

A Systematic Review of Urban Mobility and Preliminary Research of Transportation Trends in West Hungary [†]

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Abstract: Based on the available statistical data, most employees travel by car, which results in traffic jams, hurts the environment, and increases household expenditures. As a result of this phenomenon, our investigation aimed to present the global trends in urban mobility. It is also considered preliminary research of Hungarian transportation habits and trends by summarizing the standard fees of taxi service, parking, and maintaining a driving license. As our research methodology, we chose a systematic literature search and a summary of the available secondary data to present the main global trends characterizing urban mobility and the standards typical of Hungarian transport. The results enable the expansion of the research and provide an opportunity to learn about consumers' attitudes at the national level.

Keywords: ridesharing; urban mobility trends; sustainable transportation



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1. Introduction

In recent years, significant changes have been observed in all areas, primarily due to the COVID-19 pandemic and the subsequent economic impacts, such as global inflation. Regarding public transportation, the usage of buses, trolleys, and metro networks decreased from 10.4% to 7.4% from 2019 to 2020, while the proportion of train users fell from 8% to 5.4% across Europe. In Hungary, expenditures on transportation decreased in line with EU trends by 2020 [1]. This trend persisted into 2021 based on the available data [2]. However, the quality of everyday life continues to be adversely affected by traffic congestion and air pollution caused by smog. This study aims to present the trends in global urban transportation published in the literature and to detail the available secondary data about the costs of taxis, parking, and obtaining a driver's license in the Hungarian context. The study intends to lay the foundation for deeper and more detailed research on Hungarian spending habits on transportation trends by summarizing the literature framework and topline market research data. It serves as a contextual framework for the broader study that will cover more aspects of spending habits on transportation, highlighting Győr as the center of the western region and a place of different types of transportation.

2. Methodology

We chose two methods for the processing of the available data. First, we applied the steps of a systematic literature review [3]. Then, we prepared a county-level summary of taxi services, parking fees, and the costs of obtaining a driver's license based on publicly available data on the internet, with particular attention to trends specific to the city of Győr.

For the keyword search, we used the Web of Science database. The search was conducted on 13 June 2024, using the term “urban mobility trends”. In the initial search, we identified 2538 articles, the narrowing parameters of which are illustrated in Figure 1.

Subsequently, we filtered based on the topic, which was done by examining the titles and abstracts of the articles. Based on these criteria, we excluded 331 studies. An additional 15 studies were excluded in the final round because they were either inaccessible or not rated as Q1–Q2, leaving us with 36 relevant studies identified.

In the next chapter, the 36 filtered studies will be analyzed regarding content and methodology [5].

3. Results

In this chapter, the selected 36 sources will be analyzed based on two criteria. First, we examined which clusters they could be categorized into based on their content and research area. Following this, we analyzed the sources from a methodological perspective.

3.1. Classification by Topic

Based on the thematic analysis, we identified five different clusters. The first cluster, (1) sustainable transportation development and challenges, includes sources [6–22] that focus on developing sustainable mobility, reducing CO₂ emissions, and increasing energy efficiency. The second cluster consists of articles on (2) land use and transportation planning [23–27], which discuss the integrated approach to transportation development that considers the diverse needs, opportunities, and sustainability aspects derived from land use analysis.

The third cluster, (3) ridesharing and autonomous vehicles [28–36], presents a vision of the future of transportation. It highlights the potential of autonomous vehicles and ridesharing to significantly reduce traffic accidents and congestion, providing viable alternatives for those without personal cars. Ridesharing, in particular, offers a unique opportunity for car owners to share their vehicles, thereby reducing the number of cars on the roads and enhancing sustainability.

The fourth cluster, (4) impact of COVID-19 on transportation [37,38], examines the effects of the pandemic on transportation worldwide. Reducing traffic congestion during the pandemic led to decreased local air pollution and CO₂ emissions, which positively impacted the environment.

The fifth and final cluster, (5) bike sharing and taxi use [39,40], underscores the significant roles that bike-sharing systems (BSS) and taxis play in urban transportation. BSS enhances individual mobility, reduces traffic congestion, and offers additional benefits such as increased physical activity and reduced emissions. These systems provide opportunities for short-term travel without the maintenance costs or ownership responsibilities. Taxis, on the other hand, continue to be fundamental transportation modes, often combined with public transportation. Recent studies have shown that BSS can be an effective alternative to taxi travel, especially in city centers during peak times.

