



Sustainable mobility for all

Analysis of the existing bottlenecks to cycling on Malta and how to improve the current situation

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Group

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Executive summary

Introduction

Malta has been lagging behind in transitioning to sustainable and clean transportation in comparison to other European countries, causing environmental and health problems. One sustainable transportation offering solutions to these issues is cycling. Malta has potential for cycling. Most journeys made are short distance, meaning that they can be completed by bike within minutes. However, to increase cycling on Malta, several problems related to cycling need to be solved. The purpose of this report is to identify and analyse current bottlenecks to cycling within the Maltese transportation system and to evaluate possible improvements to provide recommendations. This contributes to the goal of increasing the use of sustainable mobility, especially cycling, on Malta. The research and report are commissioned by Bicycle Advocacy Group Malta (BAG).

For this consultancy report, qualitative and quantitative data were collected within five different locations in Malta; Valletta, Sliema, Mosta, Luqa, and the University of Malta. A variety of methods were used including literature reviews, expert interviews, street interviews, observations, and questionnaires.

The environment and health situation were studied to understand the current situation on Malta. Different bottlenecks to cycling were then identified and studied to understand how these can be overcome. These bottlenecks are within physical infrastructure, governance and public perception. Bicycling practices were studied to understand why people already cycle.

Environment and health: The high car usage causes bad air quality, noise pollution, congestion, and accidents. Bad air quality and noise pollution influence health negatively. Car usage also limits physical activity and influences the high overweight and obesity rates.

Physical infrastructure: The bottlenecks identified are the low connectivity of roads and cycling lanes, the indirectness of alternative routes leading to detours and the lack of road space caused by parked cars.

Governance: The governance of cycling and infrastructure is characterized by weak cooperation between different stakeholders such as Transport Malta, Local Councils and non-state actors. The end-users were consulted about changes, leading to policies that do not fit with their needs.

Public perception: Cycling on Malta is generally perceived as dangerous, mainly because of the behaviour of car drivers and other road users. People who do not cycle, perceive Malta as less suited and more dangerous for cycling than people who do cycle. Benefits of cycling are more evident to people who cycle.

Bicycling practices: Despite the bottlenecks, inhabitants and tourists are still cycling on Malta. Most people cycle for time efficiency in comparison to other modes of transport or for leisure. Most cyclists that were observed are cycling during rush hour to commute.

Conclusion

Cycling can form a solution to environmental and health problems once the bottlenecks are tackled. The bottlenecks are interrelated. Infrastructure directly affects public perception, which in turn influences the development of new policies. Nonetheless, governance incentives also directly influence the perception and behaviour of people. Next to that, there is a disconnection between perception and practices.

people start cycling, benefits of cycling become more evident.

The relations between these aspects show that it is important not to focus on one, but to take all into account when developing solutions. These well-integrated solutions will be more effective in comparison to separate initiatives tackling the bottlenecks. Recommendations are given to the integration of these aspects in the next section.

Recommendations

Recommendations are divided between short- (<7 years) and long-term (>7 years) measures. Also attention is given to steps that BAG can take in order to increase cycling.

However, before implementing recommendations, a social transition needs to be fostered through various measures to be successful. This social transition firstly consists of strengthening multi-stakeholder collaboration, for example in the form of a cycling committee. Secondly, capacity building through cycling amongst the Local Councils is vital for implementing further measures. Lastly, more effective mechanisms for the success of the measures need to be developed.

On a short-term basis, three steps can be taken to increase awareness of cycling. These are: improving the visibility of cycling by different events, developing a cycling map or app, and giving attention to cyclist's tests. For infrastructure, attention to road surface is important, as well as reducing driver's speed by for example speed bumps, replacing 'Share the road' signs with 'Cyclist may use full lane' signs, and placing more racks are options. Better enforcement of traffic rules or implementation of safety measures such as helmets and incentives for other modes of transport than cars can be implemented in the urban domain.

A long-term recommendation for increasing public awareness of cycling is the implementation of a nationwide information and education campaign about cycling and its benefits and possibilities. When infrastructure needs to be redesigned, the cyclists' needs should be taken into account by for example making space for cycling lanes. Once a national strategy for cycling and other sustainable mobility is developed, local and national policies should be integrated more to ensure success of this strategy.

The Bicycle Advocacy Group should contribute to these processes, in short and long term, by taking possible steps. Firstly, the network can be broadened by making more connections with several stakeholders such as governments, local councils but also companies involved in cycling. Secondly, BAG can raise awareness for cycling by promotional campaigns online or events in real life. Lastly, drawing more attention for cycling in policy making stays important, for example for the development of a cycling committee.

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1. Introduction

Environmental and health concerns are on the rise in Europe, and governments have resorted to adopting sustainable and clean transportation modes as one of the means to mitigate these problems. Malta has so far been relatively unsuccessful in tackling these issues as the island struggles with traffic congestion and air pollution partly resulting from high dependency on automobiles (Times of Malta, 2017). Amongst European Union (EU) countries, Malta has the third highest car-occupancies as of 2017, and 545 major roads were occupied by at least 6 million vehicles per year (Eurostat, 2018; Environment and Resources Authority, 2013). The number of cars is still increasing. On average, there is an increase of 33 cars on the road per day (Malta Independent, 2018).

The positive impacts of cycling on health, environment and economy make cycling an attractive solution to these problems. Due to the island's small size and dense transport system which leads to congestion and the fact that most journeys made by car are short trips, these trips can easily be managed within a few minutes by bicycle. Generally, the popularity of cycling in Malta is slowly but steadily increasing. The Bicycling Advocacy Group (BAG) is stimulating cycling by sharing their views on cycling improvements and addressing problems through advocacy work, political lobbying and networking with other relevant organizations with the aim to shift away from a car-oriented society.

Besides initiatives from BAG, the Maltese government is also involved in the development of cycling infrastructure. In 2006, the government introduced bicycle lanes to promote and encourage more people to use bicycles as a sustainable and green alternative to motorised transport (European Cyclists Federation, 2011). Despite these efforts, however, cycling practices have remained more or less constant with many inhabitants still reluctant to cycle. This research was carried out to identify why the Maltese inhabitants are still so far away from cycling.

To stimulate the development of cycling, it is crucial to understand the fundamental issues and infrastructure related to cycling. The purpose of this research is to identify and analyse the current social, physical and environmental bottlenecks to cycling within the Maltese transportation system. Based on the results of the research, recommendations for possible improvements of cycling as a mode of transport will be provided.

The research was carried out in five localities of Valletta, Sliema, Mosta, Luqa and the University of Malta. Additionally, parts of Qormi and Floriana were also included in this research. These localities were selected as the main areas of research as they give a representative image of Malta's diverse characteristics in terms of topography, population, infrastructure, and social and economic activities. Detailed information about the five localities can be found in Annex 5.

In order to attain the objectives of this research, both qualitative and quantitative data were gathered. Data was collected using literature reviews, observations, expert interviews, street interviews and surveys (questionnaires). Observations of the number of cyclists at different times of the day were made in the five localities, together with observations about the state of the infrastructure in each area (see results in Annex 6).

Annex 5). A total of 1044 questionnaires were filled out—675 amongst the five localities and 369 The online questionnaires were provided through Facebook pages of the University of Malta Facebook group of BAG. 13 out of 23 interviews conducted with various policy makers, e stakeholders were used to for this research. More information about the used methodology can b in Annex 1. In order to explore the different obstacles and potentials to cycling, four overarching were identified: governance, physical infrastructure, and public perception and bicycle practices. themes will be central for the analysis of this report.

In Chapter 2, the burdens of a car-oriented society with regard to environmental and public heal analysed. In addition, the governance structure is examined, providing an insight on the current t policies. Chapter 3 discusses and analyses the bottlenecks in relation to infrastructure, governan perception, which are all crucial aspects that need to be tackled to boost cycling in Malta. Subsec the existing practices and initiatives, and the role of physical infrastructure in the development o will be discussed in Chapter 4. Based on the findings of the research, the final chapters conclude main bottlenecks that have been identified in relation to cycling, and recommendations to stimulate the development of cycling are proposed.

2. Background

Before presenting the findings of this research, it is important to set a context. Below, a description of the most important characteristics of the environment and health, and policy situation is given.

2.1. Environment and health

The high density of cars in Malta results in congested roads, especially during rush hours, which increases the travel time of road users. The average commuting time is 40 minutes making Malta Europe's most congested country on the list (Times of Malta, 2018a; National Statistic Office, 2017). Not only are private vehicles affected by the traffic jams, but also public transport is severely affected. This is such as during rush hours, as buses are unable to arrive on schedule (Nokes, 2018). Besides congested roads, cars also take up a lot of space for parking. Calculation shows that the total number of parked cars in Valletta comprises an area that is four times larger than Valletta, which is about 320 hectares.

Another problem caused by the high amount of cars is the bad air quality. Around 85% of total emissions in Malta is caused by the fuel combustion of motorised road transport (National Statistic Office, 2017). This also contributes to the concentration of the ultrafine particulate matter (<2.5µm), which is considered the main air pollutant on Malta (Bonnici, 2018). These effects have a negative impact on the health of the Maltese. Consequently, around 6% of the Maltese suffer from asthma, and Malta has the highest asthma rate caused by asthma of the EU (Eurostat, 2017).

The other related issue to car traffic is noise pollution. Due to the high volume of vehicles on the roads, about 9,100 inhabitants are exposed to at least 65 decibels of noise during the day (Environment and Resources Authority, 2013). According to the World Health Organisation (2011), noise has the second highest negative impact on people's health after air pollution. It has been found that children living near to busy roads are more likely to be hyperactive and have emotional problems (European Commission, 2015).

Besides air and noise pollution, the high number of cars also poses safety risks to road users, especially pedestrians and cyclists, due to traffic accidents. The national hospital of Malta, Mater Dei, recorded an increase of 12% of the number of Accident and Emergency Unit victims related to traffic accidents between 2012 to 2017. Due to the lack of cycling experience and awareness, children are more likely to be involved in cycling accidents than adults (Attard, Deguara & Buontempo, 2016). In many injuries, some accidents have proven to be fatal. Statistics show that three deaths related to cycling occurred over the period of 2006 to 2015 (Attard et al., 2016) and a recent death of a male in June 2018 (Times of Malta, 2018b).

The car-oriented mentality of most Maltese also contributes to high rates of overweight and obesity. In fact, 69% of Maltese adults and children are either overweight or obese (Cuschieri et al., 2016). This is the result of a lack of physical activity in combination with an unhealthy high-fat diet (Reljic, 2017).

Furthermore, results from the questionnaires show that 58% of the Maltese perform sports on a weekly basis, and according to Carabott (2015) less than 1% of Maltese cycle regularly.

All the above-mentioned traffic related consequences contributed to the environmental and health costs of €274 million in the year 2012. However, by implementing active-travel policy plans, the costs could be reduced to €189.5 million by 2030 (Attard et al., 2015). Stimulating inhabitants to start cycling could have positive impacts on the environment, public health and general well-being of Malta. These positive impacts will be discussed in upcoming section.

2.1.1. Benefits of cycling

A shift from a car-oriented society towards a more cycling-oriented society can improve both the environment and the public health. As mentioned by the European Commission (n.d.), if car use in a city is reduced from 44% to 30%, the number of traffic jams, petrol consumption, and noise pollution can be reduced by 30%, 25%, and 9% respectively. Moreover, the road space and land use will be positively affected by the shift. As less space will be needed for car use, this creates more space for road users to travel safe and more opportunities to build public spaces or green infrastructures.

