

# Sustainable Urban Mobility Planning During the Covid-19 Pandemic: Barriers and Opportunities from Public Authorities' Perspective

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## Abstract

Whilst there is research on how Covid-19 impacted travel demand and transport business, little attention has been paid on how Covid-19 has affected transport planning priorities and policy making. Against this background, this paper attempts to shed light on two research questions: a) how transport planning priorities have changed after Covid-19 outbreak; b) How can the planning phases be strengthened to support a more resilient planning environment? To address these questions, an online survey was designed, examining Covid-19 effects on transport planning. The results of the survey revealed that planning objectives were significantly different in the period after Covid-19 outbreak compared to the period before that. Moreover, it was shown that most of the actions adopted to accommodate the prioritised planning objectives were already defined before Covid-19, indicating that the pandemic has acted as an accelerator of specific existing planning objectives.

**Keywords:** Covid-19, policy making, SUMP, planning objectives, European public authorities, emergency scenarios, crisis management

## 1. Introduction

The Covid-19 pandemic has brought previously unforeseen challenges and changes in travel behaviour patterns. The transport system now has to operate in a way which ensures public health is secured while minimising consequent impacts on the economy caused by health urban planning measures (reduced mobility to limit spread of the virus, increased road space for active modes). Social distance measures have imposed the necessity to perform trips in isolation or with reduced capacity on the transport modes. Transport authorities and operators have to adapt their mobility systems and services to respond to the pandemic crisis and at the same time to offer safe services for key workers.

Since the breakout of the Covid-19 pandemic, several papers have been published exploring primarily the impact of Covid-19 on the transport system performance and travel behaviour. Querying Scopus<sup>1</sup>, an astonishing 202 results were retrieved in areas such as social sciences, environmental sciences, energy, and engineering. Several of these papers focus on exploring the impact of Covid-19 on travel behaviour and the transport system (Awad-Nunez et al., 2021; Coppola and De Fabiis, 2021; Hensher, Beck and Wei, 2021; Vickerman, 2021; Sharifi and Khavarian-Garmsir, 2020; Zhang, 2020). For example, Gkiotsalitis and Cats (2020) investigated the impact of the pandemic on the public transport systems highlighting that the post-shutdown phase poses a multi-dimensional challenge. They proposed that to increase resilience in the sector, there is a need to address the demand side considerations, the perception of users on health risk derived from transport options, and the financing of public transport. Gutiérrez et al. (2020) focused on short term measures and health risks associated with transport and provided important recommendations regarding future research. They specifically mentioned the need to understand the changes in demand, continue the research of policy responses, and look into measuring the uneven impacts of change in demand, especially for public transport.

Most of the transport-related published work focuses on public transport and there are only few papers on new mobility services and active travel. Hensher et al. (2021) elaborated on the impact of Covid-19 on the concept of Mobility as a Service (MaaS) suggesting a decrease of shared mobility and increase of working from home. For active travel, Nurse and Dunning (2020) highlighted that the pandemic has produced a shift in citizens and urban planner's approach to urban realm moving from a car and road dominated public space to one with improved active mobility connectivity. On the same topic, Combs and Pardo (2021) analysed a database for mobility related actions during Covid-19 proposing that an in-depth case study effort should be made to identify those actions that were going to be deployed even without Covid-19, those that were reactionary and those that were responsive. They also make the case for linking the actions with broader societal goals such as equity, safety and behavioural demand.

Additionally, several organisations have published reports that compile the actions and measures that city and regional authorities implemented in transport due to Covid-19. For example, the UITP (2020) report looks into changes in mobility patterns, the role of Mobility as a Service (MaaS) and a Unified Mobility Management Model to increase resilience in the transport systems providing recommendations based on this. The European Institute of Innovation and Technology has also published a report (EIT Urban Mobility, 2021) looking into the effects of the pandemic on urban mobility and main actions, highlighting the shift towards individual mobility, increase in parking demand and urban freight. More interestingly, the POLIS Network has published a SUMP (Sustainable Urban Mobility Plan) topic guide on resilience and transport planning (POLIS and Rupprecht Consult - Forschung & Beratung GmbH, 2021), including case studies, short- and long-

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<sup>1</sup> Scopus Query used: "Covid-19 impact transport", accessed 19/04/2021

term measures recommendations. The Topic Guide includes sections on freight, parking, MaaS and ITS (Intelligent Transport Systems), among others.

