**	Let's talk a bit about some of the events that happened when Uber showed up.		Exploring theories of regulation
	a		What sort of actions did you and your team discuss? Did these services align with your overall vision for the city, or were they something that produced nuisance and therefore needed regulation?	
	3	There were multiple meetings with the taxi industry representatives including multiple "working groups" that were set up (mesas de trabajo)		Get them talking.

	a		What was the general tone of these meetings? *[clarifying prompt]* Were they only with the taxi industry, or was Uber also part of them?	
	b		What did you hope to accomplish with these meetings? Please use specific examples. How did these meetings help you in the regulations that were put in place?	Exploring logic behind intervention: theory/goals Probe for private interest theories
	4	**(optional - National)** You worked on a regulation for "luxury taxis" as a way to address the advent of these services		
	a		Can you remember how it was decided that this was the path that you were going to take?	Exploring logic behind intervention: theory/goals
	b		What did you hope to accomplish with the regulation? CR alternative: You had a mandate to regulate individual transport services, do you think this is important since users are vulnerable to what private companies could do?	Exploring logic behind intervention: theory/goals, potential mechanisms
	c		How were the specific measures in this regulation decided (e.g., data, fares, technical characteristics)? *[clarifying prompt]* Were these proposed by you, or was it of mutual accord with the taxi industry or Uber?	Exploring logic behind intervention: theory/goals

	d		Would you consider this approach successful? / What changes in the way the operators behave did you observe?	Exploring outcomes
	e		Would you have done things differently?	Exploring alternative explanations/different mechanisms.
	f		Regarding the data requirements, how were you expecting to use the data? Has this been the case? Are you using data differently?	Exploring logic behind intervention: theory/goals + CMO configuration.
	g		It seems to me that you were hoping that Uber would become a taxi company and compete in equal conditions against the established industry. Would you agree with this?	CR prompt: articulate the CMO configuration explicitly, inviting dis/agreement.
	h		What made you think that Uber would do this? (especially since they were vocal against it)	Exploring context/structure.
	i		Would you consider this approach successful? / What changes in the way the operators behave did you observe?	Exploring outcomes
	j		Would you have done things differently?	Exploring alternative explanations/different mechanisms.

	5	Another of the actions that the government decided to take was instructing the police to stop suspect vehicles on the streets		
	a		Was your intention to make Uber desist in providing the services? Given the magnitude of the operation, how would stopping a few vehicles allow you to accomplish this? / How did Uber drivers react to this?	CR prompt: articulate the CMO configuration explicitly, inviting dis/agreement.
	b		Would you consider this approach successful?	Exploring outcomes
	6	**(optional - National)** The government filed a lawsuit against Uber in an attempt to block the Uber app (national) This wasn't a concerted effort on the part of the government since MinTIC was against it.		
	a		How was this decision made?	Exploring goals and mechanisms.
	b		Did you expect that by blocking the Uber app they would leave the country? / *[Open ended alternative]* what did you expect to achieve with this?	CR prompt: articulate the CMO configuration explicitly, inviting dis/agreement.
	7	**(optional - Local)** The government filed a lawsuit against Uber for "usurpación de funciones".		

	a		Did you expect that this would block the operation of these apps? / What did Uber react to this?	CR prompt: articulate the CMO configuration explicitly, inviting dis/agreement.
	b		Do you think this was successful? What could have been done differently?	Exploring outcomes and alternative explanations
	8	**(optional - National)** The Superintendecia de Transporte investigated Uber and later issued sanctions against them		
	a		How was this decision made?	Exploring goals and mechanisms.
	b		Early in the process you issued a joint statement with the Ministry of transport saying that Uber was illegal. What was the intention behind this and other similar public statements? / Did Uber or the white car companies change their behaviour?	CR prompt: articulate the CMO configuration explicitly, inviting dis/agreement.
	c		You also sent letters to special service companies. Did you think the companies had any mechanism to compel the drivers to not provide the service through Uber?	CR prompt: articulate the CMO configuration explicitly, inviting dis/agreement.
	d		Ultimately, you sanctioned Uber twice, but this didn't stop them from operating. How did you think the sanctions were going to	Exploring goals and mechanisms.

			affect Uber's operation? / Did Uber change its ways?	
	9	The responsibility for regulating these services was seen to be held by the national government.		
	a		How did you work with local/national government since the enforcement was done locally?	Exploring logic behind intervention: theory/goals.
	10	You gave multiple interviews to the press.		
	a		Some of these seem to have infuriated either the taxi industry or Uber. Would you have taken a different approach such as working directly with them away from the microphones?	Exploring outcomes and alternative explanations
	b		What were you hoping to achieve with this?	Exploring logic behind intervention: theory/goals.
Goals and context	**11**	Now thinking about all these actions together,		
	a		Most of them point to you trying to uphold the law. Were there any other major goals you were trying to achieve?	Exploring goals/intended outcomes and inviting disagreement

	c		What made you think you could achieve these goals with these actions?	Exploring context/structure.
	d		What were some of the challenges you faced when trying to achieve these goals?	Exploring context/structure.
	e		Was there something about Bogotá or Colombia that you think made it particularly suited to this type of approach (e.g., policy, politics, staff, others?)	Exploring context/structure.
	f		Did you establish any metrics of success? What were these measures of success?	Exploring goals/intended outcomes
	g		Is there something in particular that you feel went well in your handling of the Uber situation?	Known, unknown and unintended outcomes
	h		Looking back at how things are right now, would you consider your goals were achieved? Would you have done things differently?	Alternative mechanisms/theories
	i		I propose that the goals of any transport intervention should be first and foremost to support access to necessities, insofar this access is respectful of the environment. How do you think this framing aligns with your own goals?	Exploring goals/intended outcomes
Closing	**12**	Is there anything else you would like to mention about the actions that you took after these services showed up?		
	13	Are there any other people that you recommend I talk to?		

9.3 Search terms used for the different modes in each language

1. **French**: EDP, “engin de déplacement personnel“, trottinette(s), libre-service, “vélo-en-libre-service”.
2. **Spanish**: Uber, “plataforma de transporte”, viaje OR vehículo AND compartido, “taxi(s) de lujo”.
3. **English**: Scooter AND sharing, shared AND scooters, shared AND micromobility, micromobility.