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## Sustainable transportation in Prishtina, Kosovo: A qualitative investigation of challenges and opportunities for urban mobility improvements

This study examines inefficiencies, possible improvements, challenges, and impacts of sustainable transportation alternatives in Prishtina with the goal of creating evidence-based strategies for small rapidly urbanizing cities and contributing to the knowledge about sustainable transportation in small and developing countries. The study uses a qualitative approach and semi-structured interviews with twelve participants to explore sustainable transportation in Prishtina, with thematic analysis and cross-case analysis to analyse the responses. The findings underscore significant inefficiencies in Prishtina's transportation system, rooted in outdated infrastructure and varied stakeholder views. Through thematic and cross-case

analyses, the study sheds light on the multifaceted challenges of implementing sustainable transportation. This study adds to the literature with insights into Prishtina's context, offering actionable guidance for transportation planning specialists. For society, the results emphasize the imperative of a comprehensive approach, blending infrastructure enhancements with behavioural adaptations, to cultivate a sustainable urban milieu in Prishtina.

**Keywords:** sustainable urban mobility planning, public transport, infrastructure improvement, developing country

## 1 Introduction

The functionality of society relies on a well-organized transportation system. The transportation sector contributes to GDP (5% in Europe according to the European Commission, 2022, and 10% in the US according to the Bureau of Transportation Statistics, 2021) and it provides vast employment opportunities. However, transportation emissions contribute to 27% of greenhouse gas emissions in Europe (European Environment Agency, 2021), posing a threat to the environment, especially in cities (Saidi & Hammami, 2017; Shafique et al., 2021). Governments are investing resources to reduce emissions and address environmental damage (Eckelman et al., 2020).

The transportation sector has played a significant role in the world's economy since the Industrial Revolution. It employs over eleven million people, making possible international trade (Maparu & Mazumder, 2017). However, the growth of advanced transport infrastructure has come at a considerable environmental cost. Accounting for over 20.8% of greenhouse gas (GHG) emissions, the transport sector is the EU's second-largest emissions contributor (Andrés & Padilla, 2018). In addition, pollutants emitted from internal combustion engines powered by fossil fuels can result in severe health consequences, including heart disease, asthma, and cancer. In the transportation sector, road transport is the leading emitter, responsible for 72.9% of emissions. In contrast, the aviation and maritime sectors contribute 13.3% and 12.8%, respectively (Pallonetto, 2023).

In 2019, the Municipality of Prishtina, in partnership with the consultancy firms Grant Thornton and Mott MacDonald, crafted a sustainable urban mobility plan, integrating insights from public hearings and feedback. The plan outlines seven key objectives targeting diverse aspects of sustainable transportation in Prishtina. This action highlights the city's forward-thinking approach to bolstering its transportation framework, resonating with the wider global push for sustainable urban mobility.

The COVID-19 pandemic disrupted the transportation sector, causing a radical shift in travel behaviour. Public transport usage dropped significantly, and there was a slight increase in cycling and walking (Eisenmann et al., 2021). Cars remain the preferred mode of travel, which could lead to increased air pollution, reducing the sustainability of the sector. Nonetheless, the pandemic has presented opportunities for alternative approaches to decrease transportation demand. Measures such as blended, flexible, and hybrid work have emerged as viable options, and a new essential travel baseline has been established. Technological advancements in transportation, such as

electric vehicles and autonomous vehicles, hold the potential to mitigate environmental impacts. However, challenges including range and safety limitations, social and economic barriers, and unanswered ethical questions need to be addressed for their successful adoption (Staat, 2018; Directorate-General for Communication, 2020; Figliozzi, 2020; Kopplin et al., 2021). Evaluating the impact of these innovations and exploring alternative solutions is crucial (Pallonetto, 2023).

The scalability of advanced mobility solutions is a significant global challenge, especially for developing countries with less structured and skilled governmental bodies and insufficient infrastructure. Establishing policies that limit the population's mobility may be a possible alternative tested during the pandemic, but it is incompatible with the concept of democracy and freedom of movement. The significance of these concerns is underscored in a policy report recently published by the European Commission (Bertoni et al., 2022), and it underlines the related policy questions that policymakers must address to ensure sustainable transportation and mobility in the future.

### 1.1 Literature review

The global transportation system is currently characterized by insufficient and inefficient public transportation systems (Novikov et al., 2022; Ali & Abdullah, 2023). A poorly developed and inefficient transport system is a significant hindrance to mobility (Żukowska et al., 2023). Especially after COVID-19, the need for reorganization and restructuring of the public transportation system has arisen (Giuffrida et al., 2021; Annunziata et al., 2022; Borchers & Figueirôa-Ferreira, 2022). The post-pandemic era has highlighted the vulnerabilities in current transportation systems, emphasizing the urgency for improvements.

Like other cities in southeastern Europe, Prishtina faces similar challenges, such as lack of investment in public transportation, lack of adequate transportation planning, congestion, and parking problems (Mladenović, 2022). Podgorica faces similar problems as Prishtina, such as insufficient funds, lack of political support, and parking issues (Vujadinović et al., 2021). The leader in sustainable transportation in southeastern Europe is Ljubljana, which has been noted for its commitment to sustainability and green initiatives, which include a comprehensive focus on sustainable transportation, and was named the European Green Capital by the European Commission (European Environment Agency, 2017). Zagreb has also been investing in sustainable transportation, particularly electric trams and buses, including plans to use hydrogen-powered buses (Iotkowska, 2021). Similarly, Athens has invested in electric buses, cycle paths, pedestrianized zones, and restrictions on car use in the city centre (Kyriakidis et al., 2023). The expected

trends in sustainable transportation are increased support for electric vehicles, sustainable urban transportation projects, advancements in autonomous vehicles and alternative fuels, shared mobility services, emphasis on transportation equity, and sustainability efforts in corporate travel (Caputo et al., 2023; Salo, 2023). Therefore, the potential for development and the way forward for sustainable transportation in Prishtina lies in improving public transportation infrastructure, diversifying transportation options with a focus on cycling and pedestrian paths, utilizing innovative technologies for efficient traffic management, and fostering a culture of sustainability among residents through educational campaigns and policy initiatives.