Whilst there is considerable research on how Covid-19 impacted travel demand, the supply side and transport business, little attention has been paid on how Covid-19 affected the transport planning priorities of authorities. To the best of authors' knowledge, there is no paper that investigates the changes in authorities' transport planning priorities and policy making due to the pandemic. Against this background, the objective of this paper is to explore how public authorities reacted to the pandemic as well as the changes in their transport planning priorities. By understanding what measures have been planned and implemented and how, we could come closer to bridge the gap in transport planning frameworks in use today; such as the SUMP framework that is widely applied in Europe. As such, we can increase the chances of success of those actions, but also of the transport planning as a discipline.

The research questions that guide this paper are:

1. How have transport planning priorities changed since the Covid-19 outbreak?
2. What are the barriers in confronting emergency scenarios in transport planning?

To address these questions, a survey specifically for public transport authorities was launched as part of the European Commission's Horizon 2020 funded project HARMONY<sup>2</sup>. In total, thirteen public authority representatives from 7 different European countries participated in the survey. The collected quantitative and qualitative data are analysed to answer the research questions. The results provide a basis for discussion and recommendations on the next steps that need to be taken to increase the resilience and sustainability of the transport system.

The remaining of the paper is structured as follows: Section 2 explains the methods, the survey design, and data collection. Section 3 presents the results, and elaborates on transport planning objectives before and after Covid-19, as well as on the characteristics of the planning environment. In Section 4, lessons learnt and barriers in confronting emergency scenarios in transport planning are discussed. Section 5 concludes the paper with the main afterthoughts of the research.

## ***2. Methods***

This section presents the tools designed to collect the data for this research, the data collection process and the characteristics of the authorities that participated in the survey.