Besides the above mentioned environmental benefits related to cycling, positive health benefits have been identified. Since cycling can be considered as an equivalent to other physical activities with similar intensity, duration and frequency (e.g. manual labour, exercise and walking) (Götschi, Garrard & Corti, 2016), cycling can contribute to the improvement of the overall public health situation especially with regards to cardiovascular diseases, obesity rates, cholesterol, hyper pressure and diabetes.

One might argue that the risks of cycling might outweigh the health benefits of cycling, such as the risk of getting involved in an accident and/or getting injured. However, a recent study rejects this reasoning (Holm, Glümer & Diderichsen, 2012). A study by de Hartog, Boogaard, Nijland and Hoek (2010) compared the health benefits of cycling to that of the risks of air pollution exposure when shifting from car to cycling in urban commuting. The results of this study showed that people gained a higher life expectancy (between 3-14 months) because of the increased physical activities, compared to the life expectancy lost due to air pollution exposure of 1 to 40 days.

Another interesting issue to mention in relation to health are the psychological benefits cycling offers. It has been found that commuting from and to work has significant impacts on the psychological and physical states of people. Each extra minute of commuting affects someone's anxiety and happiness as well as the overall well-being (Brutus, Javadian & Panaccio, 2017). While on the other hand, commuting to work by car has shown to result in hostility, stress and anxiety due to traffic-related incidents such as congestion and obstructions (Hennessey, 2008; Roberts, Hodgson & Dolan, 2011; Brutus et al., 2017). Other studies show that cycling has positive effects on the overall mental state and stress levels when arriving at work (Brutus et al., 2017; Morris & Guerra, 2015; Ohta, Mizone, Mishima & Ikeda, 2015). When comparing cyclists to car drivers, cyclists find their commute more exciting and relaxing, and they, in such, are much better able to deal with the stress from commuting (Martin, Goryakin & Suhrcke, 2012).

2.2. Governance

In order to achieve the desired environmental and health benefits related to cycling described in the previous section, it is important to discuss the governance concerning transportation in Malta.

Governance is defined as the process of decision-making that could be undertaken by an individual, government, social system, network, etc. (Bevir, 2013). This section gives a brief explanation of the actors involved in the process of policy-making and the current policies related to cycling in Malta.

The current policies and strategies involving cycling on Malta are proposed, implemented and funded mainly by two main actors: the European Union and Government of Malta through Transport Malta (the body responsible for the transport sector in Malta). Transport Malta's responsibilities include planning, construction, reconstruction, design, maintenance and traffic management of the arterial, and district road network (Transport Malta, n.d.-a). Through its Transport Strategy Directorate, it is also responsible for developing, coordinating and implementing road transport policies and regulations in Malta (Transport Malta, n.d.-a). The Authority's mission is "to develop integrated transport policies which aim at accelerating modal shifts that favour public transport and non-polluting strategies (including those related to cycling) to ensure the development of an efficient and socially sustainable transport system in Malta" (ITS Malta, 2014).

The Local Councils have limited power and functions surrounding road infrastructure development. The governance structure is highly centralised. The local councils' main functions are the upkeep, improvement and maintenance of local roads (Commonwealth Local Government Forum, 2017). Any decision or alteration of traffic schemes and buildings are consulted with the National Authorities and Government of Malta. The expenses for all the major transport projects are managed by the National Government (Transport Malta, n.d.-a). However, a large amount of funding destined to infrastructure projects is provided by the European Union's programs such as the European Structural and Investment Funds (Commonwealth Local Government Forum, 2017).

Policy-making processes surrounding traffic schemes and plans are made by Transport Malta in consultation with Local Councils and the public (Commonwealth Local Government Forum, 2017). However, from an interview with the Luqa Council executive secretary, it was mentioned that very little citizen consultation is done in the infrastructure policy-making processes. Indeed, public consultation is done through a feedback section that takes part only when the policies need to be finalised (Commonwealth Local Government Forum, 2017).

2.2.1. Current policy and strategy plan

Transport Malta has implemented two transport strategies to improve the quality of transport in Malta: the National Transport Strategy 2025 and 2050. The National Transport Strategy 2050 sets out strategic goals, guiding principles and targets for the development of Malta's air, sea and land transport system that should be implemented in the long term (Transport Malta, n.d.-b), while the National

Strategy 2025 identifies the actions (physical infrastructure projects, regulatory, policy and building) that will be prioritised according to the financial resources available (Transport Malta, n.d.-a).

The National Transport Strategy 2025 wants to promote soft modes such as cycling and walking in areas with a high concentration of short distance trips (Transport Malta, n.d.-c). Moreover, improvements in the cooperation between road infrastructure managers, service utility providers and entities responsible for road construction are considered one of the main key points to minimise disruption during works and improve the quality of the roads.

Concerning the National Transport Strategy 2050, the main goal of the strategy is to provide a sustainable transport system which is efficient, inclusive, safe, integrated and reliable for people and freight and supports attractive urban and coastal environments and communities where people want to live and work (Transport Malta, n.d.-b). In order to achieve this goal, Transport Malta wants to improve the quality and effectiveness on the long-terms of the following policies related to cycling:

- The National Environment Policy (2012) which aims at maximizing opportunities where transport development can contribute to improving the quality of the environment.
- The National sustainable development strategy (2007) which aims to develop strategic priorities which determine the role in which transport will work towards adaptation to climate change and reducing greenhouse gas emissions.
- The Sustainable land transport (2003) which encourages sustainable modes of transport and work towards reduced car ownership levels.

3. Bottlenecks to cycling in Malta

There are plenty of reasons for a transition to a more cycling-oriented society, as argued in the previous section. However, despite efforts from the government to include cycling in the national development plan, the development of cycling in Malta is limited by several important bottlenecks. Bottlenecks related to infrastructure, governance and perception are discussed.

3.1. Infrastructure

Cycling infrastructure has been defined in this project as “the basic facilities, services and installations needed for the functioning of a cycling community, such as bicycle lanes, connections to other modes of transport, bicycle repair shops, and bicycle racks” (Dill & Voros, 2007). Four main obstacles related to cycling infrastructure in Malta were identified: safety, comfort, connectivity and directness.

Five important aspects related to infrastructure were found in literature: safety, comfort, directness, connectivity and attractiveness (Van der Spek & Scheltema, 2015). These aspects were used to develop indicators for the questionnaire. The indicators that were chosen most often in the questionnaire, were ‘a designated space for cyclists on the road’ (72%), ‘a smooth road with no holes or bumps’ (54%) and ‘lower speed limit for cars’ (41%), which all relate to safety or comfort aspects. Therefore the focus was on these two aspects. After observations it was decided to also include connectivity and directness as bottlenecks related to those two aspects were observed.

For more information on how these obstacles were identified, see Annex 2.3.

3.1.1. Road conditions

Given the extensive use of private vehicles and buses in Malta, the major arterial and distributor roads were observed to be relatively well maintained in terms of road quality. However, most of the secondary roads—which are occasionally used by cyclists (since main roads are often too busy for them)—were found to be unsatisfactory for safe cycling based on observations and interviews. According to a local cyclist interviewed in Luqa, there are only a few short cycling lanes in Malta, but these roads are not well maintained. There is debris scattered on the surfaces, which affects the safety of the cyclists and deteriorates the condition of bicycle tyres. Moreover, Nextbike officials stated potholes and cracks (see Figure 1) as one of the main issues that hinders cyclists, and as a result most bicycle users resort to the use of mountain bikes (Owner Nextbike, personal communication, June 6, 2018).



Figure 1 Potholes and cracks in roads observed in Sliema (left) and Sliema (right) of Malta

3.1.2. Road space

As mentioned earlier, car ownership has been rapidly growing over the years. Despite this increase, infrastructure has remained more or less the same, resulting in a lack of road space (Lecturer Spatial Planning & Infrastructure at University of Malta, personal communication, June 11, 2018). The lack of road space results in a competition for space between the different road users. The current transport infrastructure is mainly focused on cars, and a large portion of space is taken up by car lanes and car parks, and a limited portion is left for cyclists and pedestrians (see Figure 2). Parked cars do not only take up a large portion of space, but also pose a threat for cyclists. Drivers sometimes suddenly open their car door or start moving without checking if cyclists are approaching.

Removing parking spots to create more space is a sensitive issue, as Maltese are attached to their cars. Therefore, removed parking spaces must be compensated elsewhere. Underground parking could be a viable option, but is expensive and not always possible due to archaeological issues (Lecturer Spatial Planning & Infrastructure at University of Malta, personal communication, June 6, 2018). Furthermore, drivers do not like to park their cars in underground car parks, as they like to show off their cars and park their cars as close to their destination as possible (Mayor of Sliema, personal communication, June 12, 2018).



Figure 2 Like the majority of the roads in Malta, more than half of the road space in the University of Malta (left) and Valletta (right) is occupied by parked vehicles.

3.1.3. Connectivity

The connectivity of cycling infrastructure refers to the connection and linkage of the cycling network. One of the main issues for the safety of cyclists is the lack of cycling lanes. The few cycling lanes that are not well connected to each other (Lecturer Spatial Planning & Infrastructure at University of Malta, personal communication, 11 June, 2018). This is inconvenient and dangerous for cyclists, as cycling lanes sometimes abruptly end and cyclists are forced to use the road again. Connectivity is crucial to cycling infrastructure as it helps cyclists to reach their destination easier and faster.

3.1.4. Directness

Another important factor for cycling paths is directness. According to Spek and Scheltema (2015), road directness means that a route is short and direct, enabling users to quickly reach their destination. Cyclists in general want to use the shortest route possible, and directness could help cyclists to save time as this is one of the reasons why Maltese would start cycling. However, as cyclists have to obey traffic rules as cars, they are not allowed to cycle in the opposite direction in one-way streets. Like cars, cyclists have to use indirect routes, which are inconvenient for cyclists, especially in hilly areas. Thus, allowing cyclists to cycle in the opposite direction would improve the directness of cycling routes, but in this situation might also be dangerous since the roads are narrow and because cars do not expect cyclists from the opposite direction.

3.2. Governance

The quality of physical infrastructure for cycling is directly influenced by the effectiveness of the policies and strategies related to cycling. Indeed, a limited prioritisation of cycling policies would result in inefficient infrastructure for cyclists. Through the data collected it is possible to identify some bottlenecks related to the cooperation of different stakeholders and to the integration of different initiatives for cycling in the process of decision-making on cycling initiatives.

3.2.1. Weak cooperation and collaboration among different stakeholders

One of the main factors that impedes the promotion of cycling is the weak cooperation and collaboration among different stakeholders. Based on the expert interview analysis, it was identified that the different government agencies in Malta make decisions and take actions based on their organisational interests without considering its effects to other government agencies' policies. However, this weak cooperation leads to lack of integration between spatial and infrastructure planning, while this is crucial in promoting cycling. The review of expert interviews also showed that the lack of collaboration leads to problems in the transport planning system in Malta. As an example, Associate Professor of Environmental & Planning Law at University of Malta (Personal communication, June 6, 2018), mentioned that there are no responsible systems to ensure safety on the roads. Additionally, she states that the presence of multiple actors (Transport Malta, Local Councils etc.) complicates the transport planning process. Even though Local Councils are the administrative arms of the National Government, they have limited

planning decisions. Indeed, Local Councils can suggest to integrate cycling to future transport plans. However, only Transport Malta has decision and executive power on transportation regulations.

