
Source pictures of Phoenix:

Author

Source pictures of Groningen:

www.melkweg7.nl (large), www.youtube.com (Herestraat) / www.rug.nl (Slimme Route) / www.rtvnoord.nl (Emmaviaduct)

ABSTRACT

Since the 1970s we started our sustainable mobility pursuit. The main purpose of pursuing sustainable mobility is limiting the amount of trips made by car and shifting towards cleaner modes of transport such as cycling and public transit. Innovations in this pursuit can mainly be divided into two categories: through technical innovation such as new fuel types or limiting emission, or through institutional innovations: policy and executive actions to intervene in spatial structures to contribute to sustainable mobility. This research focuses on these institutional innovations by indicating conditions and barriers within the two dimensions of institutional innovations: institutions and governance. In addition, this research specifically focuses on the role that collaboration and coalitions play in the process of innovations in sustainable mobility.

Data was gathered in Phoenix, Arizona in the United States and Groningen in the Netherlands. Almost fifty experts were interviewed, a document analysis was conducted, and observations were made on site. Data was analyzed using a historiography and by indicating conditions and barriers based on the dimensions and categories in the conceptual model.

In the conclusion of this research the most important conditions for innovations in sustainable mobility are indicated in five categories: land use (density, size, TOD), actors & organizations (collaboration, grassroots ideas, involvement of residents), collaboration & coalitions (leadership, dedication, expertise, courage), social institutions (education, willingness), and cultural institutions (planning culture, long-term strategies, trial and error). In addition, this research concludes that urgency, trial and error, involvement of coalition members, willingness, and size of the city define the role of collaboration and coalitions in the process of innovations in sustainable mobility.

Differences between both cities in the pursuit of sustainable mobility are also found. Groningen focuses on expanding current transport networks, separating modes of transport, and expanding the car-free inner city, whereas Phoenix first has to create new transport networks, introduce mixed use planning, install an urban growth boundary, and most importantly focus on education to become successful.

Keywords: Sustainable – Mobility – Innovation – Collaboration – Coalitions – Phoenix – Groningen

ACKNOWLEDGEMENTS

This thesis marks the end of the Master Environmental & Infrastructure Planning at the University of Groningen. It also tells the story of becoming a professional planner with reference to three personal highlights during my academic career: discovering my passion for urban planning, a two-time visit to the United States, and the establishment of the student consultancy firm SAC Groningen. It took about one year to put all these highlights together in this final product. A process that I never could have done all by myself.

Over fifty people have contributed to this product and I would like to thank those who were willing to share their knowledge, show me around, and offer me a place to stay. Kevin Rayes, Ariane Burson, and Matt Messina for hosting me in Phoenix and being great tour guides. Elizabeth Barnes, Jacoline Beerepoot, Joe Bowar, Mikhail Chester, Susan Conklu, Alexandra Crisan, Michael Cynecki, Brian Fellows, Bram Fetter, Andrew Fraser, Aaron Golub, Kolby Granville, Annelies Groenewolt, Ryan Guzy, Anne Marel Hilbers, Sjoerd Hoekstra, Wilko Huyink, Eric Iwersen, Cor van der Klaauw, Lauren Kuby, Michael Kuby, Sander van der Leeuw, Donna Lewandowski, Hessel Luxen, Shawn Monk, Kevin Moore, Robin Neef, Femke Niekerk, Alex Oreschak, Mary O'Brien, Deirdre Pfeiffer, Paul Plazier, JC Porter, Paul de Rook, Gerard Tolner, Patrick Valandra, Jaap Valkema, Richard van der Velde, Hans Vissers, Rob van Vliet, Hans Vooges, Scott Walters, Rolinde Weide, Elizabeth Wentz, Eileen Yazzie, and Saskia Zwiers for participating in the interviews.

In the end, special thanks to the Van Eesteren-Fluck & Van Lohuizen Stichting and the University of Groningen for granting me scholarships for doing research in Phoenix and to Wendy Tan for being a great supervisor and giving me the opportunity to put all those highlights together in one final thesis. I had a great time being a student and look forward to start a new adventure in just one month from now, as consultant at Royal HaskoningDHV.

Jasper Homrighausen,

Groningen

24-08-2015

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LIST OF ABBREVIATIONS

ASU	Arizona State University
BRT	Bus Rapid Transit
CRAP	Car Resistance Action Party
MAG	Maricopa Association of Governments (M.P.O. surrounding Phoenix)
RUG	University of Groningen (<i>Rijksuniversiteit Groningen</i>)
SAC	Student Advisory Council (<i>Student Advies Commissie</i>)
SCC	Sustainable Communities Collaborative
T.B.A.G.	Tempe Bicycle Action Group
TOD	Transit Oriented Development
UGB	Urban Growth Boundary
VCP	Traffic Circulation Plan (<i>Verkeerscirculatieplan</i>)

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1 INTRODUCTION

Mobility – the extent to which we travel – has always been one of the main needs in human lives. Movements between home, study, work, family, friends, and leisure activities are a major part of our daily routines. Moreover, mobility has always been an engine of growth and forms the basis for cities, industries, and modern economies. Historically, people first traveled by foot and later by boat, train, or streetcar. When in the early nineteen hundreds the car was invented, we all switched to this mode of transport; it gave us the opportunity to travel faster, further, and more individualistic.

As the car gained popularity, an automobile century started. This lasted until the 1970s when environmental awareness arose. Problems such as finiteness of fuel, oil-dependency on the Middle-East, air quality problems, noise, global atmospheric problems, excessive fatalities, congestion, urban sprawl, and declining city centers came up (Black, 1996; Greene & Wegener, 1997). In 1972, Meadows & The Club of Rome commissioned their *Limits to Growth* in which they stressed resource depletion. In 1987, the World Commission on Environment and Development reported *Our Common Future*, better known as the Brundtland Report. This report concluded that sustainability had to be the answer to the faced problems.

This research focuses on our sustainable mobility pursuit, and in particular how we keep innovating to become more sustainable. Innovations in sustainable mobility can however be achieved in different ways. Generally, two main types of innovations in sustainable mobility can be distinct. First, technical innovations such as new fuel types or innovative vehicles that limit emission contribute to more sustainable transport. Second, the focus of this research, are institutional innovations affecting spatial planning and contributing to sustainable mobility. By ‘innovations in sustainable mobility’ in this thesis we only refer to this second type of innovation. In addition, we have special interest in the role of collaboration and coalitions in this process of innovations in sustainable mobility.

1.1 Problem statement

Although the importance of the sustainable mobility pursuit is indisputable, it seems to be difficult to put it into practice. Conditions for sustainable mobility are discussed in detail (Banister, 2008; Greene & Wegener, 1997; Nykvist & Whitmarsh, 2008; Vergragt & Brown, 2007), however barriers for implementing sustainable mobility are also well described (Banister, 1996, 2005a; Clifford et al., 2005; Hull, 2008; P. Rietveld & Stough, 2005). These barriers might be due to what Banister (2005a, p. 54) defines as the policy behavior gap: “the gap between the assumptions underlying policy measures on the one hand, and the behavioral by individuals on the other”. To successfully implement sustainable mobility it is therefore important to understand the process of innovations in sustainable mobility. Banister (2008) tries to define this process using a sustainable mobility paradigm. He concludes that effective implementation of

sustainable mobility requires the engagement of stakeholders and needs particular elements. Also, sustainable mobility plays a central role in the future of sustainable cities, but will only succeed through understanding and acceptance by the people. In addition, scholars also state the importance of institutions (Alexander, 2006; Innes, 1995; Kim, 2011; Köhler et al., 2009) and the relation with land use (Brömmelstroet & Bertolini, 2011; Curtis & James, 2004; Geurs & Van Wee, 2006; Meurs et al., 2003; Vergragt & Brown, 2007; Wegener & Fürst, 2004) as affecting sustainable mobility.

Another trend that we experience is a changing role of government. Cities, counties, or provinces are no longer solely responsible for spatial planning. Decentralization, decreasing government expenses, and increasing activist interference lead to government responsibilities that shift from controller to facilitator. Bottom-up initiatives forces keep resisting and reworking top-down policies (Healey, 2003). This trend leads to new opportunities and partnerships between the public and private or between cities and universities. Moreover, bottom-up initiatives and coalitions between different actor groups start to prove their success in the process of innovations in sustainable mobility.

Research goal

This research aims to define the process of innovations in sustainable mobility by using the aforementioned dimensions institutions, governance, and land use. In addition, it elaborates on the role that coalitions can play in this process. Therefore a theoretical framework is designed in which the context of the process of innovations is researched. Thereafter an in-depth research follows of two cases that both are in a complete different stage of their sustainable mobility pursuit: Phoenix, Arizona in the United States and Groningen in the Netherlands. By stage is meant the time since the beginning of a pro-active sustainable mobility pursuit and the willingness of past and current local governmental bodies to pursue innovations in sustainable mobility. The process of sustainable mobility pursuit will be analyzed by indicating key innovations: documents, actors, organizations, and events. Besides, conditions and barriers will be identified for both the process of innovations and the role of collaboration and coalitions.

The required data is gathered by conducting almost fifty in-depth interviews, but also through conducting a document analysis, and by visiting the research locations for observations on site. All key elements in a case are analyzed to understand the process of innovations through time. Moreover, institutions, local planning culture, and land use were researched for each case to provide further understanding in the specific pursuit sustainable mobility. In the end we will contribute to our current understanding of institutional innovations in sustainable mobility and the specific role collaboration and coalitions play in these innovations. Moreover, special attention will be paid to specific successful coalitions in Groningen such as the SAC and the differences in sustainable mobility pursuit between Groningen and Phoenix.

Societal relevance

The importance of pursuing sustainable mobility has been made clear in the previous part. However, how to successfully implement sustainable mobility goals is not well understood. In practice, innovations in sustainable mobility regularly fail due to inaccurate expectations, poor communication, or lack of understanding among key actors. Therefore this research aims to contribute to the general understanding of the process of innovations in sustainable mobility among all actor groups. Besides, this research also exposes different viewpoints of actor groups in urban planning to foster knowledge exchange among them. Moreover, an extensive analysis of past innovations and their effect on sustainable mobility is usually not conducted by key actors or organizations due to time or capacity constraints. This research contributes to specific understandings for both cases by providing this analysis on past innovations in sustainable mobility. In addition, by providing successful examples of collaboration and coalitions and explain their contribution to sustainable mobility, this research aims to foster both new partnerships and governments to support these initiatives.

Academic relevance

Theoretical ideas about innovating sustainable mobility usually lack the practical implementation due to numerous implementation barriers or lack of understanding between academics and practitioners (Banister, 2005b; Clifford et al., 2005; P. Rietveld & Stough, 2005; van Buuren & Edelenbos, 2004). Targeting and indicating these barriers aims to contribute to the understanding of academics and helps to limit practical implementation issues. Moreover, by providing proof of successful coalitions this research may stimulate scholars to conduct more research into the role of collaboration and coalitions contributing to sustainable mobility. In addition, it is not completely clear yet what the important conditions and barriers for coalitions are and how these coalitions contribute to the process of innovations in sustainable mobility. Therefore this research aims to indicate these conditions and barriers and analyzes the emergence of successful coalitions contributing to sustainable mobility and to academic knowledge.

1.2 Research questions

This research aims to contribute to the understanding of institutional innovations in the process of pursuing sustainable mobility and the role that collaboration and coalitions can play in this process. The main research questions will therefore be:

- **How do institutional innovations in sustainable mobility occur and what is the role of collaboration and coalitions in this process?**

For research purposes the main research question is divided into two parts. In addition, underlying research questions were formulated to answer both parts of the main research question.

1. How do institutional innovations in sustainable mobility occur? ..

- What land use conditions affect the process of innovations?
- What are the reasons for pursuing sustainable mobility?
- How is the willingness for innovations in sustainable mobility?
- What key innovations affect the process of innovations in sustainable mobility?
- What are the conditions and barriers in the process of innovations in sustainable mobility?

2. .. And what is the role of collaboration and coalitions in this process?

- What are examples of collaboration and coalitions in the process of innovations in sustainable mobility?
- What are the conditions and barriers for collaboration and coalitions in the process of innovations in sustainable mobility?

The complete research model including all research questions can be found in Appendix C.

1.3 Areas of research

Four criteria were used to select cases for this research:

1. An explicit will to pursue sustainable mobility had to be propagated by the local government, for example by willing to lift implementation barriers to indicate a change towards a more conducive context for sustainable mobility.
2. A successful modal shift towards more sustainable forms of transport such as public transit or cycling.
3. Cultural and progression difference between both cases to increase the chance of collecting a wide range of understandings and stress the explicit focus of the research on the full process of innovations.
4. The availability and accessibility of information to enable the author to do a successful research. This criterion is mainly based on the willingness of actors and organizations to participate in the research and the authors' professional network.

Based on the mentioned criteria Groningen in the Netherlands and Phoenix, Arizona in the United States were chosen as case studies. Groningen shows numerous examples of innovations in sustainable mobility and can be seen as one of the world leading cities in terms of sustainability and sustainable mobility. Phoenix recently started showing a strong political will to pursue sustainable mobility even though its pursuit is still in a very early stage. Besides, it also shows a little modal shift towards cycling and numerous initiatives are carried out to stimulate innovations in sustainable mobility.

Groningen

Groningen, the seventh largest city of the Netherlands with a little over 200,000 inhabitants, has a traceable history in sustainable mobility and being innovative. In 1977 it introduced the famous Traffic Circulation Plan (VCP). This plan divided the inner city into four quadrants between which travelling by car was no longer possible. Therefore the inner city could not be crossed by car anymore leading to a significant decrease in amount of cars. As a result, public transport, cycling, and walking soon became the main travel modes in the city resulting in a livable city core. Nowadays, Groningen often is praised for its compact car-free inner city and enormous bike share. Fifty percent of the people in Groningen use the bike as a key means of transportation (Centraal Bureau voor de Statistiek, 2002). Moreover, sixty percent of all trips in the city is made by bicycle (City of Groningen, 2015b). In 2002, Groningen won the title bike capital of the Netherlands (Fietzersbond, 2002) and Cityclock (2014) compared cycling mode share data for 700 cities over the world and rated Groningen number 1 with a bike share varying between 31 and 55 percent. In 2013, Technology platform for transport, infrastructure, and public space CROW rated Groningen as most sustainable city in the Netherlands in terms of mobility (CROW, 2014) and also in 2014,

The European Commission rated Groningen as second innovative city of Europe just behind Barcelona in Spain (European Commission, 2014).

Phoenix

Phoenix, located in the southwestern United States is the country's sixth largest city with a little over 1,5 million inhabitants (U.S. Department of Commerce, 2012). Phoenix is also the main city in the larger Phoenix metropolitan area, often referred to as *Valley of the Sun* and geographically almost similar to Maricopa County. This area is home to almost 4 million people and consists of 27 cities. Besides the city of Phoenix other important or large cities in this metropolitan area are Chandler, Gilbert, Glendale, Mesa, Tempe, and Scottsdale. The entire metropolitan area is located in the Sonoran desert and is known for its hot climate. Worth to mention is the Phoenix area being one of the fastest growing and most sprawled regions in the United States. Besides, the Phoenix area is home to the largest university of the country: Arizona State University (ASU).

Due to its size and spread out city design most people in this area rely on the car. Only 5,7% of commuting trips are made by bike, walking, or transit (Hampton, 2013). However, efforts are made to stimulate other forms of transport. As written in the Arizona Town Hall document (2009, p. 9): "Developing a sustainable transportation system is the key. To achieve sustainability, Arizona needs to develop and fund an integrated, multimodal transportation system that reduces our dependence on petroleum and limits the production of greenhouse gases." Bike share has increased with 4.6% to 0.9% between 2000 and 2009, while public transit use declined with 1.4% (to 3.2%) and walking 9.8% (to 5.6) (The Transport Politic, 2010). Despite the decrease of transit use in the first years of this century, the in 2008 opened light rail is an enormous success by easily exceeding all traveler amount expectations. An explanation for the limited use of other modes than the car can also be found in the climate. Due to the desert heat it is almost impossible to travel by bike or foot between May and October. In comparison to other metropolitan areas within the United States, however, Phoenix' 0.9% bike share is large (The Transport Politic, 2009). Some of Phoenix' suburbs also show a much higher bike and transit share. For example the landlocked city of Tempe, that also hosts the country's largest university (Arizona State University) has a bike share of 2.5% (City Clock Magazine, 2014). Besides, the League of American Bicyclists awarded the city of Tempe with a silver rating and the city of Scottsdale with a gold rating (Bike League, 2015).

2 INNOVATING SUSTAINABLE MOBILITY

2.1 Introduction

People move between different places of interest. A lot of trips are made between home, school, work, and leisure activities. Back in the days we made these movements by foot, streetcar, or boat. Later, in the 1920s, we also started to travel by car. An important advantage of the car was that it enabled us to travel further, faster, and more individualistic. As a result, an automobile century started and car use increased dramatically. However, since the 1970s our environmental awareness arose. At that moment we started to realize the problems that came with our car-dependency: oil-dependency on the Middle-East, air quality problems, noise, fatalities, congestion, sprawl, and declining city centers. The answer to these problems had to be sustainable mobility.

To create a framework for this research we will first define sustainable mobility. Thereafter, we will elaborate upon how sustainable mobility consists of three dimensions in which conditions and barriers affect the process of innovations. The three dimensions will be combined in the conceptual model: the basis for the rest of this research.

2.2 Defining sustainable mobility

The term sustainable mobility is ubiquitously used in all types of (academic) literature. The term amalgamates two fundamental concepts: sustainability and mobility. Sustainability originates from the 1970s when human awareness arose on principles to preserve the earth. For example Meadows & The Club of Rome commissioned in 1972 *Limits to Growth* in which they stressed the resource depletion. As definition of sustainability usually the concept of sustainable development is used which is defined in the Brundtland Report of the United Nations: “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987, p.37). The concept of mobility is defined as the extent to which people travel (Van Wee & Annema, 2009). Sustainable mobility therefore aims to provide in our current traveling needs without compromising the ability of future generations to meet their own traveling needs.

2.3 Innovations in sustainable mobility

The process of innovations in sustainable mobility takes place in the urban planning realm. The main purpose of urban planning is to maintain urban quality or improve it where possible. In order to provide in this purpose two tools are available: spatial planning (*ruimtelijke planning*) and ‘spatial implementation’ (*ruimtelijk ontwerpen*) (Voogd, Woltjer, & van Dijk, 2011). Voogd et al. describe spatial implementation as purposefully intervening in spatial structures using either physical action or regulations. Spatial

planning, on the other hand, is about the systematic preparations of policy and executive actions aiming at purposefully intervening in spatial structures and the organization of these interventions.

Sustainable mobility strategies basically focus on limiting car usage, for example by limiting trips, or promoting other modes of transport and is closely linked to urban planning. According to Banister (2008) the sustainable mobility approach requires actions to reduce the need to travel by car: fewer trips, encouraging modal shift, reducing trip lengths, and encouraging greater efficiency in the transport system. These actions relate to an ongoing process that repeatedly pushes its boundaries to maintain or improve sustainable mobility: the process of innovations in sustainable mobility. Most importantly, innovations in this process require both spatial planning and spatial implementation.

Spatial implementation mainly involves the way in which land is used and how our transportation network is designed. The effect of this spatial component on sustainable mobility is extensively researched (Black, 1996; Brömmelstroet & Bertolini, 2011; Curtis & James, 2004; Geurs & Van Wee, 2006; Greene & Wegener, 1997; Meurs et al., 2003; Vergragt & Brown, 2007; Wegener & Fürst, 2004). Spatial planning, on the other hand, is a combination of two dimensions: institutions affecting sustainable mobility (Alexander, 2006; Innes, 1995; Kim, 2011; Köhler et al., 2009) and the actors, organizations, and partnerships between them (governance) (Black, 1996; Healey, 1998, 2003; Hull, 2008). Within the dimensions of institutions, governance, and land use and transport, numerous conditions and barriers can be distinguished that affect the process of innovations in sustainable mobility. The dimensions and the corresponding conditions and barriers will be elaborated upon in the following parts. The connection between the three dimensions and their influence on the process of innovations in sustainable mobility is indicated in the conceptual model in figure 2.3.

2.4 Institutions

Since the 2000s the institutionalist approach was introduced to planning. This approach stresses the importance of underlying normative institutions affecting the process of urban planning (Voogd et al., 2011). Scholars state that change in institutions is required to lift implementation barriers, close the planning-behavior gap, and, most importantly, implement sustainable mobility goals (Alexander, 2006; Innes, 1995; Kim, 2011; Köhler et al., 2009). Goldman & Gorham (2006, p. 271) state about new institutions: *"[New] policies (...) involve significant challenges to the traditional ways that transportation agencies define their missions, and organize their work."* Since sustainable mobility takes place in an institutional environment it is affected by institutions. Moreover, institutions are linked to sustainable development due to the context of human activities that can support or inhibit behavior that affects sustainability (Alexander, 2006). Although institutions are defined differently, most definitions mainly center around the concepts of rules, structures, and patterns. Hodgson (2006, p. 2 based on Knight, 1992) defines institutions as "systems of established and prevalent social rules that structure social

interactions". González and Healey (2005, p. 2058) use "the framework of norms, rules, and practices which structure action in social contexts" and Dembski and Salet (2010, p. 615) call it the "patterns of social rules". A clear distinction between different types of institutions can be found between either formal and informal institutions (Buitelaar, Legendijk, & Jacobs, 2007; Marsden & May, 2006). Formal institutions are rules, laws, and orders, while informal institutions are about values, norms, practices, customs, and traditions (Rietveld & Stough, 2005). Formal institutions change rapidly but tend to be stable for a long time whereas informal institutions are known as changing slowly but may having a fast impact on behavior.

Formal institutional rules

Formal institutions affect the process of innovations in sustainable mobility through rules, laws, and orders. For example a lack of concentration on sustainable mobility policies among several parts of public institutions can form a barrier to innovations (Banister, 2005a; Clifford et al., 2005; Goldman & Gorham, 2006; Vergragt & Brown, 2007). Besides, an overlap of responsibilities or bad interaction with national governments can also limit innovations (Clifford et al., 2005). Hull (2008) indicates the importance of organizational issues, such as lack of funding, absence of management mechanisms for policy integration, insufficient staff time resources, and technical skills to implement new ideas on sustainable transport, and the insufficiency of local baseline monitoring data.

