Master Thesis

Institutional Lock-in and Active Mobility: A Comparative Case Study

Ertel, Gillian- S2474743
g.e.ertel@student.utwente.nl
gillian.ertel@uni-muenster.de

Comparative Public Governance/ European Studies

Faculty of Behavioural, Management, and Social Sciences

University of Twente

Supervisor: Islam Bouzguenda, Oliver Treib

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Abstract: Prioritizing active modes of transportation could not only decarbonize the transportation sector but simultaneously revamp urban areas, improve the health of residents, and create more people friendly cities. The purpose of this research is to determine to what extent does institutional lock-in- or how an institution becomes path dependent- influence active mobility implementation within the cities of Amsterdam and Orlando. Using deductive reasoning to explore two cities with two very different shares of active mobility, the research looks at policies and regulations along with economic spending to determine the extent of institutional lock. The results show there is an apparent difference between both Orlando and Amsterdam in terms of priority. Amsterdam demonstrates how prioritizing active mobility policies can improve the lives of those residing in the city, where Orlando focuses far more on financial reward and individual car usage. Therefore, the city of Orlando has created a path dependency based on private car usage where there is little to no movement on transitioning to a more active mobility system, while Amsterdam has created a positive feedback loop dedicated to active mobility within the city.

Key words: Active Mobility, Micro Mobility, Institutional lock-in, historical institutionalism, path dependency, Amsterdam, Orlando

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1.Introduction

Cities are imperative for human development, and transportation is the backbone of a successful city. Transportation costs- such as gas prices, train and bus fares, and cost per parking- all determine how cities function and the patterns of land use (Alonso, 1964). While cities continue to grow rapidly, it is vital that the environment of urban areas remains liveable and attractive. A key aspect that hinders the attractiveness of a city include poor air quality, noise pollution, and congestion. The determinant of these hindering variables is the transportation within a city. Considering the transport sector accounts for almost one-quarter of global energy-related CO2 emissions, climate action within the realm of transport is urgently needed (European Environment Agency (EEA) 2017a). Brand et al. (2021a) and Brand et al. (2021b) used travel activity data based on 7 European cities and found that of all the collected data they computed that roughly 70% of the total 3.2 kg CO2 comes from car trips, compared to 1% from cycling.

Within the sustainable transportation transition, there are options on how to reach the agreed-upon 1.5 Paris Agreement goal, which is that “countries aim to reach global peaking of greenhouse gas emissions as soon as possible to achieve a climate neutral world by mid-century" (UNFCC, n.d.). There are current solutions being in place to reduce carbon emissions from the transportation sector. Zero-emission vehicles, such as electric vehicles are growing in number, and phase outs of Internal Combustion Engines are becoming more prominent. In addition, mass public transportation projects are coming to light across the world- and huge progress in traffic management techniques in European cities have already progressed greatly as documented by a handbook published by the European Union (Council Directive 2004/54/EC). In Europe, cycling is seen more in urban areas, however, even then, in urban cities such as Copenhagen, half of the residents' bike to work or school (City of Copenhagen, 2013). A similar situation can be seen in The Netherlands, as 63% of Dutch people are using their bicycle daily, totalling a rough 48% of all city traffic- while vehicle traffic is only 22% (Reliance Foundry Co. Ltd, 2021). Even the European cities that are not famous for their active mobility status have a high share of active mobility seemingly compared to North America. Budapest, ranking in the middle of a study done by Wuppertal Institute, has a percentage of residents walking or cycling to work at a relatively high 21% (Kodukula et al, 2018).

Yet- western cities outside the European Union – such as those in North America- tend to have a lower share of active mobility. Differences between the cities of Amsterdam and Orlando in cycling levels are enlightening because they both are highly developed, democratic, affluent societies that are popular tourist destinations. Prioritizing active modes of transportation could not only decarbonize the transportation sector but simultaneously revamp urban areas and improve the health of residents. Active modes of transportation have four main terms to describe the phenomenon- Active Mobility, Active Travel, Active Transport, and Active Transportation. For reasons of consistency, this study will adopt the term active mobility, as the terms are all synonymous (Clark et al. 2018). According to Gerike et al. (2016), active mobility is defined as "utilizing walking and cycling for single trips or within a trip in combination with public transport". While Gerike et al. (2016) provides a proper basis for a basic understanding of what active mobility is defined as, the PASTA Project (Clark et al. 2018) provided a definition in which will be adopted for the following study:

"Active mobility is regular physical activity undertaken as a means of transport. It includes travel by foot, bicycle and other vehicles which require physical effort to get moving. Use of public transport is also included in the definition as it often involves some walking or cycling to pick-up and from drop-off points. It does not include walking, cycling or other physical activity that is undertaken for recreation." (Clark et al. 2018, pg. 24)

As there are other forms of active mobility rather than walking and cycling, the inclusion of "other vehicles which require physical effort to get moving" gives lead way for the inclusion of a broader scope (Clark et al. 2018). For example- the inclusion of micro mobility such as scooters, skateboards, and wheelchairs. The inclusion of recreational walking and cycling is not included in the definition due to the intent behind the walking and cycling is for leisure and not for mobility.

Increasing implementation of active mobility is beneficial to individuals- such as higher levels of personal mobility and opportunities to remain healthy. Walking and cycling have many long-term rewards for an individual such as reducing the risk of heart disease,

cancer, and obesity (Koszowski et al., 2019). Moving as a form of mobility aligns with the Sustainable Development Goal 3, good health and wellbeing, due to the long-term individual rewards previously mentioned. For cities implementing active mobility projects, there are benefits that go beyond the individual- such as sustainability improvements, cleaner air, and reduced congestion (Ohlund et al., 2021). These benefits align with Sustainable Development Goal 11- sustainable cities and communities, and Sustainable Development Goal 13, Climate action. Due to the vitality of active mobility on the individual, communal, and global scale, examining the institutional basis on how to have a community that prioritizes an active mobility scheme is a top priority.

The following research will examine two large urban areas- Amsterdam, Netherlands, and Orlando, Florida (USA), to determine how active mobility implementation can influence active mobility implementation. As a comparative case study, the selected cities are the most similar case selections. The two selected cities have variables that are mostly similar- such as unemployment rate, average salary, the average age of the population, crime rate, and geographic similarities. But, in the two selected urban areas, one variable that will be the focus of the investigation is the very different shares of active mobility implementation. Looking at two cases with similar settings yet extreme differences in the share of active mobility implementation, the aim of the research is to explain how policies and regulations, along with economic spending can "lock-in" an institution in terms of transportation modes.

With Amsterdam as the city ranked highest in terms of share of walking and cycling, this can be used as a best-case scenario. Orlando, however, is ranked close to last in North America on the share of walking and cycling (Alliance for Regional Transportation, 2019). Questioning the institutional dimension of active mobility implementation in both Amsterdam and Orlando is the premise of this research. Using a state and local- centric approach reinforces the argument that stakeholder strategies, historical policies, and regulations, along with financial spending are vital to understand dynamics and challenges when implementing active mobility. Exploring how various geographic locations have reached their "locked-in" status will give insight into what public institutions can achieve to increase active mobility implementation to reach the 1.5 Paris Agreement goal. The similarities between the two cities serve as a tool to measure how the institution impacts active mobility implementation, rather than geographic factors, leading to the question of:

RQ: To what extent can institutional lock-in explain the different share of active mobility in the cities of Amsterdam and Orlando?

Institutions may be defined as a form of constraint that humans devise to shape human interaction (Foxton, 2002). Formal and informal constraints are what define an institution. These constraints set in place a "course of action" for an institution that, once in place, molds the social construct and is difficult to change- otherwise known as institutional lock in. According to Brown et.al (2007), institutional lock-in protects the so-called "status quo" which include policies and regulations, tax codes, and financial practices. These factors can simultaneously co-evolve to lead to an institution's structures and consistencies, resulting in a lock-in effect. These factors produced by the institution lead to the sub-questions of:

SQ1: To what extent do policy and regulations determine the share of active mobility in the cities of Amsterdam and Orlando?

SQ2: To what extent does economic spending determine the share of active mobility in the cities of Amsterdam and Orlando?

The primary aim of this research is to determine how an institution's historic course of actions can provide insight on how a phenomenon can occur and influence active mobility implementation. The relevance of this research fills a gap in the contribution of institutional lock-in when referencing active mobility. Prior research uses a similar theoretical framework to determine how large-scale transportation structure projects can be impacted by lock-in (Kotilainen et al., 2019). Further, other transportation modes- such as electric mobility- have existing research on how lock-in prevents the transition to electric vehicles rather than Internal Combustion Engines (Kotilainen et al., 2019). The following research on how an institution can create a lock-in effect through implementing active mobility projects fills an understudied research gap that could move forward the sustainable transportation transition. Researching how institutional lock-in can influence active mobility implementation holds societal relevance, due to the importance of providing safe, accessible, and affordable options to even the most vulnerable of populations- which active mobility provides. As active mobility is the most affordable form of mobility, it is also the most equitable.

This paper is organized as follows: A background on the concept of active mobility will be addressed and further defined to lay the foundation of research. Within the following

sub-chapter, the theoretical background will lay the dimensions of an institution and historical institutionalism (Pierson, 2000; Foxton, 2002; North, 1990), which help determine the factors that will be used to operationalize institutional-lock in. Once the theoretical background is structured, the criteria used to measure both the independent variable (institutional lock-in) and dependent variable (active mobility implementation) will be finalized through a literature review. Once the basis of research has been structured, the methodology chapter will outline how the research will be conducted, along with rationale for case selection. Based on the methodology, the analysis will look at various policy documents, reports, and official government sources as the basis of research, then a discussion of the findings will occur. During the discussion, the shortcomings and obstacles that occurred during research will be conveyed, along with any particularly interesting findings. Finally, analytical conclusions found from the analysis will be drawn upon and discussed. Within the conclusion, opportunities for future research will be addressed.

2. Theoretical Framework

2.1 Theory

According to prior research, one of the main aspects of modal shift from car-usage to active mobility is both path dependencies and how much active mobility is already present in the institution (Mattioli et al. 2020). Institutions may be defined as a form of constraint that humans devise to shape human interaction (Foxton, 2002). These constraints, both formal and informal, have been of interest for research on how institutions have the capabilities to evolve over time. Institutions' evolution can lead to both drivers and barriers for social change- which can influence transportation policies within said institution. Based on this, policies and regulations are one aspect that would define the institution, due to the formal constraints shaping the residents within the institution's interaction. When this is done over a long period of time, this can lead to lock-in effects. A policy or regulation within transportation policy can define the travel behavior of those residing within the institution.

John Searle, in The Construction of Social Reality defined institutions as 'systems of constitutive rules' (1995). To build off John Searle, North (1990) makes the arguments that all the features that would increase returns for technologies are equally applicable to institutions. Meaning, the tendency for an institution that is already ahead will continue to get further ahead, and those which are falling behind tend to fall further behind. North elaborates that

there are coordination effects through contracts with organizations involved in the institutions' work that generate informal constraints (1990). Increased favoring of economic rules and spending create a dimension of how to measure the status of an institution. North (1990) argues, “the interdependent web of an institutional matrix produces massive increasing return”. This can refer to multi-level cooperation within the institution, such as national and city levels working together to continue to further ahead the institution.

The increased return of economic spending within an institution would lead to a high return value to the institution. This can be positive or negative. For example, increased economic spending within one area can further this area ahead- such as investment into active mobility. On the negative side of the spectrum, if there is a lack of economic spending to increase the return of an aspect of the institution that is already underfunded, then the institution will fall further behind. Pierson (2000) argues that when using increasing return- or path dependencies- in a political context, there is a huge variance between technological or economic settings, and policy. Pierson (2000) has developed four aspects of politics that directly impact the increasing returns process.

a. Central role of collective action
b. High density of institutions
c. Possibility for using political authority to enhance asymmetries of power
d. Intrinsic complexity and opacity

The first aspect of politics influencing the increasing return process, central role of collection action, is simply that consequences of actions are incredibly dependent on actions of others (Pierson, 2000). Meaning, the results of an action are not dependent on individual doing, but what others do. This is relevant to political life as an institution’s principal goal is to create conditions favorable with collective action. Therefore, in a political setting, policymakers must adjust behavior to preemptively predict how others will act. As Pierson (2000) puts it, "despite massive social, economic, and political changes over time, self-reinforcing dynamics associated with collective action processes mean that organizations have a strong tendency to persist once they are institutionalized”. Meaning, once a path is put into place within an institution, the institution remains “locked-in” due in part to the actions of the collective.