Sustainable transportation can only be strengthened and implemented through research, innovation, and investment in modern transportation systems (Antunes et al., 2023). Furthermore, improvement of public transportation system and digital transportation services under the umbrella of sustainability are key to implementing sustainable mobility (Hezam et al., 2023). To this end, investment in high-quality transit services and in walking and cycling infrastructure is key to achieving sustainable transportation (Szakonyi & Makó, 2023). Sustainability in transportation is a multifaceted challenge requiring both technological advancements and policy shifts.

Integrating mobility alternatives such as hybrid vehicles, car sharing, cycling, and electric bikes or scooters is crucial for sustainable cities (Pallonetto, 2023). Hybrid vehicles offer lower energy consumption costs (Habib et al., 2018), and car sharing significantly reduces CO<sub>2</sub> emissions (Nijland & van Meerkerk, 2017). Micromobility alternatives cut carbon emissions by 40% to 70% compared to conventional modes (Abduljabbar et al., 2021). Strategic planning, cycling, modernizing public transportation, and changing travel behaviour contribute to sustainable transport. Enhancing sustainable transportation requires improving public transportation, integrating modes, prioritizing sustainability, and fostering a sustainable travel culture (Abu-Rayash & Dincer, 2021; Bi et al., 2023; Yaliniz et al., 2023). Diverse mobility options not only reduce environmental impact but also offer flexibility and convenience to users.

Infrastructure and management challenges in developing countries often lead to inefficient governance and environmental management, making it extremely challenging for them to pursue sustainable transportation. Poor infrastructure contributes to a high number of accidents and higher mortality rates, indicating the need for better transportation planning and infrastructure management (Pallonetto, 2023). In addition, the lack of necessary transport infrastructure and planning leads to high traffic congestion, making it difficult to design infrastructure that can meet current needs (Kyriacou et al., 2019). Nevertheless, financial constraints can be a substantial barrier

in implementing sustainable transportation systems. In addition, the operation and maintenance costs of sustainable transportation systems can exceed those of conventional systems, which creates challenges for governments when prioritizing sustainable transport investments (Sperling & Gordon, 2009; Mattioli et al., 2020). In this regard, financial constraints and other management challenges can pose substantial obstacles to implementing sustainable transportation solutions. Cycling, for example, has been marginalized in many cities' transport planning systems, and the absence of infrastructure, funding, and leadership has impeded the adoption of pro-cycling policies (Wang, 2018). Further, introducing new transportation modes such as electric scooters can result in encounters related to space, speed, and safety, underscoring the significance of proper management practices and absence of physical infrastructure (O'Keeffe, 2019; Gössling, 2020). In conclusion, absence of physical infrastructure, financial constraints, management and organizational obstacles, and travel attitudes and behaviour are some of the concerns and challenges that must be tackled by cities pursuing sustainable transportation agendas (Anagnostopoulou et al., 2020; Bouraima et al., 2023; Feldman, 2023). The challenges faced by developing countries in implementing sustainable transportation are multifaceted, but these challenges can be overcome with the right strategies, investments, and international cooperation. The benefits of sustainable transportation, both environmental and social, make it a priority for the future.

Sustainable transportation alternatives such as electric and hybrid vehicles significantly lower pollution (Nijland & van Meerkerk, 2017). According to Saidla (2018), promoting active transportation leads to higher levels of health of the city's population. Finally, sustainable transportation alternatives lead to improved quality of life (Steg & Gifford, 2005, 2007; Wey & Huang, 2018). Reducing traffic and pollution, promoting public transportation and active transportation, and improving the overall wellbeing of a city's residents are key benefits of sustainable transportation (Elliott, 2023; Mohapatra et al., 2023; Molner et al., 2023). Embracing sustainable transportation not only addresses environmental concerns but also significantly increases the overall wellbeing of urban populations.

## 1.2 Research questions

From the reviewed literature, a lack of attention to sustainable transportation alternatives in the context of small and developing countries and small and rapidly urbanizing cities was identified as a research gap. Kosovo heavily relies on road transportation for trade and mobility due to its small size and rapid urbanization, leading to issues such as air pollution and traffic congestion (Malka et al., 2021). Prishtina, the capital, faces significant transportation challenges, including limited

public transportation, limited infrastructure for pedestrians and cyclists, and high levels of air pollution (Humolli et al., 2020). Studying Prishtina's transportation system can help develop evidence-based strategies to improve mobility, reduce greenhouse gas emissions, and promote public health in small, rapidly urbanizing cities. Kosovo has received limited attention in the literature on sustainable transportation, making studying this region important. Understanding Prishtina's challenges can contribute to knowledge about sustainable transportation in other small and developing countries.

Based on an extensive literature review, this study poses the following research questions and hypotheses:

RQ1: What are the specific aspects of transportation in Prishtina that are currently deemed inefficient and unsustainable?

Hypothesis 1 (H1): The inefficiencies in Prishtina's transportation system are largely attributed to inadequate public transportation coverage, inefficient bus schedules, and poor taxi services.

RQ2: What specific improvements in Prishtina's transportation infrastructure are perceived as key to achieving sustainable transportation?