This lack of cooperation leads to the limited integration of various initiatives taken by different stakeholders. From expert interviews, it was identified that the government agencies and the lack of interaction and participation between other stakeholders leads to delays in the process of implementing and achieving sustainable transport systems in Malta. For instance, during an interview with a Professor of the University of Malta, she mentioned that, even though the university initiated a Green Travel Plan (GTP) to promote cycling among students and staff, this was only applicable within the boundaries of the university and none of the actions were replicated elsewhere on the island (Professor at the Institute for Climate Change and Sustainable Development at the University of Malta, personal communication, 5, 2018). This fragmentation between different stakeholders negatively affects the development of cycling.

3.2.2. Weak public consultation process

As explained in the second chapter, the National Government conducts consultations to discuss citizens' opinions on transport policies and projects. However, different stakeholders such as other cycling advocacy groups, knowledge institutes, bike shops, and citizens are only involved at the end of the policy-making process and project development (Transport Malta, personal communication, 2018). This means that the National Government is mostly informing the public about the new plans, it is not identifying the needs and opinions of the public. For example, Transport Malta is currently formulating the National Cycling Strategy, however no consultation has yet been conducted with other ministries, non-governmental organisations and citizens. Transport Malta plans to conduct public consultation when the said strategy has been finalised (Transport Malta, personal communication, 6, 2018). Furthermore, during an interactive session with members of BAG and other stakeholders (14th 2018), participants stressed the issue of lack of government consultation particularly with cyclists on the development and implementation of cycling infrastructure such as cycling lanes.

3.2.3. Weak law enforcement

Law enforcement is vital in shaping the behaviour of road users including car drivers, cyclists, and pedestrians particularly in ensuring road safety. One of the traffic rules implemented is the speed limit. However, based on the street interviews and observations in the different localities, it was concluded that the majority of motorists do not follow the speed limits especially on collector roads, compromising cyclists' safety. Furthermore, from the street and expert interviews, careless driving was considered one of the biggest reasons why people do not take up cycling which can be attributed to a lack of strong road traffic law enforcement.

3.3. Perception

Besides analyzing whether the infrastructure and policy on Malta is suitable for cycling, it is also important to have a closer look at what inhabitants of Malta think about cycling. Negative perceptions towards cycling are an important bottleneck towards the development of cycling in Malta.

3.3.1. Safety

Safety is influenced by a combination of the infrastructure and the behaviour of both car users and cyclists. Together they shape the perception of safety and/or danger. Results from the questionnaire show that 72% of the people perceive cycling on Malta as dangerous. Figure 3 shows the distribution (percentages) of perceptions towards the safety of cycling of the general population.

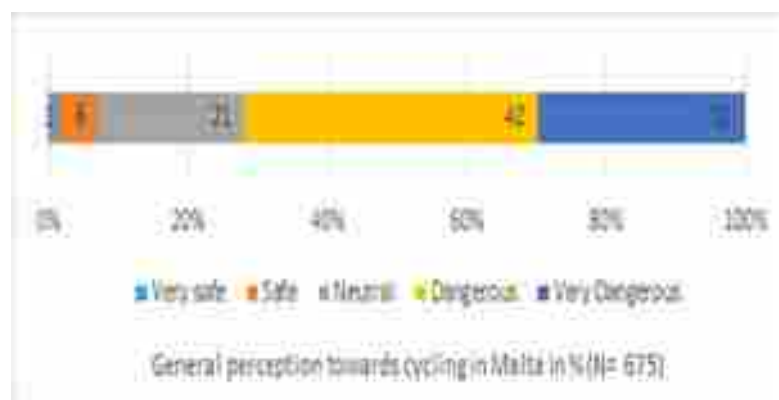


Figure 3 General perception towards safety of cycling

Concerns about the safety of cycling are not evenly spread among the population. Besides the difference in the perception towards safety between men and women (70% of the men perceive cycling on Malta as dangerous compared to 74% of the women), Figure 4 shows that children generally perceive cycling as less dangerous compared to other age categories. It can be assumed that this difference is caused by the experience children have with cycling. Another interesting finding is that non-cyclists perceive cycling on Malta as more dangerous than cyclists (80% compared to 65%). This is also supported as there is a strong significant relationship ($p\text{-value} = <0.000$) between cyclists and non-cyclists' perception towards the dangers of cycling. Therefore, it can be concluded that cycling reduces the perception of danger towards cycling on Malta.

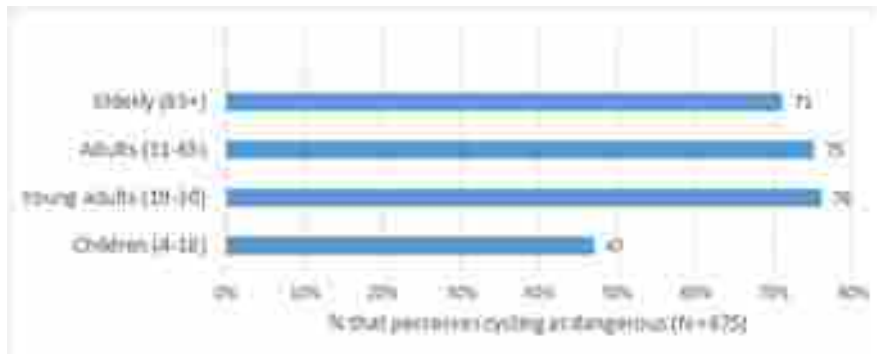


Figure 4 Percentage of inhabitants (age categories) who perceive cycling as dangerous

Interviews with inhabitants have led to interesting insights in the challenges which inhabitants of Malta are facing in relation to the safety of cycling. Sharing the road with different kinds of road users has been identified as a main challenge. The use of the road is dependent on two important factors that are interconnected to each other: the hard infrastructure and the type of road users and their behaviour (pedestrians, cyclists, motorcyclists and busses). The two factors influence the perception of inhabitants towards cycling, yet perception also influences the type and behaviour of road users. Both relationships will be elaborated upon in the next paragraph.

As mentioned above, the perception towards safety is not only influenced by the physical infrastructure but also by the road users and their behaviour, as illustrated by the following statement of a Maltese resident:

“It is very inconvenient to share the road with vehicles, bicycles and pedestrians all together. The roads are too narrow and the difference in speed is too high. Therefore, it is very dangerous to cycle on shared roads.”

Cyclists often mention the offensive behaviour of car drivers when talking about a lack of safety. From street interviews, car-drivers stated that cyclists also behave irresponsibly by cycling on roads with vehicles. In general, it can be said that different types of road users all blame each other, as confirmed in several street and expert interviews:

“Cycling is dangerous now, because of the lack of tolerance and behaviour towards each other.” (Ward, Nextbike, personal communication, June 6, 2018).

The influence of perception on the type of road users (and their behaviour) also became clear from several street interviews. It was found that once inhabitants have a negative perception towards cycling and its dangers, they do not use a bicycle as a mode of transport, but rather take the car. Even though they would like to start cycling, they perceive it as too dangerous in the current situation. Furthermore, multiple authorities and companies refrain from encouraging people to cycle as they equally perceive cycling as dangerous (Employee Office of Superintendent of Public Health, personal communication, June 6, 2018; Traffic Enforcer Mosta, personal communication, June 7, 2018). However, other inhabitants do see cycling as less dangerous, use their bicycle instead of the car.

3.3.1 Culture

The car is perceived as an important aspect of Maltese culture. According to one of the professors at the University of Malta, the car is a status symbol in Malta (Associate Professor Environmental & Resource Law at University of Malta, personal communication, June 6, 2018). This is especially true for the elderly. For young adults and adults, this is less the case as can be seen in Figure 5.

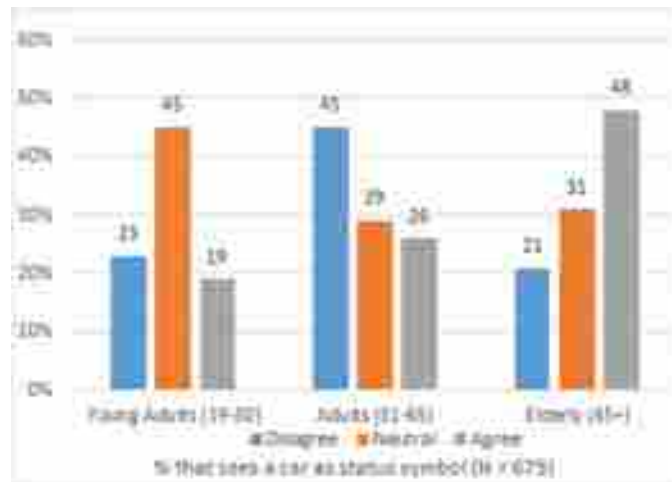


Figure 5 Percentage of inhabitants that see a car as status symbol

Besides the perception of the car as status symbol, there is also a sense of competition for road space between cyclists and cars. The street interviews showed that quite some Maltese non-cyclists find the primary use of roads should be for cars. This perception of competition between cyclists and cars is being further intensified as a result of the perception that the amount of cyclists has been increasing over the past few years.

3.3.3. Geography

Malta's climate is characterised by mild winters and warm summers, which logically could have a negative influence on the perception of people towards cycling. Especially during summers, the temperature is according to a lot of inhabitants too high to cycle (71%). Besides the climate, the landscape of Malta plays an important role in the decision-making process on whether to cycle or not. From the questionnaires and street interviews, it was discovered that 37% of the inhabitants of Malta argue that the landscape is suitable for cycling.

4. Existing practices and initiatives

Despite the fragmentation in governance, physical infrastructure and perception resulting in bottlenecks concerning cycling, people still cycle on Malta. The upcoming section will discuss the of cycling in Malta in more detail.

4.1. Differing perspectives

Although many obstacles were identified with regards to the perception of inhabitants towards cycling, it was also found that these perceptions between cyclists and non-cyclists are considerably different. A significant relationship was found between people who do not cycle and their perception of cycling in Malta's summers: non-cyclists argue that summers are too hot to cycle. Yet, people who cycle more often argue that summers are not too hot to cycle as can be seen in Figure 6.

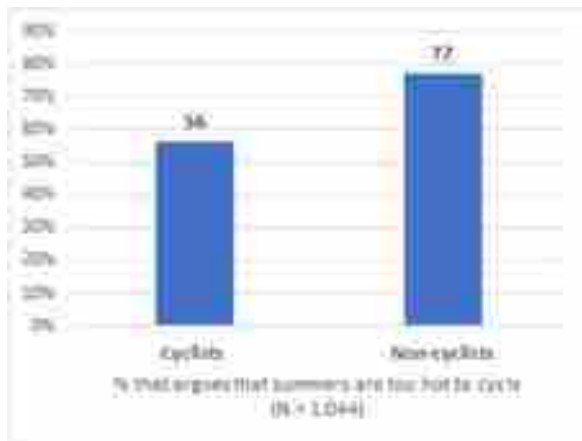


Figure 6. Perception towards temperature in summer for cycling

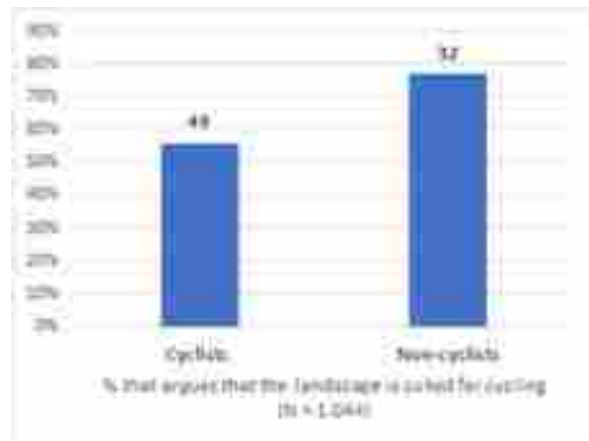


Figure 7. Perception towards suitability of landscape

A significant relationship is also found between how often people cycle and how suitable they think the landscape is for cycling (Figure 7). People who cycle perceive the landscape as suitable while people who do not cycle perceive it as less suitable. The findings are interesting as they suggest that people who cycle overcome these perceived obstacles. This might be supported by the following statement from a professor at the University of Malta:

“Topography and the climate of the area is not a problem, it is an excuse to avoid cycling. That is something that is usually given as an excuse” (Professor at the Institute for Climate Change and Sustainable Development at the University of Malta, personal communication, June 5, 2018).