Informal institutional rules

Numerous values, norms, practices, customs, and traditions affect the process of innovations in sustainable mobility. Clear objectives, a long term strategy, and vision are indicated as having a stimulatory effect on sustainability (Hull, 2008). Besides, policies focusing on promoting others modes such as bicycling, public transit, or bus rapid transit (BRT) also have a profound impact on sustainable mobility (Banister, 1996, 2008; Black, 1996; Goldman & Gorham, 2006). Banister (2008) points out the importance of seeing streets as a place and not as just a road, consistency in policy, and adopting controversial policies in stages. Again Banister (2005a, 2008) and Vergragt and Brown (2007) stress the importance of regulations and leadership. Finally, an important condition is the willingness of governments to experiment and to accept a culture of trial and error (Goldman & Gorham, 2006; Vergragt & Brown, 2007).

Banister (1996, 2008) also indicates the importance of education and awareness of the population as a social conditions for implementing sustainable mobility. It may alter people's attitudes towards the automobile and stimulates other forms of transport. Besides, he mentions the importance of involved citizens, the combination of push and pull factors, and selling the benefits. Goldman and Gorham (2006) indicate the importance of personal information as being contributory to sustainable mobility.

Changing institutions

We assume that the before mentioned conditions and barriers can successfully intervene in spatial planning and therefore enable us to create a more conducive or restrictive context for innovations in sustainable mobility. This viewpoint follows the theory of deliberate institutional change, one of the main proposed theories for institutional change. Scholars argue that institutions change either deliberate and performed on purpose, or evolutionary, unintended, and gradual (Alexander, 2006; Bertolini, 2007; Buitelaar et al., 2007). Alexander (2006, p. 4) defines purposefully institutional change as: “The devising and realization of rules, procedures, and organizational structures that will enable and constrain behavior and action so as to accord held values, achieve desired objectives, or execute given tasks.” Devising and realization stresses a man-made element, that institutions can be created or designed by, for example, governments to implement sustainable mobility. Kim (2011) agrees with Alexander and states that institutions are socially, deliberate, and purposefully constructed rather than naturally occurring. This contention helps her to explain the differences between cities in the world. Kim also states that institutions are constructed, that they can be reconstructed, and therefore that institutional change is possible.

Path dependencies

North (1990 in Buitelaar et al., 2007) argues that although institutions can be changed deliberately the future possibilities are limited due to decisions made in the past. This theory is known as path dependency: “The concept of ‘path dependence’ has emerged in a number of disciplines to re-emphasize the importance of situating comparisons of current conditions and outcomes within a proper consideration of the historical evolution of particular places, problems and policy responses.” (Couch, Sykes, & Börstinghaus, 2011, p. 6). In urban planning, decisions for physical structures usually affect the pursuit of sustainable mobility for a long time since they cannot be adjusted easily. An outstretched city structure is for example not easily replaced by compact mixed-use functions and therefore affect possible innovations in sustainable mobility for a long time. Banister (1996) argues that existing commitments made it difficult to change policies to implement urban sustainability while other scholars state that options for innovations in a city may be limited due to obstructive policies from before (Couch et al., 2011; Elzen, Geels, & Green, 2004). The theory of path dependence also links spatial planning with spatial implementation. As mentioned, the way in which institutions are defined and contribute to spatial planning affect how the land is used as well as that land use affects the possible spatial planning decisions. Examples of land use affecting institutions can be found in the medieval Dutch cities that are compact because they used to have very strict *urban growth boundaries* (UGBs) in the form of a city wall. Another example is the structure of American cities that usually is very spacious because they were designed for cars and there was an abundance of cheap land. These planning decisions from a long time ago still affect possible innovations in sustainable mobility.

The concept of path dependency is in this research particularly of interest because this analysis focuses on two cases that both are in a different stage of their sustainable mobility pursuit. Therefore it is challenging to compare both cases based on their stage to research how past decisions may affect current planning policies or may have created a specific conducive context for innovations in sustainable mobility.

2.5 Governance

Collaborative planning

After World War II cities were designed on paper, a form of planning we called blueprint planning. However, in the 1960s this form of planning lost popularity. Strategic plans were introduced to better reflect social and regulatory plans while various stakeholders became more involved in spatial plans which made the communicate element in planning more important. Plans were created in collaborations between different actor groups and no longer only came from the central government. Healey (2003) describes this trend as bottom-up initiatives forces that kept resisting and reworking 'top-down' policies which eventually led to the development of collaboration planning. This type of planning sees the planning process as an interactive one in which transport policy is socially constructed. Besides, it is a governance activity in a complex and dynamic institutional environment, shaped by wider economic, social, and environmental forces that structure, but do not determine, specific interactions (Healey, 2003). Due to collaborative planning a wider range of organizations becomes involved in the process of urban planning and responsibilities shift from governments to for example companies or local organizations. Friedman (1993, p. 482) says about this trend:

"I am not saying that national and transnational planning are obsolete. Far from it. Planning is instituted at all levels of public decision making, but in thinking about a new model, where should the emphasis lie? There are several reasons for my choice of the regional and local scale. It means that a space for participation must be found for a whole new set of actors in addition to the nation state and capital. Regions, cities, and neighborhoods are the places where meaningful citizen participation can take place. It is far less likely to occur at superordinate levels."

The paradigm shift from blueprint planning to collaborative planning has also resulted in several new trends. Collaboration with new players, stakeholder involvement, coalitions between actor groups, and increased importance of bottom-up initiatives. This decentralized planning is attractive due to a wider distribution of risks, the potential for social experimentation, and the revival of democratic practices (Friedmann, 1993). Besides collaborative planning is useful to deal with local, uncertain, and more complex situations since those people are involved that are truly affected. Healey (1998, p. 1539) states:

"One of the main reasons for widening involvement in the processes of policy development and delivery is that public officials and professionals lack sufficient knowledge about the qualities of place, about problems, potential solutions, and about how to make policies work effectively. People who live in an area or who are involved in business have a knowledge built up through their day-to-day experience of a place."

Since social problems and implementation barriers can often be found on the interface of different stakeholder groups, collaboration between different stakeholders becomes more important. Moreover, decreasing government expenses triggers innovative investments from other parties in urban planning and therefore the government autonomy decreases further. Besides, the rise of the Internet and social media enables people to become more well-informed and emancipated which stimulated the willingness of changing their own life and environment.

The importance of collaboration contributing to sustainable mobility is stressed by several scholars. Black (1996) argues that public-private collaboration should be encouraged to make transportation more in line with sustainable development notions. Clifford et al. (2005), on the other hand, indicate lacking cooperation between politicians, administration, corporate activity, and citizens as a barrier to pursue sustainable mobility. Healey (1998) mentions the importance of a rich 'institutional capital', a social infrastructure of positive relationship between governance, citizens, and companies to build relational resources. Also Hull (2008, p. 102) points out the importance of collaboration between all public actors to contribute to sustainable mobility:

“The paradigm of sustainability needs to be shared (implemented and enforced) by all public sector actors if a step-change in the delivery of sustainable transport outcomes is to be achieved. Once this paradigm is clearly defined and accepted, institutional rules can be devised that make the alternatives to the car more attractive. Legal and fiscal instruments and public provision could be used to implement the sustainable transport paradigm.”

Research on collaborative planning also shows that it can solve complex, contentious problems, and creates an improved climate for future action when a community is divided by disputes (Innes & Booher, 2004). These public sector actors that need to collaborate are mentioned by Banister (2008): specialists, researchers, academics, practitioners, policy makers, and activists. A means for collaboration between these actor groups is through coalitions.

Coalitions

Coalitions are a specific form of collaboration between (people from) different actor groups. In a coalition, persons or organizations have left their former role as for example consultant, practitioner, or businessman and have grown in a new role as coalition member. In a coalition the members mostly work together without hierarchy. A coalition itself is defined as a group of people or organizations that wants to achieve something in the future for the better (Jong, 2014). They form on the interface of institutions and networks, focusing on directing, partnering, and facilitating, see figure 2.1. Coalitions emerge because actor groups in urban planning are unable to reach their ambitions on their own and regulation and permission oriented planning and development oriented planning were no longer sufficient (Jong, 2014). Coalitions, however, comprise a complex process and needs design and special skills.

Boonstra and Boelens (2011), for example, state after a Dutch history of civic participation in public planning that the participatory planning has led to disappointing results. They also argue that one reason is that planning proposals remain controlled by public government, that public government is not very adaptive to new initiatives, and thus is unable to address growing complexity in urban planning. According to Boelens (2010) a radical turn needs to be made. Coalitions involving citizens may play an important role in this process. Moreover, coalitions contribute to creating networks between organizations (Cross, Ernst, & Pasmore, 2013). Banister (2008, p. 79) points out the importance of coalitions in the *Sustainable Mobility Paradigm*:

“There is a strong support for enlarging the scope of public discourse and empowering the stakeholders through an interactive and participatory process to commit themselves to the sustainable mobility paradigm. The open and active involvement of all parties would be far more effective than the conventional passive means of persuasion. Thus, broad coalitions should be formed to include specialists, researchers, academics, practitioners, policy makers and activists in the related areas of transport, land use, urban affairs, environment, public health, ecology, engineering, green modes and public transport. It is only when such coalitions form that a real debate about sustainable mobility can take place. There must be a willingness to change and an acceptance of collective responsibility. To achieve sustainable mobility, the arguments must be sufficiently powerful to overcome the dependence on the car and the possibility that the costs of delay and congestion have already been internalized by drivers.”

FIGURE 2.1 – COALITIONS: THE NEW PLAYING FIELD OF THE URBAN PLANNER (Jong, 2014)



Stakeholder analysis and trust

The process of innovations in sustainable mobility also consists of a physical component, namely in the way land is used. Interventions in sustainable mobility therefore affect many people in either a direct or indirect manner. Freeman (1984) refers to stakeholders being “any group or individual who can affect or is affected by the achievement of the organization’s objectives”. Therefore citizens can be regarded being the stakeholders in the process of urban planning. To cherish a good relationship between actor groups

and the stakeholders, or residents, several conditions have to be met. Freeman illustrates in the *stakeholder theory* that organizations that manage their stakeholder relationships effectively will survive longer and perform better. An important conditions in this relationship is trust. Greenwood and Van Buren (2010) state that trustworthiness is vital to the moral treatment of stakeholders in the organization-stakeholder relationship. This relationship is similar to a relationship between parties that intervene in urban planning and residents who are the stakeholders in this process. Connelly (2007) argues the importance of trust among individuals and organizations as being essential to the success of any interorganizational activity.

2.6 Land use

There is a close relationship between land use and sustainable mobility (Black, 1996; Brömmelstroet & Bertolini, 2011; Curtis & James, 2004; Geurs & Van Wee, 2006; Greene & Wegener, 1997; Meurs et al., 2003; Vergragt & Brown, 2007; Wegener & Fürst, 2004). Physical structures, density, and mobility networks affect the human need to travel and thus affect mobility. Better coordination between land use and mobility may result in fewer trips made by car or shifting to other transport modes. Moreover, compact cities, in combination with mixed land use and neighborhood design, reduce car ownership levels, trip rates, and commuting distances (Banister, 1996, 2008; Meurs et al., 2003).

Cervero (in Meurs et al., 2003) has done specific research on the connection of land use and sustainable mobility in the United States. He found that ample availability of parking space and concentrated decentralization encourages car use while on the other hand smart growth strategies discourage usage. Moreover he states that it is difficult to achieve integral policy that looks at land use and transport at the same time because it is considered to be too much an intrusion on the privacy.

In the same article is stated that in the Netherlands weighty government policies explain land use. “For example, it included goals for improving the economic basis of the cities, reducing growth in mobility, offering all the most important functions (houses, employment and facilities) close to each other and preventing further suburbanization in rural areas.” (Meurs et al., 2003, p. 116). Moreover, they indicate the high level of building density, short distances, and specific spatial structure in the Netherlands contributory to public transit use, biking, and walking.

City design

The size of a city has a clear effect on innovations in sustainable mobility (Banister, 1996). Longer distances mean a decreased use of slower transport modes such as cycling or walking. Besides, in large cities it is more difficult to supply a robust transit system with enough hubs that serves every part of the area. Tendencies as sprawl therefore also effect the pursuit of sustainability.

Except the size in general also compactness has a stimulating effect on sustainability in cities (Banister, 1996, 2008; Geurs & Van Wee, 2006; Jabareen, 2006; Meurs et al., 2003). Density limits the length of trips

and encourages use of slower transport modes. Besides, the accessibility of transit hubs increases when being located in compact areas. Density can get stimulated using restricting policies, such as UGBs (Jabareen, 2006). UGBs are limits on land development beyond a politically designated area to curb sprawl, protect open space, or encourage the redevelopment of inner city neighborhoods (Staley, Edgens, & Mildner, 1999). In the Netherlands for example the national government has played an important role by stimulated to (re)development on brownfield locations and on greenfield locations next to existing urban areas (Geurs & Van Wee, 2006).

TOD and mixed use

Two important policies to reduce the need for travel can be found in promoting transit oriented development (TOD) and mixed use planning. TOD aims for integrating land use and transport “concentrating urban development around stations in order to support transit use, and develop transit systems to connect existing and planned concentrations of development” (Curtis, Renne, & Bertolini, 2009). This development results in shorter travel distances and fewer trips that have to be made. Above all, it encourages transit ridership, biking, and walking (Cervero, 1996; Köhler et al., 2009). Mixed use has the same purpose as TOD and tries to limit travel distances. Due to the proximity of activities and public transit hubs car dependence is countered which is seen as an important conditions for sustainable mobility (Banister, 2008; Goldman & Gorham, 2006; Greene & Wegener, 1997).

Land Use Transport Feedback Cycle

The link between land use and sustainable mobility is also explained by the Land Use Transport Feedback Cycle by Wegener and Fürst (2004). This cycle consists of four parts: accessibility, land use, activities, and transport system (see Figure 2.2). The model explains that there is more than just one relationship between all components and that all components subsequently affect each other in a vicious manner. Therefore neither it is possible to define a start or end point nor a most important factor. The model illustrates how a transport system directly affects the accessibility of a place. As a result the accessibility slowly affects land use which as a result directly affects activities. In the end, the slow effect of activities on the transport system closes the cycle.

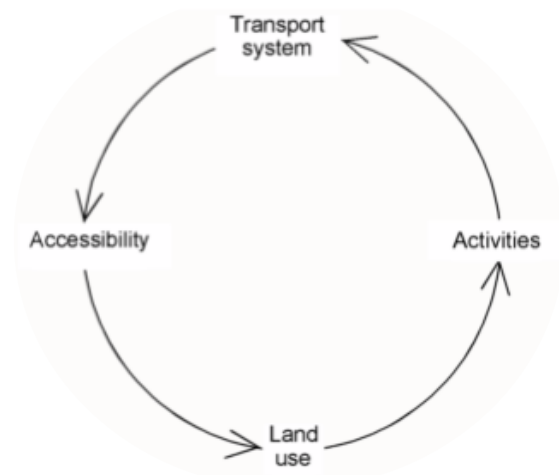


FIGURE 2.2 – LAND USE TRANSPORT FEEDBACK CYCLE (WEGENER & FÜRST, 2004)

2.7 Conceptual model

We have introduced that in the process of innovations in sustainable mobility there are two available tools: spatial design and spatial implementation. A clear link between both is indicated in the conceptual model. This connection is earlier explained using the theory of path dependency: the physical structures of a city directly affect the process of spatial planning as a condition to spatial planning whereas spatial planning tries to intervene in planning affecting spatial implementation. Moreover, Curtis and James (2004) state that development and establishment of appropriate institutional arrangements integrated with land use planning and transport planning is crucial to achieve sustainable travel behavior, while Van Wee (2013) indicates that land use has a long-term impact on travel behavior and our customs and practices (institutions).

Second, spatial planning is affected by the formal and informal rules of planning (institutions) and the human side of planning (governance). The effect of both dimensions on spatial planning is extensively discussed in earlier parts. Alexander (2006), for example, describes the connection between institutions and spatial planning through the institutional context of human activities that can either support or inhibit sustainable mobility. The red arrow indicates the focus of the research: the combination of institutions and governance affecting spatial planning to pursue sustainable mobility (institutional innovations).

The conceptual model also shows institutions and governance affecting each other both ways. Healey (1998) emphasizes this connection by stating how different cultures in organizations affect institutions. The collaboration between key actors thus affect the design of institutions while rules and norms also affect the human side of planning.

In addition, numerous conditions and barriers affect the process of institutions in sustainable mobility through one of the three dimensions. For institutions and governance these conditions and barriers can be divided into subcategories. Institutions for example are divided into the subcategories cultural and social institutions. By cultural is meant conditions and barriers strongly affected by local planning culture, while social conditions and barriers are merely based on social habits. Governance also consists of two subcategories for conditions and barriers: collaboration & coalitions and actors & organizations. The first category is about partnerships between actors and organizations and the emergence of coalitions while the second focuses on actors and organizations themselves and is affiliated with characteristics and capacities among these actors and organizations. With red, the second specific focus of this research is highlighted: the role of collaboration and coalitions in the process of innovations in sustainable mobility.

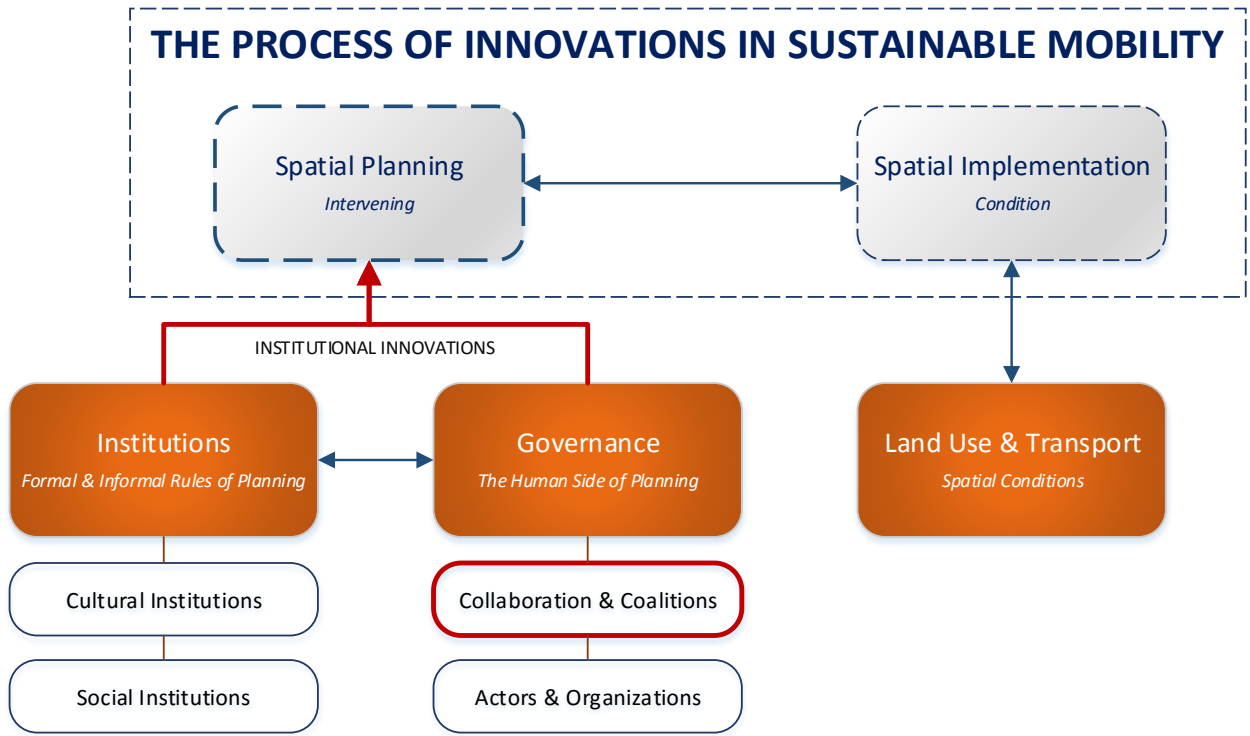


FIGURE 2.3 – CONCEPTUAL MODEL

3 METHODOLOGY

In this chapter the research methods will be discussed. First the methodology will be introduced and the decision to use case studies is elaborated upon. Thereafter, the research design is presented and the different methods are described, including the document analysis, in-depth interviews, and observations. In paragraph 3.4 the recruitment of interviewees is explained, as well as the process of data collection. In paragraph 3.5 the analysis of all gathered data is described. Finally, ethical considerations and limitations of the research will be explained in paragraph 3.6.

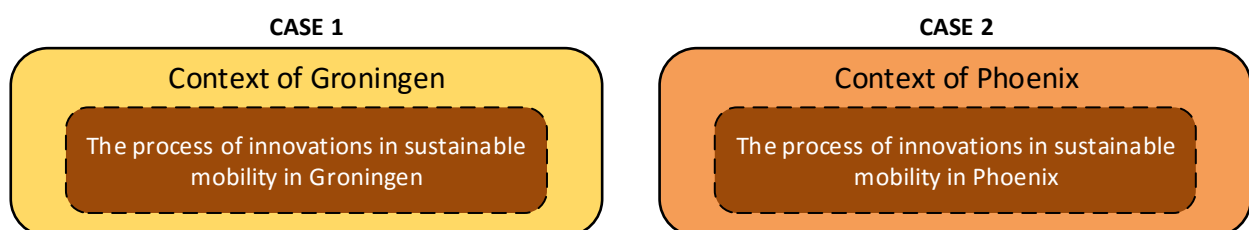
3.1 Introduction

This research focuses on the process of innovations in sustainable mobility in two specific cases. The purpose of this research is to answer the main research question “How do institutional innovations in sustainable mobility occur and what is the role of collaboration and coalitions in this process?” To answer research questions that start with “how” preferably an explanatory research is conducted using either a case study, history, or experiment (Yin, 2009).

A case study includes direct observation of the events being studied and interviews of the person involved in the case, whereas a history is limited to only particular events. Moreover, “the case study’s unique strength is its ability to deal with a full variety of evidence – documents, artifacts, interviews, and observations” (Yin, 2009, p. 11). Experiments, however, are only chosen if behavior can be manipulated directly, precisely, and systematically.