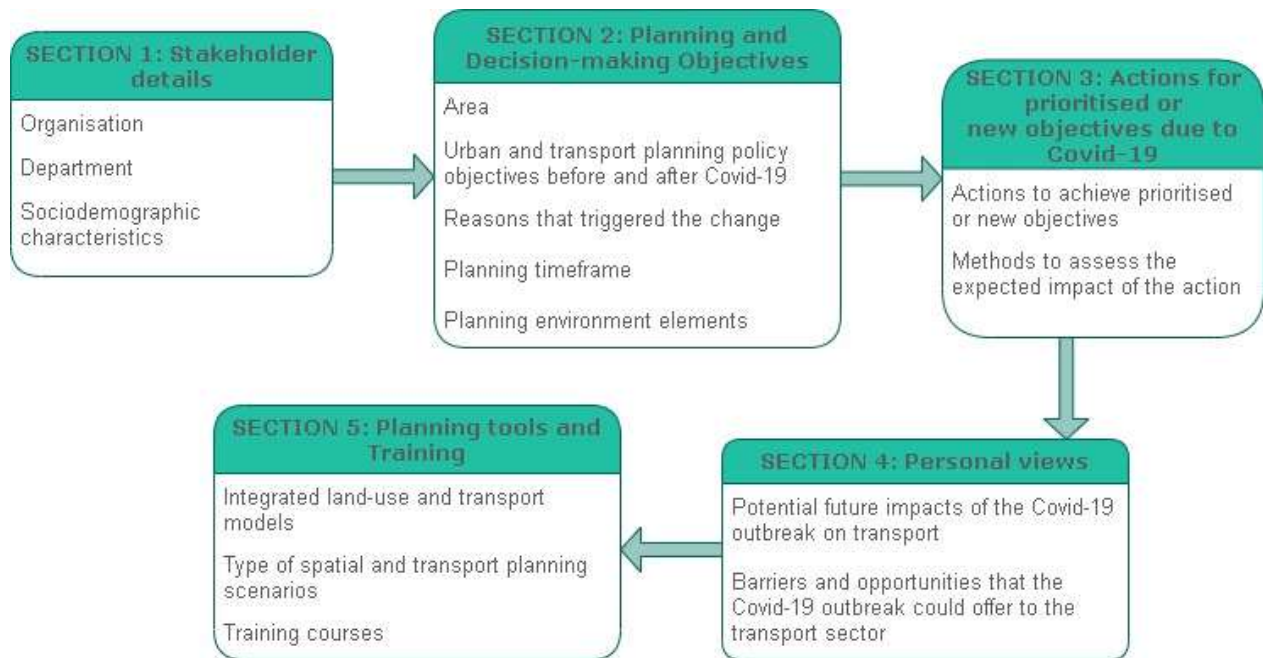
### ***2.1 Survey Design***

The primary objective of this research is to investigate the Covid-19 effects on the transport planning environment and to identify related requirements, barriers and opportunities. For this purpose, a questionnaire was designed to capture these changes in planning objectives due to

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<sup>2</sup> <https://harmony-h2020.eu> (grant agreement number: 815269)

the Covid-19 outbreak and explore how the planning phases can be strengthened to support a more resilient planning environment. To design the questionnaire, we had several rounds of bilateral discussions with the authorities that are partners of the HARMONY project. They provided feedback in terms of the planning objectives and the objectives listed in their SUMP frameworks supporting us in the development of the questionnaire. Before the official launch of the survey, three of them also tested it and provided feedback to arrive to the final version of the questionnaire.



***Figure 1: Online questionnaire flow***

The questionnaire includes 33 questions grouped in five sections (Figure 1):

- Section 1 contains questions regarding the profile of the participant organisation as well as the profile of the organisation's representative.
- Section 2 includes questions on the planning environment and decision-making process within the organisation both before and during Covid-19 crisis.
- Section 3 includes questions about the actions followed to apply the prioritised planning objectives within the Covid-19 era.
- Section 4 focuses on personal views of the authorities' representative regarding the potential impacts of Covid-19 on transport, and barriers and opportunities of this crisis to the transport sector.
- Finally, section 5 includes questions on tools that the authorities use for urban and transport planning, as well as provision of training support.

The questionnaire was available online and it was distributed to European-based stakeholders via various channels such as personalised emails to public authorities (including five authorities that

are partners of the HARMONY project), as well as posts on social media inviting representatives of public authorities.

## ***2.2 Data Collection and Sample Characteristics***

The data collection process took place in November and December 2020. As mentioned above, except from official mail invitations to European-based public authorities, we also made the link of the questionnaire available on social media aiming to attract the interest of authorities that were not included in the authors' contact list. By doing this, the authors were aware that the questionnaire would be answered by several participants that were out of their target sample. As such, the online questionnaire was answered by 108 individuals. Out of them the 19 were representatives of public authorities.

After cleaning the dataset, we ended up with 13 valid responses from representatives of European-based public authorities. Non valid responses were considered those that were incomplete or not consistent across the different sections of the questionnaire. 10 authorities provided responses to all 5 sections of the questionnaire and 3 responded only to section 1 and section 2. Authorities from the US, Africa and Australia also participated in the survey. However, due to the low participation and the different planning approaches in these areas, we did not take them into account for this specific paper.

The characteristics of the public authorities participated in the survey are shown in Table 1, while the characteristics of the representatives are presented in the lower part of the table. The public authorities participated in the survey are located in areas across seven different European countries, with various population sizes ranging from small urban areas to large metropolitan areas. Most of the authorities employ more than 250 employees. Regarding the authority representatives' characteristics, most of them hold key positions within transport planning and transport innovation departments in public authorities. Although age of respondents is quite diverse, there is an imbalance in gender reflecting the male-dominated employment in the transport sector and transport policy (European Commission, 2010).