3.2. Classification Based on Methodology

We identified four main groups in the processed sources based on the methodology. Figure 3 illustrates that the selected studies utilized qualitative and quantitative methodological approaches. The secondary data collection allowed for a systematic [15] presentation of the different focus areas. Some studies summarized empirical knowledge through case studies [24,29]. Additionally, there were instances of statistical modeling and analysis [7,10,20,28] concerning the efficiency and sustainability of urban transportation systems. Simulations [21,31] were also carried out to highlight the strategic side of ridesharing.

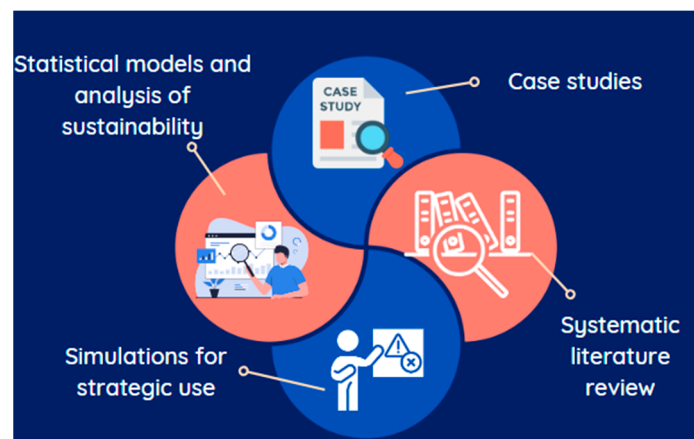


Figure 3. Summary of methodologies created by Canva tool.

3.3. Summary of the Hungarian Standard Fees in Urban Mobility

Our research collected average taxi fare rates at the county level (Appendix A in Supplementary Materials), parking fees, and the costs of obtaining a driver's license (Appendix B in Supplementary Materials). It aims to provide data about Hungarians' average transportation costs. Drawing a parallel with the literature review will lead to choosing one of the most researched topics and preparing a deeper analysis of Hungarian households regarding their expenses on transportation.

Based on this data, we analyzed the cost-effectiveness of choosing different modes of transportation, with a particular focus on the city of Győr. We found that taxi fare rates vary significantly between counties, and the composition of fare packages also differs; some counties have mileage-based pricing, while others use uniform, area-based pricing. In Győr, these rates exceed the national averages but do not reach the highest levels; for instance, the base fare in the city is 1000 HUF, compared to the national average of 890 HUF. It is recommended for occasional use based on the cost of taxi services, as daily commuting by taxi is extremely expensive. Obtaining a driver's license may be a better solution for daily transportation, but the high tuition fees of driving schools impose a significant financial burden on applicants. Furthermore, the number of licensed drivers significantly increases the number of individuals commuting by personal car, who then seek parking near their workplace or residence. This increase leads to a more extensive stock of parked vehicles, making finding available parking spots more challenging. Parking fees are often high, adding additional financial burdens to solo drivers. In Győr, the tuition fees for driving schools and parking fees also exceed the national average, as shown in Appendix B in Supplementary Materials. Car-sharing emerges as a financially savvy solution to these challenges. It not only offers a more affordable alternative to taxis but also presents a cost-effective option for occasional car users. With car-sharing, users pay only for the time they use the vehicle, thereby avoiding the high parking costs associated with personal car ownership. This model not only reduces individual financial burdens but also contributes to a more efficient use of urban space.

4. Conclusions

This research briefly summarizes the focus areas found in the literature, as well as the methodologies used in the studies. Overall, the studies highlight the opportunities and perceived disadvantages of the urban transportation infrastructure. Analyses were conducted ranging from identifying social needs to economic implications. The impact of changes in urban transportation on the environment during the COVID-19 pandemic was also examined. The research aims to further develop the trends that evolved and persisted from this period through various simulations and models that can assist decision-makers. The second part of the research summarizes publicly available taxis, parking, and driver's license fees. The results indicate that these forms of urban transportation impose significant

financial burdens on households. The insights gained from these two investigations lay the groundwork for sustainability-related research concerning Hungary. The limitations of this study also carry future perspectives. Firstly, the creation of a model that provides a more detailed framework for the in-depth analysis of the selected studies on the topic. Secondly, a deeper analysis of transportation habits in Hungarian society, calculating the environmental impact of harmful emissions and the spread of alternative transportation forms such as car-sharing and bike-sharing.

Supplementary Materials: The following supporting information can be downloaded at: <https://doi.org/10.5281/zenodo.13329346>. Appendix A: Taxi fees by county, Appendix B: Parking fees and tuition fees by county.

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