Case studies are particularly chosen to “investigate a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (Yin, 2009, p. 18). The phenomenon in this research is the process of innovations in sustainable mobility. Yet, the process of innovations in sustainable mobility gets affected by a case specific context as shown in Figure 3.1. Besides, this research focuses on a contemporary topic: the current process of innovations. According to the mentioned characteristics a multiple case study is the best fitted approach for this research.

FIGURE 3.1 – MULTIPLE CASE DESIGN



Within this multiple case design the unit of analysis is the same for both cases. The difference can be found in the contexts affecting the process of innovations. The purpose of two deviating contexts in this research is to collect a wide variety of understandings of both the effect of context on the process and of the process itself. An important advantage of a multiple case design is that it often is considered more compelling, and the overall study is therefore regarded as more robust (Herriot & Firestone, 1983 in Yin, 2009).

Research criteria

Reliability, internal and external validity, and replicability are seen as important criteria in social research (Bryman, 2008; Yin, 2009). These criteria are more often used in quantitative research, but do have an importance in qualitative research as well. The purpose of using research criteria is to ensure the quality of the research. For example to whether the answers on the research questions match the evidence that is used in the line of reasoning of stating findings. Both, reliability and replicability are pretty much self-explanatory. The reliability of this research is covered in the reasoning on the different methods used, the application of triangulation, and the explanation of data selection. Replicability is covered by an extensive description of the data collection, data selection, and data analysis process.

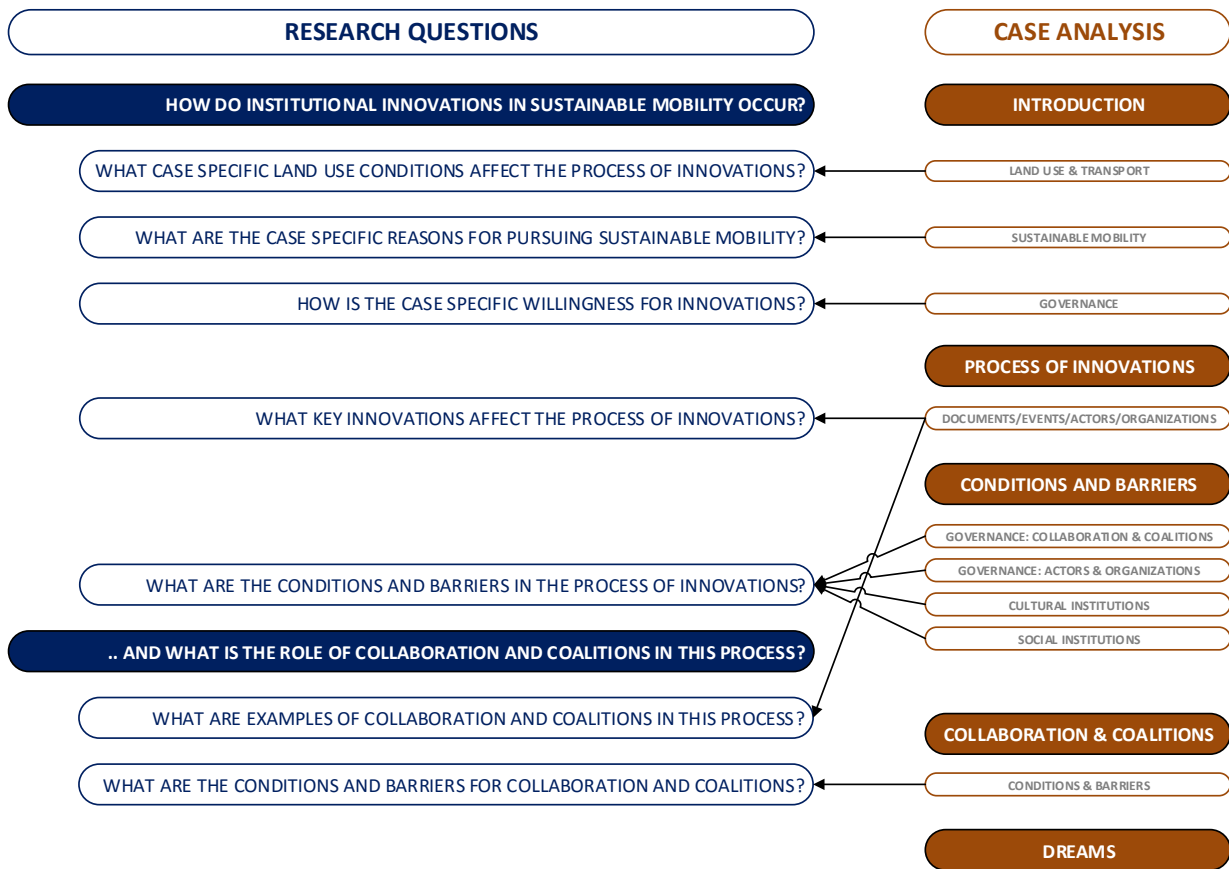
Validity, however, is less self-explanatory. Moreover, this criterion is often seen as the most important one of research (Bryman, 2008). Internal validity is related to the causality of variables. In qualitative research it merely stresses the importance of interconnectedness between different concepts in the theory. For example if only collaboration, institutions, and land use affect the process of innovations in sustainable mobility or if there might be other aspects that affect the process as well. This research however has no intention to either measure or test the causality of these dimensions on the process but rather aims to understand what happens within the predefined dimensions. Therefore the internal validity for both cases is considered to be similar. External validity is concerned with the generalization of research results beyond its specific context. Since the context and thus external validity for both cases is different, this research aims to provide understandings in the process of innovations in sustainable mobility in general. These understandings go far beyond the context of both cases and thus aim to contribute to general understandings in the process of innovations in sustainable mobility that is applicable to a wide variety of cases.

3.2 Research design

As explained in chapter 1.2, several questions were formulated to contribute to answer the main research questions. Figure 3.2 shows in blue the main research question (divided into two parts) and in white the underlying research questions that help to answer the main research question. As shown in orange, an analysis is conducted to answer the underlying research questions for both cases. This analysis consists of a general introduction, a historiography of innovations, a discussion of conditions and barriers to these

innovations, a discussion of conditions and barriers for collaboration and coalitions, and a list of the interviewees’ dreams. The next part discusses the analysis of methods in more detail.

FIGURE 3.2 – RESEARCH DESIGN: RESEARCH QUESTIONS AND CASE ANALYSIS



3.3 Research methods

Choice of methods

To conduct the case analysis to answer the underlying research questions, three methods of data collection were used (see figure 3.3).

The purpose of using multiple methods was the possibility of applying triangulation in this research. Using triangulation, facts are double checked by using different sources aimed at corroborating the same phenomenon to avoid bias. Besides, triangulation increases the power of each individual research method. An interviewee can for example

recommend important reports that can be used in the document analysis and contribute to the general understanding of a case. Also, an interviewee can be asked about earlier observed findings to enhance understandings. In this research one internal main method (structured in-depth interviews) was combined with (internal) observations, and an external document analysis.

FIGURE 3.3 – TRIANGULATION IN RESEARCH METHODS



Document analysis

A document analysis was used as an iterative tool during the entire research process. Before, during, and after the interviews, public records, media, papers, and documents were analyzed to understand the process of innovations through time. Specifically, information on the topics of urban planning, infrastructure, and politics was targeted to indicate the key innovations from documents, actors, organizations, and events in the process sustainable mobility pursuit. Besides, document analysis was used to apply triangulation to findings from other research methods.

Interviews

An important reason for using interviews as method for data collection is the ability to collect a diversity of meaning, opinion, and experiences (Hay, 2010). Interviews with a wide variety and large of amount of experts were held to truly understand the process of innovations that mainly focuses on a decision-making process where people's opinions and attitudes are essential. To cover all research goals a list of topics was defined and an interview guideline was designed (see Appendix A). Although the interview guideline was well structured, the interview questions were open to stimulate interviewees to share their opinions and ideas. In addition, during answering a research question interviewees were barely interrupted to enable them to tell amply about their experiences.

Observations

The reason for using observations in this research was twofold. First, to enable the researcher to personally experience the process of innovations in sustainable mobility for both cases. By visiting the research areas particular data can be collected that would not have been possible from behind a desk. Second, visiting the cases enabled the researcher to take notes, photographs, and videos which add to the research as being an important type of data.

Visiting a particular place enables you to experience real time events in a way they could not be understand by reading about it or getting told about it. Unique stories are told by the physical and social structure of places. Discussions with locals lead to new ideas, thoughts, and stories that contributed to new understandings and therefore to the final results of a research. Besides visiting places also particular events were be visited contributing to preliminary findings. For this research, examples can be found in public meetings, classes, and outdoor events.

Photographs can be used in social research in three different ways (Bryman, 2008). First, as illustration, to enliven the findings and let the authors experience specific features that cannot be shared in a text. Second, as data to supplement other findings by telling an own story. And third, as prompts during the data collection to entice for example interviewees to tell a particular story that a photo remind them on. This research uses the two first mentioned forms.

3.4 Data collection and selection

Interviews

The interviewees were selected through a four steps process. First, interviewees were targeted based on the authors experience in the field of urban planning. Second, after a thorough document analysis key organizations were selected from which interviewees were targeted. Third, individuals were approached based on their involvement in organizations or events mentioned by other interviewees. Finally, interviewees were selected after personally being recommended by other interviewees using snowball sampling which seemed particularly useful in Phoenix. All interviewees were selected based on their availability and willingness for one-to-one interviews between thirty minutes and one hour. Almost every interviewee was attained via e-mail using either the authors' personal network or after being redirected by other interviewees. Finally, the interviewees together had to cover all actor groups in urban planning: academics, consultants, policy makers, activists, and politicians to better understand the dynamics between these different actor groups. In addition, also experts from coalitions were interviewed, see Box 3.1.

BOX 3.1 – ACTOR GROUPS TARGETED FOR IN-DEPTH INTERVIEWS

Academics and researchers

Academics and researchers are mostly connected to an university or research institute and affect urban planning by providing new theories and thoughts on research topics and by taking part in the public discussion.

Practitioners: consultants and specialists

The first group of practitioners consists of consultants and specialist. These experts work for public and private companies such as consultancy firms or executing organizations. They differ from the second group of practitioners because they are not restricted to a specific governmental body such as a city or province.

Practitioners: policy makers

The second group of practitioners consists of policy makers. They work for (local) government and are thus linked to a specific region. Moreover they work as a civil servant and not for commercial businesses.

Activists

Activists can be individuals or groups that campaign for a specific purpose such as the environment or cycling.

Politicians

Politicians affect the process of sustainable mobility by implementing direct or indirect policies. Besides, they promote change, stimulate innovations, or lead the political debate by providing leadership.

Coalitions

As mentioned before, coalitions consist of persons or organizations that have left their former role as for example consultant, policy maker, or businessman and have grown in a new role as coalition member without hierarchy and together with other members.

A total of 47 (26 in Phoenix, 21 in Groningen) interviews was held with experts from all actor groups in urban planning. Table 3.1 and 3.2 show a full list of the background, position, or employer of the interviewees. To protect the interviewees' privacy the actor groups policy makers and politicians have been combined into one code: government (G). The codes of the interviewees start with either a G

(Groningen), or P (Phoenix) and are followed by either an U (university), G (government and council), C (coalition and activist), or S (specialist). The interviewees' features are shown in alphabetical order which makes it impossible to trace back a code to a specific interviewee.

TABLE 3.1 – INTERVIEWEES IN GRONINGEN

University (GU1-3)	Government (GG1-7)	Coalition (GC1-7)	Specialist (GS1-4)
Academic lecturer RUG	Groningen Council	Beter Benutten	Grontmij
PhD-student RUG	Planner City of Groningen	Fietsersbond	OV-Bureau
Planning student RUG	Planner City of Groningen	Green Office	Royal HaskoningDHV
	Planner City of Groningen	Groningen Bereikbaar	Weusthuis & Partners
	Planner City of Groningen	Regio Groningen-Assen	
	Planner Province of Groningen	Urban Gro Lab	
	Planner Province of Groningen	Urban Gro Lab	

TABLE 3.2 – INTERVIEWEES IN PHOENIX

University (PU1-10)	Government (PG1-9)	Coalition (PC1-3)	Specialist (PS1-4)
Ass. Professor ASU	Planner ASU	T.B.A.G.	Amec Foster Wheeler
Ass. Professor ASU	Planner ASU	T.B.A.G.	Amec Foster Wheeler
Educator ASU	Planner MAG	T.B.A.G.	Lee Engineering
PhD-student ASU	Planner MAG		MooreSwick
Planning student ASU	Planner City of Phoenix		
Planning student ASU	Planner City of Scottsdale		
Professor ASU	Planner City of Tempe		
Professor ASU	Tempe Council		
Professor ASU	Tempe Council		
Professor ASU			

Observations

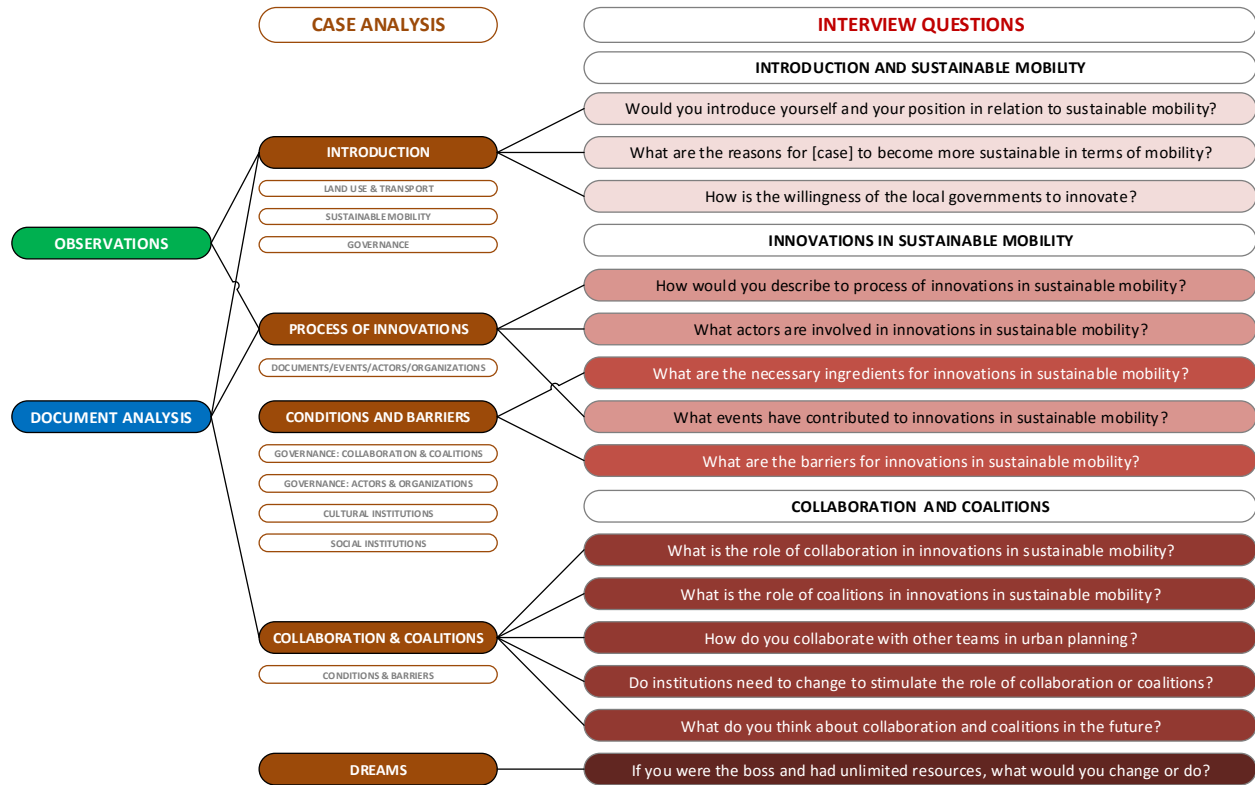
Observations were made at different locations that show examples of sustainable mobility. For example places with revealing infrastructure, larger transit hubs, and specific urban design were visited. These places were selected based on the document analysis or after being mentioned or recommended in interviews. The observations appeared to be useful to limit the unknown unknowns. Besides, numerous physical examples of sustainable mobility implementation were found.

Besides just visiting places also public meetings were attended in Phoenix. Examples are seminars and classes about sustainable mobility and urban planning, a presentation about the new bike strategy, and a bike ride organized by activists. All observations were collected in a daily online blog. Besides, photos and videos were taken. Photos can be found at the end of the chapter 4 and 5. The final blog can be found in Appendix B.

3.5 Data analysis

Figure 3.4 shows how the different research methods have contributed to the case analysis. This paragraph discusses the analysis of the individual research methods in more detail.

FIGURE 3.4 – CONTRIBUTION OF RESEARCH METHODS TO CASE ANALYSIS



Document analysis

The scanned and analyzed documents were reported in a historiography that shows all innovations in sustainable mobility through time. The so-called key factors (all actors, organizations, documents, and events) were included in this analysis. As shown in the figure above, the document analysis also contributed to the general understanding of a case (processes in the introduction) and gave examples of collaboration and coalitions (processed in the namesake paragraph). The document analysis was an iterative process and therefore the timeline was continuously supplemented.

Interviews

The interviews consisted of three main parts: an introduction to sustainable mobility for the specific case, the process of innovations in sustainable mobility, and the role of collaboration and coalitions in this process. In addition, one final question was asked focusing on the interviewees' dreams on the topic of sustainable mobility. As shown in the figure above every interview part contributed to a specific part of the analysis. First, to supplement the general understanding of a case by indicating why sustainable mobility is pursued and how the willingness in this pursued is ranked. Thereafter, by researching the process of innovations and indicating conditions and barriers in this process. Third, to understand the role

of collaboration and coalitions in the process of innovations. As mentioned, the last questions focused on the interviewees' dreams in sustainable mobility.

The interview data was collected by conducting 47 in person interviews using audio recordings and transcribing it into text files. All transcripts were analyzed using a code tree similar to the content of the case analysis. Since all interviews followed the same set of questions the data for the analysis could easily be extracted from the transcripts.

Observations

As mentioned before, observations were used in different ways. First, it led to a unique understanding of the case. Second, it also contributed to the process of innovations in sustainable mobility by completing the historiography and fine-tuning the data collection process. Thereafter, taken photos and videos contributed to this research by illustrating the story and as data on its own.

Analysis

As mentioned, to answer the underlying research questions two individual case analyses were conducted. As illustrated in figure 3.5, both start with a general introduction on the case focusing on land use and transport, sustainable mobility, and governance. The second part of the analyses is about the process of innovations in sustainable mobility in which key innovations (documents, actors, organizations, and events) are processed into a historiography. The third part focuses on conditions and barriers to innovations in sustainable mobility. Based on the results from the interviews, four categories are distinguished: collaboration & coalitions, actors & organizations, cultural institutions, and social institutions (see box 3.2). Moreover, more conditions than barriers are defined because most barriers can be seen as an 'opposite condition'. For example after mentioning the condition 'having enough funds', the barrier 'lack of funds' will not be mentioned. Part four is about conditions and barriers to collaboration and coalitions while the fifth part is about the dreams of interviewees.

BOX 3.2 – ANALYSIS CATEGORIES OF CONDITIONS FOR INNOVATIONS IN SUSTAINABLE MOBILITY

Collaboration & coalitions

Conditions that are affiliated with partnerships between actors and organizations and the emergence of coalitions.

Actors & organizations

Key actors or organizations themselves and conditions that are affiliated with characteristics and capacities among actors and organizations contributing to innovations in sustainable mobility.

Cultural institutions

Institutions strongly affected by local planning culture contributing to innovations in sustainable mobility.

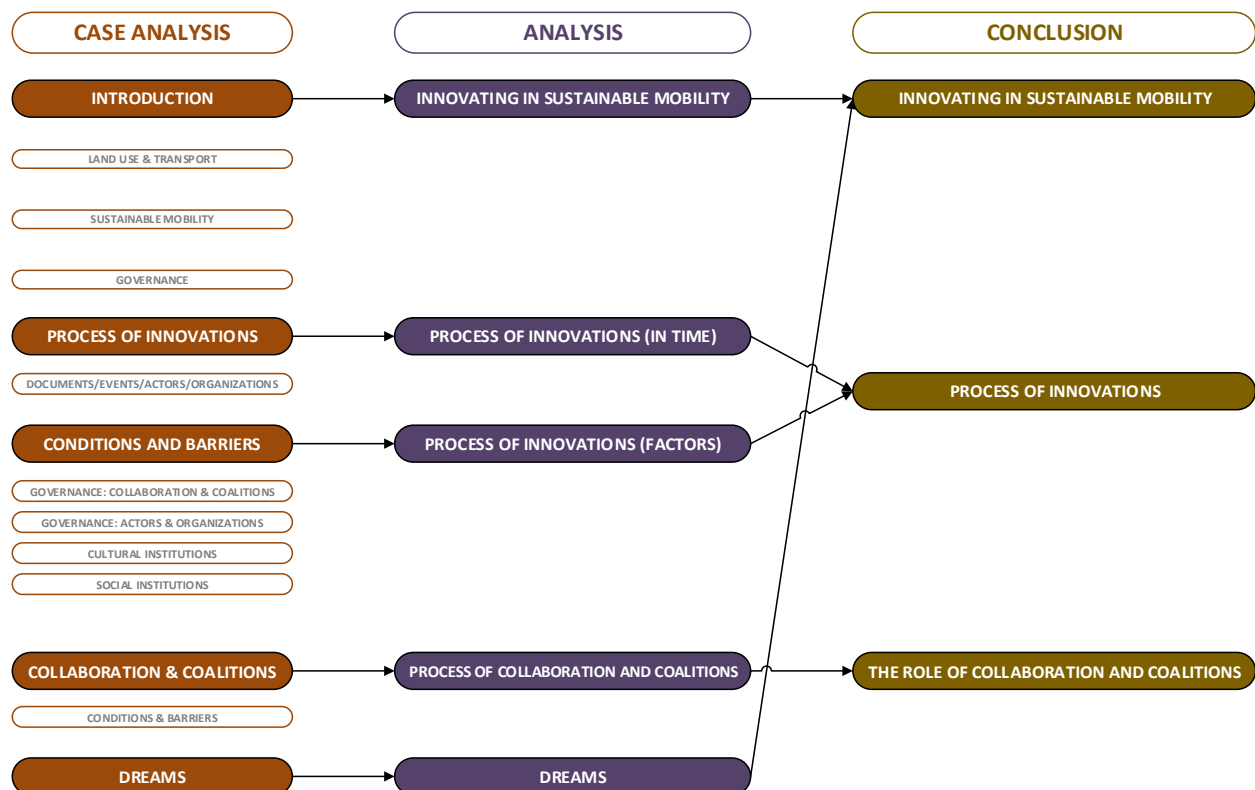
Social institutions

Institutions strongly affected by social habits contributing to innovations in sustainable mobility.