Although the sample size may be considered small, for such a survey that focuses only on public authorities, it is considered satisfactory as it is also in line with previous efforts to explore practices of public authorities (Jennings, 2020; Johanson et al., 2019). It should be also considered that several authorities around Europe put on furlough part of their employees during the pandemic. As such, it was difficult to reach such organisations during the pandemic.

***Table 1: Characteristics of respondents and areas***

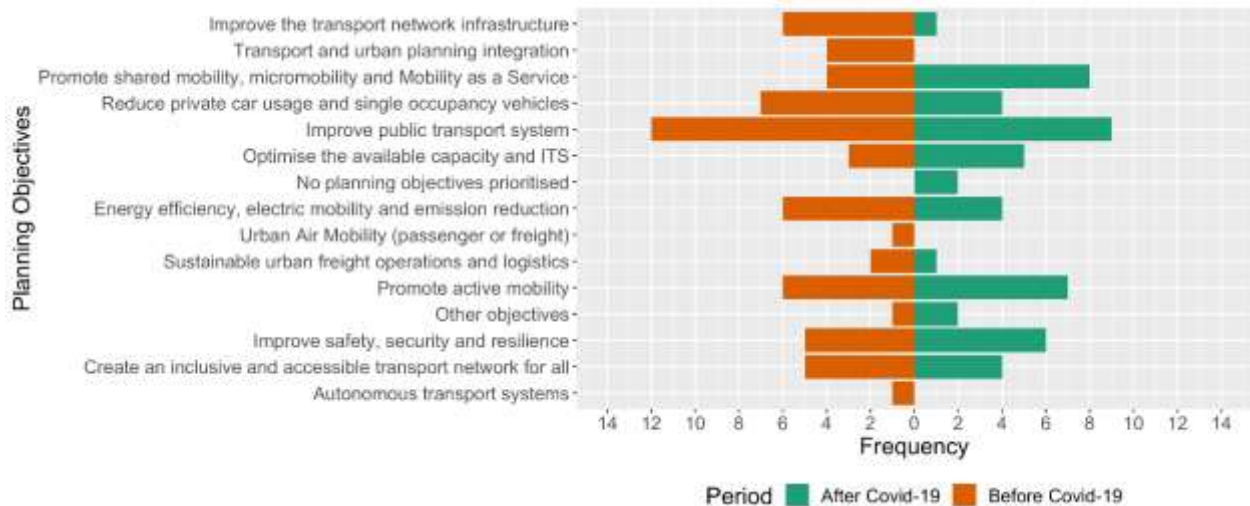
Characteristic	Category	Online survey
<b>Characteristics of the public authority</b>		
Location	Graz, Austria	1
	Flanders Region, Belgium	1
	Aachen and the border region, Germany	1
	Athens, Greece	1
	Trikala, Greece	1
	Como, Italy	1
	Milan, Italy	1
	Turin, Italy	1
	Katowice Metropolitan Area, Poland	1
	London, United Kingdom	1
	Middlesbrough, United Kingdom	1
	Oxfordshire, United Kingdom	1
West Midlands, United Kingdom	1	
Size of organisation	Micro (<10 employees)	0
	Small (10-49 employees)	2
	Medium (50-249 employees)	2
	Large (>250 employees)	9
Size of area	< 50,000 inhabitants	0
	50,000-200,000 inhabitants	4
	200,000-500,000 inhabitants	2
	500,000-1,500,000 inhabitants	3
	> 1,500,000 inhabitants	4
<b>Characteristics of the public authority's representative participated in the survey</b>		
Age	<25	0
	25-34	2
	35-44	4
	45-54	6
	55-64	1
	>64	0
Gender	Male	11
	Female	2
Department	Transport planning	6
	Transport Innovation	2
	Other	5

### 3. Results

#### 3.1 Planning Objectives Before and After Covid-19

The results of the survey indicate that there has been a vast change in the planning priorities that authorities targeted before and after the outbreak of the pandemic. Figure 2 illustrates the top five selections of urban and transport planning policy objectives by all public authorities for the period before and after the Covid-19 outbreak. The planning objectives are ranked by order of absolute

difference between the period before and after Covid-19, with the ones presenting the biggest change at the top.