Hypothesis 2 (H2): Improvements in Prishtina's transportation infrastructure, such as expanding public transportation routes, introducing modern buses, and enhancing road conditions, are perceived as critical for achieving sustainable transportation.

RQ3: What are the perceived major challenges to implementing sustainable transportation alternatives in Prishtina?

Hypothesis 3 (H3): Infrastructure inadequacies, financial constraints, mindset changes, and implementation and management challenges are major obstacles to implementing sustainable transportation alternatives in Prishtina.

RQ4: How are sustainable transportation alternatives in Prishtina perceived to impact residents' mobility and quality of life?

Hypothesis 4 (H4): Sustainable transportation alternatives in Prishtina have the potential to reduce traffic congestion, decrease pollution, and enhance mobility, ultimately leading to improved quality of life.

## 2 Methods

This qualitative research employed semi-structured interviews with twelve participants to gain insights. The interviews lasted

thirty minutes and they were conducted in person and recorded. Ethical considerations were reviewed by the Human Research Ethics Committee of ESLG College, granting authorization no. 2124/2023 due to the absence of an independent ethics review body in Kosovo.

The interview questions focused on sustainable transportation in Prishtina. The first question asked about current inefficiencies in the transportation system, and the second question inquired about key improvements for achieving sustainable transportation. The third question delved into how perceived major challenges relate to implementing sustainable transportation. Finally, the fourth question explored how sustainable transportation alternatives could affect mobility and quality of life. To further explore these topics, laddering technique sub-questions were used, asking participants about the benefits and drawbacks of each transportation alternative, their personal values and beliefs around sustainable transportation, and their preferences for transportation modes. The laddering technique is suggested by Reynolds and Gutman (1984) to avoid biases that originate from qualitative research, as suggested by Gutman (1982).

This study ensured participant anonymity through coding. Utilizing purposive sampling, a nonprobability technique, qualitative interviews were conducted. Homogenous purposive sampling, selected for shared road transportation experiences, was employed following Saunders et al. (2012), who highlight its use when common characteristics are found within the sample. From across Kosovo, twenty individuals with significant transportation and traffic engineering expertise were invited for interviews. However, only twelve responded.

In line with Hennink et al. (2017), this study adopted a sample size of twelve respondents per population to ensure code and meaning saturation, which typically occurs around the sixth interview, accounting for about 91% of vital information. The structure of respondents is presented in Table 1.

The semi-structured interviews were recorded, transcribed, and transformed into textual data for analysis. Verbatim transcription generated approximately six pages of data per interview. Thematic analysis was conducted to discern underlying and overt ideas, with emphasis on phrases. The material was reviewed three times to establish patterns, develop codes, and organize them into recurrent and non-recurrent themes, following the recommendations of Clarke and Braun (2017). NVivo software systematically coded themes and identified patterns across seventy-two pages of data. The study also used cross-case analysis to juxtapose different cases, allowing for a deeper understanding of the data by identifying commonalities, differences, and overarching themes. This method enriched the



**Table 1:** Structure of respondents

Code	Profession	Education	Sector	Age	Sex
01	Transportation engineer	PhD, transport engineering	Private	40–50	M
02	Architect	PhD, architecture	Private	30–40	M
03	Geographer	PhD, geography and planning	Private	40–50	M
04	Urban planner	BSc, urban planning	Private	20–30	F
05	Urban planner	MSc, urban planning	Private	20–30	M
06	Geographer	PhD, geography	Private	40–50	M
07	Traffic engineer	PhD, transport engineering	Private	30–40	M
08	Civil engineer	PhD, transport engineering	Private	30–40	M
09	Urban and transportation planner	PhD, transport engineering	Private	40–50	F
10	Head of public services sector, Municipality of Prishtina	MSc, transport and civil engineering	Public	50–60	M
11	Transportation officer, Municipality of Prishtina	BSc, transport engineering	Public	40–50	M
12	Senior officer for traffic signalling, Municipality of Prishtina	MSc, transport engineering	Public	30–40	M

analysis by addressing any conflicting responses and providing a more comprehensive view of the participants' perspectives. Adopting Yin's (2011) methodology, the researchers compiled, disassembled, and reassembled data. During reassembly, following Castleberry and Nolen (2018), thematic relevance to the research questions took precedence over frequency. This strategy allowed the identification of pertinent themes, even if infrequent, effectively addressing the research inquiries.

### 3 Results

#### 3.1 Prishtina's transportation inefficiencies and the need for comprehensive changes

The thematic analysis of the interview responses revealed that transportation in Prishtina is inefficient and unsustainable due to several key factors. Bus operators, mostly private, have inconsistent schedules, resulting in unreliable service. The bus fleet is outdated and insufficient, not meeting required standards for passenger transport. In addition, the absence of cycling and pedestrian infrastructure undermines the attractiveness and safety of alternative modes of transportation. The thematic analysis thus supported the hypothesis that Prishtina's transportation inefficiencies stem from inadequate public transportation coverage, inefficient bus schedules, an outdated bus fleet, and a lack of cycling and pedestrian infrastructure. Improvement in these areas is crucial for a more sustainable transportation system.

Conversely, in analysing Prishtina's transportation issues by means of cross-case analysis, conflicts emerge. Although most respondents express dissatisfaction with the current infrastruc-

ture and suggest improving public transit and cycling, a minority emphasize systemic problems requiring comprehensive change. However, some fear that these measures may inadvertently encourage more driving into the city, and they therefore propose solutions such as congestion charges or driving restrictions in the city centre. These varied viewpoints underscore the complexity of the issue, emphasizing the need for expert discussions to evaluate and prioritize proposed solutions.