The high density of institutions is an aspect of politics impacting the increasing returns process partly due to the idea that institutional constraints are ever-present in politics (Pierson, 2000). The institutional constraints that are ever-present in politics are due to the basis of authority in politics rather than exchange. As Foxton (2002) defined intuitions as formal and informal constraints to form human interactions. Therefore, we see political authorities as an aspect of the institution due to the extensive and legally binding formal constraints put on humans through policy making and legislation. This is important as it could be argued that policies are more adjustable than, per say, a constitutional amendment, but provide a constraint that alters the behaviors within the political environment. Therefore, institutional lock-in becomes prominent. As both Pierson (2000) and North (1990) claim, institutions are self-reinforcing and reversing these constraints become both increasingly difficult and unattractive overtime. Creating new policies is costly and needs time due to coordination and policy learning (Grin & Loeber, 2017).

Political authorities use their power to reinforce asymmetries in aspects of the increasing returns process that holds the capabilities to transform a situation of balance, to one in which political actors must openly take a stance (Pierson, 2000). Actors which impose their preferences on another set of actors cause a power relation that is so "uneven that anticipated reactions and ideological manipulation" make the opportunity for political opposition unnecessary (Pierson, 2000). This, in turn, leads to increased power asymmetries and distribution of power less likely. Meaning, a lock-in effect within the institution occurs as actors can use this power to generate changes in the institution, enhancing their already said power and reinforcing their authority. When this occurs, change is unlikely to happen within the political institution.

Pierson argues that while economic theory is quite simple and transparent in terms of good performance, politics is far more complex (Pierson, 2000). The fourth aspect creating a contextual condition in which institutional lock in can occur is due to the complexity and opacity of political institutions. One aspect of the complexities surrounding politics is the "loose and diffuse links between actions and outcomes render politics inherently ambiguous" (Pierson, 2000). Based on this, mistakes or failures can appear obvious, but improvement through trial and error is difficult and cannot be assumed to occur. Rather, participants in politics- including voters, lobbying groups, and other political participants- engage in the

political process rather sporadically. With these aspects combined, the result is that errors in the political process often do not get corrected. Therefore, established outlooks and opinions on politics are generally path dependent.

For all these four aspects Pierson (2000) conceptualizes as contexts in which increasing returns can occur, there are valid assumptions to be made once those steps are taken in a certain direction, there is a self-reinforcing dynamic that occurs- or a "lock-in effect". When an institution results in a path dependent dynamic, the institutional lock in occurs. Institutional lock in occurs when collective action mechanisms result from consumption patterns, norms, and customs through coalition building in social networks (Pierson & Skocpol, 2002). Due to this, there is a lack of incentive to change the habits of those within the institutions. Pierson's (2000) aspect of high density of institutions addresses what happens when there are interactions among multiple institutions that influence the same behavior. This, along with the other aspect that politics is highly complex makes it difficult to link actions and outcomes- therefore making politics highly equivocal. Foxton's (2002) concept of institutional learning effects describes the result of how adoption of institutions through public procurement leads to complementary institutions, which reinforces the current institutions but creates limitations through interdependencies which are close to impossible to "lock-out" of.

Building off the constructs on how institutional lock-in occurs, Pierson and Skocpol (2002) present the concept of historical institutionalism in modern political science with the idea the concept serves to "make visible and understandable the overarching contexts and interacting processes that shape and reshape states, politics, and public policy making" (Pierson and Skocpol, 2002, pg. 2). The intent of using historical institutionalism is to address big, substantial questions that would be of interest to the public. Having affordable, safe, and accessible travel options is a public concern that should be addressed by all institutions. Understanding why some institutions have historical evidence of implementing active mobility policies and others do not is worth exploring and should be of concern to the general public. In this investigation, the intent is to explain "variations in importance of surprising patterns, events, or arrangement" rather than a focus on behaviorism Pierson and Skocpol, 2002, pg. 4).

Meaning, why does Amsterdam have different historical patterns of active mobility implementation than Orlando. While cultural context in this investigation holds relevance, a broader explanation using historical evidence assists in developing a normative understanding of the origin of the dynamics within the institution. In turn, this explains the status of active mobility within the two selected cases. As Pierson and Skocpol ascertain, historical institutionalism serves as a linkage between normative theorists and empirical researchers- as "normative dilemmas are frequently apparent in the phenomena explored by historical institutionalists" (Pierson and Skocpol, 2002, pg 5). To fully understand how or why some institutions fall into a path dependency in terms of travel behavior requires an analysis of institutional constraints over substantial stretch of years, which will be conducted.

2.2 Active Mobility

Embracing walking and cycling into urban environments has far more benefits than downfalls. For one, there is essentially no noise pollution and using far less resources than vehicles, public transport, or even electric vehicles (Koszowski et al., 2019). While the environmental benefits remain prominent, the infrastructural benefits are additionally difficult to reason against. For one, there is just a minor fraction of city space needed for a bicycle and would require little to no road surface or housing allocation (Koszowski et al., 2019). In terms of economic benefits, there is little that can be argued as to why cycling is not the most affordable. Essentially, cycling costs close to no money to maintain and is affordable to virtually everyone with the proper physical capabilities. Due to the affordability and accessibility of the bicycle, an argument can be made that it is among the most equitable of all the modes of transport.

Most research studies back up the importance of active mobility. Promoting active mobility is prominent across Europe in terms of popular policy measures with the main goal to increase both walking and cycling as the main mobility options to improve the modality of urban areas transportation system (Gerike et al., 2016). However, the shift to more active mobility remains difficult and takes far longer than attainable to reach the 1.5-degree Paris Agreement.

Individual car use and resistance to switch transport modes remains strong. According to prior research, the difficulty in shifting modals from cars to active mobility is both path dependencies and the amount of active mobility already present in a nation (Mattioli et al.

2020). The following research intends on supporting this claim with a comparative case study of two institutions that have opposing shares of active mobility.

Advantages of active mobility on multiple dimensions remain prominent. For example, evidence of how active mobility projects contribute to CO2 mitigation serves precedent. A study done by Brand et al. (2021a) (and Brand et al., 2021b) used travel activity data based on 7 European cities and found that of all the collected data they computed that roughly 70% of the total 3.2 kg of CO2 comes from car trips, and only 1% from cycling. This quite clearly demonstrates how active mobility assists in fighting climate change, and the researchers estimated that according to the numbers, carbon emissions can be reduced by −14% per additional cycling trip and by −62% for each avoided car trip (Brand et al. (2021a) (and Brand et al., 2021b).

When looking at the spatial benefits of active mobility, from a city planning perspective, active mobility provides less space consuming transport systems, and increases road safety due to functioning at lower speeds. Therefore, the city environment becomes more attractive and livable, as there is more room for local industries and housing for residents. According to a study done by Gehl (2010), re-allocating road space to increase active modes of transport creates more attractive public spaces and success for local industries.

This study done by Gehl (2010) shows that creating a more attractive public space by reallocating road space to pedestrian areas that people are inherently drawn to the area, which in turn calls on political support to create an improved living space for the individuals, leading to more prominence of people in streets and public space. Reduced congestion, clean air, and less noise pollution also leads to the attractiveness of a city. While research on how active mobility improves air quality is limited (due to the complexities of finding accurate data), there is evidence that reduced individual car use would impact air pollutants (Pisoni et al., 2019).

Health benefits of active mobility may have the strongest argument for prioritization of this mode of transport. Active mobility helps reduce overweight and obesity levels amongst the population. The World Health Organization (WHO), as of 2017, recommends a minimum of 150 minutes of physical activity per week for adults, and as of 2010, 20% of

adult men and 27% of adult women did not meet this recommendation. A study conducted in Sweden demonstrated how active mobility can serve as a tool to reduce public inactivity. Through both surveys and geographical analysis, the working population in one county in Sweden can reach their workplace by a 15-minute commute by bicycle, and 47.2% can reach their workplace in 30 minutes (Raustorp and Koglin, 2019). With these numbers and a daily commute to and from work, switching mode of transport would equate to the suggested activity time per week (assuming a 5-day work week), reducing the number of individuals who would not reach their recommended personal activity goal. If all individuals commute to work by bicycle, the overall health of citizens residing in cities would improve and should be prioritized as a transport mode.

Most studies that have been conducted have agreed that the formation of a city along with certain environmental factors will determine the mobility patterns of pedestrians and cyclists (Cervero et al., 2009; Kemperman and Timmermans, 2014). However- two cities with similar environmental factors and the formation of the city have vast differences in mobility patterns of residents. Thus, a deeper investigation is warranted in determining how an institution can influence active mobility implementation.

2.3 Determining the Share of Active Mobility

The aim of the following research is to determine how the institutions of both Amsterdam and Orlando have been influenced by policies and regulations along with economic spending for active mobility implementation. Therefore, using a set of factors to measure the share of active mobility is based on a literature review on how mobility implementation is determined. The factors are based on the Wuppertal Institute ranking system to determine the dimensions of active mobility along with a literature review to justify factorial selection (Clark et al. 2017). A study done by Greenpeace has coined active mobility as walking and cycling (Kodukula et al, 2018). However, for reasons of inclusivity, other forms of active mobility rather than cycling will be included in the factors for determining the share of active mobility. These factors include micro mobility- skateboards, scooters, and wheelchairs. Based on this, the percentage of those who participate in walking and cycling within the city will be the first two sub-dimensions for measuring the share of active mobility. Having a share of residents that use active mobility inherently is an institutional

aspect that would determine the share, thus, measuring aspects that lead to increased active mobility are important sub-factors when determining success.

There is considerable evidence that land-use patterns and infrastructure within a city influence travel behavior- more so in active mobility. One of these aspects is urban green cover. Urban green cover can be defined as space within a city that "protect[s] and enhance[s] nature and natural process and are consciously integrated into spatial planning and territorial development" (European Environmental Agency, 2021). For this investigation, this includes pedestrian areas and car-free zones. Strategically planned networks of urban green cover can assist in improving the walkability of a city and is a sub-factor for measuring active mobility within the scope of investigation. This is in part due to pedestrians requiring proximity to destinations to fulfil their basic daily needs (Littke, 2015).

Grant McKenzie conducted research that used shared micro mobility as a comparative tool to measure active mobility within two cities (McKenzie, 2019). Based on their research, micro-mobility shared services are defined as "services that provide rental vehicles to the general public for a fee" (McKenzie, 2019). These shared facilities are typically operated by a for-profit company rather than the city government- such as Tier, Lime, or Bird (McKenzie, 2019). Having access to a shared mobility network within a city encourages the use of micro mobility and provides access to a form of active travel other than individual ownership. Those using micro mobility may not need as much of a proximity to attain their daily needs as those that are walking but having an area to use these modes of travel is required.

According to a study done on bike facilities, installation of bike lanes encourages a travel environment that is friendly to cyclists and those using other forms of micro mobility (Motoaki & Daziano, 2015). Having the proper infrastructure to provide a "safe space" for those using their active mode of transport gives comfort to those engaging in active mobility and reallocates space that could potentially be given to individual cars. Thus, using kilometers of bike lanes to determine success of active mobility will be the final sub-factor for the dependent variable within this research.

2.4 Determining the dimensions of Institutional Lock in

Two groups were established to determine the institutional lock in within the two cities. The first group of criteria deals with policy and regulations from both cities to

establish how formal constraints can influence an institution's course in terms of travel behavior. This group looks at policy documents, project reports, and city reports to measure how policy and regulations can determine a lock- in effect. The second group focuses on literature surrounding how economic spending can shape an institution. For example, literature that focuses on how economic spending and financial aspects of infrastructure determine the outcome for the institution. The two groups will serve as the basis to measure how formal constraints made from the institutional have influenced active mobility implementation.