Furthermore, non-cyclists perceive cycling as more dangerous than cyclists (78% and 66% respectively). In the interviews, many cyclists indicated that cycling in Malta is actually not that dangerous once one knows how to behave and which routes to take. These findings imply that the perception of danger can

bypassed once people master the required skills and competences. These skills and competences are further discussed in section 4.2.

4.2. Bicycling practices

This chapter will illustrate the bicycling practices on Malta by describing when the practices occur, how often people cycle, the motivations of the cyclists and what kind of materials there are involved within the practice of cycling on Malta.

When describing the bicycling practices on Malta, it is important to know when people started cycling. Results from the questionnaire show 70% of the respondents learned how to cycle from their family. 20% are also cyclists that learned cycling from friends, or who taught themselves. The average age that people learned how to cycle is 12, however, the largest amount of people learned it between the age of 10 and 15.

There are multiple reasons why people start cycling, and one of the most mentioned was-for fun. The most reason mentioned by the cyclists was that it is quicker than other modes of transport, as they can avoid using the vehicles that for instance are stuck in traffic jams. This gives a strong argument to start cycling for commuting. People also started cycling because they love being outside, they like the fresh air, the sportive character of cycling or the health benefits motivated them to start. As is stated in the previous chapter, the amount of cyclists on Malta has increased. This results in a positive effect on the amount of people cycling, as seeing other people cycling motivates people to get on a bicycle themselves. From an interview it can be concluded that cyclists inspire each other to cycle:

“You think oh no!, I can’t ride a bike, but then I see you doing it and more people doing it, and it encourages people to start.” (owner Nextbike, personal communication, June 6, 2018)

This is also confirmed by street interviews with cyclists on Malta. Especially the younger generation is eager to learn how to cycle, for instance, one Maltese female cyclist stated that:

“I really was ashamed that I didn’t know how to cycle, until my boyfriend taught me. Now I can ride with my friends!”

Figure 8 illustrates the three basic categories of reasons people on Malta indicated on what they are most about cycling. The largest category is ‘sense of freedom’, which includes the adventure aspect of cycling, and the feeling of independence and excitement that comes with riding a bike. The second category is reduced time in traffic. This includes the fact that for a lot of trips it is faster to take the bicycle. Cycling makes life easier and it is also more convenient, for example because of flexible parking options. The last category is sports-related. This includes healthy living and exercise. Overall, cyclists state that they feel proud when they use a bike instead of a car. From the respondents that cycle daily, this

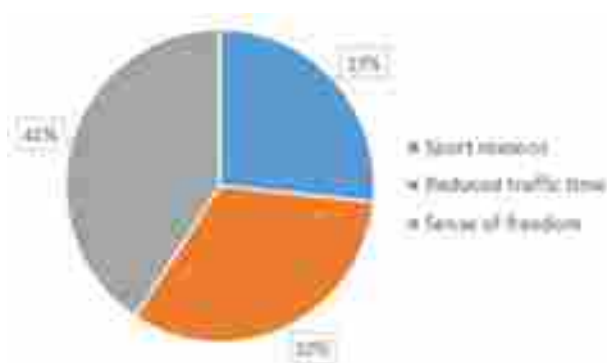


Figure 8 Reasons to cycle

To understand the people who are already cycling on Malta, it is important to know what material used when cycling. Almost two third of the observed cyclists on Malta use a sports bike, which was 20% of the time a mountain bike. This was acknowledged by an employee of the bike shop ‘The Cyclist’ in Qormi that stated that:

“Mountain bikes are the main selling item in this shop. This is because the quality of the roads on Malta is not good. There are a lot of bumps and potholes. You could even break a rim, or worse (Employee of The Cyclist, personal communication, June 7, 2018)

It may be assumed that people use their sports bike as well to deal with the mountainous terrain on the Island. Additionally, people who cycle indicated that the landscape is suitable for cyclists. Thus, sports bikes are more suitable for the current cycling practices. In contrast, less than a third of the observed wore sports clothes or wore a helmet. This may imply that people use normal bikes as well as sports bikes for their daily activities.

Most of the cyclists on Malta use cycling as a form of commuting including going to work, school, running errands, which are activities mostly done during rush hour. To find out when the people cycle, different observations were done throughout the island. A peak in the number of cyclists is observed during the typical rush hours, which are according to the president of BAG, from 06:30 to 08:00 and from 16:00 to 18:00. Different amounts of cyclists were observed during rush hours and non-rush hours. During rush hours, the average amount of cyclists per hour was 10, during non-rush hours this was 6. However, the area of Mosta is an exception. The observations show that in this area there are on average 7 cyclists cycling during rush hour and 20 during non-rush hours. Interviews with people in Mosta show that they see cycling rather as a sport activity and that they enjoy being outside. Additionally, the owner of Cycles located in Mosta (personal communication, June 6, 2018), mentioned that people who are not interested in a bike do this solely for sports.

In general, cyclists indicated during street interviews that when they cycle, they do it frequently. 70% of the cyclists mentioned that they do it daily, and 30% the cyclists use their bike multiple times a week. This is supported by the finding that a lot of cyclists commute on their bike, which may imply usage for

activities. During summer months however, cyclists indicated that the cycling activities might decrease because of the warm temperatures.

Next, one of the competences connected to the practice of cycling on Malta is knowing where to cycle. When asked about their favourite routes on Malta, a lot of different answers were given. Cyclists prefer the quiet routes, with less cars. The countryside was mentioned as their favourite, picturesque views along the roads were also stated as a reason to take certain routes. Besides knowing which route to take, it is also important to know one's position on the road. As stated by the chair of Cycling:

“You really need the practice, skills and confidence to cycle [...]. It is necessary to own your space on the road in front of cars to cycle in a safer way. But even then, cyclists need to be very careful and aware because the tolerance and understanding for cyclists is low (Chair of Cycling, personal communication, June 9, 2018)

Furthermore, the cyclists on Malta indicated that sometimes, due to the dangerous behaviour of other road users or lack of space on the road, they were forced to drive on the sidewalk. By a lack of suitable cycling routes, they are also forced to sometimes use the highways, even though they are dangerous to cycle on.

4.3. Existing initiatives to tackle bottlenecks

Some efforts have already been made to overcome the previous mentioned bottlenecks. Various stakeholders have responded to these difficulties by developing pilot projects or setting up their own initiatives. The drawbacks of the different initiatives have also been analyzed in order to come up with recommendations to improve the existing initiatives.

4.3.1. Pilot projects

Safer cycling routes

Transport Malta is working on safe urban cycling routes to encourage cyclists to use the distributed network instead of arterial roads. There are two routes identified as pilot projects; one from Mosta to the University, and one from Saint Julian's to the ferry in Sliema. However, these routes are not developed yet (Lecturer Spatial Planning & Infrastructure at University of Malta, personal communication, June 11, 2018). These routes will be secondary routes, and therefore safer for cyclists. The purpose of the project is to encourage cycling. However, the routes are longer and steeper compared to the direct routes. The project's aim is to encourage people to cycle, then the routes should be most convenient (Lecturer Spatial Planning & Infrastructure at University of Malta, personal communication, June 11, 2018).

Park and Ride (P&R)

Other pilot projects were carried out to create more space for cyclists and pedestrians through reducing traffic volume. Examples of measures that are already taken are P&R facilities. P&R facilities are

in Floriana, Pembroke, Mdina and Marsa, to reduce car traffic in the city centres and to increase the use of public transport (Attard, 2012). However, some P&R facilities have been less effective in reducing traffic congestion due to poor placement. For example, a P&R facility was established in Floriana to reduce traffic around Valletta, but it was too close to Valletta to make any significant reduction in traffic as the roads were filled with cars up until Floriana.

4.3.2. Shared roads - solution to lack of space

Transport Malta has introduced the 'Share the Road' concept in order to make most efficient use of current road space (Figure 9). Within this concept, car drivers are expected to share the space on the road with other road users like cyclists, pedestrians and wheelchair users. The concept gives cars and other road users equal rights and allows more space for the slower road users.

Another example is 'priority lanes', on which only cars carrying three people or more, buses, taxis, motorbikes, electric and LPG cars, and bicycles are allowed to drive (Times of Malta, 2016) (Figure 10). The special lanes for these vehicles were created to make their trips faster than for normal cars, thereby more attractive. Although drivers using this lane illegally risk a €50 fine, many cars ignore the signs and use the lane to escape from the traffic jams (Times of Malta, 2017). At the same time, priority lanes can be dangerous and uncomfortable for cyclists since buses and other vehicles pass close by.

In some of the research areas, stand-alone signs that indicate shared roads were observed (Figure 9). However, a study by Hess and Peterson (2015) shows that 'Share the Road' signs cannot improve road conditions and even sometimes results in misinterpretation and conflicts by both cyclists and car drivers.



Figure 9 Sign marking 'Share the road'



Figure 10 Sign marking 'Priority lane'

4.3.3. Non-governmental initiatives

Some initiatives concerning cycling are also provided by other actors such as private businesses, universities, and citizens. As a business example, Nextbike has the nationwide 'BikeAbility' program for anyone who wants to learn how to ride a bicycle. Another example is the Green Travel Plan facilitated by the University of Malta which promotes a healthier and sustainable mobility through walking, cycling, car sharing, electric vehicles and public transportation to reduce car use (for more detailed information see A

5). Concerning NGOs initiatives, a good example was an initiative conducted by BAG in raising awareness of cycling in schools, such as organising students to cycle to school in Żejtun village. Students were motivated with this event of cycling to school, to the extent of wanting it to happen every day so that they can use their bicycle to go to school (Cilia, 2018). Lastly, cycling groups such as the cycling club in Mosta are good examples of initiatives led by citizens (for more information, see Annex 5)

4.4. Stakeholder involvement in cycling governance

The previous chapter shows that initiatives regarding cycling are both coming from governmental and non-governmental organizations. Throughout the data collected, it has been observed that the majority (88%) of the street interviewees sees the government as the main policy maker for improving the cycling infrastructure. However, inhabitants also see a role for themselves in the development of cycling infrastructure. Furthermore, 44% of the respondents answered that residents should contribute to the policy making process to make the Maltese infrastructure more suitable for cycling (see Figure 11).