Both analyses underscored Prishtina's transportation inefficiencies, highlighting the urgent need for broad improvements, modernizing public transport, bolstering cycling facilities, and advocating a balanced approach catering to the population's diverse needs.

#### 3.2 Key improvements for achieving sustainable transportation in Prishtina

The thematic analysis supported Hypothesis 2, highlighting the importance of improving Prishtina's transportation infrastructure for sustainable transportation. The themes identified included improving public transportation, infrastructure reform, diversifying transportation options, a mindset shift and concrete actions, and an integrated approach to alternative solutions. Respondents suggested measures such as eliminating old buses, promoting cycling, creating new public transport lines, improving road infrastructure, and implementing integrated ticket systems. They also emphasized the need for mindset shifts, policy changes, and the use of technology for tracking and managing transportation.

The cross-case analysis revealed conflicting perspectives on improving Prishtina's transportation. The majority of inter-

viewees favoured public transport enhancements, including bus fleet upgrades, simplified ticket transfers, and better route planning, coupled with improved cycling and pedestrian infrastructure. A smaller group advocated city fringe parking lots and integrated ticketing to balance public and private transport, whereas others cautioned against overreliance on public transportation and cycling, fearing this may disadvantage car-dependent individuals.

Both analyses affirmed the need to enhance Prishtina's transportation infrastructure for sustainability, highlighting the importance of a holistic approach, considering both infrastructure and behavioural changes, to achieve a sustainable transportation system in Prishtina.

### 3.3 Perceived major challenges to implementing sustainable transportation alternatives in Prishtina

The thematic analysis of the interview answers regarding challenges to implementing sustainable transportation alternatives in Prishtina revealed various obstacles. These included insufficient funds, resistance from users, and the need for private operators to meet specific criteria. Challenges further involve changing the bus fleet, determining routes, simplifying administrative procedures, and implementing the mobility plan. Encouraging people to shift from private vehicles and addressing administrative organization were highlighted. Limited space, connectivity, and high costs contribute to the difficulties. The analysis validated Hypothesis 3, confirming the identified obstacles of infrastructure inadequacies, financial constraints, mindset changes, and implementation and management challenges in implementing sustainable transportation alternatives in Prishtina.

The cross-case analysis showed varied viewpoints on the challenges of implementing sustainable transportation in Prishtina. Some respondents highlighted tangible barriers such as inadequate funding, outdated infrastructure, and the need for better buses. Others focused on behavioural and organizational aspects such as resistance to change, the necessity for administrative overhaul, and the difficulty of conducting mobility studies. These differing perspectives underscore the complexity of implementing sustainable transportation, suggesting that a multifaceted approach is needed to overcome these diverse challenges.

Both analyses illuminated the complexities of sustainable transportation implementation in Prishtina, emphasizing the importance of a holistic approach, considering both infrastructure and behavioural changes.

### 3.4 The perceived impact of sustainable transportation alternatives on mobility and quality of life in Prishtina

Thematic analysis of the interview answers supported Hypothesis 4, showing that sustainable transportation alternatives in Prishtina are believed to have positive effects. Respondents highlighted improved circulation, reduced traffic, decreased pollution, and enhanced cycling infrastructure as potential outcomes. Implementing sustainable transportation alternatives is expected to improve mobility, reduce pollution and congestion, and promote urban and rural integration, ultimately leading to improved quality of life in Prishtina.

The cross-case analysis of the responses demonstrated broad agreement on the perceived positive impacts of sustainable transportation in Prishtina: reduced traffic and pollution, increased efficiency, and enhanced quality of life. However, some respondents placed more emphasis on infrastructure development such as bike and pedestrian paths, whereas others stressed the need for changing public mindsets about public transportation and efficient traffic management. The discrepancies do not create conflicts but instead present different facets of the issue, implying that a comprehensive approach is necessary for successfully implementing sustainable transportation in Prishtina.

Both analyses affirmed the potential of sustainable transportation to positively transform Prishtina. The overarching sentiment is that a combined effort, encompassing infrastructure upgrades, public awareness campaigns, and policy adjustments, is required to truly realize the benefits of sustainable transportation in Prishtina.

## 4 Discussion

The research findings highlight Prishtina's transportation inefficiencies and the pressing need for sustainable solutions. The thematic analysis highlighted primary issues, including inconsistent bus services, aging vehicle fleets, and a lack of suitable facilities for cyclists and pedestrians. Respondents uniformly recommended enhancements in public transportation, encompassing the replacement of aging buses, new transit routes, and unified ticketing mechanisms. Moreover, there was a pronounced demand for improving infrastructure for cyclists and pedestrians. However, the cross-case analysis brought to light varied viewpoints on the best approaches, emphasizing the multifaceted nature of the challenges and the importance of a balanced strategy that addresses the diverse needs of the population. Marans and Stimson (2011) identified the quality

of public transportation services as a pivotal factor influencing residents' satisfaction with their city's transportation system. Similarly, Xiao et al. (2023) emphasized that modernizing and reorganizing transportation infrastructure can enhance efficiency and user satisfaction. However, as Borowski and Stathopoulos (2020) noted, such modernization can increase costs, necessitating appropriate subsidization to boost ridership and alleviate traffic congestion. The research findings on Prishtina's transportation inefficiencies have significant implications for the literature, practice, and society. In the literature, the research contributes to existing knowledge by offering specific insights related to Prishtina, serving as a foundation for further research and analysis in sustainable transportation planning. In practice, transportation planners and policymakers can utilize the findings to address the inefficiencies identified, prioritize upgrades in public transport, and advocate for enhanced cycling and pedestrian infrastructure. From the perspective of society, implementing these measures can result in reduced traffic congestion, better air quality, and improved accessibility and mobility for all residents, which contributes to a more sustainable and liveable environment.