**Figure 2:** *Selected planning objectives before and after Covid-19 outbreak ranked by order of absolute difference between the two periods*

The most frequently selected planning objective for the period before Covid-19 was to ‘Improve public transport system’, selected by all but one authority. ‘Reduce private car usage and single occupancy vehicles’ objective was the second most popular. In the third place there are three objectives -all selected by six authorities- which are to ‘Improve the transport network infrastructure’, ‘Promote active mobility’ and ‘Energy efficiency, electric mobility and emission reduction’. All planning objectives listed in this question were selected by at least one authority confirming the relevance of objectives to the planning practice. One authority manually entered an additional objective related to ‘Optimising personalised mobility’ which could not fit in any of the categories specified, as it refers to the aim of the region to offer personalised mobility depending on individual needs.

In the period after Covid-19, the objective ‘Improve public transport system’ remains the most popular one; however, this time ‘Promote shared mobility micromobility and MaaS’ comes second. The third most frequently selected planning objective for the period after Covid-19 is to ‘Promote active mobility’ which was selected by an additional authority compared to the period before Covid-19. Other objectives manually entered and prioritised by respondents include a ‘Focus on digital tools for mobility’ and ‘Secure financial resources for PT’. Two authorities stated that no planning objectives were prioritised following the Covid-19 outbreak which highlights the diversity among planning mechanisms (or even existence of barriers) regardless of common needs.

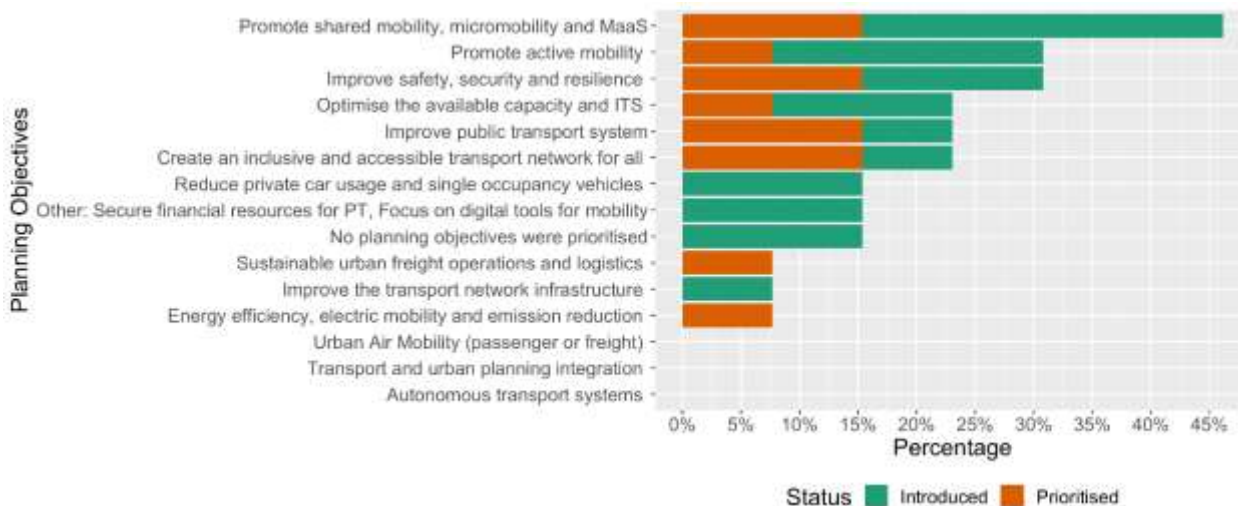
The planning objectives ‘Improve the transport network infrastructure’ and ‘Transport and urban planning integration’ present the most notable drop among the selected objectives for the period after Covid-19. Furthermore, the latter one together with the ‘Autonomous transport systems’ and ‘Urban Air Mobility’ are the only planning objectives that were not selected by none of the authorities following the outbreak of the pandemic. ‘Reduce private car usage and single occupancy vehicles’ objective presents a notable drop in the period after Covid-19 which was only selected by four authorities. On the contrary, more attention was drawn to ‘Promote shared mobility, micromobility and MaaS’ which together with ‘Optimise the available capacity and ITS’ recorded the most significant increase among the selected objectives after Covid-19.