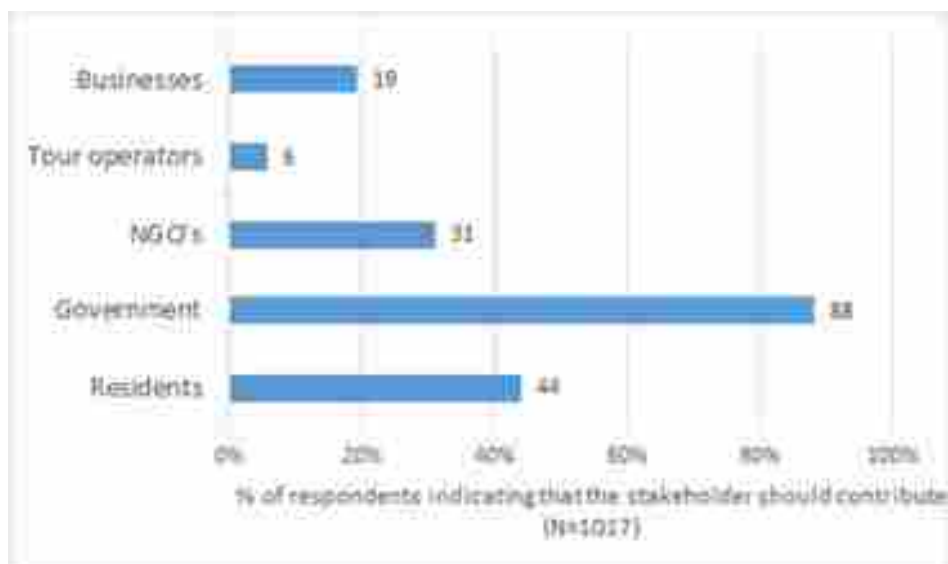


Figure 1 Percentage of respondents indicating who should contribute to the transport policy making process

In relation to the opinions of inhabitants a distinction can be made between cyclists and non-cyclists. Non-cyclists are less willing to be involved than cyclists (34% and 66% respectively), again showing fragmentation within the perception of different groups of inhabitants. The way in which they would like to contribute differs from person to person. The questionnaires showed that 26% of all the people answered “yes” to the question would contribute by starting to cycle themselves. However, some are worried about safety and would only start to cycle when the infrastructure would be improved.

There are also a few people who stated that they would like to contribute to the cycling infrastructure. One male stated that he could help them to construct the roads. A student from the University of Malta mentioned that he intends to work as an architect and he would take cyclists into consideration when he undertakes the design. Furthermore, some car drivers said they would like to contribute by adjusting their behaviour towards cyclists.

Other inhabitants argue that they can contribute by stressing the positive aspects of cycling, such as environmental and health benefits. They think this can be achieved by educating children about cycling, organising or joining a cycling-related activity and through sharing posts on social media. In one of the interviews, the owner of the bike-tour company EcoBikes mentioned they would like to help BAG to organise a car-free Sunday between St Julians and Valletta, as this would allow people to experience the positive aspects of cycling (Owner EcoBikes, personal communication, June 11, 2018).

5. Conclusion

Malta is a highly urbanised and densely populated country, with high car-occupancy. As a result, many environment and health problems, which have been discussed in the previous chapters. Up to 100 million was spent on dealing with these issues each year. To improve the quality of the environment and health conditions in Malta, promoting cycling is regarded as a potential solution. Although cycling has become increasingly popular over the past years, many bottlenecks that hinder the development of cycling on Malta have been identified.

In governance, three issues were identified which impede the development of cycling in Malta. First, there is a lack of integration between different governance levels. The lack of intra-governmental cooperation takes place between, for instance, Transport Malta and Local Councils, but also between government and non-state actors. This relates to the second issue identified; the disconnect between cycling policies and needs. It was established that cycling policies do not match the needs of cyclists due to the lack of participation in planning policies. Lastly, there is a lack of strong traffic law enforcement leading to dangerous situations for cyclists.

For infrastructure, the bottlenecks identified at governance level directly result into a flawed vision of cycling infrastructure. As a result, infrastructure is not well-integrated. This has resulted in poor connectivity throughout the island, poor road conditions and a lack of road space due to narrow streets and excessive number of parked cars.

Moreover, public perception of cycling in Malta is in general negative as a result of concerns about safety and the idea that weather and the landscape of Malta are not suitable for cycling. However, it was established that once people start cycling, these hurdles can easily be overcome through the use of appropriate materials and competences. For example, the danger of cycling in Malta can be minimised if cyclists plan secondary routes in advance, avoiding busy roads.

Well-integrated policies are essential for the development of one clear infrastructural vision. Infrastructure directly affects public perception, which in turn steers the development of new policies. Nonetheless, governance incentives also directly influence the perception and behaviour of people. As a result of these relations between policies, infrastructure and public perception, it can be concluded that one cannot solve the bottlenecks standing in the way of the development of cycling in Malta separately. To minimize the obstacles to cycling in Malta, the issues must be tackled concurrently. In the following chapter, recommendations to integrate governance, infrastructure, and perception and behaviour are provided.

6. Recommendations

In order to overcome the issues previously identified, and to promote cycling in Malta, a strategy was developed. Based on the bottlenecks identified in Chapter 2, four categories of recommendations have been suggested. These categories are:

1. Social transition
2. Policy and enforcement
3. Exposure and knowledge sharing
4. Infrastructure

To develop a robust strategy, a distinction is made between short term (<7 years) and long term strategies. Actions that are common or beneficial to all subcategories and are easily achievable by 2025 have been directly included in a short-term strategy. Other actions, that involve difficult decision-making processes and are uncertain as a result of unpredictable changes in economic, social and environmental trends, have been classified as long-term actions.

The specific content of the different actions should remain flexible, in order to respond adequately to future developments. Furthermore, many actors should be included from the beginning on in order to better communicate the results and the expectations of end-users. As already stated in the conclusions, recommendations cannot be implemented separately, and it should be taken into account that infrastructure fragmentation can only be solved by tackling them all. A timeline for the developed strategy is shown in Figure 12



Figure 12 Timeline of developed strategy

6.1. Social transition

The first steps that have to be taken in order to ensure the success of the other recommendations are social measures to strengthen collaboration between stakeholders, empower civil society and build its capacity. The following steps should be undertaken in collaboration with citizens, NGOs, private and public sector, such as developers and investors, public institutions and all other stakeholders. These steps should be undertaken continuously.

- Strengthen multi-stakeholder collaboration, specifically the coordination among different ministries and branches (e.g. transport, environmental, health, planning and finance), local councils, private and public sector, non-governmental organisations, academia, and citizens. These stakeholders should be involved in the policy-making process through consultation, so as to identify and consider the different needs and expertise. This could be achieved in the form of a cycling committee.
- Conduct capacity-building seminars to local councils. The local council has a vital role in the implementation of cycling development as they know the structure of their own locality. Providing them with skills and knowledge on cycling will enable them to propose projects on sustainable mobility.

- Formulate monitoring mechanisms of cycling projects both at the national and local level. It is important to monitor the implementation and the impact of cycling development to ensure an integrated implementation of different cycling projects. A cycling committee could also take on a role.

6.2. Short term measures

6.2.1. Exposure and knowledge-sharing

Improvement of public perception with regards to cycling is essential for the general public to accept policy and infrastructural measures, especially the more profound ones.

Furthermore, the sharing of knowledge is essential for people to be able to cycle in the short-term. The following measures should be taken:

- Increase visibility of cycling through various events and social media campaigns. Exposure to cycling will help improve perceptions with regards to cycling. Increased visibility will show the benefits of cycling and will motivate others to get on the bicycle. Examples of such events are car-free Sundays, cycling tours, lectures, etc. (continuously).
- Design and share a national cycling map. This could be in the form of an app to increase accessibility and popularity among a younger audience.
- Improve cycling awareness in automobile driving tests. This can play a significant role in improving road safety.

6.2.2. Infrastructure

Improvement of infrastructure for cyclists should not have big consequences for car drivers in the short-term, as it would contribute to a negative image of cycling due to the sense of competition for space between car-users and cyclists. Implementing separated cycle lanes in areas where there is already a lack of space is in the short-term not realistic. Therefore, the focus should be on small changes in current infrastructure.

- Maintenance of road surfaces to ensure safety for cyclists and pedestrians (continuously).
- Installation of (speed) cameras and the construction of speed bumps to reduce the speed of cars.
- Placement of clear road signs and road markings that make cars aware that they share the road with other road users like cyclists. For instance, as “Share The Road” signs are not effective, they should be replaced by “Bicycle May Use Full Lane” signs. Signs should be placed in consultation with cyclists to identify problem areas. This recommendation should be implemented only after speed enforcement has been improved, to avoid dangerous situations for cyclists.
- Once these two aspects have been improved, and more people start cycling, more bike racks and other bicycle facilities should be installed in collaboration with cyclists, as they know best what they are needed.

6.2.3. Policy and enforcement

As identified in the research, a lack of focus on slow mobility and fragmentation in current mobility and different government levels reduces the effectiveness of implemented cycling infrastructure. To overcome these challenges, the following measures should be implemented:

- Implement strict enforcement of traffic rules and regulations, specifically the lowering of speed limits to ensure safety and reduction of noise and emissions. Provision of legal penalties for reckless or careless drivers should be implemented (continuously).
- Implement the use of safety measures such as helmets.
- Once perceived safety of cycling has increased as a result of implemented changes in the policy themes, incentives for people to travel to work using alternative modes of transport, such as bus or (e-)bike should be provided, and car use should be discouraged or reduced by introducing paid parking.

6.3. Long term measures

6.3.1. Exposure and knowledge-sharing

In the long term, continuous efforts to create public awareness are required to ensure acceptance of reaching measures.

- Implement an Information and Education Campaign (IEC). The national government should coordinate awareness raising activities on cycling in cooperation with various stakeholders. Strong continuous campaigns about cycling at all levels, especially for the young generation is vital for promoting cycling. Specifically,
 - Promote schemes for physical activity including cycling and walking.
 - Conduct awareness campaign for cyclists and other road users on responsible cycling and road safety.
 - Once cycling in Malta has become more safe: encourage parents and children to use a bicycle when going to work and school.

6.3.2. Policy and enforcement

To ensure effective large-scale adjustments in the transportation system, the following adjustments should be made with regards to policy:

- Development of one standard for cycling (lane) infrastructure by Transport Malta.
- Once a cycling infrastructure standard has been set, the national and local policy framework should be integrated to implement cycling policies at the local level. This will improve effectiveness.

6.3.3. Infrastructure

In the long term, the infrastructure of Malta should be redesigned, and cyclists and other users should be included. Also, the car traffic volume should be reduced by encouraging people to use public transport for longer trips and to walk for shorter trips.

- On roads with high speed limits for cars, cycle lanes should be physically separated from the road by curbs or fences. Construction of these cycling lanes should be undertaken in collaboration with BAG and other cyclists.
- To limit the sense of competition between cyclists and non-cyclists, a decrease in motorised traffic and parked cars is required. Changes in the public transport system are needed to improve connectivity between different modes of transport, which could reduce the use of car lanes. Existing bus/priority lanes should be expanded and other public transport hubs than the ones in Valletta should be created. Since Transport Malta states that increase of sustainable mode of transport is part of their mission, these changes can be incorporated in new infrastructural plans.
- While accessibility by foot, bicycle or public transport is improving, car parking can be relocated - outside city centres or underground to create more space for pedestrians and cyclists on city streets.
- Lastly, car free town centres can be created where possible.

6.4. What can BAG do?

Besides this more general strategy to implement cycling in Malta, it is also interesting to reflect on the role of BAG in this strategy. Firstly, it is important for BAG to widen its network and build connections with other stakeholders. BAG should collaborate with other NGOs, cycling clubs, cycling groups and businesses (e.g. EcoBikes, Nextbike) to promote cycling together and create a large societal impact.