Policies and Regulations

The first set of dimensions outlines the criteria to determine institutional lock-in based on prior literature surrounding policies and regulations. According to Pierson (2000), policy and regulations bring an institution on a certain course of action that is quite difficult to stray from. As a formal factor that can lead to an institution's stability, policies and regulations will be the first dimension used to determine the lock-in effect within the institution. Due to formal institutions creating both the policies and regulations within the city, public policies based around active mobility implementation can determine the share of active mobility within the institution. The stability of the share of active mobility within the institution is potentially based on the path set out from the legislation or regulatory framework from the governing institution. Foxton (2002) points out that when legislation or regulatory framework is introduced, there is little to no movement to successfully reverse. Therefore, using policies and regulatory framework to measure institutional lock–in holds conceptual validity.

According to a prior study surrounding institutional lock-in on electric vehicles in Nordic countries, institutional lock-in can be defined as "the collective action mechanism resulting from consumption patterns, norms, and customs through coalition building in social networks" (Kotilainen et al., 2019, pg. 579). Another study based on mobility protests in the Netherlands of the 1970's that helped shape the current share of active mobility within the nation, the authors claimed the "stabilization of cycling rates occurred after broadly supported social movements" (Bruno et al., 2021, pg 2). After these social movements occurred, more policies and regulations were introduced that stabilized active mobility rates (Bruno et al., 2021, pg 2). Thus, demonstrating how policies and regulations can "lock-in"

and institution. Additionally, a study conducted by Poku-Boansi (2020) used institutional lock-in to determine the path dependency in transport for Ghana's delivery services. Poku-Boansi (2020) based the conditions to determine the lock-in effect using Pierson's (2000) theoretical framework to determine the extent of lock-in. The study shows how recognition of transport sectors governance structures, along with policies and regulations, can limit the ability to respond to transport- related challenges. The study determined that policies and regulations shape the outcomes of transport planning.

Based on Pierson's (2000) theoretical framework of institutions, one of four factors determining successful institutional return is the role of collection action. While behavioralism is not inherently defended by Pierson's theoretical framework surrounding historical institutionalism, the concept of collection action reinforces the said "social norm" of the institution. Social influence does not inherently create the lock in effect but can reinforce it. Formal restraints, such as policies and regulations, "lock-in" the social norm.

Economic Spending

North's (1990) elaboration on how increased favoring of economic rules and spending can create "increasing returns", which can lead to a path dependency, then leading to a lock-in effect. For the intent of research, looking at how cities distribute funding for infrastructure projects within the institution will determine an institutional priority. Beyond the more obvious economic aspects of implementing active mobility infrastructure, examining how the city receives the funding can influence transportation implementation within a city. Which, in turn, can lead to a certain dependency on a mode of transportation.

A study done that focused on sustainable mobility and the institutional lock-in discovered that based on historical evidence, car dependency is caused mostly from public policies surrounding spending for mobility projects (Flipo, Sallustio, Ortar, and Senil, 2021). The study showed that funding is focused primarily on the issues of economic development (Flipo, Sallustio, Ortar, and Senil, 2021). A study on wastewater management infrastructure reinforces this idea. This study stated that of the main factors leading to institutional lock in is the lack of economic incentives (Aminoff and Sundqvist-Andberg, 2021). Meaning, when a current system is economically efficient, there is little need to change the system (Parajuly

and Wenzel, 2017). The study goes further by stating that when existing infrastructure is in place, this can hinder an infrastructural change- this is based on the premise that building new infrastructure requires a heavy investment.

Table 1: Dimensions for Institutional lock in

Dimensions for Institutional Lock-in	
L1: Legislation and Regulatory Frameworks	Source: Foxon, T. J. (2002). Source: North, D.C. (1990); Pierson, P (2000); Poku-Boansi (2020); (Kotilainen et al., 2019, pg. 579).; (Bruno et al., 2021, pg 2).
L2: Economic rules and contracts	Source: North, D. C. (1990); Pierson, P (2000); (Flipo, Sallustio, Ortar, and Senil, 2021) ; (Parajuly and Wenzel, 2017); (Aminoff and Sundqvist-Andberg, 2021).

2.Design and Methodology

The aim of the research is to develop an understanding of how institutional lock-in can influence active mobility implementation within both Amsterdam and Orlando. The following research opted to use a comparative case study for the main method of analysis. The relevance of these two case studies is that they are most similar, therefore this provides the opportunity to draw conclusions based on the findings rather than subsidiary factors. These cases allow for an in-depth analysis in order to gain an understanding of how policies and regulations, along with economic spending can make sense of the current phenomena. The design and methodology of the research is found to be good methods due to the existing research following a similar methodology surrounding various infrastructure projects with the intent to explain variance in implantation (Liang, Guan, Clarke, Liu, Wang, and Yao, 2021; Thelen, K., 2018).

2.1 Case Selection

Both the city of Orlando and city of Amsterdam are most similar in terms of political, geographic, and economic standing. Meaning, both cities are western, highly developed, democratic nations. Yet- both cities have varying shares of active mobility implementation. For example, Amsterdam has a 30% commuter rate by walking or bicycle daily to work (Harms & Kansen, 2019). According to the Alliance for Regional Transportation, Orlando has a 1.2% commuter rate by walking or bicycle (Alliance for Regional Transportation, 2019). Most similar case selection method was used due to the chosen pair of cases being similar in terms of population, landscape, average age, average age, average population, average education level, and average income (Liang, Guan, Clarke, Liu, Wang, and Yao, 2021; Thelen, K., 2018). According to a study on international comparative research for social science, using the most similar case study represents guidelines for case selection, and indicates certain questions for the study (Goerres, Siewert, and Wagemann, 2019). For this research, this means the most similar case selection created the guidelines for what aspects are the explanandum under study (Goerres, Siewert, and Wagemann, 2019). This is deemed effective as the research strategy serves to identify factors that are dissimilar between otherwise similar cases in order to consider them accountable (Goerres, Siewert, and Wagemann, 2019). As you seen in Table 2, all variables measured dichotomously, showcasing the two cases being most similar across all conditions relevant to the outcome. To have two cities with such similarity, yet such different shares of active mobility, looking at the institutional constraints could serve as an explanation for this problem. For reasons of inclusivity and understanding of the entirety of the scope of the city, the metropolitan area of both cities is what is considered for research. Meaning, both the city center and surrounding regions.

Table 2: Case selection

Dimension	Orlando	Amsterdam	Sources
Population	2.6 million	2.5 million	(Metropool Regional Amsterdam, 2020); (Statista Research Department, 2021)

Landscape	Flat	Flat	(City Data, 2022); (Britannicca, 2020)
Average Age	34	37	(AdminStat, 2022); (Census Reporter, 2021)
Average Education Level	33% Bachelors or higher	33% Bachelors or higher	(Census Reporter, 2021); (OECDData, 2020)
Average income	**$**57,222 (USD)	$54,000 (USD)	**(**Census Reporter, 2021); (OECDData, 2020)

Orlando

According to a study completed by Alliance for Regional Transportation (2019), the status of mobility within the city is not optimal. The system currently in place does not provide "efficient and reliable access to jobs, education, health care, and other services" that residents of all ranges, and particular abilities, must thrive within the city (Alliance for Regional Transportation, 2019). In short, Orlando does not enjoy the full range of multimodal transportation- which includes active mobility. According to the same report provided by Alliance for Regional Transportation, commuters to and from work spent an average of 57 hours in traffic for 2017 alone when commuting to work- by personal vehicle (Alliance for Regional Transportation, 2019). A study done observing travel behaviors of residents of Orlando by the American Community Survey, conducted by the U.S Census Bureau showed that of the working residents within Orlando 2,388 walked to work, and a mere 738 biked (Census Reporter, 2021). This just represents the working population within Orlando, yet the data used for the analysis will not be. Rather, this just serves as representation of the low share of active mobility for the purpose of background information.

Orlando's population is quite diverse, as many of the residents will face disabilities or chronic health conditions at some point in their life, along with a large portion of the population having limited English proficiency (Alliance for Regional Transportation, 2019). Meaning, there needs to be an alternative for individual car use. The current Greater Orlando

population is 2.6 million residents, with 5% of the population having limited English proficiency, and 5% of households not having access to a vehicle (Alliance for Regional Transportation, 2019). The average individual income for Orlando is roughly $57,222 with a poverty rate of 17.23%. The median age in Orlando is 33 for males and 34 for females (Census Reporter, 2021). The terrain is generally flat, which makes for accessible and manageable terrain for biking (City Data, 2022). Yet- Orlando's metropolitan area is ranked the most dangerous in the nation for pedestrians, due to the dependence on highways, creating a safety risk for drivers, bicyclists, and pedestrians (Smart Growth America, 2019).

Amsterdam

Amsterdam has the second lowest share of automobiles at 20% of all European cities (Kodukula et al, 2018). According to the European Cyclist Federation in 2015, The Netherlands has the highest cycling rate in Europe with 27% (Gorris, 2019). In the city of Amsterdam alone, 58% of residents that are 12 or older ride their bicycle daily (City of Amsterdam, 2022). With the large amount of investment in infrastructure for active mobility within the city, there is far less car dependence than other cities. Yet- Amsterdam was not always as bike friendly as it has been in recent years. The increase of cycling within the Netherlands, and Amsterdam specifically, was after broadly supported social movements that supported cycling (Bruno et al., 2021). Prior to the 1950's cycling rates in other European cities had higher cycling rates, however, Dutch cities dropped far less and significantly later (Bruno et al., 2021). According to the City of Amsterdam's website, there are over 400 kilometers of bicycle paths, and over half of all the city journeys take place on bikes (City of Amsterdam, 2022). Amsterdam has a very flat landscape, that makes it much simpler to use active mobility as the primary modal choice for daily use. The population within the metropolitan region of Amsterdam is 2.5 million with more than 180 nationalities (Metropoolregio Amsterdam, 2020). The metropolitan area consists of 32 municipalities, two provinces, and the Transport Authority Amsterdam (Metropoolregio Amsterdam, 2020). The region consists of 35 different authorities divided between seven sub-regions.

However, the region functions and for all intent and purposes a single city. Within Amsterdam, there are over 300,000 businesses and 1.5 million jobs (Metropoolregio

Amsterdam, 2020). The urban system within Amsterdam holds a mutual dependency between all sectors, requiring access to transport systems that are accessible, affordable, and reliable (Metropoolregio Amsterdam, 2020). The local government, national government, and Transport Authority Amsterdam are all "essential partners" in establishing goals and policies for Amsterdam.

As of 2022, Amsterdam has close to one million bicycles, with a plan to keep bicycles the primary mode of transportation amongst their residents (City of Amsterdam, 2022). Tracing the history of how Amsterdam has gotten to the level of success in which the city currently holds will help establish to what extent an institution's path dependence can lock-in the travel behaviors of residents.

3.2 Research Design

A comparative case study covers cases in a way that produces "more generalizable knowledge about causal questions" and why policies work or fail (Goodrick, 2014). Within this study, a qualitative comparative case study aims to determine how the institution has influenced the share of active mobility implementation, through analysis of policies and regulations and economic spending within the two cases (Goodrick, 2014). The causal case within this research is how the institution has caused different shares of active mobility implementation. With the theoretical background provided by Pierson (2000), Foxton (2002) and Pierson and Skofold (2002), exploring the two cities with the theoretical framework in mind will be the foundation of the research design. The intent of the following investigation is to answer the research question of:

RQ: To what extent can institutional lock-in explain the different shares of active mobility in the cities of Amsterdam and Orlando?

The following research will be a comparative case study of both Orlando and Amsterdam. The data used is a collection of available data from government websites, official reports done by government agencies, policy documents from a city level, budget reports, and other relevant direct sources. Using sources directly from the two cities' governments (or partnering organizations) provides validity to the data found, and no room for misinterpretation. For the intent of the analysis, the most recent set of data regarding the

transportation data and infrastructure reports will be used. The criteria already laid out prior to the determination of criteria on how to measure the share of active mobility is drawn from a literature review from academic scholars.

