SUSTAINABILITY OF THE FREE PUBLIC TRANSPORT MODEL IN THE REPUBLIC OF CROATIA

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Summary

The significance of this work is multifaceted, reflecting a wide range of potential impacts that free public transportation could have on society, the environment, and urban fabric. Delving into this topic, the research aims to clarify the potential transformative power of free public transportation, offering a clear understanding that could inform policy, planning, and social perspectives. From a social standpoint, the work is crucial in exploring how free public transportation can improve accessibility and mobility for all segments of society, particularly benefiting those in lower socio-economic strata. It highlights the potential for such a policy to act as an equalizer in urban societies, reducing disparities in mobility access and, more broadly, social and economic opportunities. By facilitating a more inclusive urban mobility realm, free public transportation could play a key role in promoting social cohesion and equality. From an ecological perspective, research on free public transportation is at the centre of contemporary discussions on sustainable urban development and environmental concerns. This work seeks to illuminate the ecological benefits of increased public transportation usage, such as reducing greenhouse gas emissions, air pollution, and traffic congestion. By offering a systematic analysis of these aspects, the research contributes to a deeper understanding of how urban mobility innovations can align with

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environmental sustainability goals, in line with global efforts to mitigate the impacts of climate change. In an urban context, the significance of the work is anchored in its potential to inform urban planning and policy. It examines the implications of free public transportation on urban infrastructure, land use, and overall urban quality of life. The research explores how such a policy could impact urban form, potentially leading to more compact, efficient cities conducive to living. Furthermore, it addresses the operational and strategic dimensions of implementing free public transportation, providing insight into its feasibility and integration into broader urban mobility strategies. Ultimately, the work aims to offer a comprehensive and empirically grounded analysis that clarifies the potential benefits and challenges of free public transportation. It seeks to contribute valuable knowledge to the academic field, support informed policy-making, and stimulate public discourse on sustainable solutions for urban mobility in Croatia and beyond. As a basis for the work, secondary data were used, that is, a literature review of existing research.

Keywords: *free public transportation; environmental policy; urban planning; urban mobility.*

1. INTRODUCTION

The concept of free public transport seems radical, but it is increasingly considered within urban mobility strategies, aiming to address various socio-economic and environmental challenges. In the context of the Republic of Croatia, this concept should gain special importance regarding urbanization trends, environmental concerns, and the development of socio-economic areas. Free public transport is positioned as a transformation that could potentially reshape urban mobility, enhance social inclusion, and contribute to environmental sustainability (Batty, 2015). According to Kelemen-Erdős (2012), sustainable public transport requires reform of transport institutions, integrated settlement development, and demand-responsive transportation. However, Docherty (2011) highlights that its practical implementation faces significant challenges, including funding constraints and political feasibility.

Public transport in Croatia is shaped by a combination of various factors, from tourism and passenger demand to external shocks such as pandemics and initiatives for its sustainability. Tourism plays a significant role in shaping public transport in Croatia, known for its tourist destinations. The interaction between tourism and public road passenger transport is particularly analysed, demonstrating how the seasonal flow of tourism affects transport demand and service provision (Kos et al., 2020). This interdependence highlights the need for adaptable and responsive public transport

systems capable of addressing fluctuating demand inherent in economies with a large number of tourists. The dynamics of demand in the public transport system in Croatia are closely linked to economic factors and transport infrastructure. Bubalo et al. (2020) provide insight into the relationship between traffic, economic variables, and the importance of road transport within the national public transport network. The COVID-19 pandemic has deeply affected public transport in Croatia, as well as in many other contexts. Service suspensions and mobility restrictions domestically and abroad have disrupted standard operational paradigms and passenger demand patterns (Naletina, 2021). This disruption necessitates a reassessment of public transport policies and practices to enhance resilience to future external shocks. Research into sustainability, production, and potential use of biogas in Croatia presents opportunities for greener public transport operations. Petravić-Tominac et al. (2020) discuss the prospects of biogas in various sectors, including its implications for the public transport system, highlighting alternative energy sources that could innovate and sustain public transport solutions. Exploring public memories and narratives in post-communist Croatia offers additional layers of understanding the social impacts on public transport (Andersen and Dedović, 2021). Although not directly related to operational aspects, these historical and cultural factors contribute to shaping attitudes and public expectations regarding transport services. The current state of public transport in Croatia is influenced by a range of dynamic and interconnected factors. The interaction of tourism, passenger demand, challenges associated with pandemics, and sustainability initiatives forms a complex backdrop on which the future of Croatian public transport will unfold. Recognizing and addressing these factors is imperative for stakeholders aiming to promote a robust, efficient, and sustainable public transport system in Croatia.