Secondly, BAG can play an important role in the creation and circulation of awareness and promotion campaigns, proposed in the exposure and knowledge sharing section. The following concrete steps should be taken:

- Develop a professional national and local cycling map, perhaps in the form of an app. This map should be shared with current cyclists, but also to stimulate beginning cyclists to get on their bicycles. The map can also be handed over to the authorities, who can then use the map for infrastructural developments or educational purposes.
- Keep organising cycling-related events, for instance a car-free Sunday. These events can be organised in collaboration with other stakeholders (e.g. local council and EcoBikes) to increase visibility and create awareness of benefits of cycling.
- Create an official knowledge-sharing platform (e.g. a well-designed website) with tips and tricks for beginner cyclists. Keep this platform separated from the platform where long-time/experienced cyclists express their concerns and negative experiences.
- Organise lectures or events at schools to promote cycling among the younger generations.

- Keep organising classes for beginning cyclists and set up educational cycling programmes for at schools “How to be a cyclist in Malta”.
- Emphasise the benefits to cycling through (social media) campaigns. For example, by sharing the promotional video attached to this report.

BAG itself does not have enough power to implement most of the recommendations formulated in the transition, policy and enforcement, and exposure and knowledge sharing, but can use its network for these actions. Advocacy and lobbying will play an important role in ensuring that these steps are taken. BAG could focus on the following steps:

- Push for the creation of a cycling committee. This will allow for an official platform for BAG to voice concerns and successes, and to advocate for improvements with regards to development of cycling on Malta.
- Advocate for improvements in infrastructure and policy as mentioned above.
- Lobby for inclusion of cycling into the national school curriculum.
- Enter into dialogue with big employers, such as ministries, schools, etc. to get them to incentivise cycling to work.

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Annex 1: Methodology

This section elaborates on the methods used in this research. As indicated before, the research was divided in five different expert groups working on the following subjects: policy, public perception, environment and public health, transport infrastructure, and bicycling practices. Representatives from each expert group collected data in five geo areas. The different localities were; Valletta, Sliema, Mosta, and the University of Malta, as these areas give a good representation of the country's characteristics in terms of topography, population, infrastructure, and social and economic activities. The first chapter elaborates on the different data collection methods that were used for this research. The second part describes how the data collected in these methods were used for the expert specific analyses.

1.1 Data collection methods

Within this research, both qualitative and quantitative data collection methods have been used. Quantitative data that has been used was collected through questionnaires and observations. Qualitative data that has been used was generated via interviews and social media analyses. The research on Malta has been conducted in two weeks of time between June 4 and June 16 2018. The remainder of this section describes how these methods were developed and which choices were made.

1.1.1 Questionnaire

In order to collect the opinions from the citizens, a questionnaire was developed with several different questions on different subjects. The questionnaire can be found in Annex 2.1. The questionnaire consisted of two types of questions: personal characteristics of the respondents and questions about their perceptions and opinions. The first type of information was used to see differences between groups of people, while the latter was used to retrieve the data for the analyses. The questions in the questionnaire were designed to collect quantitative data, however, at the end of the questionnaire there was one open question that provided qualitative data. In total 775 questionnaires were printed and distributed over the different geo areas. Besides the paper questionnaires, a digital version was also created which was distributed through social media, which has led to 369 responses.

1.1.2 Street interviews

Besides questionnaires, people on the streets have been interviewed. The aim of these street interviews was to get a more in depth understanding of the perceptions of inhabitants of Malta towards cycling. The street interviews were conducted based on the street interview list that can be found in Annex 2.2.

1.1.3 Cyclist interviews

When investigating the cycling practices on Malta, it is important to take the vision of the local cyclists into account and especially the ones of the cyclists. Therefore, street interviews took place with cyclists in the field. In every geo area, eight to 30 street interviews with cyclists were conducted. These street interviews then were used to gain insights in the practice of cycling on Malta. The interview list can be found in Annex 2.7. However, it needs to be mentioned that the interview guide was used as a guide and therefore not all questions in this guide have been answered.

1.1.4 Expert interviews

In depth interviews with experts were conducted to gain more insights. These experts were able to provide insights into existing policies and structures. The interviews were conducted with policy makers (on national and regional level), knowledge institutes, and private stakeholders (e.g. NGOs, tour operators, bicycle stores). 27 expert interviews were conducted during this research. A list of these interviews can be found in Annex 2.3. As with the street interviews, an interview guide was developed with different questions for each stakeholder. This guide can be found in Annex 2.2.

1.1.5 Street observations

Street observations were conducted in all five geo areas to collect qualitative data about the quality and safety of the current infrastructure. Important aspects that were taken into consideration were the presence of bicycling lanes, the wideness of roads, the condition of the roads' surfaces, the presence of bicycle parking facilities, the number of bicycles parked in bicycle parking places, and speed limit for cars. The observations were done according to the observation protocol in Annex 2.3.

1.1.6 Cyclist observations

To create an insight in the practice of cycling on Malta, cyclists were observed. These observations included counting the amount of cyclists, the age category of the cyclist, the gender, whether they were wearing a helmet or not, what type of bicycles were used, and what kind of clothes these cyclists wore. Three age categories were defined: child, adult and elderly. For the types of bicycles and types of clothing, a distinction was made between sports and non-sports. The observations were conducted in all five geo areas and each observation session took one hour. For each geo area, observations were conducted in two different places that would provide relevant information and would create a representative image of the area. In some geo areas it was more difficult to generate relevant information, and observations took place in more places. The hours were divided in rush hours and non-rush hours. Rush hours were considered from 06:30 to 08:00 and 16:00 to 18:00. The observations were spread over different days of the week (weekend, holiday, weekday) to create a representative image.

1.1.7 Document analysis

Another data collection method that has been used is the document analysis. This method is especially useful to get the right data out of a (external) source. In this research different kind of documents have been analysed, such as policy strategies and regulations, to get insight in current visions and the working of policies. The document analysis has also been used to build up a theoretical framework in the form of a literature research. In the latter, existing relevant literature that has been written by other researchers has been used. The literature review provided facts about specific domains which helped to develop questions for the questionnaire or to back-up recommendations.

1.1.8 Social media analysis

Social media analysis was used to get more information on the practices and perceptions of cycling places where only few cyclists were observed. The analysis was mainly done in the Facebook group BAG.

1.2 Use of collected data

The following paragraphs will explain how the different data collection methods are used by different expert groups.

1.2.1 Policy analysis

For the policy analysis data has been collected through expert interviews, document analysis, and a questionnaire. Expert interviews have been mainly performed with policy makers on the National level with ministries who have a stake in cycling, and on the local level with Local Councils. Expert interviews provided valuable insights in policy-making processes on national and local levels. Also business information centers, and NGOs have been interviewed to place policy in a multi-stakeholder context. Concerning the document analysis, mainly policy documents on European and national level have been analyzed, where cycling is integrated in the context of the general transport system. Finally, also public opinions on policy-making processes have been collected. This has been done by using the questionnaire to analyse public perception on who should be included in policy-making processes. The results indicate how people see the role of stakeholders (residents, government, NGOs, tour operators, businesses and others) in a policy-making context. This information was compared with the current situation to provide recommendations.

1.2.2 Public perception

The main goal for public perception was to identify the various opinions of inhabitants towards cycling and also get more insight in the willingness of inhabitants to be involved in the development of cycling. To get the right information, several data collection methods have been used such as expert interviews, street interviews and questionnaires. It was decided to focus within the public perception on aspects that are closely related to cycling, such as safety, culture and geography. Once the aspects have been selected, the underlying concepts below these aspects were revealed. An example is that geography is partly based on the climate (temperature) and the landscape. In turn, the concepts of temperature and landscape were used in the questionnaire.

Overall it can be argued that the questionnaire was very important for the public perception because a lot of opinions of inhabitants could be collected by making use of this method. However, in depth information about the perceptions was also needed. Therefore it was decided to not only use questionnaires, but also fill in the questionnaires together with people on the island, so more

insights about their opinions could be obtained. The in depth information was written down on the spot so it could be used, in a later stage, for the qualitative data analysis.

Both the qualitative and quantitative data have been analysed to get insights in the perception of Maltese inhabitants. The quantitative data has been used at first to get more insight in the opinions of inhabitants towards cycling, while the qualitative data has been mainly used to support findings that came out of the questionnaire. The street interviews also helped to get a more in-depth view on the reasons behind the perception of inhabitants.

Important to mention is that for some of the public perception analysis, the online questionnaire has not been taken into account. The reason behind this decision is that the online questionnaire is mainly filled in by BAG members, who already have a clear perception of cycling on the island, and this research aims to reveal the perceptions of inhabitants in general. If the online questionnaire (N = 369) would have been included in some analysis (for instance the comparison between gender or age categories), it could have biased the results of this research because of its high N value. However, when the opinions of cyclists and non-cyclists were compared, the online questionnaire was taken into account, since the BAG members who filled in the questionnaire do cycle and the analysis was especially looking for differences between cyclists and non-cyclists.

1.2.3 Environment and public health

For the environment and public health section, data and information were mostly collected through document analysis and expert interviews. Documents such as academic literature and government reports mainly focused on the health situation and environmental quality on national level in Malta. Both positive and negative impacts of cycling were included in the literature, which helped to understand how cycling could affect the environmental and health situation on the islands. The interviews were conducted to obtain new and relevant information regarding environment and health issues, such as actual impacts and impacts, and to validate the data from the earlier conducted document analysis. With all the gathered information about the current environmental and health situation, its impacts, and the pros and cons of cycling, this section became the starting point for the remainder of this report.

1.2.4 Transport and infrastructure

In order to improve the physical infrastructure, the bottlenecks in the current infrastructure were identified by street observations, expert interviews and the outcome of the questionnaire. As a starting point, five important cycling infrastructure aspects were found in literature: safety, comfort, directness, connectivity and attractiveness (Van der Spek & Scheltema, 2015). These aspects were used to create indicators that served as input for two questions in the questionnaire (Annex 2.1.). In the questionnaire, people were asked which aspects would encourage them most to cycle (more). A maximum of three answers could be given in the first question. The second question focuses on aspects that are related to cycling lanes. In this question, only one answer could be given. The results of these questions are used to identify the most important aspects that would encourage people to cycle.

To support the findings of the questionnaire and to identify possible other aspects, expert interviews were carried out and observations were done in the field.

The expert interviews were carried out to get to know more about the current infrastructure bottlenecks as well as to learn more about future initiatives. Different experts were contacted: researchers at the University of Malta as well as Transport Malta and Local Councils.

The street observations were carried out in the five areas walking around, using a printed map. Before observations, an observation frame was determined (Annex 2.3.) containing several aspects: the presence of cycling lanes, obstacles, width of the road, speed limit, cycling related facilities, street lighting, bus stops and bus areas and bus stops. The aspects that were finally used in the analysis are: the presence of bicycle parking facilities, the wideness of roads, the condition of the roads' surfaces, the presence of bicycle parking facilities, number of bicycles parked in bicycle parking places, and shared bicycle stations, and speed limit. The aspects were determined using literature and are also used in the questionnaire, to determine whether the current situation is in line with infrastructural needs. The observations were used to determine the possibilities of cycling in the current infrastructure and to determine bottlenecks in the infrastructure.

1.2.5 Bicycle practices

To identify the bicycling practices that take place on Malta, multiple ways of data collection were used, both qualitative and quantitative. The data collection was based on the social practice theory and the elements developed by Shove (2012). She identified three aspects connected to practices; competences, materials and meanings.