A further analysis of results among small or medium sized areas (50,000-500,000 inhabitants) and larger metropolitan areas (>500,000 inhabitants) revealed different priorities for the period after Covid-19 outbreak. In smaller areas ‘Promote active mobility’ was the most frequently selected objective as opposed to larger areas where ‘Promote shared mobility micromobility and MaaS’ was the objective selected the most. The second most frequently selected objective was to ‘Improve public transport system’ for both smaller and larger areas.

The comparison of the ranking of planning objectives between the period before and after Covid-19 has resulted in the disclosure of the prioritised objectives or the ones introduced for the first time after the outbreak of the pandemic (Figure 3). It is remarkable that almost half of the public authorities have introduced or prioritised ‘Promote shared mobility, micromobility and MaaS’. It is now also revealed that ‘Promote active mobility’ and ‘Improve safety, security and resilience’ objectives have been ranked higher for the period after Covid-19, reflecting the need for securing public health while promoting active travel which enables trips to be carried out in isolation (avoiding human interaction). These findings are in alignment with a following question in the survey where respondents stated the reasons that triggered the prioritisation or introduction of new planning objectives: 35% of the objectives changed due to public health reasons, 27% because of the potential environmental impact, 21% for economic recovery and 15% for social equity implications.

Another interesting finding is related to the objective ‘Create an inclusive and accessible transport network for all’ which although selected by fewer authorities in the period after Covid-19, it was ranked higher by three authorities. Moreover, ‘Sustainable urban freight operations and logistics’ objective was only prioritised once, although selected twice for the period before Covid-19. This fact contradicts with the increase of freight movements in urban areas which aim to make up for the reduced movements of people and market restrictions during the pandemic.





***Figure 3: Prioritised or introduced planning objectives after Covid-19***

### ***3.2 Characteristics of the Planning Environment During Covid-19***

For each one of the prioritised objectives, the participant authorities specified one to three actions in place for achieving the prioritised or new objectives introduced in the period after the Covid-19 outbreak. A total of 48 actions were manually entered by all public authorities that completed this question of the online survey. It is noteworthy that out of 48 actions specified, 27 were defined before Covid-19 indicating that the pandemic has worked as an accelerator of objectives and measures already in place. In particular, the Covid-19 outbreak has favoured active mobility and micromobility, and related plans of public authorities came forward, using this crisis as an opportunity to promote them. In fact, nine out of ten public authorities stated that the Covid-19 outbreak provided an opportunity in their area to promote active transport policies that will be retained and after the outbreak. Regarding the planning timeframe of the specified actions, 75% of the respective prioritised objectives was stated to address the strategic level (>3 years), 21% the tactical level (1-3 years) and 4% were only formed temporary due to Covid-19. This is somehow in alignment with the perceived estimated duration of the Covid-19 impacts on the planning environment, where six authorities stated that they anticipate that these will last 1-3 years, three more than 3 years, and one replied ‘I don’t know’ (Table 2).

The results also reveal that emergency planning for a pandemic or a similar emergency situation before the Covid-19 outbreak is not part of the planning mechanisms of public authorities. As shown in Table 2, half of the participant authorities stated that there is no emergency planning, and the other half were unsure about the existence of any. At the same time, six out of ten public authorities stated that they were sharing knowledge with other cities or areas to fill knowledge gaps about Covid-19 as a response to the pandemic. Public authorities provided

diverse responses in terms of the flexibility in their planning environment in mitigating Covid-19 impacts, indicating that changes in planning objectives were implemented in an ad hoc basis (Table 2).