The research findings underscore the significance of enhancing Prishtina's transportation infrastructure for sustainable transportation. The analysis supported Hypothesis 2 and revealed themes linked to public transportation enhancement, infrastructure reformation, transportation diversification, mindset change, concrete actions, and an integrated approach to alternative solutions. It also emphasized the importance of technology in tracking and managing transportation. In turn, the cross-case analysis revealed conflicting viewpoints on optimal strategies. While a majority advocated for public transport enhancements, including bus fleet upgrades and better route planning, a smaller group emphasized the need for city fringe parking lots and integrated ticketing. Some even caution against an overreliance on public transportation and cycling, suggesting potential disadvantages for car-dependent individuals. The findings from our research resonate with prior academic investigations specifically focusing on Prishtina's transportation landscape. This alignment is evident in the emphasis on enhancing public transportation, infrastructure reforms, and diversifying transportation methods, as highlighted by Sodiq et al. (2019), Anagnostopoulou et al. (2020), Abu-Rayash and Dincer (2021), Pamucar et al. (2021), Bi et al. (2023), and Yaliniz et al. (2023). These studies, like ours, have highlighted the critical role of mindset shifts, concrete policy actions, and the integration of alternative solutions in fostering a sustainable transportation environment. The present research results contribute to the literature on sustainable transportation in Prishtina, providing an understanding about the influencing variables and enhancement strategies. It has implications for transportation planning practice, highlighting

the relevance of improvements in public transportation and cycling infrastructure, and the need for eliminating old buses, promoting technology in tracking and managing transportation, and considering the diverse opinions on public versus private transport. These results have wider social implications, including reduced congestion, improved air quality, and enhanced accessibility. They underscore the necessity for mindset change, policy shifts, consensus-building, and careful reflection on conflicting viewpoints.

The examination of challenges in implementing sustainable transportation alternatives in Prishtina reveals various obstacles, including insufficient funds, user resistance, the need for private operators to meet specific criteria, challenges with changing the bus fleet, route determination, poor infrastructure, administrative procedures, and implementing the mobility plan. These results validate Hypothesis 3, underscoring the significance of infrastructure inadequacies, financial limitations, mindset shifts, and behavioural and organizational aspects such as resistance to change and the necessity for administrative overhaul, and addressing management challenges. The diverse perspectives highlighted in the cross-case analysis emphasize the multifaceted nature of these challenges, suggesting that both tangible barriers and behavioural aspects need to be addressed in tandem. The key impediments to implementing sustainable transportation alternatives identified agree with those established by Anagnostopoulou et al. (2020), Bouraima et al. (2023), and Feldman (2023). The research findings broaden the literature on implementing sustainable transportation alternatives in Prishtina, offering a foundation for additional research. It directs transportation planners and policymakers toward addressing barriers through strategic planning, legislation, and improved administrative organization. Overcoming these barriers can result in social benefits, including improved air quality and quality of life, and this requires political will, stakeholder collaboration, a comprehensive understanding of both physical and behavioural challenges, and effective public commitment.

The analysis of interview responses supported Hypothesis 4, indicating that sustainable transportation alternatives in Prishtina are believed to have positive effects. Potential outcomes mentioned by respondents included improved circulation, reduced traffic, decreased pollution, and enhanced cycling infrastructure. Implementation is expected to improve mobility, reduce congestion, and enhance the overall quality of life. Although there is broad agreement on the benefits, respondents' emphasis varies, suggesting that a multifaceted approach is essential for Prishtina's transportation future. Although many scholars have delved into the advantages of sustainable transportation, our research offers nuanced insights specific to Prishtina. Prior studies, such as those by Elliott

(2023), Mohapatra et al. (2023), and Molner et al. (2023), have underscored benefits such as reduced congestion and enhanced service quality. Our findings resonate with these works and enrich the literature on sustainable transportation in Prishtina. They guide transportation planners and policy-makers to consider these positive impacts when formulating transportation plans and implementing strategies, especially emphasizing infrastructure upgrades, public awareness campaigns, and policy adjustments.

## 5 Conclusion

This research offers a nuanced understanding of sustainable transportation in Prishtina, bridging a gap in the literature by delving into the specific challenges and potential benefits within this urban context. The study's findings, particularly those of the thematic and cross-case analyses, contribute to the academic discourse by highlighting the multifaceted nature of transportation challenges and the diverse perspectives on potential solutions. The novelty lies in its detailed exploration of Prishtina's transportation landscape, a topic previously under-represented in scholarly literature. However, the research is not without limitations. The reliance on interview responses might introduce biases, and the study's focus on Prishtina might limit its generalizability to other urban settings. Future research could expand the geographical scope, employ mixed methods for a more comprehensive understanding, and explore the long-term impacts of the proposed sustainable transportation strategies in Prishtina and similar urban environments.