Measuring the institutional lock-in requires an analysis of both policies and regulations, and economic spending from the institution to understand how the institution has influenced the share of active mobility. These two determinants- policies and regulations and economic spending- were based on prior background provided through the theoretical framework. Both policies and regulations serve as constraints- influencing actors- therefore fall under the definition of an institution (Foxton, 2002). Therefore, using the two-sub questions will be the basis of the measurement of institutional lock in. These two sub-questions are:

SQ1: To what extent do policy and regulations determine the share of active mobility in the cities of Amsterdam and Orlando?

SQ2: To what extent does economic spending determine the share of active mobility in the cities of Amsterdam and Orlando?

The sub-questions will be divided into two subsections using direct sources from both cities to complete the analysis. The following research will conduct comparative case study to address the broad themes and patterns within both the policies and regulations and economic spending within the two cities to determine how institutional lock-in has influenced the share of active mobility within these cases.

4. Findings/ Results

The first aspect of the following chapter will determine the dimensions that define the dependent variable of implemented active mobility within the two institutions. First, Orlando will be analyzed. Then, Amsterdam will follow. Establishing the current status of active mobility within each city will set the groundwork for the analysis. This is needed to

understand the different shares of active mobility between the two case studies. Using institutional constraints will help determine the lock-in effect within both Amsterdam and Orlando, therefore, the two sub-questions will be the basis of sub-chapters to analyze the two cities. Analyzing the policies and regulation surrounding active mobility for both Orlando and Amsterdam will be first. Then, looking at the economic spending regarding active mobility infrastructure will be the next sub chapter. Economic spending includes aspects of funding, and where the city and state governments spend the transportation funds for the cities. Due to Pierson's & Skocpol (2002) concept of historical institutionalism- or institutionalism leading to a "lock-in" effect, there needs to be a considerable number of years observed to determine if a lock-in effect has occurred. With this in mind, and availability of policy databases, the analysis will observe the years from 1990-2022.

4.1 Active Mobility Status

The following sub-chapter will analyze both the city of Orlando and the city of Amsterdam's current status of active mobility implementation. Observing the status of both cities will provide a basis of how the institution has established mobility within the city- along with a foundation of the stark differences between two cities with remarkably similar settings. First, the factors used to determine success are based on Wuppertal Institute (Clark et al. 2017) foundation of measuring shares of active mobility, with support from a literature review on why these factors are important. The purpose of research is to understand how the institution has influenced the active mobility of these cities. After establishing the status between the two cities, then subsequently observing the institutions' historical implications from the policies and economic spending surrounding transportation will work cohesively to determine how the institutions actions determine the share of active mobility within the city.

Orlando

In 2010, the city of Orlando set the target goal of 20% of daily trips made by carpool, transit, bicycle or walking (Orange County Government, 2020). 20% was the baseline goal set out within 2010 and increased to 30% within 2018. The overall goal by 2040 is that more than 50 percent of all trips are made by carpool, transit, bicycle, or walking (Orange County Government, 2020). For the intent of research, looking at carpool and transit is not relevant, therefore will not be analyzed. The following findings are from travel surveys, census reports,

and data provided by the Orlando city government. While this research is focused on active mobility, it is important to note the status of car usage within the city. According to a study done by MetroPlan Orlando, 81.6% of users within Orlando use their car often, with 14.2% sometimes using their car, and only 4.2% of residents within Orlando never use their car (MetroPlan Orlando, 2021).

Percentage of Walking Trips

Research on travel frequencies within the city of Orlando was conducted in 2021 to establish the current status of transportation modes (MetroPlan Orlando, 2021). According to the report, 11.1% of residents often walk around the city, while 54.3 sometimes walk, and 17.4% never walk.

Percentage of Micro Mobility Trips

Micro mobility in this context includes bicycles, scooters, and wheelchairs. In Orlando as of 2021, 11.6% of residents often use their bicycles, while 36.3% sometimes use their bicycles, and 52.6% use their bicycles never (MetroPlan Orlando, 2021). The share of scooters is lower, with 3.3% of residents often using a scooter, 16.1 sometimes using their scooter, and 80.6% never using their scooters (MetroPlan Orlando, 2021). While wheelchair users often use their wheelchair as a mode of transport 2.6%, 5.8% of users sometimes use their wheelchair as a primary mode of transport, and 91.6% of users never do (MetroPlan Orlando, 2021).

Urban Green Cover

This information is not publicly available. There is one report from 2010 done by a study from University of Florida (Ekpe et al., 2012) that outlines Orlando's Urban Green Cover, but there is no recent public information on the current status.

Number of Shared Micro Mobility

Orlando currently has 5 providers of shared micro mobility within the region- Lime, Bird, Wheels, Spin, and Razor (City of Orlando, 2021). The combination of these shared micro mobility services allows for 18,000 vehicles within the city at a time (City of Orlando, 2021)

Km of bicycle lanes

Orlando currently has a bicycle network that consists of over 45 (72.4 kilometers) of off-street bicycle trails, and over 50 miles (80 kilometers) of signposted routes for bicycle usage. In terms of street usage, there are over 256 miles (394 kilometers) of bicycle lanes (City of Orlando, 2021).

Amsterdam

Amsterdam is the leading city in terms of active mobility on a global scale (Kodukula et al, 2018). With over 881,000 bikes within the city, 2 million km biked by those living within Amsterdam daily, and 58% of the residents over the age of 12 biking daily (City of Amsterdam, 2022). There is a reason for the global recognition of the success of the city. According to the Amsterdam city government website- the popularity of cycling in Amsterdam is undoubtedly aided by the fact that Amsterdam is a very flat and compact city- with a reasonable climate (City of Amsterdam, 2022). However- the success is due to a combination of urban planning, government spending and people power. Establishing the share of active mobility and the largely successful status within Amsterdam serves as the "best case" scenario for a comparison to Orlando. The following sub-chapter will analyze the available transportation data to convey the current status of active mobility within the city. For point of reference, those residing in Amsterdam only use a private car 20% of the time (Deloitte Mobility Index, 2021).

Percentage of Walking Trips

According to a study done by Greenpeace, 31% of residents walk as a primary mode of transportation (Kodukula et al, 2018). There is no specification on whether this is "sometimes" or "often", but for the intent of research, this percentage suffices for means of comparison.

Percentage of Micro Mobility Trips

Residents within Amsterdam commute by bicycle for 58% of all trips. There is a lack of data surrounding scooters, wheelchairs, and other modes of micro mobility (City of Amsterdam, 2022). Yet- the research will follow the assumption these forms of micro mobility were included within the conducted data.

Urban Green Cover

Greenpeace also determined the share of Urban Green Cover within Amsterdam is 28.70% (Kodukula et al, 2018). Urban Green Cover represents the amount of shared “green” space within the city.

Number of Shared Micro Mobility

There are 3,254 shared micro mobility vehicles in Amsterdam (Kodukula et al, 2018). This number is relatively low due to the Dutch Government passing a rule that motorized vehicles are not allowed to use bike lanes, and on motorized vehicles helmets must be always worn. Amsterdam is the first city to implement this (NL Times, 2020).

Km of bicycle lanes

According to the City of Amsterdam website- 767km of bicycle lanes currently exist within Amsterdam (City of Amsterdam, 2022). This number includes dedicated bike lanes, two-way cycling lanes, one-way cycling lanes, and one-way cycling lanes.

Active Mobility Status Conclusion

Orlando’s transportation data reflects the primary mode of transit within the city is individual car use. Drawing conclusions from the data, while not specified, is those using active mobility is not the primary mode of transportation, even when the data suggests that the frequency of modal usage is “often”. Additionally, Orlando has far more shared micro mobility platforms and vehicles than Amsterdam. This can be for a few reasons- for one, there is revenue surrounding contracting the vehicles from the companies to the city. For two, the lack of individuals owning their own bicycle and therefore more shared vehicles are needed.

Amsterdam's data shows as expected, minus the lack of micro mobility within the city. However, the city's intent is to focus on those living in the city and road safety, therefore removing the shared vehicles gives priority to bicyclists and pedestrians. Based on the data provided, it is quite clear Amsterdam has a high share of active mobility and lack of priority for private car use.

4.2 Policies and Regulations

The following subsection will analyze the policies and regulations surrounding transportation within both the city of Orlando and the city of Amsterdam. Analysis of the policies and regulations serves as a tool to answer the sub-question:

SQ1: To what extent do policy and regulations determine the share of active mobility in the cities of Amsterdam and Orlando?

Documents such as direct policy documents, city government reports, and project reports are used as supporting evidence to draw findings from this subchapter (See tables 3 and 4).

Orlando

The city of Orlando has wide access to policy documents and reports from 1970-onwards. Understanding the extent of which policies and regulations have impacted the share of success of active mobility implementation can help answer to what extent does institutional lock-in influence the level of share of active mobility within a city. Orlando has reports dating back to 1963, but for the intent of research the following will only look at transportation policies and regulations from 1990 onward.

In 2000, Orlando planned on delivering pedestrian and bicycle connections amongst homes, workplaces, cultural events, and shopping (Pedestrian and Bicycle Information Center, 2018). In 2002, a strategic plan was put in place to prioritize residents held within the Downtown Transportation Plan. The Downtown Transportation Plan emphasized using transportation improvements to jumpstart projects to create “people places” that ensure downtown Orlando is a pedestrian-, bicycle- and transit-friendly environment (Pedestrian and Bicycle Information Center, 2018). The Downtown Transportation Plan that was introduced as of December of 2007 began implementation of many active mobility-oriented projects. These projects included adding 70 bike racks in downtown, updating streetscape guidelines to include primary and secondary pedestrian corridors, requiring an active mobility checklist to be attached to all plans to ensure they are in alignment with land development codes, along with test projects for improving street walkability on a particular area with small businesses (Pedestrian and Bicycle Information Center, 2018). However- these recommendations for improving active mobility have never been funded, therefore not implemented.

When observing the policies surrounding transportation within Central Florida, the majority surrounding the individualized motor vehicle- with minor integrations surrounding active mobility. For example, in 1991, a policy document surrounding transportation element goals, objectives, and policies was established as a basis of Orlando transportation policy (City of Orlando, 2021). These policies have been amended since their creation in 1991. One of the main goals is to "To develop a balanced transportation system that supports building a liveable community with complete streets and improves access and travel choices through enhancement of roads, public transit, bicycle and pedestrian systems, intermodal facilities, demand management programs, and traffic management techniques." (City of Orlando, 2021, pg. 3). This goal's objective was to "encourage the efficient use of its transportation infrastructure" (City of Orlando, 2021, pg. 3) Since the goal was established in 1991, 6 policies have been implemented to ensure this objective is attainable. Of these 6 policies- there are zero that address active mobility directly (City of Orlando, 2021). Most of these policies are with the lens of individual car usage as the main mode of transport with minor mention of cycling and pedestrian areas as a side note.

Yet- in 2008, an objective to the transportation plan was added, with the inclusion that "Every Metropolitan Activity Center shall be served by internal public transit, bikeway, and pedestrian systems by 2040, and every Urban Activity Center shall integrate such systems to the maximum extent possible" (City of Orlando, 2021, pg. 3). Considering the conciseness of the objective, with a clear aim focused on achieving a higher share of active mobility, there were no direct policy measures that addressed the reallocation of car-dependent services. Rather, inclusion of provisions of reallocating spaces for bicyclists and pedestrians with "new or expanded metropolitan activity centers shall only be approved in conjunction with the approval of financially feasible plans for internal transit, bikeway, and pedestrian systems that reduce reliance on automobiles for access and internal circulation". (City of Orlando, 2021, pg. 4). The policy measure does not directly reallocate space from automobiles, but rather, for new projects being implemented. In addition, providing financially feasible plans is required, and funding must be approved by the state government.