After the two individual case analyses one integrated analysis is done to compare the results from Groningen and Phoenix. First, land use, general sustainable mobility pursuit, and governance is compared. Second, the most important innovations from both historiographies are processed into a timeline and critically analyzed. Thereafter, an overview is given of the most important factors (conditions and barriers) in the process of innovations in sustainable mobility. The fourth part integrates the results from collaboration and coalitions and focuses their influence on the process of innovations. The last part of the analysis compares the dreams from interviewees in Groningen with dreams from Phoenix.

Figure 3.5 also shows the step of the research process: from the integrated analysis to the conclusions to answer the main research questions. ‘Innovating in sustainable mobility’ and ‘dreams’ together define place specific characteristics and form the basis for the conclusion. Thereafter, the timelines and factors are integrated to answer the first part of the main research question: ‘How works the process of innovations in sustainable mobility?’ The second part of the main research question about the role that coalitions play in the process of innovations is answered according to the information from ‘the process of collaboration and coalitions’. The full research model including the research questions can be found in Appendix C.

FIGURE 3.5 – THE PROCESS FROM DATA ANALYSIS TO CONCLUSIONS



3.6 Ethics and limitations

The interviews in Phoenix took about one hour each. In Groningen, however, the interviews only took twenty to thirty minutes each. The interviews in Phoenix were longer because this case was much less known and therefore interviews were also used to better understand the background of the case. The time used in Groningen for each interview was found to be long enough to cover all key topics and collect well-founded answers. Besides, due to the time constraints interviewees were forced to prioritize their answers and to stay focused on the main research topics.

None of the interviewees was given any extra information such as answers from other interviewees or cases either before or during the interview. Using this strategy bias or difference in preparation among interviewees was limited.

A limitation of the interviews were the interviewees' positions that may have led to sharing only success stories. Tried is to limit this consequence by using triangulation in the research methods and by analyzing only those arguments that were mentioned more than just one time.

Time appeared to be a constraint for the document research. According to the limited time available, multiple cases, and extensiveness of the research was chosen to only focus on the most important and accessible documents. Besides, as document research being just one of the three applied research methods, triangulation was used to find the most important documents and to check facts.

Observations were also limited due to the authors' knowledge, network, or possibilities. Some places could for example not be visited due to time or distance constraints. Moreover, especially regional experts who may have been biased were asked about key places to visit.

4 CASE: GRONINGEN

This part start with an introduction about the city of Groningen, specific conditions for pursuing sustainable mobility, and the willingness of the local governments to innovate. Thereafter an overview of the collected data is presented using a historiography. This historiography focuses on key innovations (documents, actors, organizations, and events) in the process of pursuing sustainable mobility since World War II. After the historiography, conditions and barriers in the process of innovations in sustainable mobility are discussed. The third part discusses the role of collaboration and coalitions, while this chapter will end with the interviewees’ desires about sustainable mobility in Groningen.

FIGURE 4.1 – TOPOGRAPHIC MAP OF GRONINGEN



4.1 Introduction

Groningen, the seventh largest city of the Netherlands with a little over 200,000 inhabitants, is located in the north of the Netherlands (see figure 4.1). In this part of the country it is the only city with over 100,000 inhabitants which gives it an important regional function. Groningen is well located on a subsoil of sand and clay while most of the surrounding areas lay on peat. Back in the days, the city belonged to the Hanseatic cities, a trading service between cities through Europe. Since Groningen is a medieval city and used to have city walls, it was forced to be creative within this set border. Therefore, Groningen has a very dense city structure; almost every place in the city is located within a 3 kilometers radius from the center. Nowadays, the city has two large universities, the University of Groningen and the Hanze University for

Applied Sciences, which together have a little over 60,000 students resulting in a notable young city population. Besides, the city includes all main facilities such as shopping malls, cinemas, a large stadium, and hospitals. As mentioned, this makes Groningen the main center for people in the north of the Netherlands.

As explained in the chapter Methodology, the results from the interviews are coded. Table 4.1 shows the used codes for Groningen once again in random order.

TABLE 4.1 – INTERVIEWEES IN GRONINGEN

University (GU1-3)	Government (GG1-7)	Coalition (GC1-7)	Specialist (GS1-4)
Academic lecturer RUG	Groningen Council	Beter Benutten	Grontmij
PhD-student RUG	Planner City of Groningen	Fietsersbond	OV-Bureau
Planning student RUG	Planner City of Groningen	Green Office	Royal HaskoningDHV
	Planner City of Groningen	Groningen Bereikbaar	Weusthuis & Partners
	Planner City of Groningen	Regio Groningen-Assen	
	Planner Province of Groningen	Urban Gro Lab	
	Planner Province of Groningen	Urban Gro Lab	

Specific conditions for pursuing sustainable mobility in Groningen

All interviewees were asked why Groningen should innovate in sustainable mobility. Increasing livability is by far the most mentioned incentive to pursue innovations (GC2, GC5, GG1, GG7, GS2, GS4, GU2, GU3). Another important factor is found in the urgency of space (GC6, GC7, GG5, GS1, GS2, GS3). Since Groningen is such a compact cities it is too small to accept all modes of transport in the center. Therefore, it is necessary to continuously search for new ideas. Also the economic return of innovations is mentioned by the experts (GC4, GC5, GG3, GG5). Infrastructure leads for example to economic development and increased accessibility of spaces may attract new businesses. Other mentioned incentives are a general urgency (GG4, GG6), urgency due to crowded bike paths (GG7), and a willingness to remain a sustainable top city (GG2).

Willingness of the local government

To understand the willingness of the local governments to innovate in sustainable mobility, all interviewees was asked how they review this willingness. In Groningen, not one experts rates the local government as non-conducive for innovations in sustainable mobility. However, one expert mentions that despite a willingness to listen to new ideas, ideas are usually not implemented due to conservatism (GU1). Other experts point out the current and past city council as being extreme favorable (GG3, GG4, GG7, GS1, GS4, GU1), although the council in the 1970s is even rated better (GS3, GU3). Finally, some state that the willingness is okay (GC4, GG2, GG6, GU2) and some point out the importance of a government being innovative (GC6, GC7, GS2).

4.2 Process of innovations in time

Many documents, events, actors, and organizations indicate innovations in sustainable mobility in Groningen. This part gives an overview of important innovations based on the document analysis, interviews, and observations starting after World War II.

ACTOR | Left-wing city council (1968)

After growing force of the PvdA (labor party) in the late 1960s, a city council consisting of only left wing parties was installed in 1972 (Tsubohara, 2007). Moreover, it was the first left wing council among the large Dutch cities. Both Max van den Berg and Jacques Wallage played an important role in this generation that was started in 1968. This so-called '68 generation that led to the implementation of several new policies in the subsequent years. GG2: *“The '68 generation really made a change”*. These policies however led to drastic changes in the urban design and resulted in resentment among many residents (Tsubohara, 2007, GG1, GS3).

“Back in the days, in the 1970s, we had the left-wing city council. They did not see the car as a natural phenomenon and decided to make a radical change without cars. It was all about this left-wing council that it succeeded. The council men had the power and courage to really make a change.” (GG1)

EVENT | Compact city

The first little steps towards a compact and car-free inner city were taken with the *Doelstellingennota Binnenstad Groningen* (1972) and *Bestemmingsplan Binnenstad Groningen* (1976). The goal of these documents was to increase the livability, to install new amenities, and to limit car traffic (Doelstellingennota Binnenstad Groningen, 1972). The main purpose of the policies was not so much focused on the mobility itself but more on the livability in the city center as a whole (GG1, GU2, GS3). Eventually, the policies in the seventies led to the Traffic Circulation Plan.

ORGANIZATION | Cycling association (Fietsersbond) (1975)

In 1975 a national cycling organization was set up to represent the interests of cyclists and to affect policies in favor of cyclists (GC1). In 2000 the organization changed its name to the current name: Fietsersbond (cyclers association). The Fietsersbond collaborates with the cities and provinces and takes part in workshops. The organization has an important value for both cyclists and governments and has a strong influence on the sustainable mobility pursuit in Groningen (GS3). Despite their importance they have to deal with decreasing member amounts and do not succeed to attract enough youthful members (GC1).

EVENT | Traffic Circulation Plan (1977)

In 1977 the Traffic Circulation Plan (*Verkeerscirculatieplan*, VCP) was implemented by the city of Groningen's political executive office, consisting of only left wing parties (Tsubohara, 2007). It is seen as the first big step of the cities' step towards sustainable mobility (GG1, GG2, GU1, GU2, GS3, GC5) although

the main purpose was not even environmentally-related but more about increasing the livability of the inner city stated in the following objectives (Tsubohara, 2007; “Verkeerscirculatieplan Groningen,” 1994):

- The inner city must be made car-limited, but still remain accessible for the car
- In the inner city, more space must be offered to the pedestrian, public transport and the cyclist
- No large interventions could be made in the built environment of the inner city

The VCP included a wide variety of actions such as creating free bus lanes and placing road signs. However, the most important action was dividing the inner city into four quadrants between which it became impossible to travel by car (see figure 4.2). Cyclists and public transit users, however, were able to cross these quadrants. Despite many complaints from business owners and residents, the plan was supported by a majority of the residents according to the ruling left wing parties that voted in favor of the plan. As mentioned, the VCP turned out to become a big success and is by many pointed out as the main innovation leading to the success of Groningen.

FIGURE 4.2 – INNER CITY OF GRONINGEN AND VCP (TSUBOHARA, 2010)



EVENT | Park-and-ride facilities (1970s)

Park-and-ride (P+R) facilities are often mentioned as having a profound impact on the sustainable mobility pursuit in Groningen (GG1, GG5, GS3, GU3). These facilities just outside the city center enable visitors to park their car cheaply and to continue their trip to the center using public transit. This results in fewer traffic movements in the city and decreases the amount of necessary parking spaces.

EVENT | The nineties

In 1989 an integrated plan was presented to redesign the center of Groningen, called *Binnenstad Beter*. This plan is also seen as an important step towards innovation in sustainable mobility (GG1). In contrast to the VCP this plan was much more designed in collaboration with local businesses and was therefore implemented quite easily: “However, in the nineties the local business men and politics really worked together and succeeded to produce a joint strategy” (GS3). The main purpose of *Binnenstad Beter* was to improve consistency in the center and therefore it focused on strengthening characterized and expressional places and cherishing hidden places (*Binnenstad Beter en Ruimte voor Ruimte*, 1989). Another important part of the plan were new parking garages on walking distance from the city center. In 1996, the plan *Stad van Straks* was presented. This plan stressed the importance of Groningen being part of a bigger network in which cohesion using a well-designed traffic network was the key (*Stad van Straks*, 1996).

ORGANIZATION | Groningen-Assen Region (1996)

The Regio Groningen-Assen (Groningen-Assen Region) is a coalition from the governments of the cities Groningen and Assen and the surrounding areas. Its purpose is to develop long-term policies that transcend the current governmental borders. These policies specifically focus on four topics: housing, business and economy, accessibility, and nature. The coalition helps to establish different plans by providing assistance, knowledge, or funds (Regio Groningen-Assen, 2015).

ORGANIZATION | OV-bureau Groningen Drenthe (2004)

Since 2004 the OV-bureau Groningen Drenthe is the regional transit authority in and around Groningen. This authority is a coalition of the provinces Groningen and Drenthe and the city of Groningen and develops, organizes, and manages bus transit in the area. An important advantage of this coalition is the integration of both municipal and regional transit that is centrally managed (OV-bureau, 2015).

ORGANIZATION | Akkoord van Groningen (2005)

The *Akkoord van Groningen* (agreement of Groningen) is a strategic coalition of the University of Groningen, the Hanze University of Applied Sciences, the University Medical Center Groningen, and the city of Groningen. This coalition has the goal to create a common vision between all different parties involved to develop the cities’ position as knowledge and innovative city in the northern part of the Netherlands (*Akkoord van Groningen*, 2015). This agreement between these parties is seen an important incentive for collaboration between them (GG1, GG2, GG7).

EVENT | Tram (2012)

In 2012 the city council of Groningen took a notable decision. They cancelled the plan from the city, province, and Groningen-Assen Region for a regional tram. Two lines were planned, the first running from the main train station to the Zernike campus and the second from the main station to Kardinge, a center with multiple facilities. After years of preparations the plan eventually did not survive due to disagreement between the city council parties about the funding of the project (Regiotram, 2015). This decision is seen as an important determinant for the cities' sustainable mobility pursuit (GG1, GG3, GG5, GS1, GS3, GS4, GU2, GU3) and is by several experts seen as a big loss (GG1, GG5, GS3).

ORGANIZATION | Groningen Bereikbaar (2012)

Until about 2020 large infrastructural projects take place in the city of Groningen. Although these projects are essential for the accessibility and economy for the city in the long term, they can during the construction however lead to negative consequences. To limit these consequences as much as possible, the planning coalition Groningen Bereikbaar (*Groningen Accessible*) has been erected. Groningen Bereikbaar maps and tunes different operations, affects the travel behavior of commuters, and coordinates all communication around these operations. The coalition is formed by different governments, public and private companies, and local business people.

EVENT | Let's Gro (2013/2014)

In 2013 and 2014 Let's Gro was held. This inspiration festivals enables organizations, individuals, and visitors to experience all kind of presentations, discussions, tours, and workshops on many different topics. Most of the activities are dynamic and interactive to create an atmosphere that inspires and leads to new ideas. These ideas contributed to new ideas that helped the city in its sustainable mobility pursuit (GC1, GG2, GG5). In 2013 Mikael Colville Andersen, an urban mobility expert, give a presentation about Groningen cycling city. Experts refer to this presentation as being a wake-up call for Groningen cycling city (GG3, GG7).

ORGANIZATION | Urban Gro Lab (2013)

The Urban Gro Lab in Groningen is an initiative from the city of Groningen and the department of urban planning of the University of Groningen. The city of Groningen is the lab to which all sorts of academic relevant research is applied. Doing this, the lab wants to be a source for knowledge and inspiration for the future livable city in which science and practical implementations are strongly intertwined. The Urban Gro Lab is seen as a successful coalition that acts between science and practical implementation (GC6, GC7, GG6, GU3).

ORGANIZATION | SAC Groningen (2013)

Commissioned by Groningen Bereikbaar, four students in urban planning came together in 2013 to do a research on students' commuting behavior between their homes and the university. In this research the

knowledge of the Faculty of Spatial Sciences of the University of Groningen was actively used as well. After the success of the first project a student consultancy firm was erected in 2015: the Student Advisory Council (SAC). This council mediates between different parties, collects and passes on knowledge, and advises on mobility and urban planning issues in and around the city of Groningen. Currently, the team of the SAC has grown to twelve people and consists of students, practitioners, and academics. In the Groningen region, the SAC is seen as a successful coalition between education, science, and practice (GG1, GG5, GG6, GG7, GS2, GS3, GS4, GU1, GU2, GU3).

EVENT | Network analysis (2013)

In 2013 Groningen has presented its network analysis as part of the greater metropolitan area Groningen- Assen. This analysis elaborates on the accessibility analysis from 2006. The document draws three main conclusions to preserve the cities accessibility. First, more focus should be on traffic management and mobility management. Second, high quality public transit has to be improved and kept accessible. And third, investments in park-and-ride facilities and cycling infrastructure has to be continued (Grontmij, 2013).

ACTOR | Pro cycling city council (2014)

In 2014 a new city council was installed in Groningen. The new council members continued the focus on cycling and public transit (GG6). Some even compare the current council to the proactive council that implemented the VCP (GG7). The willingness of the current local government, together with the focus on other modalities than the car is according to many experts an important reason for the cities' successful sustainable mobility pursuit (GC6, GC7, GG4, GG5, GG7, GS1, GS3, GS4, GU2, GU3).

EVENT | Q-link bus network (2014)

Since 2014 a new bus system was introduced in the city of Groningen and its surrounding areas. Five lines serve the hot spots in the city using a high-qualitative network with comfortable busses that frequently run (Q-link, 2015). The Q-link system was mainly introduced to replace the canceled tram system (Grontmij, 2013).

EVENT | Smart Cycling Routes (2014)

In 2014 the city of Groningen came up with an innovative plan. Every day, about 14,000 students travel to the Zernike campus by bike (SAC Groningen, 2014). Since this group is so large it jams the exits of the provincial ring road leading to congestion and dangerous situations. Therefore students were pursued to choose for another bike route almost completely free from intersections with other modalities. These routes are called the smart routes and are seen as a big success since one smart route has become the busiest bike lane in the city (GG3, Slimme Route, 2015)

ORGANIZATION | Green Office Groningen (2014)

In 2014, students of the University of Groningen found a need of having to express their sustainable ideas in projects (GC2). The most effective means was creating a coalition that combines all sustainability ideas from the university. The result was the erection of the Green Office Groningen as part of the University of Groningen. The Green Office works on several projects, such as an e-bike project, organizing lectures, and coordinating a sustainability course.

EVENT | Bicycle strategy (2015)

In 2015, the city of Groningen presented an ambitious new cycling strategy called 'We are Groningen cycling city'. The document bundles five strategies: bicycles come first, a coherent bicycle network, space for bicycles, tailored bicycle parking, and the story of Groningen – cycling city (City of Groningen, 2015b). Besides, the document is also a marketing tool to tell the story of Groningen cycling city. The strategy is an important means to renew the enthusiasm as bike capital and imagines the cities' sustainable mobility pursuit (GC1, GG3, GG5, GG6, GG7, GS4, GU3).

DOCUMENT | Downtown city vision (2015)

In 2015 the city of Groningen presented a new vision for its center (*Binnenstadvisie Bestemming Binnenstad*) to prepare this area for the future. The document is centered around four main topics, the ambition, economy, housing and living, and open spaces and accessibility (City of Groningen, 2015a). This vision also discusses some interesting mobility-related topics. For example the busses will no longer ride over the Grote Markt in the center and the pedestrian and cycling zones in the center will be expanded. The removal of the busses from down town is seen as an interesting decision in terms of mobility (GG7, GU1). Besides, the cycling routes will change in a way that people who do not need to be in the city center will be seduced to choose for a new route along the center.

EVENT | Aanpak Ring Zuid (2016)

Between 2016 and 2020, the southern ring road through Groningen will be completely rebuild. This large infrastructural project has the goal to improve the accessibility of Groningen and to improve the traffic flow along the city. The road capacity will be enlarged, the traffic lights removed, and fly-overs installed. According to the current plans, the project has to be finished around 2020 (Aanpak Ring Zuid, 2015). The plan is seen as an important innovation in the sustainable mobility pursuit of Groningen.

EVENT | Main train station (2016)

At the same time the ring road will be rebuild also the main train station in Groningen will be completely renewed to deal with increasing traveler numbers. Besides working on the tracks, also a pedestrian, cycling, and bus tunnel will be installed under the station. In addition, the front and rear entrance will be complete redesigned and a station hall between the tracks will be build (City of Groningen, 2015a). According to the current plans the project has to be finished in 2020 (Sporzone, 2015).

4.3 Process of innovations in factors

Prior to this part we have defined key innovations in the sustainable mobility pursuit of Groningen based on the document analysis, interviews, and observations. The part continues on these innovations and examines conditions and barriers that affect the process of innovations in sustainable mobility. As explained in paragraph 3.5, four categories are distinguished: collaboration & coalitions, actors & organizations, cultural institutions, and social institutions.

Governance: collaboration & coalitions

COALITIONS • RESPONSIBILITY • DIALOGUE • KNOWLEDGE EXCHANGE • NETWORKING • TRUST • SIZE

Since the dynamics in planning governance are changing due to a more collaborative and institutional approach, the power of governmental bodies gets limited. As a result, more and more initiatives seem to come from individuals and companies that find each other in **COALITIONS**. These partnerships are seen as an important condition for innovation (GC3, GG6, GG7, GS2, GU3). Innovative ideas are more often found on the side of companies and academics and are no longer only the **RESPONSIBILITY** of the government (GU3). Collaborating also leads to successes, such as the vision for the Groningen city center in the nineties that was designed in a strong **DIALOGUE** with local business and became a success (GG1).

Moreover, it is found important to know what other teams in urban planning think is important. It is essential to know the agendas, visions, and ideas of collaborating parties and therefore it is important to stress **KNOWLEDGE EXCHANGE** and **NETWORKING** between actor groups (GC4, GG1, GS2, GS4, GU3). When things do not work out well it is important to know and **TRUST** each other to solve problems more easily (GG1, GG6). An advantage for the Groningen region is its small **SIZE** resulting in a robust and strong network in which ideas travel fast and partnerships are fostered (GC3, GC5).

Governance: actors & organizations

LEADERSHIP • POWER • EXPERTISE • COURAGE • VISIONARY • GOVERNMENTS • MAJOR ORGANIZATIONS

Specific actors and organizations are more than once seen as the main engine of innovations. Strong **LEADERSHIP** and **POWER** among policy makers are defined as the key determinants in a successful sustainable mobility pursuit (GC6, GC7, GG4, GG6, GS2, GS3, GU1, GU2, GU3). Besides, policy makers themselves have to have **EXPERTISE** and **COURAGE** (GG1, GG3, GG4, GG6, GS4, GU1) and to be **VISIONARY**.