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## References

- Abduljabbar, R. L., Liyanage, S. & Dia, H. (2021) The role of micro-mobility in shaping sustainable cities: A systematic literature review. *Transportation Research Part D: Transport and Environment*, 92, 102–734. doi:10.1016/j.trd.2021.102734
- Abu-Rayash, A. & Dincer, I. (2021) Development of integrated sustainability performance indicators for better management of smart cities. *Sustainable Cities and Society*, 67, 102704. doi:10.1016/j.scs.2020.102704
- Ali, H. & Abdullah, M. (2023) Exploring the perceptions about public transport and developing a mode choice model for educated disabled people in a developing country. *Case Studies on Transport Policy*, 11, 100937. doi:10.1016/j.cstp.2022.100937
- Anagnostopoulou, E., Urbančič, J., Bothos, E., Magoutas, B., Bradesko, L., Schrammel, J., et al. (2020) From mobility patterns to behavioural change: Leveraging travel behaviour and personality profiles to nudge for sustainable transportation. *Journal of Intelligent Information Systems*, 54, 157–178. doi:10.1007/s10844-018-0528-1
- Andrés, L. & Padilla, E. (2018) Driving factors of GHG emissions in the EU transport activity. *Transport Policy*, 61, 60–74. doi:10.1016/j.tranpol.2017.10.008
- Annunziata, A., Desogus, G., Mighela, F. & Garau, C. (2022) Health and mobility in the post-pandemic scenario. An analysis of the adaptation of sustainable urban mobility plans in key contexts of Italy. In: Gervasi, O., Murgante, B., Misra, S., Rocha, A.M.A.C. & Garau, C. (eds) *Computational Science and Its Applications – ICCSA 2022 Workshops*, 439–456. Cham, Springer. doi:10.1007/978-3-031-10592-0\_32
- Antunes, J., Tan, Y., Wanke, P. & Jabbour, C. J. C. (2023) Impact of R&D and innovation in Chinese road transportation sustainability performance: A novel trigonometric envelopment analysis for ideal solutions (TEA-IS). *Socio-Economic Planning Sciences*, 87, 101544. doi:10.1016/j.seps.2023.101544
- Bertoni, E., Fontana, M., Gabrielli, L., Signorelli, S. & Vespe, M. (2022) *Mapping the demand side of computational social science for policy*. Research Report. Brussels, European Commission. doi:10.1007/978-3-031-16624-2
- Bi, L., Zhou, S., Ke, J. & Song, X. (2023) Knowledge-mapping analysis of urban sustainable transportation using CiteSpace. *Sustainability*, 15(2), 958–987. doi:10.3390/su15020958
- Borchers, T. & Figueiró-Ferreira, V. G. (2022) Neoliberalism and the emptying of the state in public transportation in Araraquara, state of São Paulo, Brazil. *Cadernos Metrópole*, 24, 549–576. doi:10.1590/2236-9996.2022-5405
- Borowski, E. & Stathopoulos, A. (2020) On-demand ridesourcing for urban emergency evacuation events: An exploration of message content, emotionality, and intersectionality. *International Journal of Disaster Risk Reduction*, 44, 101406. doi:10.1016/j.ijdrr.2019.101406
- Bouraima, M. B., Qiu, Y., Stević, Ž. & Simić, V. (2023) Assessment of alternative railway systems for sustainable transportation using an integrated IRN SWARA and IRN CoCoSo model. *Socio-Economic Planning Sciences*, 86, 101475. doi:10.1016/j.seps.2022.101475
- Bureau of Transportation Statistics (2021) *Contribution of transportation to the economy: Final demand attributed to transportation*. Available at: <https://data.bts.gov> (accessed 14 Jul. 2023).
- Caputo, P., Soderberg, M., Crowley, E., Daher, M., Rauch, M., Terry, B., et al. (2023) Navigating toward a new normal: 2023 Deloitte corporate travel study. *Deloitte Insights*. Available at: <https://www2.deloitte.com/us/en/insights/focus/transportation/corporate-travel-study-2023.html> (accessed 4 Jul. 2023).
- Castleberry, A. & Nolen, A. (2018) Thematic analysis of qualitative research data: Is it as easy as it sounds? *Currents in Pharmacy Teaching and Learning*, 10(6), 807–815. doi:10.1016/j.cptl.2018.03.019
- Clarke, V. & Braun, V. (2017) Thematic analysis. *The Journal of Positive Psychology*, 12(3), 297–298. doi:10.1080/17439760.2016.1262613
- Directorate-General for Communication (2020) *Special Eurobarometer 496: Expectations and concerns from a connected and automated mobility*. Brussels, European Commission.
- Eckelman, M. J., Huang, K., Lagasse, R., Senay, E., Dubrow, R. & Sherman, J. D. (2020) Health care pollution and public health damage in the United States: An update. *Health Affairs*, 39(12), 2071–2079. doi:10.1377/hlthaff.2020.01247
- Eisenmann, C., Nobis, C., Kolarova, V., Lenz, B. & Winkler, C. (2021) Transport mode use during the COVID-19 lockdown period in Germany: The car became more important, public transport lost ground. *Transport Policy*, 103, 60–67. doi:10.1016/j.tranpol.2021.01.012
- Elliott, L. (2023) *The evaluation of active transportation public health policies and programs: Understanding equitable opportunities*. Doctoral thesis. State College, PA, Pennsylvania State University.