One of the competences connected to the practice of cycling is knowing where to cycle. To identify where the cycling practices take place, different routes of the cyclists have been identified. This is done through observations and street interviews with cyclists. To know which materials are used within the practice of cycling, observations have been conducted. To analyse the meanings connected to the practice of cycling, street interviews have been conducted to create an in-depth, quantitative image of the meanings. The information from the questionnaire has also been added, to substantiate the information about the meanings connected to cycling with a more qualitative view. To create a more holistic image of the cycling practices that take place on Malta, in-depth interviews have been conducted.

Annex 2: Research instruments

2.1. Questionnaire

Survey: Cycling in Malta

We are a group of international students from the Netherlands who want to find out more about cycling in Malta. We would like to take a few minutes of your time to answer the following questions.

1. What is your gender? Male Female

2. What is your age? _____

3. What is your nationality? _____

4. Which of the following categories suits you? Multiple answers possible

- Student Visitor/tourist
- Employed Inhabitant of Malta
- Unemployed
- Retired

5. How often do you use the following modes of transportation on Malta? Tick the categories that suit you best

	Never	Hardly ever	Monthly	Weekly	Daily
Bus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ferry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Taxi	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Private car	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Motorbike	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cycling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. From whom did you learn to ride a bike?

- Family
- Friends
- By yourself
- School
- I never learned to cycle
- Other, please specify _____

7. If you learned how to cycle, at what age? _____

8. Which of the following reasons for cycling applies to you? Multiple answers possible

- School Sport
- Work Recreational
- Shopping I never cycle

9. Do you think cycling in Malta is safe?

- Very safe Safe Neutral Dangerous Very dangerous

10. How do you think the amount of cyclists has changed in the last 20 years?

- More cycling now Less cycling now It has stayed the same I don't know

11. How often do you perform sports (besides cycling)? circle the answer that is applicable to you

_____ per day/week/month/year

12. Do you see cycling as a sports activity or as a mode of transport?

- Sports activity Mode of transport Both None of them

13. Do you disagree or agree with the following statements?

	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Not applicable
It is easy to transfer to public transport when cycling						
I am bothered by the air quality of Malta along roads						
Summers are too hot to cycle						
I rather take my car than cycling because of the strong wind						
Bicycles hinder other road users						
Cars drive too fast on the road to cycle safe						
I feel proud when using a bike						
Cycling helps me to get faster to my destination						
There are not enough bikes available on Malta						
Cycling is for physical exercise						
The landscape in Malta is suited for cyclists						
Cycling makes me enjoy the environment						
I feel proud when using a car						
There are not enough cyclists on Malta						

14. What would encourage you to cycle (more)? Choose max. 3 aspects that are most relevant for you

- Low speed limits for other road users
 Sufficient street lighting
 No physical obstacles blocking the view on intersections
 Clearly indicated areas where cyclists can wait and cross the road
 Being able to transfer from bike to bus or ferry
 Being able to safely park your bike
 Being able to easily find bike repair shops, racks and other bicycle facilities
 A smooth road with no holes or bumps
 Less cars parked next to the road
 Other, _____

15. What would be the most important aspect that encourages you to cycle (more)? Choose max. 1 aspect

- A designated (part of) the road for cyclists only
 Being able to reach my destination having right-of-way
 Enough shade to cycle comfortably
 Cycling through a pleasant landscape (historical sites or nature)

16. Who should contribute to the transport policy-making process, in order to make the transport infrastructure more suitable for cycling? Multiple answers are possible

- Residents Tour operators
 Government Businesses
 NGOs Other _____

17. Would you be willing to be involved in the development of cycling in Malta?

No

Yes

18. If you answered yes to the previous answer, could you briefly explain how you would like to contribute?

Thank you for your contribution!

2.2. Interview guide

Introduction

Good morning/afternoon,

Thank you for creating some time to talk with us.

My name is ~~name~~ and this is ~~name~~, and we are master students from Wageningen University in the Netherlands. Currently we are together with 27 other students, doing a project related to cycling on Malta in collaboration with the Bicycling Advocacy Group of Malta.

Within our research we focus on several aspects ~~to study~~ relevant e.g. ~~policy~~ that are related to cycling in Malta, which is the reason why we decided to contact you for an interview, since you are an expert ~~on expertise~~.

Our final report will be shared with Bicycle Advocacy Group or BAG, and it is up to them whether they publish the results. In case you do not want to be mentioned in this report, we can mention your organization anonymously. Do you want this?

We expect the interview to take ~~around~~ ~~10~~ minutes. During this interview, [someone] will take notes. To prevent that (s)he misses out on important information, we would like to record this interview okay with you?

Ministry, University of Malta (Policy Department) and Local Councils

Ministry for Transport, Infrastructure and Capital Projects; Malta Transport Authority (ADT); Environment and Planning Authority (MEPA); Ministry for Finance; Ministry for Tourism / Malta Tourism Authority; Ministry of Culture; Ministry of Health; Local Government Division; Strategy and Implementation

Introductory

- Could you explain your involvement in the transport policy-making process?

Knowledge (Practical)

- We know that Malta has an existing National Transport Strategy 2050. Do you know of any national transport policies in Malta which we should take into account?
- What transport policies have been implemented?
 - What measures your organization already implemented?
 - Which were successful, and which were not?
 - How many/which bicycle infrastructure have you already built?
- In the current transport policies in Malta, which type of transportation is most facilitated (bus, cars, taxis, etc.)? What are the reasons?
- Can you describe how cycling is connected to other modes of transportation in Malta?
- Can you please explain how transport policies are being developed in Malta?
 - Who are involved in the policy-making process?

- Do transport policy-making process also include the role and contributions of other stakeholders such as NGOs, business sectors, shops, university, and citizens?
- How do these stakeholders affect the policy-making process?
- What are the obstacles related to cycling in the current transport policies and situation [at the national and local levels]?
- [Follow up question] How can these issues be solved to improve public transportation in Malta? For example, by:
 - Infrastructures and facilities (e.g. routes, parking, shops)
 - Safety (e.g. car users)
 - Climate
 - Terrain
 - Health conditions
 - Social status (e.g. upper class, car dependency)
- Are there safety measures that protect cyclists? What are those (for example, laws, infrastructure, strategy)?

Policy dissemination/monitoring

- In what way is the public (e.g. drivers and cyclists, NGOs, bus drivers) informed about transport policies in Malta?
- How does the government implement and monitor the transport policies?
 - Does the government provide any incentives, grants and tax reductions to promote cycling in Malta?

Integration

- In formulating future transport policies or amending the existing one, do you think Malta needs to integrate cycling as part of the public transportation system?
 - [Follow up question] How can your organization be involved in sustainable mobility?
- From your own perspective, do you think cycling will help to solve other issues related to traffic congestion, air pollution and health (e.g. obesity)?
- How can you view your organization/ministry in promoting cycling as part of [eg. Tourism , cultural activities]?

Local Council (In addition to the questions above)

- What did the Local council do to encourage cycling via infrastructure? How did these measures work out?
- How are stakeholders involved in local policy-making?
- Do you consider incorporating cycling in your local policies or ordinances relevant? Why?
- Does the council have future plans to improve cycle infrastructure? How will you implement it?
- How is the national transport strategy implemented in local policies within your local council?
- Situational Analysis:
 - Are there any noise problems in this area?
 - What do you think about the air quality in this area?
 - How many people are cycling in [geo area]?
 - Do you have any idea about traffic injuries in this area?
 - Are cyclists involved in these traffic accidents?

University of Malta, Policy Department (In addition to the questions above)

- Will bicycles play an important role in transportation systems in the future?
- What are bottlenecks to cycling in infrastructure/ spatial planning/ policy making (-different scales/perspectives)?
- What are the low-hanging fruits for Malta to promote cycling?
- Do you think people would cycle more if the infrastructure be improved?

University of Malta, Faculty of Health Sciences

Questions related to public health

- What are the main health problems in Malta?
 - To what extent are these problems related to transportation? (caused by air pollution/infections)
 - How severe do you consider these problems?
 - Is it related to the air quality on Malta?
 - What is the number of respiration disease?
 - What is the number of incidents and prevalence of obesity?
 - What are the main causes of death?
- Do many people get injured in traffic?

- What is the number of cases of injured people that involved cyclist/pedestrians?
- What is the severity of these injuries? (scratches/ broken bones/ handicaps for life/ deaths)
- Are there any regulations for personal safety of cyclists? For example, helmet and bike light
- Are people in Malta being physically active in general?
 - Do they exercise?
 - Do they walk/cycle for leisure/commuting?
- What do you think people should change in their behavior to become healthier?
 - What is the most important behavioral changes? (for example, change exercise routines or diet)
 - What do you think is the perception of people about their willingness to be more physically and healthy lifestyle?
- Does traffic noise influence mental health of the citizens? For example, stress level.
 - What is the level on noise pollution on Malta? (Is there any data/documentation on noise level on Malta?)
- Do you think public health will improve if more people would cycle?

Questions related to environment health

- What is the level of air quality on Malta? (NO_x, CO₂, CO, PMs - ask whether data is available; I found any data mention this and ask if more is available and if it is still relevant)
 - Which are the most air-polluted area(s) or hot-spot(s) on Malta?
 - What are the main air polluters? (cars, busses, etc.)
- Do you think people care about environmental quality on Malta? (noise/ air quality)
- What do you think can be done to improve the air quality? (technology- and policy- wise)
 - Is there any official plan by the Government? (related to the air quality)
 - Are there measures from other cases that are planned to be adapted to Malta? How?
- How far do you think the air quality can be improved by shifting car use into bicycle use?
- How can you explain the relationship between public health and environmental quality here in Malta?
 - What is the relationship between cycling and environmental quality and public health? How?

Private stakeholders

Malta Public Transport

- How does cycling affect public transport on Malta? For example, decreasing rates of people using public transportation.
- Are there any space and proper facilities (e.g. bike racks) to park bikes at bus stops/ other public transport stations?

- Can people take their bike on the bus/ferry?
- Would you be willing to invest in improving bike facilities?

Non-Government Organization

Malta Cycling Federation; Paragon Europe - Bike2Work Project; Friend of Earth; Nature Trust associations

- How many people are there in the [NGO]? Who are they? (gender? job? age?)
- What activities does your organisation conduct to facilitate cycling?
- Can you tell us something about cycling projects you have already implemented and on-going in [NGO]?
 - For the projects already implemented, what are your experiences in implementing those projects?
 - For the current projects, how is the project going so far?
 - Can you give example of successful projects and those projects which are unsuccessful? What the lessons learned from these experiences? [issues, challenges]
- Are you currently involved in the policy-making process?
- Do you know any (other) NGOs involved in the policy making process?
- We know that Malta has an existing National Transport Strategy 2050. Do you think that there are other transport policies in Malta which we should take into account?
- What are the obstacles related to cycling in the current transport policies [at the national and local levels]? And what are the opportunities?
- What do you think about existing transport policy in regards to promoting cycling in Malta?
- Do you think that more stakeholders should be involved in the process of decision-making concerning the transport system (tourism offices, bike shops, hotels.)?
- What are the most popular regions/routes to cycle in the cycling association? Why these regions/routes?
- According to your knowledge, experiences and observations, what are the obstacles/challenges that hinder cycling in Malta?
- Can you describe how cycling is connected to other modes of transportation in Malta?
- In formulating future transport policies or amending the existing one, do you think that Malta should integrate cycling as part of the public transportation system?

Tour operators/ bicycle rentals

The Cruise and Travel Group; Britannia Tours; Bicycle rentals (Nextbike, The Cyclist etc.)

- Do you have any tour including cycling?