“You need visionary in politics to guide the public opinion. To change is hard for people, especially in the city. So it is up to politics to activate the crowd and therefore you need a lot of courage. Democracy may be nice, but it has its limitations as well.” (GS2)

The best example of strong leadership in Groningen goes back to the Traffic Circulation Plan when the city council had the power and courage the car not to consider as a phenomenon but to address it the hard way (GG1). Moreover, the **LOCAL GOVERNMENT** is considered still being the determining factor or whether

plans will come through (GU3). Besides local governments also **HIGHER GOVERNMENTS** play a crucial role in local innovations (GG6).

Besides leadership of one key actor or governments also other organizations are mentioned to have an impact on sustainable mobility. Major **ORGANIZATIONS** such as ProRail and Rijkswaterstaat in the Netherlands (GC3, GS1) or transit authorities may contribute to innovations (GU3).

Cultural institutions

**CONDUCTIVE PLANNING CULTURE • TRIAL AND ERROR • OUT OF THE BOX IDEAS • FLEXIBLE •
INTRINSICALLY DRIVEN • FILL THE VOID • CLEARNESS • ORGANIC EVOLUTION • URGENCY • EXPERIENCE**

The cultural institutions of a place is seen as decisive for innovations in sustainable mobility. The way ‘planning is done’ and the local planning culture strongly affect policies, successes, and ideas. The planning culture in Groningen is defined as **CONDUCTIVE** for new ideas (GU1) and more importantly: **TRIAL AND ERROR** is accepted (GC6, GC7, GG5, GG7, GU1). Although the city government still faces issues with innovative ideas they starting to accept and appreciate **OUT OF THE BOX IDEAS** (GG7).

Except being conducive and open to new ideas a planning culture also has to be **FLEXIBLE** (GC4, GU1). Most bottom-up organizations are for example very **FLEXIBLE**, **INTRINSICALLY DRIVEN**, and **FILL THE VOID** (GU1). The local government, however, is not familiar to handle these initiatives yet since it does not have the knowledge if interventions would have either a conducive of restrictive outcome.

To better deal with new ideas and flexible organization forms it is considered as necessary to adopt policies equally and in a **CLEAR** manner (GG6, GU1, GS4). Moreover, **ORGANIC EVOLUTION** in policies towards a more conducive context is considered to be better than abrupt change (GS1, GS2, GU1). Young talents can play an important role in this organic evolution within organizations. It however is important to not obstruct them in their creativity and to accept the knowledge of more **EXPERIENCED** workers (GS2).

Another important locally driven factor for innovations in sustainable mobility is **URGENCY** (GC3, GC4, GG6, GG7, GU1). The economic crisis for example has led to reorganizations within the government that have contributed to more forceful policy making (GG3). Moreover, Groningen has to be aware not to collapse due to its own bike success in terms of capacity on bike paths and overcrowded parking facilities. This has led to a sense of urgency and accelerated bike-related policies (GG6, GG7, GS3).

Social institutions

**ENTHUSIASM • PASSION • WILLINGNESS AMONG CITIZENS • STRONG FOLLOWERS • STORYTELLING •
CRITICAL MASS • SHARING BEST PRACTICES • THOUGHTFUL EXECUTION**

A very important role in the process of innovations is played by social values such as enthusiasm, willingness, and telling the story. **ENTHUSIASM** and **PASSION** among the key actors is essential to activate others and succeed (GG4, GG7, GS2, GU3). *“It can be frustrating that we [policy makers] always try our hardest best but that you still need a president or council member to successfully promote your story” (GG7).*

Another essential factor is **WILLINGNESS AMONG CITIZENS** (GC4, GC6, GC7, GG3, GG6, GU1, GU2, GU3, GS4). After the first steps are set by a visionary leader it is vital to have **STRONG FOLLOWERS** as well (GU1). Plans have to come to life and others have to be persuaded by **TELLING THE STORY** (GC6, GC7). Groningen for example is defined as a bike capital because it has 200,000 bike ambassadors. Such a thing is hard to create but forms an essential part of the success. A **CRITICAL MASS** is therefore seen as an indispensable characteristic of success (GG3, GU2). Moreover, this mass helps to shape innovations by providing feedback and more and more people start to actively enjoy their worth.

Another social character that is found important for successful innovations is storytelling and **SHARING BEST PRACTICES** (GC4, GG1, GG2, GG3, GS2, GU1, GU3). Since the Internet becomes more important in our daily lives it also become easier to share stories and search for information in for example online databases (GG2). Copying these **BEST PRACTICE EXAMPLES** from other cases is valuable for new policies (GS2), moreover prove of successes elsewhere may benefit intern policies as well. Another aspect of storytelling is the marketing of own innovations. It is important to show what you are doing and why you do this. Investments to do a project once but **THOUGHTFULLY EXECUTED** may lead to more success than multiple small projects that may be overlooked (GC6, GC7, GU1).

Barriers

LACK OF FUNDING • LACK OF LONG TERM STRATEGIES • RESTRICTING LEGISLATURE • LACK OF URGENCY

During the interviews also specific barriers were emphasized. Especially **LACK OF FUNDING** was identified as main barrier of innovations (GG4, GG6, GS4, GU3). Besides, the **LACK OF LONG TERM POLICIES** (GC6, GC7, GS4, GU3), **RESTRICTING LEGISLATURE** from higher governments (GC3, GC5), and the **LACK OF URGENCY** (GG7, GU3) were seen as barriers. An example for the latest can be found in bicycle related policies. Since Groningen has always been on the forefront of innovations in biking a feeling had arisen that all goals had been achieved. Therefore it is important to realize that you always have to keep innovating to stay at forefront, for example by visiting international meetings and looking at other best practices (GU3). One specific mentioned possible barrier is the danger that the success of bike policies in Groningen will change into barriers such as overcrowded bike paths and bike parking facilities (GG6, GG7, GS3)

4.4 Process of collaboration

REASON OR URGENCY • FILL A VOID • STRONGER MESSAGE • ENTHUSIASM • OPENNESS • TRIAL AND ERROR

Collaboration between different actor groups and coalitions have in paragraph 4.3 been identified as an important condition for innovations in sustainability. Especially knowledge exchange and networking were seen as factors stimulating innovations in sustainable mobility. This part examines the specific incentives and conditions to come to collaboration between actor groups as well as the origin of coalitions. According to the interviews, several ingredients or barriers are essential to come to collaboration or coalitions. First, there has to be an **REASON** and **URGENCY** (GC3, GC4, GG5, GG6, GS2, GS4, GU1). This urgency

can be found in many different aspects. Companies and individuals have for example specific knowledge that is useful for policy makers (GC3, GG5, GG6, GS4, GU3). Or academics and students have methods to **FILL A VOID** a practical problems (GG2, GG5, GS3, GU3). Besides, coalitions of multiple parties are able to communicate a **STRONGER** unified **MESSAGE** (GG1, GS2).

Successfully implementing a coalition in which for example students are involved requires **ENTHUSIASTIC** students that are willing to invest a lot of their own time (GG6, GU3). Besides you need **OPENNESS** between the different actors (GC3), and **PERSEVERANCE** among all coalition parties (GG6). Moreover, the size and culture of Groningen is identified as being conducive for such innovations since people are able to find each other and **TRIAL AND ERROR** are accepted in the culture (GC4, GG6, GG7).

Collaboration and coalitions are also affected by changing institutions and trends. Some specific changes and trends are identified to create a more conducive context for these innovations. First, many experts experience specific trends in governance. An increase in bottom-up initiatives (GG1) and shift of responsibilities to companies (GC5). Besides, people realize that it is also possible to succeed without involvement of the government (GG5). This results in a local government that uses external expertise and tries to boost processes that include several actor groups (GG1).

4.5 Dreams in Groningen

All interviewees were asked to forget about any restrictions in terms of money and power and to elaborate on their personal dreams in terms of sustainability, urban planning, and mobility. In contrast to earlier parts, these dreams are not restricted to only institutional innovations. Box 4.1 and 4.2 show the results for Groningen. The numbers indicate how many times each dream was mentioned.

BOX 4.1 – PHYSICAL DREAMS IN GRONINGEN



BOX 4.2 – SOCIAL DREAMS IN GRONINGEN





Q-LINK BUS SYSTEM ON THE ZERNIKE CAMPUS



DYNAMIC ROUTE INFO AT BUS STOP



SIGNAGE OF THE SMART ROUTE



GRONINGEN SEEN FROM THE DUO BUILDING



DEDICATED BIKE INFRASTRUCTURE IN GRONINGEN



BOTTOM: MIXED USE AND SHARED SPACE IN GRONINGEN CENTER



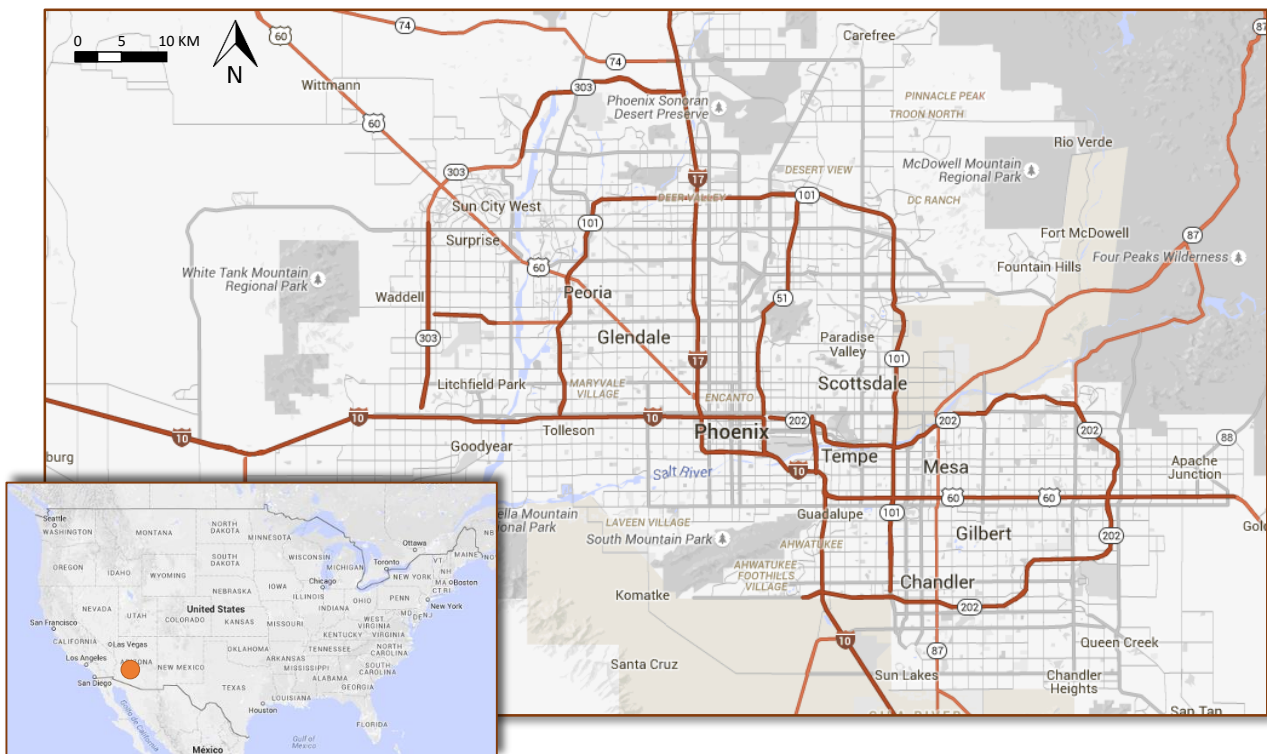
BOTTOM: GRONINGEN CENTRAL STATION



5 CASE: PHOENIX

The part presents the results in the Phoenix metropolitan area. First a short introduction is given on the history and urban design. Thereafter sustainable mobility and willingness of the local governments is discussed for the case. In the next part an overview is presented of key innovations (documents, actors, organizations, and events) based on the document research, interviews, and observations. After this overview the process of innovations including its conditions and barriers is discussed. The parts thereafter focuses the role of collaboration and coalitions, while in the last part all dreams of the interviewees are presented.

FIGURE 5.1 – TOPOGRAPHIC MAP OF PHOENIX AND SURROUNDING CITIES



5.1 Introduction

The Phoenix metropolitan area is located in the State of Arizona (see Figure 5.1). Phoenix as main city is the sixth city of the United States with a little over 1,5 million inhabitants (U.S. Department of Commerce, 2012). The full metropolitan area is home to almost 4 million people and is often referred to as *Valley of the Sun*. As mentioned before, the Phoenix area is one of the fast growing and most sprawled regions of the country. The reason for this outstretched design goes back to people’s motivation to move to the area. Although the history of Phoenix goes all the way back to 1300 B.C. and was home to cowboys in the Wild West later, it only became a real city after the industrial revolution in the late nineteenth century. People started to escape from the congested cities in the Northeast and desired to live in decentralized

and suburban communities (Ross, 2011). In a quest for space, cheap land, and sun a lot of them ended up in Phoenix.

In the first years Phoenix stayed a relatively compact city in which walking and the streetcar were the main ways to travel (Luckingham, 1989). As in many other American cities, this changed with the introduction of the automobile. Now it became possible to live in the suburbs while being in reach of the facilities in the city. Living on cheap land with a lot of space surrounding your home, the presence of the car, and the warm climate led to an enormous increase of the population in the 20th century. Especially after World War II a significant growth was measured: from 106,000 in 1950 (99th in the US) to 789,000 in 1980 (9th) to over 1,5 million in 2013 (6th) (US Census, 2015).

Nowadays, the *Valley of the Sun* consists of 27 cities in which besides Phoenix Chandler, Gilbert, Glendale, Mesa, Tempe, and Scottsdale are the most important and largest ones. Since these cities are all strongly intertwined it is sometimes hard to distinguish the legislative borders within the area. A total of four legislative bodies affect policies in the area: the federal government (the United States of America), state (Arizona), county (Maricopa County), and the different mentioned cities.

Figure 5.1 shows the codes for interviewees in Phoenix once again in random order.

TABLE 5.1 – INTERVIEWEES IN PHOENIX

University (PU1-10)	Government (PG1-9)	Coalition (PC1-3)	Specialist (PS1-4)
Ass. Professor ASU	Planner ASU	T.B.A.G.	Amec Foster Wheeler
Ass. Professor ASU	Planner ASU	T.B.A.G.	Amec Foster Wheeler
Educator ASU	Planner MAG	T.B.A.G.	Lee Engineering
PhD-student ASU	Planner MAG		MooreSwick
Planning student ASU	Planner City of Phoenix		
Planning student ASU	Planner City of Scottsdale		
Professor ASU	Planner City of Tempe		
Professor ASU	Tempe Council		
Professor ASU	Tempe Council		
Professor ASU			

Specific conditions for pursuing sustainable mobility in Phoenix

The reasons for pursuing sustainable mobility have extensively been discussed in earlier parts. The prevailing incentives for the specific case of Phoenix, however, are less clear. Numerous reasons are mentioned in interviews that can be divided into two main categories. First, specific reasons can be led back to the location of Phoenix in the middle of an unproductive desert area (PU4, PU5) and the problems that come with this geography such as water depletion (PG2, PG3, PG4, PU2, PU4). Second, car-related issues are also mentioned such as such as gas dependency (PG2, PG3, PS2) and the price of extra infrastructure (PG1, PU5, PU7). Third, an urgency due to physical constraints such as being landlocked (as is the city of Tempe) is also found an important reason to pursue sustainable mobility (PC2, PC3, PG5, PG7, PU8). Caring about the environment and future generations, the pure sustainability concept, is however much less heard (PU3, PU6).

Willingness of the local government

To identify how current institutions are defined, all interviewees were asked how they look at the willingness of the local governments (on city, county, and state level). Striking enough most interviewees agrees with each other. The State of Arizona is known as a typical 'freedom-loving' conservative red state meaning the majority votes Republican in the federal elections (PG2, PG3, PG4, PG5, PG7, PU1, PU2, PU3, PU4, PU7, PU10). The city of Tempe, however, is home to the largest university of the country and has many young, liberal, open-minded, and internationally aware students. Tempe also is landlocked which means it has to come up with creative and progressive solutions to deal with mobility issues. However, due to these extreme cultural differences between the state and different cities, extreme differences in willingness can be found between the levels of government (PG5, PG7, PG9, PS2, PU1, PU2, PU4, PU5, PU7, PU9). The city of Tempe is by far seen as the most liberal and willing city in the area (PG7, PS2, PU9). According to the experts this is due to some specific very willing council members (PG9, PU4, PU5) or the complete city council (PC2, PG2, PG3, PG7, PG8, PG9, PU6, PU7, PU9). Phoenix, however, is appointed as being liberal as well (PG4, PS2, PU1, PU2, PU4, PU9) despite being inhibited by a conservative county (PG5) and very conservative state (PG5, PG7, PU1, PU2, PU7, PU8, PU9).

City design

The way in which Phoenix physically is designed is probably the most striking difference with Groningen. The city is located the middle of the Arizona desert, surrounded by just sand, cacti, and mountains. These surroundings and the lack of any physical barriers have made Phoenix the sparsest populated large city within the United States. Both from north to south and from east to west the metropolitan area stretches for almost one hundred kilometers. Several reasons will be mentioned to explain the outstretched design, ranging from an abundance of cheap land, freedom and individualism, and the non-presence of an UGB.

The exceptional city design has serious consequences. First, distances are large and therefore people rely on the car. Besides, distances are mostly too far to cycle and the busses can by far not serve all city parts. Second, as a result of the car-reliability the city is also designed for cars. Wide roads, that use a lot of space, can be found everywhere, even in the small neighborhoods. As a consequence, all roads absorb a lot of heat which is radiated during the nights and leads to the urban heat island effect. Based on observations in early spring, the night temperature on streets differs more than ten degrees from the temperature in parks.

5.2 Process of innovations in time

Many documents, events, actors, and organizations have shaped innovations in sustainable mobility in Phoenix. This part gives an overview of important key innovations based on the document analysis, interviews, and observations. Not all innovations are connected to a specific year. Therefore they can be found after the historiography in alphabetical order.

EVENT | Streetcar network (1887-1948)

The first worthwhile innovation in mobility was the streetcar network that served Phoenix in the first half of the 20th century. A total of four lines ran until 1948 when a big fire destroyed most of the fleet and the network got replaced by cars (Holle, n.d.).

EVENT | Light rail (2008)

The biggest innovation in sustainable mobility is the light rail connecting downtown Phoenix with Tempe and Mesa (PG2, PG3, PG4, PG5, PS1, PS2, PS3, PS4, PU2, PU3, PU4, PU5, PU6, PU7). It is seen as a very successful program because it easily surpassed all traveler amount expectations. Besides, development along the light rail has increased in price and is seen as prime location. Despite the success, experts also expect that the network has to be extended to remain its success (PS1, PS2, PU2, PU3, PU6). An important advantage of the light rail is that it does not have the stigma of busses and thus attains a larger audience.

DOCUMENT | 94th Arizona Town Hall (2009)

The 94th Arizona Town Hall document *From Here to There: Transportation Opportunities for Arizona* was written to develop consensus recommendations addressing the transportation needs of Arizona. The document contains the conclusion of four days of discussions between all participants of the Town Hall. It stresses the importance of congestion, safety, and adequacy of street and highway systems, and bus, light rail, bicycle, and pedestrian modes of transportation (Dusenberry, 2009).

ORGANIZATION | Sustainable Communities Collaborative (2011)

The Sustainable Communities Collaborative (SCC) is a coalition of advocacy groups, governmental organizations, businesses, and transport authorities that work together on five different policy topics: housing, public health, community development, financial tools, and transportation (SCC, 2015). The collaborative is seen as a successful innovation working on sustainable mobility (PG5, PS3, PS4, PU2, PU5).

ORGANIZATION | Phoenix Spokes People (2012)

Phoenix Spokes People is a bike advocacy group on city level that is dedicated to make Phoenix a friendlier and more welcoming place to ride a bike (Phoenix Spokes People, 2015). One of their main goals is to get more bicycle infrastructure in the city. To reach their goal they also contribute with the Maricopa Association of Governments (MAG) (PG1).

DOCUMENT | Phoenix Bicycle Master Plan (2014)

In 2014 the City of Phoenix presented its Bicycle Master Plan. It stresses five essential elements, the five E's: engineering, education, encouragement, enforcement, and evaluation and planning. The purpose of the document is to let Phoenix become a Platinum-level Bicycle Friendly Community within 20 years. It has to be safe and ease to bike anywhere whereas well-connected infrastructure will link people and places to make bicycling a preferred option for daily transportation, recreation, and healthy lifestyles (City of Phoenix, 2014).

EVENT | Bike share program (2014)

Since 2014 Phoenix has a bike share system called Grid Bike Share. Five hundred public bikes are all day long accessible from fifty location throughout the city. Moreover, the service will soon be expanded to Mesa and Tempe, the other cities that are also served by the light rail system. An advantage of this system over regular bike share systems is the bikes themselves contain a payment and locking system (PG1).

DOCUMENT | Tempe Transportation Master Plan (2015)

In 2015, Tempe published a Transportation Master Plan. The goal of this document to provide a multi-modal transportation guide for Tempe that includes both short term and long term recommendations. The report emphasizes transportation linkages, connection between activity centers, priority corridors, multi-modal connections, neighborhood vitality, optimization of existing network, and transportation recommendations (City of Tempe, 2015).

EVENT | Bicycle valets

Bike valets follow the concept of car valets at hotels: you give away your bike and receive a receipt instead. This service increases the accessibility of places since you do not need a bike lock (a barrier to cycling in Phoenix) and your bike will not be stolen (a serious problem in Phoenix). The bike valets at ASU are a success and increased ridership among students (PU7). Besides, for many Americans not being able to securely store your bike is a serious threshold to visit for example a beer festival or a concert where alcohol is involved (PC2).

ORGANIZATION | Bicycle and Pedestrian Committees

Several bicycle, pedestrian, and transport committees are involved in both MAG and cities in the Phoenix area to review and update plans and policies (PC2, PG1, PG2, PG3, PG8, PS1, PU6). These committees have an important task to represent the interests of these commuting groups and but also do bring up their own ideas. The MAG-committee specifically encourages the implementation of pedestrian and bicycle-related projects (MAG, 2015).