There have been policies that have been implemented that directly impact the share of active mobility within Orlando. In 2001, policy 1.14.9 was added as an amendment to the transportation policy document for the city for the elimination of on-street parking from

thoroughfares “as required to enable the development of public transit, bicycle, and pedestrian systems” (City of Orlando, 2021, pg 14). Additionally, objective 1.26 focuses strictly on the bicycle system, with the focus being that “By 2025, the City shall add at least 60 miles of bikeway facilities to the 361 miles of bikeway facilities already constructed within the City” (City of Orlando, 2021, pg. 19) The objective was amended throughout the years- with additional bike lanes being added from 2002 until 2017. The objective has 11 cycling-based policies included within which include:

Table 3. Orlando Policies and Regulations/ Projects

Policy 1.26.1	The City shall integrate the bicycle plan into residential areas, public schools, activity enters, recreational areas, major industrial zones, and the park system through activities such as the development review process and the road resurfacing	(City of Orlando, 2021, pg. 19)
Policy 1.26.2	The City shall require bicycle lanes of five (5) feet minimum on all new or reconstructed roadways within the city, where feasible (excluding limited access facilities and residential streets). Wherever bicycle lanes are not feasible, justification shall be included as part of the road preliminary design process and alternative routes shall be identified. (Amended March 18, 2002, Effective June 2, 2002, Doc. No. 020318704; Amended August 28, 2017, Effective October 27, 2017, Doc. No.	(City of Orlando, 2021 pg.19)

Policy 1.26.3	The City shall stripe selected Major Thoroughfares to allow for a minimum of five (5) foot bicycle lanes and sign selected ocal roads as bikeways (Amended March 18, 2002, Effective June 2, 2002, Doc. No. 020318704; Amended August 28, 2017, Effective October 27, 2017, Doc. No. 1708281201)	(City of Orlando, 2021, pg. 19**)**
Policy 1.26.4	The City shall continue to incorporate bicycle lanes as part of the resurfacing program by narrowing traffic lanes to a minimum of ten (10) feet and striping five (5) foot bicycle lanes, when possible. (Amended August 28, 2017, Effective October 27, 2017, Doc. No. 1708281201)	(City of Orlando, 2021, pg. 20)
Policy 1.26.5	The City shall require a minimum width of ten (10) feet twelve (12) feet preferred for the construction of dual- use bicycle/ pedestrian facilities. (Amended August 28, 2017, Effective October 27, 2017, Doc. No. 1708281201)	(City of Orlando, 2021, pg. 20)
Policy 1.26.6	The City shall use the Bicycle Plan recommended improvements for acquisition of rights-of-way needed to implement bicycle projects. (Amended August 28, 2017,Effective October 27, 2017,	(City of Orlando, 2021, pg. 20)

Policy 1. 26.7	The City shall require that new bikeway projects meet or exceed the city's criteria for bicycle facility design to promote cycling.	(City of Orlando, 2021, pg. 20)
Policy 1.26.8	The City shall provide bicycle trails, overpasses and underpasses where feasible to create unique transportation opportunities and to address specific access and safety problems.	(City of Orlando, 2021, pg. 20)
Policy 1.26.9	The City's bicycle facilities shall include directional signs.Warning and other signs shall be provided as needed.	(City of Orlando, 2021, pg. 20)
Policy 1.26.10	The City shall incorporate bicycle facilities as part of the Southeast Orlando Sector Plan. (Amended March 18, 2002, Effective June 2, 2002, Doc. No. 020318704; Amended June 8, 09, Effective August 25, 2009,Doc. No. 0906081103)	(City of Orlando, 2021, pg. 20)
Policy 1.26.11	The City shall continue to look for opportunities to complete connections between existing bicycle facilities in all future transportation plans. (Amended September 23, 2002, Effective November 14, 2002, Doc. No. 020923719)	(City of Orlando, 2021, pg. 20).
2000 Downtown Orlando Outlook Plan	Provide pedestrian and bicycle connections amongst homes, workplaces, cultural events and shopping.	(DTP; 2000)

2002 Downtown Orlando Outlook Plan	Using transportation improvements as a catalyst to create quality "people places" that ensure downtown Orlando is a pedestrian-, bicycle- and transit-friendly	(DTP;2002)

The policy document also specifically states objective 1.27 that “Throughout the planning period, the City shall require bicycle and pedestrian connectivity within all new development and redevelopment, consistent with the City’s Land Development Code” (City of Orlando, 2021, pg. 20). The objective specifically mentions pedestrian areas, however, the 7 policies that address how to accomplish the issue have no direct measures surrounding active mobility. Regarding transportation policy and regulations, there are mentions surrounding means of active mobility.

However, of the entirety of the policies implemented within Orlando since 1990, most of them focus on individual cars, highway expansion, and financial revenue from transportation projects. As of 2020, the “transportation indicators' required by the state for federal funding outline the mobility targets for the city (City of Orlando, 2021). Of all of these, there is not one target that focuses on increasing the share of active mobility within the city. Based on the evidence provided by the city government, there have been no significant policy changes since 1990 that would improve the share of active mobility in Orlando.

Amsterdam

According to the Dutch government, the local authorities are responsible for implementing the following aspects of transportation:

- Constructing and maintaining local roads and bicycle lanes;
- Managing local public transport;
- Determining urban areas and urban planning;

- Issuing drivers licenses;
- Developing local traffic plans;
- Managing inland water transport and infrastructure;
- Arranging parking;
- Placing traffic signs and traffic lights.

However, the local government, national government, and Transport Authority Amsterdam are the responsible actors in establishing the transportation policies for Amsterdam (City of Amsterdam, 2022). As of 2022, Metropolitan Regional Amsterdam has established four goals to improve the quality of life for those that reside within the region. Amsterdam works on these goals together with provincial councils and city councils (City of Amsterdam, 2022).

These goals include:

- Further strengthening partnerships
- Pursue a resilient, inclusive and 'green' economy
- Building housing needs in mind and strengthen quality of life through growth
- Most importantly for the purpose of research: Accelerate the establishment of metropolitan mobility systems.

With the intent of reaching the fourth goal of accelerating the establishment of metropolitan mobility systems, the city of Amsterdam has outlined strategies to ensure this happens. One of these goals is to create more space in the city center with regulations including policies to ensure restricting car traffic and introducing 30km/h zones, introducing new cycling bridges and ferry services, more bicycling facilities, building underground parking (City of Amsterdam, 2022).

Additionally, the city of Amsterdam has policies in place to improve public transport, build better cycling routes and cycling crossings, adding more high-quality pedestrian areas, ensuring fast, efficient routes in and out of the city for cars, providing space for loading and unloading goods, and designating priority routes for each mode of transportation. Finally, the last goal outlined as of 2022 in Amsterdam's transportation plan is to link the city center with

the rest of the region. This is done through measures of completing missing sections of cycling routes.

Lastly, the transportation plan emphasizes traffic safety at the heart of all measures involved through transportation plans with the intent of giving pedestrians and cyclists priority of movement rather than cars. In the Netherlands, the cities are connected through a common legal and planning policy framework that focus on three policy measures that protesters in the 1970's worked with government actors to ensure these aspects are implemented throughout the Netherlands, including Amsterdam. These policy measures are:

- The woonerf: a low-speed traffic environment designed to discourage through-traffic to eliminate distinctions between areas for pedestrians and those using micro mobility and spaces for automobiles (Ben-Joseph, 1995)
- Car restricted central business are designed to limit car access while prioritizing pedestrians and cyclists
- Bottle-neck memoranda ensuring communication with government officials to ensure community participation regarding reporting issues with active mobility.

As of 2021, Amsterdam-along with other large Dutch cities- implemented a broader policy of exempting cyclists from one way street regulations- this includes the addition of traffic signs that designate when this practice is allowed (VNV, 2021). Additionally, since the bottleneck memoranda has become standardized policy making, a toolkit was developed to increase the safety of those using active mobility. As of 2012, the national government came to Amsterdam to establish a bottleneck memorandum (Bruno et al., 2021).

Since 1990, there have been over 3500 low-speed traffic environments throughout the Netherlands developed to discourage through-traffic to prioritize road space to pedestrians and those using micro mobility (Ben-Joseph, 1995). The majority of these are in Amsterdam, as cyclists are the primary road users, and plans to limit or discourage car use within the city center are a priority amongst city planners within Amsterdam (Ben-Joseph, 1995). One example of policies that assisted in furthering the share of active mobility within the region was in 1992, the Ministry of Traffic and Water Management launched the Bicycle master plan which stated bicycling and pedestrian planning would be the primary responsibility of the

city governments (Directoraat-Generaal Personenvervoer / Dutch Ministry of Transport and Water, 1998).

In addition, the plan set out by the Ministry of Traffic and Water Management established four goals for the local governments to implement (Directoraat-Generaal Personenvervoer / Dutch Ministry of Transport and Water, 1998). This includes:

- Encourage people to walk instead of bike
- Expanding the connections between public transportation and cycling
- Improve safety of people cycling
- Create secure bicycle parking locations to reduce theft

The national government ensured that once decentralization had occurred, the national government would still pay close attention to cycling and pedestrian planning and funding (Directoraat-Generaal Personenvervoer / Dutch Ministry of Transport and Water, 1998). In 2017, the national government set out a framework that intended to increase the number of kilometers cycled by 20% in 2027, along with other measures that would improve cycling and walking travel times and safety (Tour de Force, 2017). These measures include a separate traffic signal for those with micro mobility and pedestrians that have shorter wait times than the automobile, and separate highways micro mobility users (Tour de Force, 2017). This national cycling policy, called the Tour de Force, is intended to coordinate the cycling policies on a national level, which influence the city level governance as the policies are streamlined to Amsterdam (Tour de Force, 2017).

As of 2022, the city of Amsterdam has worked to establish the metropolitan area bicycle friendly and implemented objectives to improve the cycling experience for residents within the city. The City of Amsterdam has taken plenty of measures to improve the cycling network within the city (City of Amsterdam, 2022). This includes ensuring the designated areas meant for active mobility are wider and more recognizable (City of Amsterdam, 2022). The city government also states in the mobility plan planned until the year 2030, that the plan is to create connected cycle paths to eliminate problem areas for increased accessibility (Amsterdam City Council, 2017). Additionally, create new routes for pedestrians and those

using active mobility, along with providing more room for already popular routes (City of Amsterdam, 2022).

As historically established, the citizens participation in the bicycling experiences will be continued as an annual survey on the implemented measures will be conducted to ensure satisfaction with the current active mobility networks (City of Amsterdam, 2022). Another measure implemented within 2022 is to improve bicycle parking, to ensure the pavement remains clear for pedestrians within the city. Measures that government officials are considering implementing include introducing bicycle parking regulations, parking a bicycle further away if one cannot park at your destination, creating more storage facilities for micro mobility, and improving signage to make it easier to park your bike. Finally, there are current projects in place that the City of Amsterdam is actively engaged in as of 2022. These include adding more space for micro mobility parking at stations across the city, connecting new residential areas, creating a better-connected bicycle route through Amsterdam's inner ring, where bicycles and pedestrians will take priority over cars along the entirety of the newly implemented route (Amsterdam City Council, 2017). Within this newly developed route, prohibiting through traffic will be regulated, along with a reduced speed limit for automobiles to 30km/h (City of Amsterdam, 2022). Additionally, beyond policies and regulations set by the government, there are several projects that represent how mobility policies are implemented, as seen in Table 4.