- If yes, what kind of tourists choose the cycling tours? (age? alone or group?)
- What kind of attractions and which cycling routes they chose?
- If not, what's your perception about adding cycling tours?
- How many people rent the bike? per day (workday/weekend/holiday)/week/month
- What is their reason for renting a bike (commuting/recreation/sport)?
- Have you been involved in a policy-making process regarding infrastructure?
- What are the safety measures that protect cyclists? For example, laws, infrastructure, helmet.
- Do you receive any incentives or recognitions from the government or any organizations (ex. by promoting cycling)?
 - How are tourists informed about this?
- What do think about the current cycling infrastructure?
- What improvements on infrastructure or policy could be made according to you to have more cycling and renting bicycles on Malta?
 - Are there any issues concerning cycling?
 - What are the solutions you can recommend?

End/Closing

- Appreciate time and effort
- Be grateful -> information
- May we also ask permission if we could email you about follow up or additional questions that think is necessary that we weren't able to ask during the interview
- (more time) - ask questions related to the project
- Get business card
- Present the token

2.3. Infrastructure: mapping instructions

Map infrastructure observation

Methodology: For this observation frame start with the main roads that form the main transport network within the geo-location. Go from main (primary) roads to secondary and tertiary roads (only if the more time available). This is a quantitative analysis.

The analysis can be done walking. Think about a smart way to walk so that you do not have to walk the same road more than once. Take some prints of the map of the area and some colour pens that will be provided by the expert of transport infrastructure.

Materials necessary:

- black, blue, green, orange & red pens
- map of the area

Indicator	Mark on map
Cycle lane present? (pictures if yes)	blue line
Cycle lane suddenly stops?	pink cross
Obstacles of 30cm or more? (pictures if yes)	blue circle
How wide is the car lane if no cycle lane present? <ul style="list-style-type: none"> - Enough space for one-way cyclists including parked cars? - Enough space for one-way cyclists without parked cars? - Not enough space for one-way cyclists even without parked cars? 	Green line Orange line Purple line
Speed limit for cars?	Green km/hr nr.
How many bicycle (repair) shops do we notice on the street?	"B" for each shop
How many bicycle rental shops do we notice on the street?	"R" for each shop
How many public bicycle parking facilities?	"P" for each facility

How many bikes are parked in public space (not in racks)? (When parked, write the number of parked bikes on the map)	Blue numbers
How many shared bikes parking in the observation area?	"SP"
Street lights present in the street?	Yellow circle
Are there clearly indicated areas where cyclists can wait and cross?	Pink circle
Are there bus stops?	"BUS" for each stop

2.4. Public perception: street interview

Street Interview Guide

This guide can be used to interview people on the street for the public perceptions group. The idea behind this interview is to get a better perspective on how cycling is framed in Malta. We gave some suggestions of questions that you can ask, but please take note that certain questions might be more relevant for some people than for others. Please take short notes of the answers on this paper and indicate your geo-location and time in the corner.

1) Why do you use certain modes of transport? answer in questionnaire

circle: car / public transport / boat / cycle / other

why:

2) Why do you cycle never/monthly/weekly/daily? circle answer given in questionnaire

3) Do you think cycling in Malta is safe or dangerous? Why?

circle: safe and/or dangerous

why:

4) To what extent do you think the amount of cyclists has changed over time?

circle: More cycling now / Less cycling now / It hasn't changed

why:

5) Are you currently involved in the development of cycling practices? How?

circle: yes / no

how: Education / policy / local initiatives / infrastructure / other: _____

why:

6) What kind of people are involved in the development of cycling?

2.5. Bicycling practices: experimental observation

Cycle around in your geo area and experience how it is to cycle in Malta and to get a general impression of in your area. Try to cover different type of roads (primary secondary tertiary), road conditions and geographical differences. This participation experimental observation is based on qualitative observations. You can use your experience ("engage in the practice") to feel how it is to cycle in Malta. There is a list of key points include you can focus on. When you are done cycling, give a qualitative analysis about the different points.

While doing this observation you will also identify the two hotspots where the quantitative observations will place, so keep this in mind. The two locations should belong to the following categories:

1. Active main place in the center of the city
2. Main transporting hotspot (connecting road to other areas)
 - a main connection between active areas
 - not too wide to observe

Geo area of observation: _____

Time:
Date (dd/mm/yy) _____/____/____

Day of the week (what weekday, weekend, holiday): _____

Time of day: _____:_____

Rush-hour: _____ yes / no
(8-10am and 4-6pm)

Use Google to find the weather conditions on your location

Temperature: _____ °C

Wind _____

Precipitation _____ mm

Quality indicators:

Damage on roads

Physical obstacles on the roads

Lack of navigation items (signs etc.)

Connectivity (dead-ending streets, connectivity of bike lanes)

Presence of bike lanes/roads for bikes

Air quality (visual and smelling observation)

Noise

Litter on the streets

Groundcover (sand/hardcover/gravel/stones)

Slope (steep/medium/flat)

Other transport (car/pedestrians/buses/other)

Additional comments:

2.6. Bicycling practices: quantitative observation

Quantitative observation at identified spots

Time & Location of the observations:

4 days in total:

- Two days of Wednesday, Friday and Monday (Monday is back-up day)
- Thursday (National Holiday)
- Saturday

2 times 1 hour per day:

- On every day: one hour between 8:00 and 10:00
- On Wednesday and Saturday: one hour between 10:00 and 16:00
- On Thursday and Friday: one hour between 19:00 and 21:00

On 2 locations simultaneously:

- Suggestions below
- Defined before
 - 1. Active main place in the center of the city
 - 2. Main transporting hotspot
 - a main connection between active areas
 - not too wide to observe

Note: if you are not able to do an observation within the timeframe that is set in this observation frame (for example due to an important interview), do not do the observation outside of the specified hours. In that case, skip the observation.

Suggested locations:

Locations in Sliema:

- High street (Tas-Sliema)
- Ferries terminals

Locations in Malta university:

- roundabout (between university and hospital)
- south intersection of ring road (enter point from stores in the south)
- main gate of the university

Locations in Luqa

- roundabout near the church
- main street near the Lidl
- other main street in the other direction, or airport, depending on observation during first days

Locations in Mosta:

- Main roundabout near the church
- West intersection near bike it up! shop
- South roundabout near Portelli & Brincat Ltd

Locations in Valletta:

- City gate
- Ferry to Sliema
- Ferry to the three cities
- Bombi
- Valletta Waterfront
- Castille Square

Quantitative observation form

Geo area	Valletta	Sliema	Uni. of Malta	Mosta	Luqa
Type of street	primary	secondary	tertiary		
Road condition	Excellent	Good	Average	Poor	
Groundcover	Sand	Hardcover	Gravel	Stones	
Slope of area	Very steep	Steep	Medium Steep	Flat	
Temperature					
Precipitation	yes/no				
Day of the week	Weekday:		Weekend	Holiday	
Time of day (00:00)					
Rush-hour (8-10am and 4-6pm)	yes/no				

Road condition criteria:

Excellent: able to cycle fast and comfortably,

Good: able to cycle fast but bumpy, less comfortable

Average: not able to cycle too fast, not comfortable

Poor: not able to cycle normally (due to holes)

Slope of area

Very steep: not able to cycle up normally

Steep: hard to cycle up

Medium steep: takes some effort to cycle up

Flat: no (significant) slope.

Observation frame

#	Type of Bikes			Helmet		Clothes		Age		
	Sports	Non-Sport	E-Bike	Yes	No	Sporty	Non-Sporty	Child	Adult	Elderly

2.7. Bicycling practices: street interview guide

Street interview questions for cyclists

This is the interview guide from the social practice group. The idea behind this questionnaire is that you catch people that are cycling (of if you see someone with a bike) and ask her/him if you can ask her/him some questions. Questions in bold are the questions you ask, and because this is a street interview, we gave some suggestions of possible answers. This will make it easier for you to make notes during the interview. Information to the suggestions can be written beneath the question.

Keep in mind that the points beneath the questions are possible answers, not suggestions!

1. How did you learn how to cycle?
 - I learned it from parents
 - I learned it from friends
 - I learned it myself

2. Why did you start cycling?
 - It was faster
 - I wanted to lose weight (health)
 - I love being outside
 - Financial reasons
 - Environmental reasons

3. How often do you cycle?
 - Every day
 - Once a week

4. Where do you cycle to?
 - To my work
 - To school/uni
 - Shopping
 - For fun
 - For sports

5. What do you like the most about cycling?
 - Being outside
 - That it is faster
 - Getting some exercise

6. What would be a reason for you not to cycle?
 - Weather
 - Dangerous
 - Lack of infrastructure

7. Do you know other people that cycle?

- Colleagues
- Friends
- Family

8. How would you think other people could be motivated to cycle?

- Improved cycling infrastructure (bicycle related facilities/cycle lanes/road surface)
- Slower car speeds
- Education
- Facilities for cycling

9. What are your favorite routes? Why?

10. Are there places you avoid? Why?

- Abandoned places
- Darkness
- Busy roads

11. Are you sometimes scared when you cycle? When and why is that?

- Other traffic
- Darkness
- Obstacles

Annex 3 List of interviews

Associate Professor Environmental & Resources Law at University of Malta, June 6, 2018

Basic Specialist Trainee in Public Health Ministry of Health, June 13, 2018

Chair of Mosta Cycling Club, June 9, 2018

Director of Product Development Malta tourism Authority, June 11, 2018

Director of Strategy and Policy Implementation under Ministry of Justice, Culture, and Local Government, June 8, 2018

Employee Office of Superintendent of Public Health, June 8, 2018

Employee of The Cyclist, June 7, 2018

Environmental Officer and Researcher Officer Valletta 2018, June 14, 2018

Environmental Resource Authority, June 5, 2018

Executive Secretary Local Council Luqa, June 8, 2018

Focal Point on Cycling, June 6, 2018

Friends of the Earth, June 5, 2018

Head of Department of Health Services Management, June 6, 2018

KSU, June 13, 2018

Lecturer Spatial Planning & Infrastructure at University of Malta, June 6, 2018

Lecturer Spatial Planning & Infrastructure At University of Malta, June 11, 2018

Mayor of Mosta, June 11, 2018

Mayor of Sliema, June 12, 2018

Mosta Cycling Club, June 9, 2018

Owner EcoBikes, June 11, 2018

Owner Magri Cycles, June 9, 2018

Owner Nextbike, June 6, 2018

Professor at the Institute for Climate Change and Sustainable Development at the University of Malta, June 5, 2018

Student Cyclist, June 11, 2018

Traffic Enforcer Mosta, June 7, 2018

Transport Malta, June 6, 2018

WHO, June 8, 2018

Annex 4 List of figures

Figure 1 Potholes and cracks in roads observed in Sliema (left) and Msida (right).

Figure 2 Like the majority of the roads in Malta, more than half of the road space in the University Malta (left) and Valletta (right) is occupied by parked vehicles.

Figure 3 General perception towards safety of cycling.

Figure 4 Percentage of inhabitants (age categories) who perceive cycling as dangerous.

Figure 5 Percentage of inhabitants that sees a car as status symbol.

Figure 6 Perception towards temperature in summer for cycling.

Figure 7 Perception towards suitability of landscape for cycling.

Figure 8 Reasons to cycle.

Figure 9 Sign marking 'Share the road'.

Figure 10 Sign marking 'Priority lane'.

Figure 11 Percentage of respondents indicating who should contribute to the transport policy making process.

Figure 12 Timeline of the developed strategy.

Annex 5 Geo-reports