- European Commission (2022) *Providing efficient, safe and environmentally friendly transport* Available at: [https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/transport-and-green-deal\\_en](https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/transport-and-green-deal_en) (accessed 2 Apr. 2023).
- European Environment Agency (2017) *Ljubljana wins European Green Capital Award for 2016*. Available at: <https://www.eea.europa.eu/highlights/ljubljana-wins-european-green-capital-2016> (accessed 4 Jul. 2023).
- European Environment Agency (2021) *Transport and environment report 2021 Decarbonising road transport – the role of vehicles, fuels and transport demand*. Available at: <https://www.eea.europa.eu/publications/transport-and-environment-report-2021> (accessed 2 Apr. 2023).
- Feldman, O. (2023) Innovative ways for financing transport infrastructure. In: Woodcock, A., Saunders, J., Fadden-Hopper, K. & O'Connell, E. (eds.) *Building in local authorities for sustainable transport planning*, 253–278. Singapore, Springer Nature. doi:10.1007/978-981-19-6962-1\_14
- Figliozzi, M. A. (2020) Carbon emissions reductions in last mile and grocery deliveries utilizing air and ground autonomous vehicles. *Transportation Research Part D: Transport and Environment*, 85, 102443. doi:10.1016/j.trd.2020.102443
- Giuffrida, N., Le Pira, M., Inturri, G. & Ignaccolo, M. (2021) Addressing the public transport ridership/coverage dilemma in small cities: A spatial approach. *Case Studies on Transport Policy*, 9(1), 12–21. doi:10.1016/j.cstp.2020.06.008
- Gössling, S. (2020) Integrating e-scooters in urban transportation: Problems, policies, and the prospect of system change. *Transportation Research Part D: Transport and Environment*, 79, 102230. doi:10.1016/j.trd.2020.102230
- Gutman, J. (1982) A means–end chain model based on consumer categorization processes. *Journal of Marketing*, 46(2), 60–72. doi:10.1177/002224298204600207
- Habib, S., Khan, M. M., Abbas, F., Sang, L., Shahid, M. U. & Tang, H. (2018) A comprehensive study of implemented international standards, technical challenges, impacts and prospects for electric vehicles. *IEEE Access*, 6, 866–890. doi:10.1109/ACCESS.2018.2812303
- Hennink, M. M., Kaiser, B. N. & Marconi, V. C. (2017) Code saturation versus meaning saturation: How many interviews are enough? *Qualitative Health Research*, 27(4), 591–608. doi:10.1177/1049732316665344
- Hezam, I. M., Mishra, A. R., Rani, P. & Alshamrani, A. (2023) Assessing the barriers of digitally sustainable transportation system for persons with disabilities using Fermatean fuzzy double normalization-based multiple aggregation method. *Applied Soft Computing*, 133, 109910. doi:10.1016/j.asoc.2022.109910
- Humolli, F., Çinaj, N. & Kelmendi, N. (2020) The typology of travels in Pristina in relation to purpose, time and distance. *Quaestiones Geographicae*, 39(1), 79–91. doi:10.2478/quageo-2020-0006
- lotkowska, S. (2021) *Zagreb is planning the use of hydrogen for public transport*. Available at: <https://www.themayor.eu/en/a/view/zagreb-is-planning-the-use-of-hydrogen-for-public-transport-7340> (accessed 4 Jul. 2023).
- Kopplin, C. S., Brand, B. M. & Reichenberger, Y. (2021) Consumer acceptance of shared e-scooters for urban and short-distance mobility. *Transportation Research Part D: Transport and Environment*, 91, 102680. doi:10.1016/j.trd.2020.102680
- Kyriacou, A. P., Muinelo-Gallo, L. & Roca-Sagalés, O. (2019) The efficiency of transport infrastructure investment and the role of government quality: An empirical analysis. *Transport Policy*, 74, 93–102. doi:10.1016/j.tranpol.2018.11.017
- Kyriakidis, C., Chatziioannou, I., Iliadis, F., Nikitas, A. & Bakogiannis, E. (2023) Evaluating the public acceptance of sustainable mobility interventions responding to Covid-19: The case of the Great Walk of Athens and the importance of citizen engagement. *Cities*, 132, 103966. doi:10.1016/j.cities.2022.103966
- Malka, L., Konomi, I., Bartocci, P. & Rrapaj, E. (2021) An integrated approach toward a sustainable transport sector using EnergyPLAN model: Case of Albania. *Innovations*, 9(4), 141–147.
- Maparu, T. S. & Mazumder, T. N. (2017) Transport infrastructure, economic development and urbanization in India (1990–2011): Is there any causal relationship? *Transportation Research Part A: Policy and Practice*, 100(6), 319–336. doi:10.1016/j.tra.2017.04.033
- Marans, R. W. & Stimson, R. (2011) An overview of quality of urban life. In: Marans, R.W. & Stimson, R. (eds.) *Investigating quality of urban life: Theory, methods, and empirical research*, 1–29. Berlin, Springer. doi:10.1007/978-94-007-1742-8\_1
- Mattioli, G., Roberts, C., Steinberger, J. K. & Brown, A. (2020) The political economy of car dependence: A systems of provision approach. *Energy Research and Social Science*, 66, 101486. doi:10.1016/j.erss.2020.101486
- Mladenović, M. (2022) Learning to plan? Knowledge framework and plan quality assessment dimensions for developing transport planning practice in south-east Europe. *Journal of Road and Traffic Engineering*, 68(1), 1–10. doi:10.31075/PIS.68.01.01
- Mohapatra, S., Mohanachandran, D., Dwivedi, G., Kesharvani, S., Harish, V. S. K. V., Verma, S., et al. (2023) A comprehensive study on the sustainable transportation system in India and lessons to be learned from other developing nations. *Energies*, 16(4), 1986. doi:10.3390/en16041986
- Molner, B., Curtin, K. D., Kongats, K., Brown, J. A., Thomson, M., Atkey, K., et al. (2023) Policy influencer support for active transportation policy in two Canadian provinces: Implications for advocacy. *Journal of Transport and Health*, 28, 101537. doi:10.1016/j.jth.2022.101537
- Nijland, H. & van Meerkerk, J. (2017) Mobility and environmental impacts of car sharing in the Netherlands. *Environmental Innovation and Societal Transitions*, 23, 84–91. doi:10.1016/j.eist.2017.02.001
- Novikov, A. N., Emelianov, I. P. & Pykhtin, A. I. (2022) Evaluation of the public transport route network of the city of Kursk and recommendations for its improvement. In: Silhavy, R., Silhavy P. & Prokopova, Z. (eds.) *Data Science and Algorithms in Systems*, 912–920. Cham, Springer. doi:10.1007/978-3-031-21438-7\_77
- O'Keeffe, B. (2019) Regulatory challenges arising from disruptive transport technologies – The case of e-scooters. In: *Australasian Transport Research Forum (ATRF)*, 1–9. Washington DC, Transportation Research Board.
- Pallonetto, F. (2023) Towards a more sustainable mobility. In: Bertoni, E., Fontana, M., Gabrielli, L., Signorelli, S. & Vespe, M. (eds.) *Handbook of Computational Social Science for Policy*, 465–486. Cham, Springer. doi:10.1007/978-3-031-16624-2\_24
- Pamucar, D., Deveci, M., Canitez, F., Paksoy, T. & Lukovac, V. (2021) A novel methodology for prioritizing zero-carbon measures for sustainable transport. *Sustainable Production and Consumption*, 27, 1093–1112. doi:10.1016/j.spc.2021.02.016
- Reynolds, T. J. & Gutman, J. (1984) Laddering: Extending the repertory grid methodology to construct attribute–consequence–value hierarchies. In: Pitts, R. & Woodside, A. (eds.) *Personal values and consumer psychology*, 155–167. Lexington, MA, Lexington Books.