ORGANIZATION | Bicycle Coalition ASU

The Tempe Bicycle Action Group (T.B.A.G.) advocates for cycling in Tempe. The situation on the ASU campus in Tempe is however completely different. Therefore, the Bicycle Coalition ASU was started to have political advocacy and involve professors in the process (PU7). The coalition gave the members more recognition in the area and accelerated several bike related projects. Besides, bicycle meetings are organized, cooperation with council members and professional members is sought, and students are seduced to get involved in cycling by using different marketing products (PC2, PG2, PG3, PU7).

ORGANIZATION | Bicycle Program ASU

To deal with all transportation issues on one of the busiest campus in the United States, ASU has its own bicycle manager and commuter service directors. Their main goal is to make transportation to and around

the campuses save and sustainable. The bicycle program is responsible for the installation of walk-only zones, providing bike lessons to teach traffic rules, and collaborating with student groups (PG2, PG3).

EVENT | Bike boulevard Scottsdale

Good examples of innovative sustainable mobility solutions are the Scottsdale bike boulevards. For example, The Indian Bend Wash Greenbelt connects downtown Scottsdale with Tempe Town Lake. This trail is completely free from other modes of traffic and runs through parks and along lakes. Moreover, the greenbelt can also be used as floodable area during the monsoon season. A second trail runs from downtown Scottsdale to Downtown Tempe along the canal system. The wide network of dedicated bike infrastructure through parks is also much cooler than the regular infrastructure: a big advantage during the hot summer months.

EVENT | Bike class

To increase and safer bike ridership among students a bike class is organized (PU9). Via a newsletter bike lessons are promoted to let students become a better cyclist and let them feel safer in traffic. Students do not receive official credits for this class, however the education is still really appreciated. The lessons are given by staff and students and focus on behavior in traffic, hazard avoidance skills, and handling skills.

EVENT | Bus network and Bus Rapid Transit

Although Phoenix is already served by a large bus system, the network will be updated and expanded in the near future (PG4). It is going to serve all main arterial streets, sixty percent of the routes will get a fifteen minutes service, and buses are going to run more hours a day. Besides the regular bus network, a Bus Rapid Transit (BRT) system will also be introduced on some main arterial roads. BRT has limited stops, serves more frequently, and have a higher capacity. It will be connected to the light rail system to attract more commuters and is seen as a large innovation in sustainable mobility (PG4, PU2, PU4, PU6).

EVENT | Canals

The Phoenix has an extensive network of canals to provide water. Since most streets do not have bike lanes and are designed for particular car flows that cannot easily be limited, canals are seen as opportunity to install bike infrastructure along (PG6, PG7, PS1, PU2). An advantage of canals is that they are mostly separated from other infrastructure and run in straight lines for large distances. This makes it quite easy to install a connecting bike network along the canals throughout the Phoenix metropolitan area. This invention, however, also leads to complaints from residents (PG6). Bike lanes make houses along the canal easily accessible which may lead to an increase in burglaries. Besides, some residents would like to preserve the 'natural' concrete design of the canals without adding extra infrastructure or dislike the sound that comes with skate or bike tires on the concrete.

EVENT | Capstone project

To finish their Master's program urban planning students at ASU can choose to fulfill either an individual research project, a thesis, or a capstone project. These capstone projects concentrate on a practical problem and mostly result in a consultancy report. More important, students have to put their theoretical knowledge into practice and therefore the capstone projects are a good way to get prepared for working as an urban planning professional (PG2, PG3, PU2, PU5, PU6, PU7).

ACTOR | City council

According to several experts the city councils fulfill an important role in the pursuit of innovations in sustainable mobility. It is found important that council members have a long term foresight to push particular project. A council can make a difference to for example long term investments in sustainability by clarifying the long term benefits to the public (PU6). A clear example of this long term vision can be found in a Tempe councilwoman who really championed the light rail and made it a success (PU4).

ORGANIZATION | Coalition of Arizona Bicyclists

On the state level, Arizona knows one advocacy group for sustainable mobility: the Coalition of Arizona Bicyclists. They participate in all activities of MAG (PG1) and promote efforts that improve cycling and safety by addressing law enforcement and transportation engineering issues through education, outreach, and advocacy programs (Coalition of Arizona Bicyclists, 2015).

EVENT | Fat Tire Festival

To increase awareness and participation in cycling the New Belgium Brewing's Company organizes Tour de Fat. These festivals, that also take place in the Phoenix area, have a large impact on cycling in wide area (PC1, PU7). The program usually consists of a bike ride through the host city and thereafter combining beer, biking, and amusement in one festival.

ORGANIZATION | Maricopa Association of Governments

The Maricopa Association of Governments, or MAG, is the counties' governmental body in the Phoenix metropolitan area (PC2, PG1, PG4, PG5, PG6, PG7). It collaborates with all cities within Maricopa County as well as some cities and towns in the bordering Pinal County. The transportation authority works with about thirty different agencies from which Phoenix and Tempe are the biggest. Despite being a governmental body MAG is lacking power since it does not have any regulatory authority (PG1). The cities overrule most of MAG's ideas (PG5) resulting in MAG being an organization that is only left responsible for handing out funds and creating incentives for a dialogue between the different cities (PC1, PG1, PG5).

ORGANIZATION | Reinvent PHX

Reinvent PHX is a collaborative partnership between the City of Phoenix, the U.S. Department of Housing and Urban Development, ASU, and numerous other organizations committed to developing walkable,

opportunity-rich communities connected to light rail (Reinvent PHX, 2015). This partnership has contributed to several sustainable mobility oriented projects between Phoenix and ASU (PU2).

EVENT | Sales tax

The sales tax is the primary means to accomplish urban planning and transport projects (PG4, PG5, PG5, PS1, PS3, PS4, PU2). Every purchase in a store comes with a sales tax. This tax is used to cover all kinds of expenses such as health care, education, and infrastructure. An increase in sales tax means more funds and thus more possible investments. The sales tax that is collected for infrastructure, however, is still for fifty percent used for road expansion works while the other half goes to transit, cycling, and pedestrian infrastructure (PG4).

ACTOR | Sustainability director

At the city manager level, a new person is hired that is responsible for all other employees that have something to do with sustainability. The goal to integrate policies between different departments by using people that have the same mindset which is good for fertilization. The creation of the position is seen as an important innovation in sustainability (PG4, PG8).

ORGANIZATION | T.B.A.G.

The Tempe Bicycle Action Group (T.B.A.G.) is seen as a perfect example of a coalition advocating for sustainable mobility (PC1, PC2, PC3, PG1, PG5, PG8, PG9, PU1, PU3). It started more than ten years ago with a group of cyclists that were having a beer, making fun, and promoting cycling (PC1, PC2). The civic leaders in the community, however, liked to have an organization that was a little more serious and thus T.B.A.G.'s mission changed as well (PC3). They started hammering public meetings and creating a mass. The power of the coalition is that it filled a void with a lot of goodwill from the members and volunteers. T.B.A.G. is a very organic group of people and therefore able to flex with the time to keep it successful (PC3).

Besides advocating for cycling, T.B.A.G. also organizes all kinds of community events and a yearly bike count (PC1, PU7). For example, in the beginning people of T.B.A.G. always went to particular places in Tempe to have a beer on Thursday night and got their by bike. After a while they decided to keep the drinking part but add an official bike ride before this. They called it the Car Resistance Action Party ride, shortened to CRAP-ride (PC1, PC2). Besides, the members visit council meetings and really encourage the council to push (PG1, PG9). They also raise awareness by made bumper stickers and doing a series of billboards, television shows, and radio interviews (PC1). Due to these actions the membership doubled. Besides, the professional network of different experienced members helps the organization as well.

5.3 Process of innovations in factors

Prior to this part key documents, events, organizations, and actors were defined that have affected or affect innovations in sustainable mobility according to documents, interviews, and observations. This part

follows up on these findings and examines the factors that define the process. Four categories of factors are distinguished: collaboration & coalitions, actors & organizations, institutions, and finance (also see box 3.2). In contrast to the Groningen analysis there is no clear distinction made between cultural and social institutions. Besides, finance is found to be another important category in Phoenix.

Governance: collaboration & coalitions

GRASSROOTS IDEAS • COALITIONS

An important feature of innovations in sustainable mobility is found in **GRASSROOTS IDEAS** (PC2, PG4, PG7) and **COALITIONS** between different actor groups (PG8, PS2, PU1, PU2, PU5). The local agencies in the Phoenix area all seem very committed to sustainable mobility and have the tools to work on it as well (PG1). Initiatives are seen as more organic and stronger coming from the bottom-up, however also the combination of top-down and bottom-up planning is seen as being the most effective (PU1).

“To support sustainability goals you need coalitions meaning organizations that are comprised of leaders of other organizations representing different factors in a place that can rally around the cause, support it, and pressure on local officials” (PU2).

Collaboration is also important to realize innovations in sustainable mobility. The street design in Phoenix has for example always been a responsibility of civil engineers. They are used to designing streets to accommodate the automobile but have never learned about the importance of installing bike lanes. Therefore it is advocated that other types of actors, such as landscape designers or planners, need to become involved and slowly change the culture to implement street designs that are more attractive for cyclists or pedestrians (PS2).

“I think all organizations create mechanisms to preserve themselves. It’s almost biological. They recruit members of which they think can reproduce of what the organization thinks it is. They will create incentives, back accounts, events, institutional momentum that will be hard for the institution to end and people will respect the institution. (...) My point is that institutions create, like animals, you wanna reproduce, you prepare, you wanna smell good. Not for your own enjoyment, but so you can reproduce. Besides, people form habits, they begin to identify as cyclists. They don’t want bicycling to go away, they feel themselves activists, it becomes part of their identity. I think there are multiple scales of drives of sustainable practices, bicycling being one that causes kinda momentum.” (PU4)

Governance: actors & organizations

LEADERSHIP • TOP-DOWN POLICIES • DEDICATED COUNCIL • SUSTAINABILITY CHAMPION • EXPERIMENTING • ARIZONA STATE UNIVERSITY • PROGRESSIVE • INNOVATIVE • GLOBAL

Strong **LEADERSHIP** is seen as an indispensable condition for innovations (PG4, PG5, PG7, PU2, PU4, PS1). Thereafter, **STRONG TOP-DOWN POLICIES** (PG5), **DEDICATED COUNCIL PEOPLE** (PG2, PG3, PU6), and a **SUSTAINABILITY**

CHAMPION (PU4) may contribute to innovations in the city. **EXPERIMENTING** and refining the model is important to solve problems and find best practice examples (PU3).

ARIZONA STATE UNIVERSITY plays as largest university in the country an important role in stimulating innovations in sustainable mobility in the Phoenix area (PG2, PG3, PG5, PG7, PS3, PS4, PU9). The **PROGRESSIVE** attitude of the young population pushes for doing things better (PG7) and the university tends to attract a lot of people who are interested in **INNOVATIVE** thinking (PU9). Besides, students usually do not have cars, are higher educated, and have a more **GLOBAL** perspective (PG9). Moreover, the campus itself is a perfect example of mixed use and being bike friendly (PU9). The campuses in downtown Phoenix and Tempe are both located along the light rail network and attracts a lot of student commuters. As a result, the large number of commuting students is an important reason for the success of the light rail (PG5).

Institutions

PLANNING CULTURE • LONG-TERM VISION • VISIONARY GOVERNMENT • STUDIES • EVALUATIONS • REGIONAL PLANNING APPROACH • EDUCATION • COMMUNITY SUPPORT • AWARENESS • PROVE • BEST PRACTICE EXAMPLES • INVOLVEMENT • PUBLIC MEETINGS • CRITICAL MASS • STREET FILMS • BRAND

The local **PLANNING CULTURE** and the way in which things are organized are seen as a very important factors affecting innovations in sustainable mobility (PU2, PU3). To successfully pursue innovations in sustainable mobility it is essential for a city to have **STRATEGIC PLANS** and a **LONG-TERM VISION** (PG4, PG5, PG7, PS2, PU2, PU3, PU6, PG7). A **VISIONARY GOVERNMENT** (PU5), **STUDIES** and **EVALUATIONS** (PS1), and a **REGIONAL PLANNING APPROACH** (PG7) can contribute to this pursuit.

Several social features are identified as being beneficiary to innovations in sustainable mobility. Especially **EDUCATION** to raise awareness and teach about sustainability is seen as a meaningful method (PG2, PG3, PG4, PG7, PS2, PS3, PS4, PU6, PU7). As mentioned before, most people in the Phoenix area are not so much politically or environmentally aware. As a result, they are not very interested in innovations in sustainable mobility and therefore form a significant barrier in this process. Especially because **COMMUNITY SUPPORT** is identified as key factor for successful innovations (PC1, PG6, PG7, PG8, PS3, PS4). Experts underpin the importance of involving as many as possible stakeholders. People's concerns for example provide feedback which leads to stronger policies and puts the pressure on governments to keep going in the right direction.

After the increased gas price some years ago, Americans slowly started to realize how dependent they are on their cars. In line with this, several academics mention the need of a major disaster to finally raise **AWARENESS** in Phoenix (PU1, PU2, PU4, PU5). A critical incident such as a fuel shortage, flood, water shortage, serious air quality problems, or transportation congestion may result in a shift in thinking and make people more environmentally aware.

PROVE and **BEST PRACTICE EXAMPLES** from other cases are also seen as important incentives for pursuing innovations (PG4, PG9, PS2, PU9). It is seen as important to underpin political choices and provide an image of expected results. This type of branding may even be more successful if it is translated into a personal message: *“The biggest trick is to let people try it once. Also for opponents you see that if they try the light rail or bus once that they think it is a pleasant experience. Creating a personal message is therefore essential”* (PG4). Active **INVOLVEMENT** of the people that it really is about (PG7, PU1) and organizing **PUBLIC MEETINGS** to slowly introduce people to new policies is important (PU3, PU6). These people may form the beginning of a **CRITICAL MASS** which is seen as an important instrument to adopt innovations definitively (PU3, PU6). Branding new ideas and innovations may succeed by using media such as **STREET FILMS** (PU1, PU9). Besides, it is stated that the whole Phoenix area is lacking a **BRAND** (PU2):

“Phoenix does not have anything except possibly downtown to put on a postcard. To become more dynamic in terms of sustainability you need place making. Things residents can affiliate themselves with. The light rail with mixed homes and business around it and parks nearby can make such a place. This will help to boost innovations.”

Finance

As often seen in the United States, **ECONOMIC DEVELOPMENT** is an important driving force behind innovations (PC1, PC2, PG2, PG3, PG4, PG7, PG8, PG9, PS1, PS3, PS4, PU2). The idea that innovations in sustainable mobility should always lead to an economic boom however also limits these innovations. Moreover, most of the people lack the awareness that innovations often only lead to long-term profits. These barriers are discussed in the next part.

Barriers

Many barriers were identified that limit the process of innovations in sustainable mobility. The most important barrier is the prevailing culture in the Phoenix area. As mentioned before, the Wild West, **CONSERVATIVE**, and **INDIVIDUAL ATTITUDE** of the majority of the people is seen as a major barrier for innovations (PG2, PG3, PG4, PG5, PG7, PU1, PU2, PU3, PU4, PU5, PU7, PU10). Most of the people living in Phoenix are not aware of sustainability challenges and the threats they pose.

“One reason for the conservatism comes from the many retired people in Phoenix. They came over for the climate and cheap land to have their final years in their last house. However, their image of what this picture should look like is affected by the sustainability pursuit and therefore they are really conservative” (PU4).

Moreover, the subjective **PUBLIC DISCUSSION** on sustainability is predominated with examples such as that the U.N. is taking over the world and also forms a barrier for innovations (PG8). On the other, the more progressive and liberal students are hardly politically aware and do not **VOTE** in the local elections (PS4, PU5, PU7). In the last local election in 2012 for example less than one hundred students voted at the ASU voting

point (PG9). Therefore some politicians have a hard time to balance between what they think is good for the community and what their voters want.

Another significant barrier for sustainable mobility is the current **PHYSICAL STRUCTURE** and **LAND USE** in Phoenix (PC2, PG5, PG7, PS1, PU1, PU2). Large distances, sprawl, and the lack of an UGB result in all kinds of mobility issues. Therefore possible innovations are limited or not even possible. The bus network appears for example **TOO LARGE** to manage (PG4, PG6) and **DISTANCES** are too long to make investments in cycling infrastructure valuable (PC2).

The absence of sufficient **FUNDS** for innovations is also seen as an important barrier (PC2, PC3, PG2, PG3, PG4, PG5, PG8, PS1). The main source of income is the earlier mentioned sales tax. However, these revenues are for fifty percent used to invest in roads instead of innovations in either transit, cycling, or walking.

A lack of **STRATEGIC THINKING** among policy makers and the government is also a barrier (PC3, PG4, PU4, PG8). Politics is very economically driven and has to deal with **CAREER POLITICIANS** (PU4):

“I think it is not the way government was intended to work but you have people that see their livelihood in their entire working careers being a politician. When you are an elected official you have to do things too appease the people that elect you so I do not want to say that our politicians get manipulated but they do certain things for themselves in order to get reelected.”

Moreover, the economic component of politics is so important that policies that have a long term benefit usually do not make it (PG8). *“Sustainable solutions and innovations are usually costly. People, however, do not think about the long term of these investments that seem pricy and vote against”* (PG8).

Besides these barriers that are strongly related to planning culture and institutional design Phoenix also faces barriers that affect specific modes of transport. People on bikes do for example not follow traffic rules which leads to dangerous situations or accidents. Due to this behavior the goodwill of cyclists decreases and fund raisers are deterred (PC3). Besides, cyclists also face an important natural barriers: the heat. Between May and October the temperature tops 40 degrees Celsius which makes it almost impossible to bike or wait for the bus outside. A transit-related barrier can be found in the **STIGMA** behind public transit (PG4, PU6, PU7). Because of this stigma a major part of the population is not willing to even consider traveling by buss. As mentioned before, the light rail does not have such a stigma and attracts a wide variety of users.

5.4 Process of collaboration

Conditions

As specific focus of this research is on innovations in sustainable mobility in terms of new partnerships and coalitions. Therefore this part elaborates on these topics for the Phoenix area and tries to answer the questions why collaboration takes place, how it works, and what it requires.

To succeed in bottom-up coalition you first of all need to **CONNECT TO RESIDENTS** (PC1, PC2, PG6, PS1). This process of connecting is twofold. First, it requires active residents that are willing to run for sustainable ideas and want to make a difference. Second, you need an open culture in which policy-makers or consultants are willing to actively involve residents in the process of innovations. The input of residents can be essential and moreover they are all experts in their own neighborhood and may fill a void in knowledge.

Besides, stated is that almost all sustainable mobility coalitions in Phoenix come from the bottom-up and are therefore more organic and stronger (PG1). On the other hand, implementing sustainability goals from top-down will never succeed (PU10):

“You will never succeed implementing to top-down sustainability because all these different culture will never agree. Moreover, sustainability is seen as paying to limit the damage and not as creating new opportunities. So this will only succeed from the bottom-up. In cities you will succeed because people are closer connected and have something in common.”

Another specific condition to boost collaboration is **COMMUNICATION** and **NETWORKING** (PC2, PU1). Connecting residents, business men, and council members is important to share success stories. Council meetings and community events are seen as important means for raising awareness, storytelling, and sharing best case examples (PC2). Moreover, to encourage collaboration between ASU and other parties, guest lectures and practical assignments may play an important role (PU2). It, however, is important that all parties are professional and truly **RESPECT** each other (PC2, PC3, PU7).

Several initiatives in the fields of collaboration of coalitions can be found in Phoenix. Student’s intern in MAG and MAG worked together with both professors and students from ASU in a bike network analysis project. Besides, practitioners in Tempe meet monthly with different groups from ASU consisting of students and planning teachers to share visionary ideas and keep updated. Moreover, several students are involved in T.B.A.G. and visit council meetings regularly.

Barriers

Although expert may define several conditions to succeed in collaborating and coalitions, they find it much easier to identify practical limitations to these innovations. Especially a lack of understanding between academics and students from ASU and practitioners is observed. Complaints range from difference in **EXPECTATIONS** (PU5), lack of realism and practical **UNDERSTANDING** at ASU (PU2, PU4), not willing to take any

RISK (PU6), or too time consuming (PU6). Another identified barrier is the physical barrier between ASU and downtown Phoenix. As a result, experts from different actor fields do not **INTERACT** and this complicated collaboration (PU4, PU7).

Other barriers to collaboration and coalitions in general are identified as well. Students are for example not so much willing to become involved in practices since they have to focus on their **EXPENSIVE STUDIES** and a part-time job to provide for this study (PU7, PG8, PG9). Besides, they seem to lack the mind set to distinguish themselves by looking for internships yet there are numerous opportunities to do so (PU5). Coalitions face another specific issue: people who are willing to participate in projects or getting involved in organizations are extremely rare (PC1).

5.5 Dreams in Phoenix

Equally as for Groningen, all interviewees were asked about their unrestricted dreams in terms of mobility, sustainability, and urban planning contributing to sustainable mobility. Boxes 5.1 and 5.2 show the results from Phoenix. The numbers indicate how many times each dream was mentioned.

BOX 5.1 – PHYSICAL DREAMS IN PHOENIX



BOX 5.2 – SOCIAL DREAMS IN PHOENIX





CRAP-RIDE IN TEMPE



BIKE FACILITIES AT ASU CAMPUS



FREE BIKE VALET AT ASU CAMPUS



HIGHWAY THROUGH TEMPE



PUBLIC TRANSIT DEPARTMENT & MAG IN DOWNTOWN PHOENIX



T.B.A.G. MEETING AFTER TEMPE BIKE COUNT



BIKE SIGNAGE IN PHOENIX



CENTRAL STATION IN DOWNTOWN PHOENIX



BIKE INFRASTRUCTURE AT TEMPE TOWN LAKE



VIEW OVER PHOENIX AND SUBURBS FROM CAMELBACK MOUNTAIN



BIKE FRIENDLY 'HANDLE BAR'

WALK-ONLY ZONES AT ASU CAMPUS



END OF BIKE INFRASTRUCTURE AT CITY BORDER

FREE BIKE TOOLS AT ASU CAMPUS



PHOENIX



« BUS SYSTEM IN SCOTTSDALE »



INFRASTRUCTURE IN TEMPE »



« LOCAL ROAD IN TEMPE »



BIKE BOULEVARD ALONG THE CANAL IN SCOTTSDALE »



« SCOTTSDALE BICYCLE FRIENDLY COMMUNITY »



BIKE SHARE SYSTEM IN DOWNTOWN PHOENIX »

6 ANALYSIS

6.1 Innovating in sustainable mobility

The first part of the case analyses focused on land use and transport, the pursuit of sustainable mobility, and the willingness of the local government to pursue these innovations. This part integrates both analyses in preparation to some concluding remarks in paragraph 7.1.