Table 4: Amsterdam Policies and Regulations/ Projects

City of Amsterdam Annual Report	Ensure restricting car traffic and introducing 30km/h zones, introducing new cycling bridges and ferry services, more bicycling facilities, building underground parking	(City of Amsterdam, 2022)

Progress Report 2020 Metropolitan Cycle Routes Amsterdam	The bicycle lanes as part of 'the new N200' had already been realized in 2019, the last part of which was completed in 2020. In 2020, the bicycle bridge at the old sugar factory in Halfweg was completed, as well as two bicycle lanes in the core of Halfweg. In total, this has again improved about 500 meters of the route.	(Metropool Regional Amsterdam, 2020, pg 3)
Dutch Ministry of Transport and Water	Car restricted central business are designed to limit car access while prioritizing pedestrians and cyclists	(Directoraat-Generaal Personenvervoer / Dutch Ministry of Transport and Water, 1998)
Dutch Ministry of Transport and Water	The woonerf: a low-speed traffic environment designed to discourage through-traffic to eliminate distinctions between areas for pedestrians and those using micro mobility and spaces for automobiles	(Directoraat-Generaal Personenvervoer / Dutch Ministry of Transport and Water, 1998)
Dutch Ministry of Transport and Water	Bottle-neck memoranda ensuring communication with government officials to ensure community participation regarding reporting issues with active mobility.	(Directoraat-Generaal Personenvervoer / Dutch Ministry of Transport and Water, 1998)
Tour de Force	increase the number of kilometers cycled by 20% in 2027	(Tour de Force, 2017)

Tour de Force	separate traffic signal for those with micro mobility and pedestrians that have shorter wait times than the automobile, and separate highways micro mobility users	(Tour de Force, 2017)
Amsterdam City Council	Add more space for micro mobility parking at stations across the city, connecting new residential areas, creating a better-connected bicycle route through Amsterdam's inner ring, where bicycles and pedestrians will take priority over cars along the entirety of the newly implemented route	(City of Amsterdam, 2017)
Progress Report 2020 Metropolitan Cycle Routes Amsterdam	On the route from Amstelveen to Schiphol/ Badhoevedorp solution has been found for the unlit bicycle path through the Amster- damse Bos near Burg. A. Colijnweg. Rijkswaterstaat will relocate and light the path.	(Metropool Regional Amsterdam, 2020, pg 3)
Progress Report 2020 Metropolitan Cycle Routes Amsterdam	Near the Amsterdam Central Station, the Westerdokskade is set up as a wide two-way bike path, with the street now set up with one-way traffic.	(Metropool Regional Amsterdam, 2020, pg 3)

Progress Report 2020 Metropolitan Cycle Routes Amsterdam	Schiphol Airport has put the plans for improvements to the bicycle network (Rijkerstreek / Loevesteinse Randweg) on hold due to the coronary crisis. The directors of the Transport Region and the Province of North Holland and the municipality of Haarlemmermeer are discussing with the director of Schiphol the importance of the agreed construction of cycle paths on the Schiphol site as an important link in the MRA bicycle route network. The consultation is aimed at preventing any further postponement of the construction, as announced by Schiphol. If necessary, this signal will also be issued to Schiphol administratively.	(Metropool Regional Amsterdam, 2020, pg 3)
Amsterdam City Council	prohibiting traffic will be regulated, along with a reduced speed limit for automobiles to 30km/h	(City of Amsterdam, 2022)

Policies and Regulations Conclusion

Observing both cities and the institutions' approach towards transportation there are a few key findings that stand out. Looking at policy and regulation implementation surrounding active mobility and transportation, there is an apparent difference between both Orlando and Amsterdam in terms of priority. Amsterdam demonstrates how prioritizing active mobility policies can improve the lives of those residing in the city, where Orlando focuses far more on financial reward and individual car usage. For one, Amsterdam has historically been a leading institution for active mobility implementation. The government's willingness to adapt policies and regulations based on collective quality of life for residents rather than individual car use could explain the high share of active mobility within the city. Citizens' participation

in terms of bicycling surveys, road allocation for active mobility users and pedestrians could be a factor that sets the city apart as the leading institution for active mobility culture. Additionally, the Netherland's national government ensures the local government has the resources to properly implement policies and regulations for active mobility.

On the other hand, the current situation in Orlando appears to have different priorities in terms of transportation policies. While the local government directly addresses opportunities to implement more active mobility within the city, there are no direct measures to ensure the policies are properly implemented. Policies that have been introduced within the past 30 years have developed a "lock-in effect" that causes car dependency. The institutional influences of policies that surround creating better roads, less traffic, and financial gain have established the transportation system based around automobiles that causes the residents to have limited options for modal choice. In addition, there is far less interconnected cooperation within the institution to ensure policies are implemented with the residents' best interest in mind, compared with the Netherlands. Therefore, the city of Orlando has created a path dependency based on private car usage where there is little to no movement on transitioning to a more active mobility system.

4.3 Economic Spending

The following sub-chapter will examine the spending from the institution on transportation projects. The intent is to determine how much financial aspects can influence modal choice within the city. Looking at infrastructure projects, government spending, and other direct sources from the government and government agencies will answer the sub-question of:

SQ2: To what extent does economic spending determine the share of active mobility in the cities of Amsterdam and Orlando?

First, spending on both infrastructure and transportation projects in Orlando will be established. Then, an analysis of Amsterdam will follow. Both cities will use the same time period as the prior sub-chapter, looking at financial spending from 1990-2021.

Orlando

When observing the current economic spending of Orlando, a significant amount of the budget goes towards highway investments. In addition, according to the City of Orlando's

Transportation Element Policy Document (2021), every transportation project proposed to the state government for funding, there must be a comprehensive plan to have capital improvement elements. This element includes aspects such as increasing capacity, estimated costs, and projected revenue. In 1990, huge investment in State Road 417 became one of the most expensive transportation projects within the region. As of 2022, the state road spans 55 miles and makes a giant circle around Central Florida (MetroPlan Orlando, 2022). The initial cost of the highway was $105 million with $35 million being spent simply on acquiring the right-of-way for part of the route (MetroPlan Orlando, 2022).

Most transportation investments within the last 30 years were on this highway, resulting in a path dependency on car usage. The highway eventually introduced polls into the road, creating financial benefits for the government, as the road serves as a main point of destination for all the city. According to MetroOrlando, one of the cities partners for implementing transportation plans, major transportation projects are funded by four methods: Transportation projects are traditionally funded through four major sources: 1) federal gas tax, 2) state gas tax, 3) local gas tax, and 4) tolls (MetroPlan Orlando, 2019). Orlando economic partnership outlines the strategies for the 10 billion dollars invested in transportation projects within the region. Of these projects, 2.3 billion dollars is invested in major highway expansion, 3.1 billion dollars is invested in airport expansion, 3.5 billion dollars towards light-speed rail, 1.7 million dollars towards buses, and $345 million dollars dedicated to shipping (City of Orlando, 2021) Within the investment plan, there is no mention of financial investment in any form of active mobility project.

When observing the financial budgeting from the past fiscal year, Orlando intended on using $9,631,000 USD on transportation based on two separate impact funds. The funds provided from the city for transportation improvements are funds intended for capital improvement projects (City of Orlando, 2021). Of the $9,631,000, only $500,000 was spent on a single project surrounding active mobility- a project based on a Bike Study Implementation (City of Orlando, 2021). The rest of the transportation funds were dedicated to highway and road improvement, or public transportation expansion (See table 5).

Table 5: Orlando Transportation Spending

Money Spent	Project funded	Source

$105 million (USD)	State Road 408 Initial	(MetroPlan Orlando, 2022).
$35 million (USD)	State Road 408 Further Investment	(MetroPlan Orlando, 2022).
$2.3 billion (USD)	Highway expansion	(MetroPlan Orlando, 2019).
$3.1 billion (USD)	Airport expansion	(MetroPlan Orlando, 2019).
$345 million (USD)	Shipping route expansion	(MetroPlan Orlando, 2019).
$500,000 (USD)	Bicycle Study	(City of Orlando, 2021)
$9.1 million (USD)	Road Improvement/ Public Transport expansion	(City of Orlando, 2021)

Amsterdam

The Netherland's national government is very willing to fund transportation projects surrounding active mobility- this includes ensuring the local governments have the capabilities, resources, and funding to negate the negative effects of motorizations (Directoraat-Generaal Personenvervoer / Dutch Ministry of Transport and Water, 1998). This has been the case since the 1990's since transportation policies became decentralized in The Netherlands. The Dutch government spends €487 million euros per year on cycling infrastructure (Hawkins Kreps, 2018). This equates to about $35 USD per person per year simply on bike infrastructure. While this number seems steep, it is just a small fraction of what is spent on auto infrastructure. According to figures from 2015, €15 billion euros were spent on traffic and transport, meaning that cycling infrastructure makes up simply 3% of all the traffic budget (Hawkins Kreps, 2018). Yet- Amsterdam remains the leading city in the world for bicycling. These numbers demonstrate that intensive amounts of budgeting need to go into active mobility infrastructure to have a successful active mobility system in place.

As of 2021, with Amsterdam already having strong infrastructure within the city, the city plans on investing in completing paths that go on the outskirts of the city center. According to the Netherlands national government website, the national government plans on injecting €646 million euros, and €3.5 billion euros for projects to improve economic growth within the nation. This includes investments in green hydrogen and extension of Amsterdam's North-South metro line to improve connectivity (City of Amsterdam, 2022). The city

government of Amsterdam plans to actively promote cycling by providing financial support to cycling infrastructure projects in the districts of Nieuw-West, Noord, and Zuidoost by providing financial support to promising cycling initiatives in those areas (City of Amsterdam, 2022).

In terms of project spending, there is significant spending on projects within the Metropolitan region of Amsterdam. - as seen in Table 5. For example, the transport authority and city government spent €562,000 euros on a single bike path alone in 2018 (Metropool Regional Amsterdam, 2020, pg 19). There were significantly more investments in active mobility infrastructure, such as €31.6 million euros for a bicycle route Haarlemmer Houttuinen, €2.5 million of a street redesign of Linnaeuskade into a bicycle street, €650,000 of investment for asphalt resurfacing and widening of bicycle paths in the south tie of the city (Metropool Regional Amsterdam, 2020, pg 19). Of importance to note, the city government or transport authority were the funders of all these projects. While there are significantly more projects being implemented in the upcoming years, the funding information is not yet available for reporting (Metropool Regional Amsterdam, 2020, pg 19).

Table 6: Amsterdam Transportation Spending

Funds:	**Project funded:**	**Source:**
€487 million per year (EUR)	Bicycling Infrastructure	(Hawkins Kreps, 2018).
€15 billion (EUR)	Road Traffic	(Hawkins Kreps, 2018).
€562,000 (EUR)	Bicycle path Westerdokskade	(Metropool Regional Amsterdam, 2020, pg 19)
€31.6 million (EUR)	Through bicycle route Haarlemmer Houttuinen	(Metropool Regional Amsterdam, 2020, pg 19)
€2.5 million (EUR)	Redesigning Linnaeuskade into a bicycle street	(Metropool Regional Amsterdam, 2020, pg 19)

€650,000 (EUR)	Asphalt surfacing and widening of bicycle paths in South tie (Strawinskylaan/F. Roeskestraat	(Metropool Regional Amsterdam, 2020, pg 19)

Economic Spending Conclusions

Based on observations on the spending and funding for transportation projects from each city, there are a few findings that highlight the economic influence within the institution. For one, all the transportation projects within the city of Orlando are reliant on revenue from car usage- such as gas taxes and tolls produced from motor vehicles using the highway system (City of Orlando, 2021). Economic reliance on the usage of cars would inherently influence the implementation of active mobility projects within the city. Orlando has no major plans to invest in active mobility projects- with most of the spending on transportation projects surrounding highway improvements and expansion. Based on the institution of Orlando historically building on a car-dependent system in terms of how the spending of funds for transportation projects is distributed, there is no logical motivation for the city to introduce alternative spending schemes- especially if the residents are already reliant on automobiles for transportation.

Alternatively, with Amsterdam, there appears to also be significant investment into roads and projects not related to active mobility. However, the more important finding is that even with 3% of the total budget comprising funding for active mobility projects, this is enough to ensure a reliable active mobility system for a city. The national government's willingness to use funding demonstrates how political actors' decision to invest in the active mobility itself creates a standard the cities must uphold, in terms of active mobility projects.

5. Discussion and Conclusion

The research conducted sought to answer the research question of:

RQ: To what extent can institutional lock-in explain the different shares of active mobility in the cities of Amsterdam and Orlando?

Based on the findings found, conclusions can be drawn that institutional lock is one of the main drivers in how much active mobility implementation is present within both Orlando and Amsterdam. Looking into the policies and regulations of both Amsterdam and Orlando, a picture has been painted of how policies can influence the path an institution is set on once it has been established. As Pierson (2000) puts it, "despite massive social, economic, and political changes over time, self-reinforcing dynamics associated with collective action processes mean that organizations have a strong tendency to persist once they are institutionalized" (Pierson, 2000, pg. 259). Meaning, while culturally it can be argued that the United States and the Netherlands have very opposing social-norms, the institution is what created these norms through historically reinforced governmental decisions. Within the context of mobility, even if there are new policies introduced, once the collective action tends to have one mode of travel behavior, it tends to remain, and this is seen through both cities.