- Saidi, S. & Hammami, S. (2017) Modeling the causal linkages between transport, economic growth and environmental degradation for 75 countries. *Transportation Research Part D: Transport and Environment*, 53, 415–427. doi:10.1016/j.trd.2017.04.031
- Saidla, K. (2018) Health promotion by stealth: Active transportation success in Helsinki, Finland. *Health Promotion International*, 33(4), 600–609. doi:10.1093/heapro/daw110
- Salo, R. (2023) Transportation trends that could impact the future of transportation. *Forbes*. Available at: <https://www.forbes.com/sites/rudysalo/2023/01/04/2023-transportation-trends-that-could-impact-the-future-of-transportation/?sh=2c2cc5526a74> (accessed 4 Jul. 2023).
- Saunders, M., Lewis, P. & Thornhill, A. (2012) *Research methods for business students*. Harlow, UK, Pearson Education.
- Shafique, M., Azam, A., Rafiq, M. & Luo, X. (2020) Evaluating the relationship between freight transport, economic prosperity, urbanization, and CO2 emissions: Evidence from Hong Kong, Singapore, and South Korea. *Sustainability*, 12(24), 1–14. doi:10.3390/su122410664
- Sodiq, A., Baloch, A. A., Khan, S. A., Sezer, N., Mahmoud, S., Jama, M., et al. (2019) Towards modern sustainable cities: Review of sustainability principles and trends. *Journal of Cleaner Production*, 227, 972–1001. doi:10.1016/j.jclepro.2019.04.106
- Sperling, D. & Gordon, D. (2009) *Two billion cars: Driving toward sustainability*. Oxford, Oxford University Press. doi:10.1093/oso/9780195376647.001.0001
- Staat, D. W. (2018) *Facing an exponential future: Technology and the community college*. Lanham, MD, Rowman & Littlefield.
- Steg, L. & Gifford, R. (2005) Sustainable transportation and quality of life. *Journal of Transport Geography*, 13(1), 59–69. doi:10.1016/j.jtrangeo.2004.11.003
- Steg, L. & Gifford, R. (2007) Sustainable transport and quality of life. In: Perrels A., Himanen V. & Lee-Gosselin M. P. (eds.) *Building blocks for sustainable transport*, 183–202. Bingley, UK, Emerald.
- Szakonyi, P. & Makó, E. (2023) Transport development challenges of brownfield investments in the name of sustainability. In: Duque de Brito, P.S., et al. (eds.) *Proceedings of the 2nd International Conference on Water Energy Food and Sustainability (ICoWEFS 2022)*, 36–47. Cham, Springer. doi:10.1007/978-3-031-26849-6\_5
- Vujadinović, R., Jovanović, J. Š., Plevnik, A., Mladenović, L. & Rye, T. (2021) Key challenges in the status analysis for the sustainable urban mobility plan in Podgorica, Montenegro. *Sustainability*, 13(3), 1037–1065. doi:10.3390/su13031037
- Wang, L. (2018) Barriers to implementing pro-cycling policies: A case study of Hamburg. *Sustainability*, 10(11), 4196–4214. doi:10.3390/su10114196
- Wey, W. M. & Huang, J. Y. (2018) Urban sustainable transportation planning strategies for livable city's quality of life. *Habitat International*, 82, 9–27. doi:10.1016/j.habitatint.2018.10.002
- Xiao, F., Pang, Z., Yan, D., Kong, Y. & Yang, F. (2023) How does transportation infrastructure affect urban carbon emissions? An empirical study based on 286 cities in China. *Environmental Science and Pollution Research*, 30(4), 10624–10642. doi:10.1007/s11356-022-22866-4
- Yalınz, P., Kırış, Ş., Üstün, Ö. & Bilgiç, Ş. (2023) An integrated quality function deployment and multichoice goal programming approach for sustainable transportation: The case of Eskişehir. *Journal of Urban Planning and Development*, 149(1), 42–54. doi:10.1061/(ASCE)UP.1943-5444.0000894
- Yin, R. K. (2011) *Qualitative research from start to finish*. New York, The Guilford Press.
- Żukowska, S., Chmiel, B. & Polom, M. (2023) The smart village concept and transport exclusion of rural areas – A case study of a village in northern Poland. *Land*, 12(1), 260–283. doi:10.3390/land12010260