Land use and transport

Groningen and the Phoenix metropolitan area are both relatively far located from other large cities. The big difference between both, however, is the size. Groningen is home to only 200,000 inhabitants, whereas the Phoenix area hosts about 25 times as much. Besides, the city design is much more sprawled. This is mainly due to the different histories. Groningen as medieval city used to have a city wall resulting in clear city limits. Phoenix, located in the desert, has however an abundance of cheap land and only started growing in the 20th century.

Sustainable mobility

The pursuit of sustainable mobility in Groningen started in about the 1970s to increase livability in the city core. Nowadays, the main reason to the pursue innovations is an urgency of space, or because of economic incentives. In Phoenix, the pursuit of sustainable mobility has started some years ago although the urgency of environmental problems is still only acknowledged by a small part of the population. Serious expected problems such as depletion of water, gas dependency, and the price of infrastructure should lead to more environmental awareness in the next years.

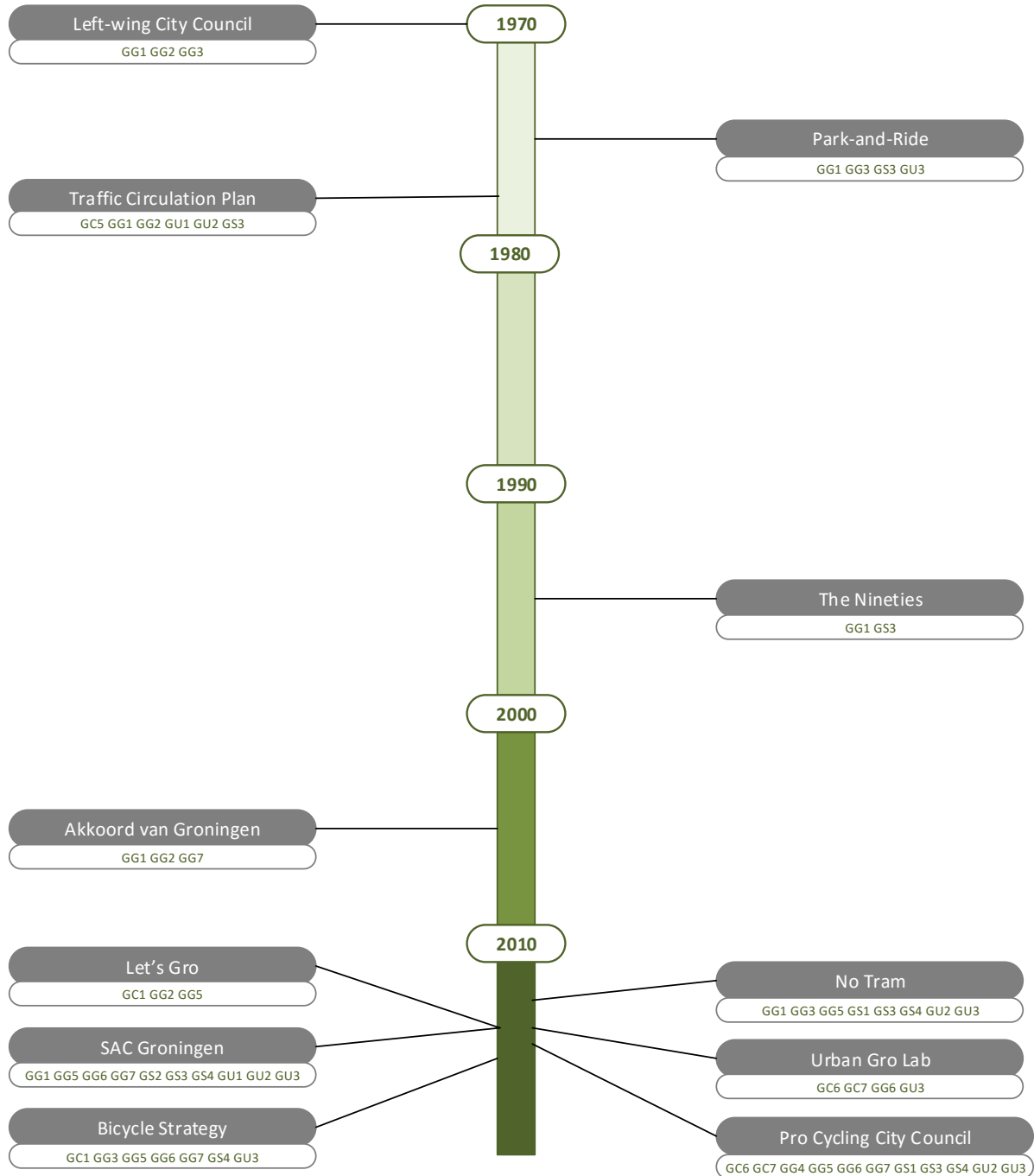
Governance

With governance is meant the 'human side of planning'. The local governments as being a part of this human side are therefore tested if they are willing to pursue innovations in sustainable mobility. In Groningen all governmental stakeholders seem to be really favorable of innovations. In Phoenix, on the other side, clear differences are found between different levels of government. Several cities in the area seem to be really progressive although other cities, the county, and the state seem not so much willing to pursue innovations.

6.2 Innovating through time

The historiographies in paragraphs 4.2 and 5.2 have shown the innovations in sustainable mobility through time by indication key documents, actors, organizations, and events. The timelines in figures 6.1 and 6.2 show the most important innovations in Groningen and Phoenix based on these historiographies.

FIGURE 6.1 – TIMELINE OF IMPORTANT INNOVATIONS IN SUSTAINABLE MOBILITY IN GRONINGEN



Based on the results from the document analysis and interview in chapter 4, we can distinguish three main phases that have shaped the sustainable mobility pursuit in Groningen. One around the 1960s and 1970s, a second in the 1990s, and a last in the past few years.

Phase 1: The sixties and seventies

When in the final years of the 1960s the new left-wing city council was installed, the focus on sustainable mobility gained momentum. This council gave priority to livability instead of focusing on expanding the current road network. The biggest step was set in 1977 when the VCP was installed. Despite a lot of criticism this decision is seen as the most important step in the right direction. Besides, the vision of these years also stresses the importance of park-and-ride facilities including parking spots outside the inner core and gave priority to public transit within the inner city.

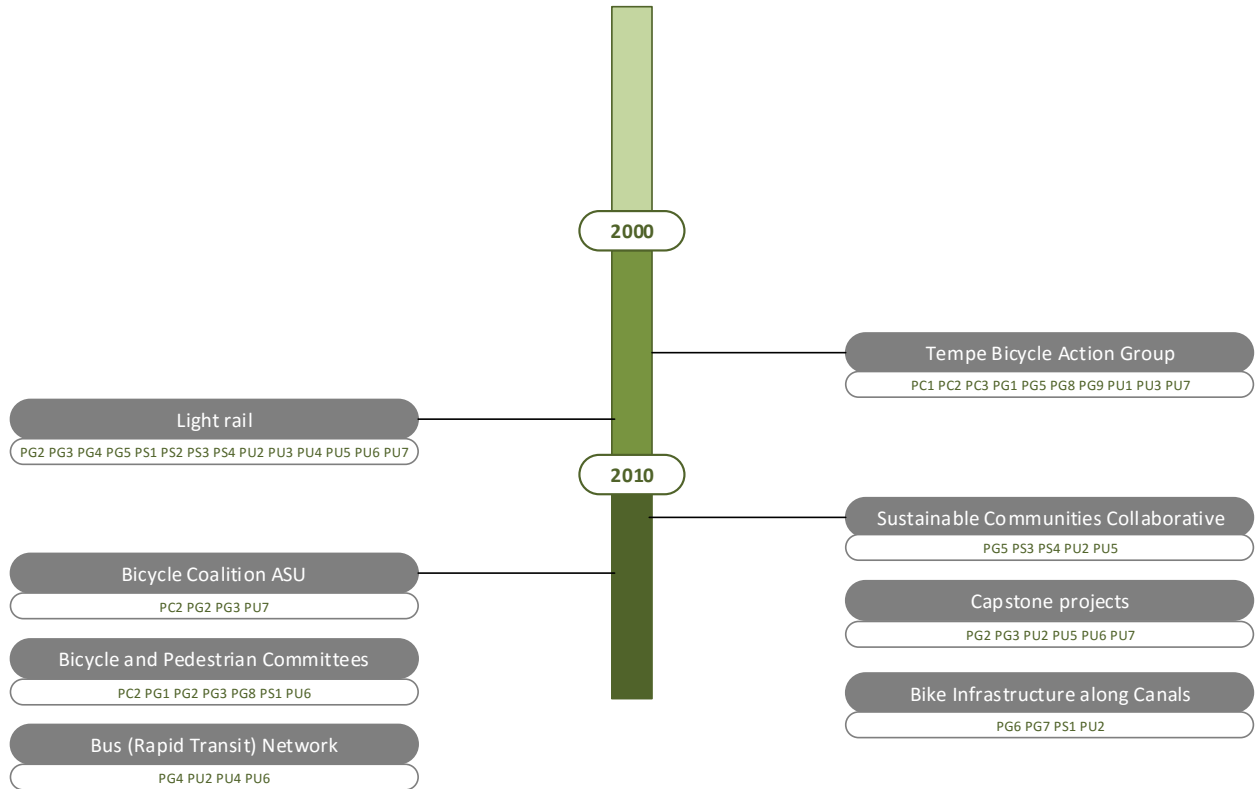
Phase 2: The nineties

The second phase started in 1989 when *Binnenstad Beter* was presented. After several quite years it was time for a new vision. The vision on the inner city specifically focused on accessibility and livability and expand the car free zones in the inner core of the city. Although the plans were not as comprehensive as the plans of twenty years earlier, they still did have a very positive effect on the city. Moreover, the plans were made in collaboration with local businesses and therefore led to much less criticism than earlier.

Phase 3: Nowadays

Currently, Groningen also knows an important phase of innovations in sustainable mobility. After the plans for the tram were cancelled the city had to focus on a new public transit system. A high quality bus network was introduced to connect the main dynamos in the city. Besides, several coalitions focusing on economic growth, partnership, and accessibility have arisen in the past few years. Also large infrastructural projects were started or will start in the near future such as the improvement of the southern ring road and remodeling of the main train station. Moreover, two new visions have been presented. The first focusing on the inner core resulting in the removal of busses from the city center and the second focusing on a comprehensive bicycle strategy. The most important reason for the innovations of the past few years is the current proactive city council and a sense of urgency to search for new solutions.

FIGURE 6.2 – TIMELINE OF IMPORTANT INNOVATIONS IN SUSTAINABLE MOBILITY IN PHOENIX



The timeline of innovations in sustainable mobility in Phoenix starts much later than in Groningen. No key initiatives contributing to sustainable mobility were found before 2000. Since then, however, several innovations have created a more conducive context for sustainable mobility in Phoenix. T.B.A.G., the light rail, SCC, and the ASU Bicycle Coalition can be traced back to a particular moment in time. Other innovations, such as committees, capstone projects, BRT, and infrastructure along canals have proven to be successful innovations but cannot be traced back to a specific year. Moreover, due to the recent start of sustainable mobility pursuit in Groningen no historical series of innovations can be found. This analysis, however, shows that the recent sustainable pursuit has put something in motion and make it plausible to assume that numerous innovations will follow in the near future.

6.3 Process of innovations

Conditions

The data in Table 6.1 and 6.2 show the most important (three or more references) conditions for innovations in sustainable mobility in Groningen based on the results in paragraphs 4.3 and 5.3. Table 6.3 and 6.4 show the most important barriers (two or more references) for innovations in Phoenix based on paragraphs 0 and 0.

TABLE 6.1 – IMPORTANT CONDITIONS FOR INNOVATIONS IN GRONINGEN

Category	Condition	Reference
Collaboration & Coalitions	Coalitions	GC3, GG6, GG7, GS2, GU3
Collaboration & Coalitions	Knowledge exchange/networking	GC4, GG1, GS2, GS4, GU3
Actors & Organizations	Leadership	GC6, GC7, GG4, GG6, GS2, GS3, GU1, GU2, GU3
Actors & Organizations	Expertise and courage	GG1, GG3, GG4, GG6, GS4, GU1
Cultural institutions	Trial & error	GC6, GC7, GG5, GG7, GU1
Cultural institutions	Urgency	GC3, GC4, GG6, GG7, GU1
Cultural institutions	Transparency	GG6, GS4, GU1
Cultural institutions	Organic evolution	GS1, GS2, GU1
Social institutions	Willingness among citizens	GG3, GG6, GU1, GU2, GU3, GC4, GC6, GC7, GS4
Social institutions	Enthusiasm and passion	GG4, GG7, GS2, GU3
Social institutions	Storytelling and best practices	GC4, GG1, GG2, GG3, GS2, GU1, GU3
Social institutions	Thoughtfully executed marketing	GC6, GC7, GU1

TABLE 6.2 – IMPORTANT CONDITIONS FOR INNOVATIONS IN PHOENIX

Category	Condition	Reference
Collaboration & Coalitions	Coalitions	PG8, PS2, PU1, PU2, PU5
Collaboration & Coalitions	Grassroots ideas	PC2, PG4, PG7
Actors & Organizations	Arizona State University	PG2, PG3, PG5, PG7, PS3, PS4, PU9
Actors & Organizations	Leadership	PG4, PG5, PG7, PU2, PU4, PS1
Actors & Organizations	Dedicated council	PG2, PG3, PU6
Cultural institutions	Strategic long-term planning	PG4, PG5, PG7, PS2, PU2, PU3, PU6, PG7
Social institutions	Education	PG2, PG3, PG4, PG7, PS2, PS3, PS4, PU6, PU7
Social institutions	Community support	PC1, PG6, PG7, PG8, PS3, PS4
Social institutions	Disaster to raise awareness	PU1, PU2, PU4, PU5
Social institutions	Prove and best practices	PG4, PG9, PS2, PU9
Financial	Economic development	PC1, PC2, PG2, PG3, PG4, PG7, PG8, PG9, PS1, PS3, PS4, PU2

Numerous conditions for innovations in sustainable mobility were discussed. We have indicated conditions that were successful in particular key events as well as conditions that have a more general effect. A total of four categories of conditions was distinguished for both cases: collaboration and coalitions, actors and organizations, cultural institutions, and social institutions. In addition, in Phoenix also financial incentives were mentioned as having an effect on sustainable mobility.

Collaboration & coalitions

In Groningen, collaboration between actors has proven its success. As a result, experts stress the importance of knowledge exchange and networking contributing to sustainable mobility. Although Groningen shows more examples of successful coalitions, the importance of coalitions in general is indicated in both cases. In contrast to Groningen, Phoenix has less trust in top-down policies. Therefore

experts focus more on working from the bottom up and stress the importance of grassroots initiatives contributing to sustainable mobility.

Actors & organizations

Leadership is found as a very important condition for innovations for both cases. Without a sustainability champion, city council, or progressive major, innovations in the process are excluded. In Groningen, expertise and courage are also mentioned as important factors in the process. This is mainly due to earlier councils that were dedicated and had courage and succeeded implementing important innovations. In Phoenix, Arizona State University is mentioned as important organization to speed up the process of innovations. Progressive, open, and environmentally aware students and staff may make a difference if they become more involved in the process.

Cultural institutions

As stated in earlier parts, the planning culture and institutional design of Groningen and Phoenix are completely different. In Groningen, the acceptance of trial and error is seen as very condition for innovations in sustainable mobility. In addition, urgency seems to be the most effective trigger to implement new sustainable mobility strategies. Transparency in the process of innovations and organic evolution instead of rapid change also contribute to sustainable mobility. Phoenix, on the other hand, has to deal with a much more conservative planning culture. Therefore innovations are not so much triggered and a shift in thinking is required. Pursuing strategic long-term planning is indicated as the most valuable shift contributing to sustainable mobility. Since sustainability-related innovations do usually not pay off right away an acceptance of long term goals is required to become really successful.

Social institutions

Socially, both cases show similar important conditions in terms of community support or willingness among citizens. Citizens are seen as having a profound impact on the success of innovations. Besides, the concepts of storytelling, delivering prove, and sharing best practice examples, are found important in both Groningen and Phoenix. Prove of successes in different cities that had to contend with similar challenges are an important means to show expected success of innovations and increase support.

Differences in social factors for both cases can be found in enthusiasm and passion among key actors. These conditions are seen as important in Groningen but were not mentioned in Phoenix. In Phoenix, however, education is much more emphasized. Since most of the people are more conservative, know not so much about best practice examples from elsewhere, and are not so much environmentally aware, education is found the key to success. Moreover, a disaster such as a flooding or strong gas price increase is seen as a very successful way to finally raise awareness among citizens. The traffic situation in the Netherlands and Groningen in the 1960s for example cannot be called a disaster, but did raise awareness for traffic safety and ultimately led to the VCP. This situation proves how social anxiety can raise awareness and lead to innovations in sustainable mobility.

Finance

Only in Phoenix financial conditions for innovations in sustainable mobility were indicated as being important. As often seen in the United States, economic development is an important conditions for new innovations. There is a current idea that innovations should always directly lead to an economic win. However, sustainable mobility innovations are usually not meant to serve an immediate profit and are thus limited by this idea of economic development.

Barriers

TABLE 6.3 – IMPORTANT BARRIERS FOR INNOVATIONS IN GRONINGEN

Barrier	Reference
Lack of funding	GG4, GG6, GS4, GU3
Lack of long term policies	GC6, GC7, GS4, GU3
Overcrowded bike lanes and parking facilities	GG6, GG7, GS3
Lack of urgency	GG7, GU3
Restricting legislature from higher governments	GC3, GC5

TABLE 6.4 – IMPORTANT BARRIERS FOR INNOVATIONS IN PHOENIX

Barrier	Reference
Conservatism and individualism	PG2, PG3, PG4, PG5, PG7, PU1, PU2, PU3, PU4, PU5, PU7, PU10
Lack of funding	PC2, PC3, PG2, PG3, PG4, PG5, PG8, PS1
Current physical structure and land use	PC2, PG5, PG7, PS1, PU1, PU2
Lack of strategic thinking	PC3, PG4, PU4, PG8
Not political aware students	PS4, PU5, PU7
Stigma behind public transit	PG4, PU6, PU7

Looking at barriers in the process of innovations in sustainable mobility there is one clear difference between both cases: in Phoenix barriers are much more frequently indicated. Especially the conservatism and individualism in the culture seem to limit innovations. Thanks to car ownership, residents experience a particular type of freedom and are very unwilling to give this freedom away. Another important barrier in Phoenix is lack of funding. The way the system works results in the fact that every increase in sales tax requires a bill that accepts this increase. Therefore it is almost impossible to increase expenses in mobility without criticism. Moreover, mobility sales tax still needs to be divided among both road works and all others modes of transport. Structural innovations in transit or cycling are therefore limited due to a lack of necessary funds and political choices. In addition, the land use also limits the opportunities for innovations. For example because commuting distances are too long to cycle or the area is too big to implement a comprehensive bus system.

In Groningen similar barriers can be found although they are much less mentioned. Funding and a lack of long term policies are seen as the most limiting factors. Besides, a lack of urgency is experienced which results in less proactive policies and lack of enthusiasm among key persons. This urgency, however, has raised in the past years and is therefore less and less seen as barrier. Striking enough, Groningen also faces a barrier due to the success of sustainable mobility: overcrowded bike lanes and parking facilities start to make cycling less attractive and form a serious barrier; an issue that Phoenix would wish it would had.

6.4 Process of collaboration

In the results in the foregoing chapters we have identified several examples of collaboration and coalitions for both cases. Although coalitions can be found in Groningen as well as in Phoenix there are some clear differences. In the Phoenix area, a total of four bike advocacy groups on three levels were discussed. The Coalition of Arizona Bicyclists serves state wide, Phoenix Spokes People and T.B.A.G. focus on city level, and ASU Bicycle Coalition serves the university. Moreover, two non-cycling oriented collaborations were found: Sustainable Communities Collaborative and Reinvent PHX.

In Groningen, however, collaboration between different organizations or companies is more abundant. For example the Groningen-Assen Region is a decisively example of a collaboration between various governmental bodies. Also the transit authority (OV-bureau) and Groningen Bereikbaar are clear examples of professional coalitions. Moreover, successful coalitions between governments, practitioners, academics, and students can be found as well (Green Office, Urban Gro Lab, and SAC Groningen).

The data in Table 6.5 and 6.6 show the most important (two or more references) conditions for collaboration and coalitions based on the results in paragraphs 4.4 and 5.4. Table 6.7 shows the most important barriers (two or more references) for collaboration and coalitions in Phoenix based on the results in paragraph 6.4.

TABLE 6.5 – IMPORTANT CONDITIONS FOR COLLABORATION AND COALITIONS IN GRONINGEN

Condition	Reference
Urgency	GC3, GC4, GG5, GG6, GS2, GS4, GU1
Specific knowledge	GC3, GG5, GG6, GS4, GU3
Acceptance of trial & error	GC4, GG6, GG7
Enthusiastic students	GG6, GS4, GU3
Coalitions have a stronger message	GG1, GS2
Size of Groningen	GC4, GC5

TABLE 6.6 – IMPORTANT CONDITIONS FOR COLLABORATION AND COALITIONS IN PHOENIX

Condition	Reference
Connecting to residents	PC1, PC2, PG6, PS1
Respect among all coalition members	PC2, PC3, PU7
Communication and networking	PC2, PU1

An important difference in the rise of partnerships and coalitions between Groningen and Phoenix is the completion of these organizations. In Groningen multiple examples of successful innovations can be found and the conditions that define their successes are quite clear. In Phoenix, on the other hand, coalitions are not so much known yet and can fewer conditions and more barriers be distinguished.