Orlando, for example, has reinforced policies surrounding how to make it easier to travel in a private car. This is in part due to the financial gain of reinforcing these policies- such as an increasing return through road tolls, federal, and state gas taxes. Orlando has simply been more passive in the implementation of their active mobility policies. For example, the majority of the initiatives or stated measures that would improve active mobility can only be implemented through restructuring infrastructure that has already been enforced. While building active mobility projects when the city does reconstruct new areas does move forward the share of active mobility within the city, this does not inherently mean more residents will be using active mobility. The already highly integrated private car dependence within the city institutions are self-reinforcing and reversing these constraints becomes both increasingly difficult and unattractive overtime- especially due to the fact that when new policies are created, they need time for coordination and policy learning. A study done on the social practice of cycling addresses the criticism of the assumption of the individual being responsible for the primary mode of travel within an institution (Spotswood et at, 2015). Rather, the argument is made that changing travel behavior is based on structure action. This reinforces the findings based on the concept of habit, and decision making of the individual is rather insignificant compared to the "automated sets of meanings and connotations which are embedded in society" (Spotswood et al, 2015, pg. 3). This is related as cars are embedded in the institution of Orlando, and active mobility is embedded in the structure of Amsterdam.

Amsterdam has had policies within the city for so long that the institutional norm is to embrace active mobility. In a study on mobility protests in the Netherlands, there was research done on how social movements influenced the mobility culture within the nation (Bruno et al, 2021). The study interviewed various leaders in the social movement and their impression on what made their activism so successful. One of the main findings of this study is that nearly all the interview subjects reflected on the willingness of institutional actors to both consider and support activists' ideas for mitigating the negative effects of increasing auto ownership (Bruno et al, 2021). This is reflected in the findings from this research, and the opposite is reflected when observing Orlando. The findings from both cities reflect that the governments' willingness to take into consideration citizen participation can reinforce asymmetries of their power, which then causes political actors to make a stance (Pierson, 2000). When actors such as national, state, or local government officials impose their preference on a specific policy issue, then a lock-in effect is likely to occur. Meaning, when Orlando's decision to invest in highways and roads from the get-go, then actors have used their institutional power to generate a path for the institution surrounding car dependence. In turn, the path set-out will be unlikely to change. In opposition, when Amsterdam and the Dutch government decided to impose policies and changes that give road spaces to non-motorist, the results have not only been "locked-in" but continue to improve.

Findings surrounding economic spending have shown that Orlando's increasing investments in highway expansion creates a path dependency on car dependence. Additionally, when looking at the policies surrounding implementing active mobility projects within the city, the implementers must prove that the projects provide revenue when submitting a request for funding to the state government. This demonstrates the capitalist approach to transport planning has been the focus for the past 30 year based around the premise that car dependence creates income for the state. Alternatively, Amsterdam is more than willing to invest into active mobility projects for the residents within their city, and the National government believes investment in active mobility is the best course of action for the city. The results show that investment in active mobility for the city of Amsterdam does not take away funding from highway investment- as there is far more money that goes into road infrastructure than active mobility infrastructure. However, the increased amount in

active mobility investments shows how you can have revenue and a successful sustainable mobility system within a city.

Observing shared micro mobility within the two cities resulted in an interesting finding that reinforces that institutional lock-in can very much determine the status of active mobility within the city. Orlando, for example, has a proven history of revenue-based transportation project implementation. Orlando's high number of shared micro mobility within the city reflects the revenue-based priorities within the city. Micro mobility sharing systems create revenue for the city through contracts with the companies providing the services. Alternatively, Amsterdam has decided to not further micro mobility sharing schemes through a national government ruling, due to the safety concerns for pedestrians and cyclists. This reinforces the politicians taking a stance on prioritizing the safety and citizens desires for a people-focused city. A study done on the impacts of micro mobility reinforces this idea. The evidence from this study shows that trips done by shared micro mobility typically would have been taken by more sustainable modes- such as walking, rolling, or cycling (Milakis et al, 2020). As Amsterdam had also taken into consideration- the space of these micro mobility takes away space from pedestrians and those already using their bikes (Milakis et al, 2020). While having more availability to alternative forms of active mobility seems positive, it does not inherently help with increasing the share of active mobility within the city. This concept is representative of both Amsterdam and Orlando when observing the number of daily users of active mobility. While Orlando has many shared micro mobility platforms, the share of active mobility implementation remains low. Amsterdam has a low share of micro mobility platforms yet outperforms for all aspects of active mobility within the city.

5.1 Limitations

During the analysis phase of research, there were few obstacles that occurred. For one, the data availability for urban green cover was non-existent for the city of Orlando. This could be representative that a lack of publicly available information reflects a lack of public policy priorities. When searching for public policies surrounding active mobility, there was no database that would allow the access of viewing city level documents surrounding active mobility.

Therefore, using reports and both city government websites surrounding active mobility within the two cities served as the tool for analysis. There were, however, policies

and documents on a State level of Florida for the city of Orlando and National level in Amsterdam that were publicly available. Observing most different cities with the same level of active mobility implementation would be future research that would be helpful to help reinforce how active mobility implementation can be successful. While this research only took into consideration institutional aspects of active mobility implementation, a study using both Orlando and Amsterdam but analyzing the socialized behavioral aspects would assist in furthering active mobility usage and be used as potential future research.

Considering these findings, the expectations of the analysis are confirmed. Institutions can influence travel behaviors within a city. The share of active mobility is impacted through both policy and regulations and economic spending. When it comes to active mobility implementation, institutional lock-in does matter very much.

5.2 Future Research

Based on the research conducted, opportunities for future research could stem from the challenges presented during the analysis. For example, surveys with residents of both cities would provide insight into citizen participation within the implementation of active mobility within each city. This would also provide subjective opinions on travel behavior and the behaviorism aspect of lock in could be further explored. Additionally, having access to stakeholder interviews could give insight into why allocation of funds was prioritized the way that they were. Lastly, observing the other aspects of the city that could potentially impact active mobility implementation- such as weather- would provide more insight into why active mobility may not be an implementation priority.

6. Sources

AdminStat. (2022). *Maps, analysis and statistics about the resident population.* Demographic statistics Municipality of Amsterdam. Retrieved June 16, 2022, from: https://ugeo.urbistat.com/AdminStat/en/nl/demografia/dati-sintesi/amsterdam/23055764/ 4

Alliance for Regional Transport. (2019). *Orlando Transportation 2030.* Alliance for Regional Transport. Retrieved May 17, 2022, from: https://orlando.org/wp-tent/uploads/sites/4/2020/04/Transportation2030Report.pdf

Alonso, W. (1964). *The historic and the structural theories of urban form: Their implications for urban renewal*. Land Economics, 40(2), 227-231.

Amsterdam City Council. (2017). (*rep.). Long Term Bicycle Plan 2017-2022*. Amsterdam, Netherlands: City of Amsterdam.

Aminoff, A., & Sundqvist-Andberg, H. (2021). *Constraints leading to system-level lock-ins—the case of electronic waste management in the circular economy.* Journal of Cleaner Production, 322, 129029.

Ben-Joseph, E. (1995). *Changing the residential street scene: Adapting the shared street (woonerf) concept to the suburban environment*. Journal of the American Planning Association, 61(4), 504–515. https://doi.org/10.1080/01944369508975661

Brand, C., Dons, E., Anaya-Boig, E., Avila-Palencia, I., Clark, A., de Nazelle, A., Gascon, M., Gaupp-Berghausen, M., Gerike, R., Götschi, T., Iacorossi, F., Kahlmeier, S., Laeremans, M., Nieuwenhuijsen, M.J., Pablo Orjuela, J., Racioppi, F., Raser, E., Rojas-Rueda, D., Standaert, A., Stigell, E., Sulikova, S., Wegener, S., Int Panis, L., (2021a). *The climate change mitigation effects of daily active travel in cities.* Transp. Res. Part D: Transp. Environ. 93 .ttps://doi.org/10.1016/j.trd.2021.102764.

Brand, C., Götschi, T., Dons, E., Gerike, R., Anaya-Boig, E., Avila-Palencia, I., de Nazelle, A., Gascon, M., Gaupp-Berghausen, M., Iacorossi, F. and Kahlmeier, S., (2021.b) *The climate change mitigation impacts of active travel: Evidence from a longitudinal panel study in seven European cities*. Global environmental change, 67, p.102224.

Britannicca. (2020). *Amsterdam.* Encyclopedia Britannica. Retrieved June 16, 2022, from https://www.britannica.com/place/Amsterdam

Brown, M. A., Chandler, J., Lapsa, M. V, & Sovacool, B. K. (2007). *Carbon lock-in: barriers to deploying climate change mitigation technologies*. ORNL/TM-2007/124. Oak Ridge. https ://doi.org/10.1016/j.jngse .2014.08.025

Bruno, M., Dekker, H.-J., & Lemos, L. L. (2021). *Mobility protests in the Netherlands of the 1970s: Activism, innovation, and Transitions.* Environmental Innovation and Societal Transitions, 40, 521–535. https://doi.org/10.1016/j.eist.2021.10.001

Census Reporter. (2021). *Census profile: Orlando-Kissimmee-Sanford, FL Metro Area.* Census Reporter. Retrieved June 16, 2022, from https://censusreporter.org/profiles/ 31000US36740-orlando-kissimmee-sanford-fl-metro-a rea/

Cervero, R., Sarmiento, O. L., Jacoby, E., Gomez, L. F., & Neiman, A. (2009). *Influences of built environments on walking and cycling: lessons from Bogotá*. International journal of sustainable transportation, 3(4), 203-226.

City Data. (2022). *Orlando: Geography and Climate Read.* City Data. Retrieved June 16, 2022, from https://www.city-data.com/us-cities/The-South/Orlando-Geography-and-Climate.html

City of Amsterdam. (2022). *Amsterdam's cycling history.* I am amsterdam. Retrieved June 10, 2022, from https://www.iamsterdam.com/en/plan-your-trip/getting-around/cycling/ amsterdam-cycli ng-history

City of Copenhagen (2013). *Copenhagen City of Cyclists: Bicycle Account* . Copenhagenize. Retrieved May 17, 2022, from https://copenhagenize.eu/

City of Orlando. (2021). Annual Budget 2021. *Annual Budget in Brief Budget*. Retrieved June 19, 2022, from https://www.orlando.gov/files/sharedassets/public/documents/obfs/budget/ 2020-2021/budg et-in-brief-fy2021-final-9-1-20.pdf

City of Orlando. (2021). *Bike Share / Scooter Share Pilot Program.* City of Orlando. Retrieved June 12, 2022, from https://www.orlando.gov/Initiatives/Bike-Share-Scooter-Share-Pilot-Program

City of Orlando. (2021). *Bike trails*. City of Orlando. Retrieved June 12, 2022, from https:// www.orlando.gov/Parking-Transportation/Bike-Trails-and-Paths

City of Orlando. (2021). *Orlando's Transportation Element Growth Management Plan*. City of Orlando .Retrieved June 16, 2022, from https://www.orlando.gov/files/sharedassets/public/documents/city-and-district-plans/co mprehensive-plan/policy-documents/04-transportation_supp18.pdf

Clark, Anna & Eriksson, Ulf & Witzell, Jacob & Brand, Christian & Götschi, Thomas & Kahlmeier, Sonja & Dons, Evi & Int Panis, Luc & Gerike, Regine & Anaya Boig, Esther & Nazelle, Audrey & Rojas-Rueda, David & Cole-Hunter, Tom & Uhlmann, Tina & Wegener, Sandra & Boschetti, Florinda. (2017). *Description and classification of Active Mobility measures including factors affecting their effectiveness: Literature review and assessment of state-of-the-art of Active Mobility.* Physical Activity Through Sustainable Transport Approaches (PASTA). Retrieved June 15 2022, from: https://www.researchgate.net/publication/360066374_Description_and_classification_of_Active_Mobility_measures_including_factors_affecting_their_effectiveness_Literature_review_and_assessment_of_state-of-the-art_of_Active_Mobility

Deloitte Mobility Index. (2021). *Deloitte City of Amsterdam Mobility Index*. Deloitte Mobility Index. Retrieved June 12, 2022, from https://www2.deloitte.com/content/dam/insights/us/articles/4331_Deloitte-City-Mobility- Index/2020/DCMI_Overview2020_WEB.pdf

DTP. (2000). *Downtown Orlando Transportation Plan 2000*. City of Orlando. Retrieved August 2, 2022, from https://www.orlando.gov/Our-Government/Records-and-Documents/Plans-Studies

DTP. (2002). *Downtown Orlando Transportation Plan 2000*. City of Orlando. Retrieved August 2, 2022, from https://www.orlando.gov/Our-Government/Records-and-Documents/Plans-Studies

Ekpe, E. K., Becker, E., Lab, J., Hinkle, R., & Escobedo, F. (2012). *Orlando, Florida's urban and community forests and their ecosystem services*. EDIS, 2012(3). https://doi.org/10.32473/edis-fr358-2012

European Environment Agency (EEA). (2017b). *Exceedance of air quality standards in urban areas*. European Environment Agency. Retrieved May 6, 2022 from: h ttps://www.eea.europa.eu/data-and-maps/indicators/exceedance-of-air-quality-limit-3/assessment-3.