*Table 2: Planning environment elements*

Question	Responses		
	Yes	No	
Opportunity to promote and retain active transport policies	9	1	-
			-
Flexibility in the planning environment to mitigate Covid-19 impacts	3	2	5
	Yes	No	Somehow
Emergency planning test before Covid-19	0	5	5
	Yes	No	Not sure
Sharing knowledge on Covid-19 with other areas	6	0	4
	Yes	No	I do not know
Estimated duration of Covid-19 impacts on planning environment	6	3	1
	1-3 years	>3 years	I do not know

#### 4. Discussion

The results of the prioritisation of objectives reveal that the response to the pandemic involved objectives which relate to smaller scale interventions or those established longer in the planning environment. The preference over such objectives, offers an opportunity to react fast in a crisis involving lower risk or uncertainty in the implementation phase. For example, measures related to active mobility or micromobility seem more appropriate to deal with the crisis as opposed to less explored urban mobility solutions such as CAVs or UAM. In the same manner, transport and urban planning integration was not considered in the period after Covid-19, as this practice entails a long timeframe to be realised. At the same time, the crucial factor of human safety has provided an advantage to trips performed individually such as those by bike or walking while supporting the underlying vision of car usage reduction. The preference of active mobility solutions in smaller areas as opposed to shared mobility in larger areas is also pointing out the preference to more mature and readily available interventions, considering that shared mobility is more advanced in the larger areas participated in the study.

It is evident that the pandemic has provided great grounds for existing or new active mobility initiatives to move forward, overcoming in many cases barriers established long in the urban environment. It remains however uncertain if the adopted measures are going to last. Given

the environmental crisis and the rising awareness on health benefits around active mobility, the observed changes in travel patterns during the pandemic might indeed stay long. On the other hand, and in accordance with the personal views of public authorities of this study, although Covid-19 offers an opportunity to promote active transport, people might go back to private vehicles after the lockdowns.

Most of the public authorities participated in the study provided evidence on the implemented changes as a response to the pandemic. However, two authorities stated that there were not any changes in their prioritisation of planning objectives adopting a ‘business as usual’ approach in their areas. Even within an emergency scenario, it was shown that some public authorities lack planning flexibility, remaining unresponsive due to regulatory, political, or administrative barriers.

## 5. Conclusions

The results of this study demonstrated that the Covid-19 crisis has an apparent impact on the prioritisation of planning objectives in European public authorities. The response to the pandemic involved mostly actions that were readily available and defined before the Covid-19 outbreak. Active travel measures were preferred over more advanced mobility solutions, which could fulfil the imposed restrictions for social isolation securing protection of human health. Most public authorities confronted several barriers in their planning environment when dealing with Covid-19 crisis, revealing lack of emergency planning and preparedness in response to the pandemic.

Although each public authority is unique with specific needs and capabilities, several measures were identified as potential contributors towards a more resilient planning environment. Crisis management and emergency planning should be embedded in the SUMP process to strengthen future responsiveness to unforeseen scenarios. Communication channels between different levels of the planning process need to be enhanced, to ensure smooth collaboration among stakeholders. Availability of data and integrated data sets can also provide valuable insights for dealing with crisis, when time constraints are imposed. These recommendations are derived following the analysis of a limited number of responses from public authorities in Europe, however, they can be interpreted and applied for similar urban mobility settings.

Further discussions with public authorities could reveal additional evidence on different planning approaches across geographical areas beyond Europe. Considering the climate crisis, it would be also interesting to explore the relation between Covid-19 and environmental awareness and examine whether the adopted changes will remain following the pandemic. Moreover, a similar study at a later stage during or after the pandemic, could bring insights on how public authorities respond to the crisis when additional progress is made or provide post Covid-19 evidence on official changes in planning processes when dealing with a crisis. Another interesting research

topic would be to explore the relationship between the local and national level in terms of adopting planning objectives and actions and which planning level is the most efficient in emergency scenarios.

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