In Groningen, the most important factor for coalitions can be found in urgency. For the Groningen-Assen Region this urgency is the size of the region which is too small to not to collaborate with each other, while Groningen Bereikbaar was erected to fill a void: guaranteeing the accessibility of the city and the SAC was created to answer a research question that needed both practitioners and students. For the SAC also other conditions were indicated, such as filling a knowledge gap and participation of enthusiastic students.

Successful coalitions requires involvement of coalition members that preferable have specific knowledge. Besides, the emergence of coalitions needs a planning culture in which trial and error is accepted.

The conditions in Phoenix are much vaguer. Coalitions especially focus on having one particular goal such as cycling or sustainability or to connect residents with other actor groups. Specific coalitions consisting of people from different actor groups are much less known. A reason for this can, besides the dissimilar physical structure of Phoenix, also be found in the geographical distances between places. For example the ASU campus in Tempe is more than 20 kilometers from downtown Phoenix, while the distance between the RUG campus and Groningen is between 1 and 3 kilometers. The distances in Phoenix thus limit physical interaction and make collaboration between actor groups much less obvious.

In Phoenix, also several barriers for coalitions were identified. The education systems in the Netherlands and the United States seem for example to have a profound impact on student involvement in coalitions. Whereas studying in the Netherlands is fairly cheap, a master’s degree in the United States is much more expensive. Moreover, on Dutch universities the bachelors and masters are seen as subsequent degrees while in the US a break between both degrees is more common. Therefore, American students are much more involved in their master’s and prioritize finishing their studies instead of becoming involved in internships or professional jobs.

Another mentioned complaint in Phoenix is the lack of practical knowledge among students at the university. Most governmental organizations or consultancy firms are therefore not so much interested in collaborating with student parties yet. However, this trends seems to have changed in the past years and therefore opportunities for new coalitions emerge. A willingness for collaboration seems to start to exist among the key parties, it however takes time to develop these initiatives.

TABLE 6.7 – IMPORTANT BARRIERS FOR COLLABORATION AND COALITIONS IN PHOENIX

Barrier	Reference
Expensive time-consuming studies	PG8, PG9, PU7
Lack of practical understanding at ASU	PU2, PU4
Size of Phoenix	PU4, PU7

6.5 Dreams

All interviewees was asked the same final question: “If you were the only boss and had unlimited funds, what would you do?”

This question led to notable situations. While experts in the Phoenix area could tell amply about their ideas and dreams about sustainable mobility, experts in Groningen found it often quite difficult to answer this question. Several reasons can be found to explain this difference. First, Phoenix is in a really early stage of sustainable mobility pursuit and therefore has numerous low hanging fruits examples from other places in the world. Groningen, on the other hand, has always been acting on the foreground of innovations which makes it much more difficult and challenging to implement new innovations.

Moreover, the innovations that are being considered in Groningen are much more striking than the down-to-earth ideas in Phoenix. For example separating different modalities or implementing a tram network is a much larger investments than closing gaps in a bicycle network or installing bus stops. These quick wins that Phoenix envies have in Groningen been executed many years ago.

The physical dreams in Phoenix focus on land use and networks in general whereas dreams in Groningen were much more focused on specific modes of transport. For example, ten experts in Phoenix state the importance of an UGB to increase density and stimulate mixed use development. Besides they would focus on bike policies by redesigning the streets or closing gaps in the network. In Groningen, the experts would also focus bike policies but more specifically with the purpose of separating modes and expanding the car-free inner city. In Groningen, the most wanted innovation is still a tram network. This dream also endorses why the canceling of the tram is seen as such an important event in the sustainable mobility pursuit of Groningen. Phoenix is oriented on installing new modes of transport such as the light rail and BRT, while Groningen focuses on improving existing modes. Moreover, Phoenix wants to improve the network within its border, while Groningen stresses the importance of connecting to other places. This difference is partly due to the differences in size, but also because of the stage of innovation. Phoenix only recently started focusing on more sustainable modes and still needs to create a network within its borders. Groningen, however, started this pursuit almost sixty years ago and is already provided with a well-functioning network.

The focus of Groningen is on experimenting, investing in coalitions with students, and active policies to stimulate modes other than the car. In contrast, Phoenix needs to stress the importance of education. People need to learn about the environment and sustainability and need to become aware about other forms of transport.

7 CONCLUSION

This research started with the introduction to our sustainable mobility pursuit since the 1970s. This pursuit mostly emphasizes limiting car usage by for example reducing the amount of trips that has to be made or by shifting to more sustainable forms of transport such as transit or cycling. We have stated that the process of innovations in sustainable mobility consist of three dimensions: institutions, governance, and land use and transport. Within these dimensions numerous conditions and barriers for innovations in sustainable mobility were defined.

All three dimensions were analyzed to understand the process of innovations in sustainable mobility for both cases. By targeting key documents, actors, organizations, and events, the process of innovations through time was analyzed. Thereafter, mainly based on almost fifty interviews with experts, numerous conditions and barriers for innovations were indicated. In addition, special attention was paid to the role of collaboration and coalitions in the process of innovations by identifying important conditions and barriers. In the analysis, the results from both cases were combined to collect a wide variety of understandings about the process of innovations in sustainable mobility.

This part draws conclusions based on these understandings and puts the results into perspective using the foregoing theory. Thereafter, the conclusions are discussed in more detail and the research process itself is reflected upon.

7.1 Innovations in sustainable mobility

Sustainable mobility requires actions to reduce the need to travel by car (Banister, 2008) with the purpose to better deal with sustainability and livability concerns such as air quality problems, noise, global atmospheric problems, fatalities, congestion, urban sprawl, and declining city centers (Black, 1996; Greene & Wegener, 1997). In Groningen, sustainable mobility is pursued to improve livability, due to an urgency of place limitations, and for economic return, whereas in Phoenix water depletion, gas dependency, and expensive infrastructure create an unavoidable urgency for innovations in sustainable mobility.

There is a clear link between the stage of sustainable mobility pursuit and the focus of sustainable mobility strategies. Groningen, as sustainable city, stimulates coalitions (with citizens and students) to exchange knowledge and accepts trial-and-error to make sustainable solutions even better while in Phoenix it is important to first create a critical mass using education to raise awareness. Most importantly, a large part of the populations needs to accept innovations to make the implementation process successful. Moreover, a younger population seems to trigger innovations and provides innovative out of the box ideas. Practical examples of pursued innovations in Groningen are a tram network, separating different

modes of transport completely, and expanding the car-free inner city. Phoenix, on the other hand, needs to focus on a different kind of challenges, such as introducing mixed use planning, installing an UGB, closing gaps in the bike network, and supporting and accepting cycling in general.

Land use and transport

DENSITY • SHORT DISTANCES • UGB • TOD • PATH DEPENDENCY

Land use and spatial distribution of functions in a city are found as important conditions for pursuing sustainable mobility. Density, short distances, and mixed-use in Groningen are found being conducive to limit car use while the lack of an UGB and large distances form barriers to implement sustainable mobility in Phoenix. This is in accordance with Banister (1996, 2008) and Meurs et al. (2003) who state that compact cities, in combination with mixed land use, reduce car ownership levels, trip rates, and commuting distances. Moreover, as mentioned by Cervero (1996) and Köhler et al. (2009) also TOD contributes to sustainable mobility which is seen as a success in Groningen and as opportunity in Phoenix. Most importantly, it should be acknowledged that the urban form may have a profound impact on possible future innovations in sustainable mobility as also stated by Couch et al. (2011) and Elzen et al. (2004).

7.2 The process of innovations in sustainable mobility

Collaboration & coalitions

COLLABORATION • COALITIONS • TOP-DOWN AND LOCAL EXPERTISE • GRASSROOTS IDEAS • RESIDENT INVOLVEMENT

The importance of collaboration to innovate in sustainable mobility is indicated by numerous scholars (Banister, 2008; Black, 1996; Clifford et al., 2005; Healey, 1998; Hull, 2008; Innes & Booher, 2004). This research endorses this importance of collaborating and working in coalitions. Especially knowledge exchange and networking among actor groups is considered important. Besides, combining top-down planning with local expertise, supporting grassroots ideas, and connecting to residents is indicated as being beneficiary to pursuing sustainable mobility which is in line with Friedmann (1993).

Actors & organizations

LEADERSHIP • DEDICATION • EXPERTISE • COURAGE • SUSTAINABILITY CHAMPION • COUNCIL • UNIVERSITY • FOLLOWERS

This research concludes that the most important factor among key actors or key organizations is strong leadership which is in line with statements by Banister (2005a, 2008) and Vergragt and Brown (2007). Dedication, expertise, and courage among key actors is found beneficially to innovations in sustainable mobility. More specifically, a sustainability champion, proactive city council, and university play a very stimulating role in the process of innovations. Moreover, this research emphasizes the importance of strong followers in addition to strong leaders. These followers can be the first step to create a critical mass of ambassadors who contribute to the success of sustainable mobility innovations.

Cultural institutions

PLANNING CULTURE • LONG-TERM VISION • TRIAL AND ERROR • TRANSPARENCY • URGENCY

The local planning culture appears to have an important impact on innovations in sustainable mobility whereas strategic and long-term planning are found particularly important. Sustainability related plans usually lack short term revenues. In accordance to Banister (2008) and Hull (2008), it is therefore important to have a long-term vision in order to ensure that these plans are implemented. Besides, acceptance of trial and error together with transparency among all stakeholders are found important conditions to successfully implement sustainable mobility, which is confirmed by Goldman and Gorham (2006) and Vergragt and Brown (2007). Moreover, a sense of urgency is essential to raise awareness for sustainable mobility issues and to overcome implementation barriers for new strategies.

Social institutions

EDUCATION • WILLINGNESS • ATTITUDES • ORGANIC IMPLEMENTATION

In line with Banister (1996, 2008), education is found being a crucial condition for innovations in sustainable mobility. Either through raising awareness or as part of the upbringing education is found important to become more aware of sustainability and environment. As earlier stated by Clifford et al. (2005) and Healey (1998), this research also affirms the importance of community support and willingness among citizens. Besides, storytelling, sharing best practices, and providing prove of successful strategies from other cities seems meaningful to pursue innovations. These conditions are described by Banister (2008) as 'selling the benefits'. Banister also states that people's attitudes need to change, for example on what a street should look like. This is found relevant in especially Phoenix where is advocated to see streets as a place and not just as a road. This attitude may increase acceptance of road use by other modes such as cycling or walking. Finally, this research finds that the implementation of innovations is preferably done in an easy and organic way instead of an abrupt implementation to increase the chances of success. Banister (2008) agrees on this and indicates the importance of implementing controversial policies in stages.

7.3 The role of collaboration and coalitions

URGENCY • TRIAL AND ERROR • ENTHUSIASTIC AND PROACTIVE MEMBERS • WILLINGNESS • SIZE

As mentioned, collaboration between actor groups and coalitions play an important role in the process of innovations in sustainable mobility. Knowledge exchange and networking contribute to the sharing of innovative ideas and make it easier to share success stories. Coalitions contribute to this by creating networks between organizations (Cross et al., 2013). Moreover, it is shown that coalitions can fill a void and contribute to unique and valuable understandings to sustainable mobility.

Except the contribution of collaboration and coalitions to sustainable mobility little is researched about the emergence of these partnerships. In line with Healey (1998), this research concludes that urgency is

the main incentive for new coalitions. This can be advocating (T.B.A.G.), an economic goal (Sustainable Communities Collaborative and Regio Groningen-Assen), congestion issues (Groningen Bereikbaar), or specifically needed knowledge (SAC Groningen).

Three main conditions are indicated as being conducive or restricting to successful collaboration. Firstly, as stated by Friedmann (1993), trial and error needs to be accepted in the planning cultures because most coalitions are experiments to figure out an optimal solution. Secondly, partnerships with students involved require enthusiastic and proactive students who do not have other priorities. A willingness of students to distinguish oneself from other students for better career opportunities is found being an important stimulating condition and this form of specific willingness among coalition members is also emphasized by Banister (2008). Thirdly, in smaller or remote cities such as Groningen, actor groups need each other in order to be more successful which fosters collaboration initiatives. On the other hand, distances can also be too large to physically meet each other which is seen as a barrier to collaboration.

7.4 Discussion

As explained in the relevance paragraphs of chapter 1, this research aims to contribute to both societal and academic understandings. Socially, the purpose of this research is contributing to successful implementation of sustainable mobility goals by deepen our understanding in the process of institutional innovations in sustainable mobility by indicating conditions and barriers. In addition, this research critically analyses the effect of key innovations in a cities' sustainable mobility pursuit and thus contributes to the understanding of key actors in the planning process. Moreover, interviewing experts from all actor fields exposes different viewpoints and fosters knowledge exchange among them. Academically, this research contributes to current theories by indicating implementation barriers for sustainable mobility. Moreover, it reviews the limited-studied emergence of successful coalitions and their contribution to innovations in sustainable mobility.

The process of innovations in sustainable mobility is explained in the conceptual model as having three dimensions: institutions, governance, and land use and transport. Within each dimension conditions and barriers affect the process of innovations. Institutionally, we made a distinction between institutions strongly affected by local planning culture (cultural institutions) and by social habits (social institutions). In terms of governance, the human side of planning, we made a distinction between the actors and organizations in this process and the way in which they collaborate. Using these categories we have targeted numerous factors that help us to better understand the process of innovations in sustainable mobility.

This research also emphasized the importance of urgency in the process of innovations meaning that without a specific reason innovations in sustainable mobility will not be pursued. Key actors, such as political leaders, city councils, and universities can stimulate this urgency. In addition, key actors are

unable to pursue innovations by themselves. Therefore this research supports earlier research that indicates the importance of trial and error and education to raise awareness and contributing to a critical mass of ambassadors for innovations.

In addition, in Groningen the dynamics of local governments seem to affect the process of innovations in sustainable mobility. A highly dynamic and willing city council has for example boosted three critical phases of sustainable mobility pursuit whereupon a series of innovations followed. For Phoenix, indicated as having some restrictive local governments, this insight should lead to the realization that especially the local governments should propagate and support sustainable mobility. This may boost other actor groups to come up with new ideas contributing to sustainable mobility. For Groningen this means that local government should keep supporting initiatives contributing to sustainable mobility.

Lessons about the SAC

Little was known about the creation of coalitions contributing to sustainable mobility. This research has pointed out several important conditions that support the emergence of new and successful coalitions. One occasion of this research, the origin of the SAC in Groningen, has been critically analyzed and leads to compelling new understandings in the role that coalitions play in the process of innovations in sustainable mobility. A committed network of actors and acceptance of trial and error are found to be the main reasons for the success of this coalition. In addition, there is a demand for enthusiastic and proactive students and there has to be a sense of urgency. In this specific case, the urgency was found in a research that needed specific knowledge from students to connect the realms of academics and practitioners.

A similar initiative would not lead to the same success in Phoenix due to multiple reasons. First, a restrictive planning culture for innovations in sustainable mobility limits sustainable initiatives in general. Second, students in Phoenix seem to be less committed to internships and jobs because of more expensive education and a more education-centered attitude. Third, little understanding and difference in expectations between practitioners and academics results in a non-conducive context for initiatives that want to collaborate with both actor groups. However, one phenomenon in Phoenix was found being really supportive for innovations: the disinhibition innovative ideas are started with. Even small ideas have proven they can lead to big successes, such as a beer drinking bike riders leading to a bike advocacy group with over 200 members. This attitude should be a lesson for cities all over the world.

These new understandings could help future coalitions to successfully being erected to link different actor groups in urban planning and contribute to sustainable mobility. In addition, coalitions in Groningen have proven that they can plan an important role in planning, can fill a knowledge gap, help students to become more experienced and be better prepared for the job market, and stimulate networking between practitioners and academics contributing to better understandings among all actor groups.

7.5 Reflection

This research has fulfilled its purpose by providing understanding in institutional innovations in the process of pursuing sustainable mobility and the role that collaboration and coalitions play in this process. However, despite amply available sources it was difficult to catch all concepts in one model and translate them into one research strategy. Thereafter, almost fifty experts were interviewed as means of data collection and every interviewee had their own focus and stressed other important parts of the process of innovations in sustainable mobility. This research tried to cover the most important ideas, thoughts, and understandings by framing them into the chosen research strategy with the purpose of extracting lessons for both practitioners and academics. This strategy has, despite the variety and extensiveness of collected data, helped to stay focused on the main research topic but also resulted in a lot of data that could not be applied to this research.

This research has also given the opportunity to collect an amazing amount of understandings by talking to experts, conducting fieldwork, and experiencing the planning cultures. Although the amount of gathered data appeared to be too much to put in one thesis, visiting Phoenix for almost one month to collect less data would neither have been effective. In addition, visiting Phoenix was extremely valuable for both data collection and the authors' personal insights. In Groningen, on the other side, the author's personal network appeared to be very helpful for the recruitment of interviewees.

In addition, the first purpose of this research was to make a sustainable mobility pursuit comparison between Groningen and Phoenix. The progress of this research, however, let the researcher realize that a real comparison was impossible due to the very large difference in sustainable mobility pursuit. Therefore, the main research question was rephrased to focus on collecting a wide variety of understandings of the same process of innovations in sustainable mobility based on the different cases.

Moreover, despite an abundance of theories about collaborative planning, little is researched about the role of coalitions in the process of sustainable mobility. Therefore it was found difficult to apply cross referencing between current theories and findings from this research. However, due to the lack of available theories, this research may be a valuable product to increase current understandings on this contribution of coalitions and can hopefully encourage further research.

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APPENDICES

A Interview guideline

The questions in this guideline are meant to cover all research topics during an interview. However, not all questions will or can exactly be asked in all interviews. Overall the interview focuses on three main topics: sustainable mobility, innovations in sustainable mobility, and coalitions. Within these topics several aspects have to be covered resulting in the following questions:

Introduction and sustainable mobility

- Would you introduce yourself and your position in relation to sustainable mobility?
- What are the reasons for [case] to become more sustainable in terms of mobility?
- How is the willingness of the local governments to innovate?

Innovations in sustainable mobility

- How would you describe to process of innovations in sustainable mobility?
- What actors and organizations are involved in innovations in sustainable mobility?
- What are the necessary ingredients for innovations in sustainable mobility?
- What events have contributed to innovations in sustainable mobility?
- What are the barriers for innovations in sustainable mobility?

Collaboration and coalitions

- What is the role of collaboration in innovations in sustainable mobility?
- What is the role of coalitions in innovations in sustainable mobility?
- How do you collaborate with other teams in urban planning?
- Do institutions need to change to stimulate the role collaboration or coalitions?
- What do you think about collaboration and coalitions in the future?

Final question

- If you were the boss and had unlimited resources, what would you change or do?

B Final blog

Innovations in sustainable mobility in the metropolitan Phoenix area

The past three weeks I visited Phoenix in the desert state of Arizona to do research on innovations in sustainable mobility. After extensive desktop research back in the Netherlands and a lot of reading during my stay here, I spoke to almost 30 experts in the fields of urban planning, sustainability, and political science. Besides, I once again lived the American college life, visited many events, and went on fieldtrips to understand what's going on here. This is a summary of three weeks of experiences.

The Phoenix area, where spring brings sun and temperatures ranging between 25 and 35 in Celsius is home to over 4 million people. One of the first things I found out was that people appreciate freedom. Actually, they love freedom. The word freedom forms the basis for people's behavior and explains a lot of their choices. This red state is part of the former Wild West and was home to the cowboys that originally came to here to find their 'freedom'. These roots recently resulted in bills that tried to ban the word 'sustainability' or governments that try to make it impossible to ban plastic bags – a bill that is currently worked on in this area. Freedom has also led to one of the most spread out cities in the world. The metropolitan area easily makes it to 50 x 100 km and it takes you over an hour to cross the city, of course by car. Because of this sprawl almost everybody owns a car, or more. Apartments with a pool, enormous yard, 5 cars, and 1 shared bike for the Saturday are common here. People don't bike. Yet. They only bike on Saturdays for fun, but not to commute.

A lot of initiatives are carried out to promote more sustainable forms of transport such as biking or transit. The light rail is new and connects Tempe (a 'suburb' that hosts the biggest university in the country) with downtown Phoenix. It easily exceeded all travelers' expectations and will be expanded in the near future. A not-expected economic win for the cities and therefore called a big success. Also cycling becomes more interesting. Action groups stimulate usage, social rides are organized to raise awareness, students are involved to create bicycle master plans, and politicians start to embrace cycling. A fully operational bike network is due in 10 years, 20 years later is expected to be the moment of environmental awareness.

In Arizona, as in other parts of the US, the differences between the poor and wealthy are large, very large. The rich from the Midwest hibernate in Arizona because of the weather, but don't want to pay taxes for education or infrastructure. Besides, Mexico is around the corner and therefore the city sees a lot of immigrants coming in. Hitting especially the poor, a sales tax on all products was recently introduced. 0.5 cents of every purchase goes to infrastructure, but 50 percent of that is still used to expand the roads although this changes slowly. Within years, cities cannot serve their outskirts anymore. This is going to be a problem, because cities are responsible for waste collection and providing ambulances and fire trucks. Even worse is the maintenance of the roads, but some day the awareness will come.

Solutions can be found in swiftly changing dynamics. The focus on sustainability will grow and key actors and organizations that fight for change have to stand up. Mayors, council members, and the universities play an important role in this. Besides, education is going to be the basis of success. Where we have our traffic exam in primary school, students here can take classes to learn how to cycle. Culture, attractiveness, and reliability are the main topics to create success. The first will change within 30 years, but hopefully sooner. Attractiveness is important for the light rail; even though it's such a success, as long it needs to yield to all other forms of transport, including single pedestrians, it's not yet as attractive as it can be. And reliability is the third. Busses that don't run, cycle tracks that abruptly end, the lack of bike racks, and holes in the road – things like this should change to increase the reliability on other modes than the car.

The past few weeks I have seen a lot and learned even more. The next month I'll be working on analyzing all the interviews. A time consuming job but much easier in combination with a road trip to at least San Francisco, Yosemite, Las Vegas, Utah, and Colorado. After coming back to the NL, the next stage of my research will focus on my hometown Groningen. The final results are expected in the summer. Now it's time to catch a plane to California!

April 13th, Tempe, Arizona.

[<https://innovationsinsustainablemobilityinthemetropolitanphoenixarea.wordpress.com/>]

C Research model