European Environmental Agency (EEA) (2021, June 10). *What is green infrastructure?* European Environment Agency. Retrieved June 15, 2022, from https:// www.eea.europa.eu/themes/sustainability-transitions/urban-environment/urban-gr een-infrastructure/what-is-green-infrastructure

European Parliament and the Council directive 2004/54/EC (29 April 2004). *Minimum safety requirements for tunnels in the Trans-European Road Network*. European Parliament and Council. Retrieved May 12 2022 from: https://eur-lex.europa.eu/legal- content/EN/TXT/ HTML/?uri=CELEX:32004L0054

Flipo, A., Sallustio, M., Ortar, N., & Senil, N. (2021). *Sustainable Mobility and the Institutional Lock-In: The Example of Rural France*. Sustainability, 13(4), 2189.

Foxon, T. J. (2002). *Technological lock-in and the role of Innovation.* Handbook of Sustainable Development, 304–316. https://doi.org/10.4337/9781782544708.00031

Gehl, J. (2010). *Cities for people* Island Press. Washington DC.

Gerike R, de Nazelle A, Nieuwenhuijsen M, Panis L I, Anaya E Avila-Palencia I, Boschetti F; Brand C, Cole-Hunter T, Dons E, Eriksson U, Gaupp-Berghausen M, KahlmeierS, Laeremans M, Mueller N, Orjuela JP, Racioppi F, Raser E, Rojas-Rueda D, Schweizer C, Standaert A, Uhlmann T, Wegener S, Götschi T (2016) *Physical Activity through Sustainable Transport Approaches (PASTA): a study protocol for a multicenter project*. BMJ Open 6(1)

Goerres, A., Siewert, M. B., & Wagemann, C. (2019). *Internationally comparative research designs in the social sciences: Fundamental issues, case selection logics, and research limitation*s. KZfSS Kölner Zeitschrift für Soziologie und Sozialpsychologie, 71(1), 75-97.

Goodrick, D. (2014). *Methodological briefs impact evaluation- Comparative Case Study* . UNICEF Office of Research. Retrieved August 2, 2022, from https://www.unicef-irc.org/ publications/pdf/brief_9_comparativecasestudies_eng.pdf

Gorris, T. (2019). *Gathering data on national cycling patterns in the Netherlands.* Elitis. Retrieved June 10, 2022, from https://www.eltis.org/discover/case-studies/gathering-data-national-cycling-patterns-neth erlands

Grin, J., & Loeber, A. (2017). *Theories of policy learning: Agency, structure, and change.* Handbook of Public Policy Analysis, 227–246. https://doi.org/10.4324/9781315093192-25

Harms, L., & Kansen, M. (2019). *Cycling Facts, Netherlands Institute for Transport Policy Analysis.* Retrieved June 16, 2022, from https://english.kimnet.nl/publications/publications/2018/04/06/cycling-facts

Kemperman, A., & Timmermans, H. (2014). *Green spaces in the direct living environment and social contacts of the aging population.* Landscape and Urban Planning, 129, 44-54.

Kodukula, Santhosh; Rudolph, Frederic; Jansen, Ulrich; Amon, Eva (2018). *Living. Moving. Breathing.* Wuppertal: Wuppertal Institute: Retrieved May 12, 2022, from https://epub.wupperinst.org/frontdoor/deliver/index/docId/7033/file/7033_Living_Moving_Breathing.pdf

Koszowski, C., Gerike, R., Hubrich, S., Götschi, T., Pohle, M., & Wittwer, R. (2019). *Active mobility: bringing together transport planning, urban planning, and public health.* In Towards User-Centric Transport in Europe (pp. 149-171).

Liang, X., Guan, Q., Clarke, K. C., Liu, S., Wang, B., & Yao, Y. (2021). *Understanding the drivers of sustainable land expansion using a patch-generating land use simulation (PLUS) model: A case study in Wuhan, China*. Computers, Environment and Urban Systems, 85, 101569.

Littke, H. (2015). *Planning the green walkable city: Conceptualizing values and conflicts for Urban Green Space Strategies in Stockholm*. Sustainability, 7(8), 11306–11320. https://doi.org/10.3390/su70811306

Mattioli, G., Roberts, C., Steinberger, J. K., & Brown, A. (2020). *The political economy of car dependence: A systems of provision approach.* Energy Research & Social Science, 66,101486.

McKenzie, G. (2019). *Shared micro-mobility patterns as measures of city similarity.* Proceedings of the 1st ACM SIGSPATIAL International Workshop on Computing with Multifaceted Movement Data - MOVE'19. https://doi.org/10.1145/3356392.3365221

MetroPlan Orlando. (2021). 2021 *Regional Transportation Survey Report.* MetroPlan Orlando. Retrieved June 1, 2022, from https://metroplanorlando.org/wp-content/uploads/MetroPlanOrlando_2021RegionalTran sportationSurveyReport_web.pdf

MetroPlan Orlando. (2022). *Central Florida Transportation Timeline*. MetroPlan Orlando. Retrieved June 16, 2022, from https://metroplanorlando.org/about-us/timeline/

Metropool Regional Amsterdam. (2020). *About the metropolitan region Amsterdam*. Metropool Regioamsterdam. Retrieved June 16, 2022, from https://www.metropoolregioamsterdam.nl/about-mra/

Metropool Regional Amsterdam. (2020). *Voortgangsrapportage 2020 - Vervoerregio*. Retrieved August 2, 2022, from https://vervoerregio.nl/document/cb841103-0fa3-4212-9085-30cc6fd79e93

Milakis, D., Gedhardt, L., Ehebrecht, D., & Lenz, B. (2020). *Is micro-mobility sustainable? An overview of implications for accessibility, air pollution, safety, physical activity and subjective wellbeing.* Handbook of sustainable transport, 180-189.

Motoaki, Y., & Daziano, R. A. (2015). *A hybrid-choice latent-class model for the analysis of the effects of weather on cycling demand*. Transportation Research Part A: Policy and Practice, 75, 217–230. https://doi.org/10.1016/j.tra.2015.03.017

NL Times. (2020. *Dutch parliament gives municipalities the go ahead for banning scooters from bike paths.* NL Times. Retrieved June 12, 2022, from https://nltimes.nl/2017/12/15/dutch-parliament-gives-municipalities-go-ahead-banning-s cooters-bike-paths

North, D. C. (1990*). Institutions, institutional change and economic performance.* Cambridge university press

OECD Data. (2020). *Netherlands*. The OECD. Retrieved June 16, 2022, from https://data.oecd.org/netherlands.htm

Ohlund, H., El-Samra, S., Adriazola-Steil, C., Zayas, G., & Targa, F. (2021). *Invest in walking and cycling for sustainable, safe cities. here's how*. World Resources Institute. Retrieved May 7, 2022, from https://www.wri.org/insights/invest-walking-cycling-sustainable-safe-cities

Orange County Government. (2020). *Sustainability and mobility.* Orange County Government. Retrieved June 12, 2022, from https://www.ocfl.net/OpenGovernment/CommunityInitiatives/Mobility.aspx#.YqDcdC8 RrfY

Parajuly, K., Habib, K., & Liu, G. (2017). *Waste electrical and electronic equipment (WEEE) in Denmark: Flows, quantities and management*. Resources, Conservation and Recycling, 123, 85-92.

Panter, J., Desousa, C., & Ogilvie, D. (2013). *Incorporating walking or cycling into car journeys to and from work: the role of individual, workplace and environmental characteristics.* Preventive medicine, 56(3-4), 211-217.

Pedestrian and Bicycle Information Center. (2018). *Downtown Orlando Transportation Study.* City of Orlando. Retrieved May 17, 2022, from https://www.pedbikeinfo.org/cms/downloads/PLA.DowntownOrlandoTransportationPla n.pdf

Pierson, P (2000), *'Increasing returns, path dependence, and the study of politics',* American Political Science Review, Vol. 94, No.2, pp. 251- 267

Pierson, P., & Skocpol, T. (2002). *Historical institutionalism in contemporary political science*. Political science: The state of the discipline, 3(1), 1-32.

Pisoni, E., Christidis, P., Thunis, P., & Trombetti, M. (2019). *Evaluating the impact of "Sustainable Urban Mobility Plans" on urban background air quality*. Journal of environmental management, 231, 249-255.

Poku-Boansi, M. (2020). *Path dependency in transport: A historical analysis of transport service delivery in Ghana.* Case Studies on Transport Policy, 8(4), 1137-1147.

Raustorp, J., Koglin, T.,(2019). T*he potential for active commuting by bicycle and its possible effects on public health*. J. Transp. Health 13, 72–77. https://doi.org/10.1016/j.jth.2019.03.012.

Reliance Foundry Co. Ltd. (2021). *Bike culture: Europe vs America. Bike Culture: Europe vs America*. Retrieved May 17, 2022, from https://www.reliance-foundry.com/blog/biking-usa-europe

Searle, J. R., & Willis, Y. S. (1995). *The construction of social reality.* Simon and Schuster.

Smart Growth America. (2019). *Dangerous by Design 2019.* Smart Growth America. Retrieved May 17, 2022, from https://smartgrowthamerica.org/resources/dangerous-by-design-2019/

Statista Research Department. (2021). *Orlando Metro Area Population 2020*. Statista. Retrieved June 16, 2022, from https://www.statista.com/statistics/815299/orlando-metro-area-population/

Spotswood, F., Chatterton, T., Tapp, A., & Williams, D. (2015). *Analysing cycling as a social practice: An empirical grounding for behaviour change.* Transportation research part F: traffic psychology and behaviour, 29, 22-33.

Thelen, K. (2018). *Regulating Uber: The politics of the platform economy in Europe and the United States*. Perspectives on Politics, 16(4), 938-953.

Tour de Force. (2017). *CONCEPT-UITVOERINGSPROGRAMMA TOUR DE FORCE 2017-2018*. Retrieved from http://tourdeforce2020.nl/wp-content/uploads/2017/07/ Concept-Uitvoeringsprogramma- 2017-2018.pdf.

UNFCCC. (n.d.). *The Paris Agreement.* Unfccc. Retrieved May 17, 2022, from https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

VVN. (2021). *Verkeersborden en tekens [Traffic Signs and Symbols].* Retrieved May 25, 2022, from https://verkeersregels.vvn.nl/verkeersborden-en-tekens/ob52.

World Health Organization (WHO). (2017) *Prevention and control of noncommunicable diseases in the European Region: a progress report. 2014*. World Health Organization. Retrieved May 6, 2022 from http://www.euro.who.int/en/health-topics/noncommunicable-diseases/cancer/publication s/2013/prevention-and-control-of-noncommunicablediseasesin-the-european-region-a-pr ogress-report.