The purpose of this research is to provide a new, comprehensive analysis of how free public transport could impact various aspects of urban life in Croatia, including but not limited to urban planning, social equality, environmental quality, and public health. It seeks to uncover the complexity and dynamics of introducing the model of free public transport, assessing its sustainability and alignment with the goals of national and urban policies. Grounded in the Croatian context, the work offers insight into specific challenges and opportunities that free public transport may present in an economy and society in transition. From a social standpoint, the paper explores how free public transport can improve accessibility and mobility for all segments of society, particularly benefiting those in lower socio-economic strata. It highlights the potential of such a policy to act as a kind of "equalizer" in urban societies, reducing disparities in mobility access. Free public transport could play a key role in promoting social cohesion and equality. From an environmental perspective, researching free public transport is at the centre of contemporary debates on sustainable urban development and environmental care. In an

urban context, the significance of the work lies in its potential to influence urban planning and policy by exploring how such policies could affect urban form, potentially leading to more efficient cities conducive to living. Ultimately, the work aims to offer a comprehensive and empirically grounded analysis that elucidates the potential benefits and challenges of free public transport, contributing valuable knowledge to the academic field, supporting policy-making, and stimulating public discourse on sustainable solutions for urban mobility in Croatia and beyond.

2. CONCEPT AND MODELS OF PUBLIC TRANSPORT: LITERATURE REVIEW

In recent years, the concept of free public transport has gained momentum as a potential solution to various urban challenges. The idea of providing free public transport services has been explored in various contexts (Fearnley, 2013; Goodman et al., 2014; Hess et al., 2004), with advocates highlighting its potential social, economic, and environmental benefits (Štraub and Jaroš, 2019; Tomanek, 2017). Free public transport refers to a system where passengers do not have to pay a fare to use public transport services such as buses, trains, or trams. The rationale behind this concept stems from the desire to promote the use of public transport, reduce traffic congestion, decrease emissions, and increase social equality by providing affordable mobility options for all segments of society.

Several models of free public transport have been proposed and implemented, ranging from completely free fares on all public transport routes to models with free public transport only on certain routes in various cities worldwide. Experiences vary widely, with some free public transport models enduring to this day, while others have proven less successful, leading to the reintroduction of fare charges, as seen in Hasselt, Belgium, where fare charges are reintroduced for certain passenger groups. One common approach is the introduction of free fare policies for specific modes of transport, such as buses or smart buses, as seen in the case of SMART buses in Kajang, Selangor (Shukri et al., 2020). These initiatives are often spearheaded by local authorities seeking to encourage a modal shift from private vehicles to public transport (Ponrahono and Shukri, 2019). Another model involves the implementation of city-wide free fare schemes, where all public transport services are free for residents. Although such programs have the potential to significantly increase public transport usage and reduce car dependency, they are typically limited to local residents (Štraub and Jaroš, 2019). For example, the Ministry of Transport of the Russian Federation recommends free public transport for all categories of passengers according to the "user pays" model (Klychova, 2022).

The results of previous research (Fearnley, 2013; Goodman et al., 2014; Hess et al., 2004; Tomanek, 2017) suggest that the introduction of free public transport can increase the number of individual trips taken by public transport. This increase is attributed to the removal of financial barriers to accessing public transport services, resulting in a shift from walking and cycling to public transport use (Fadyushin, 2021). Free public transport can significantly contribute to environmental sustainability as well. As noted by Fadyushin (2021), transitioning from private vehicles to public transport can lead to a significant reduction in urban traffic volumes, thereby reducing greenhouse gas emissions and air pollution. This change is crucial for cities aiming to mitigate their environmental impact and move towards sustainability. Initiatives for free public transport have the potential to improve air quality, reduce greenhouse gas emissions, and alleviate traffic congestion in urban areas.

While the concept of free public transport offers numerous advantages, its implementation is not without challenges. Transitioning to a free public transport system poses several challenges that need to be carefully addressed. Financing such initiatives can be a significant hurdle for local authorities, as they must find alternative revenue sources to offset the loss of fare revenue. Without fare revenue, public transport systems must rely on alternative funding sources, which may include government subsidies, tax measures, or reallocating funds from other sectors (Štraub and Jaroš, 2019). By removing price barriers, public transport becomes a more sustainable option for all community members, particularly benefiting those with lower incomes and promoting social inclusion (Ponrahono and Shukri, 2019). Identifying stable and sustainable sources of funding is imperative to ensure the long-term sustainability of free public transport.

Ensuring the sustainability and efficiency of free public transport systems requires careful planning, monitoring, and evaluation to optimize service quality and user experience (Ponrahono and Shukri, 2019). The concept of free public transport represents a promising path for promoting sustainable urban mobility, increasing social inclusion, and mitigating the environmental impacts associated with private vehicle use. By exploring different models and approaches to implementing free fare schemes, cities can work towards creating more accessible, equitable, and environmentally friendly transportation systems for their residents. One of the most notable advantages of free public transport is the increased accessibility it provides. Improved accessibility can lead to greater mobility freedom, facilitating access to employment, education, healthcare, and other essential services. While free public transport offers significant potential benefits in terms of accessibility, social equality, and environmental sustainability, it also presents significant challenges that need to be addressed. Careful planning, robust funding strategies, and ongoing evaluation are key to overcoming these obstacles and realizing the full potential of free public transport systems.

3. DISCOURSE ON THE CONCEPTS OF FREE PUBLIC TRANSPORT

3.1. Concept of free public transport abroad

The adoption of free public transport initiatives has become increasingly widespread worldwide as cities aim for sustainable urban mobility, reduced traffic congestion, and improved air quality. This section showcases various global cases where free public transport programs have been implemented, closely examining their outcomes and the obstacles encountered during their implementation. Hasselt in Belgium stands out as a pioneer in the field of free public transport after launching an extensive scheme that eradicated fares in the public transport network. The primary goal was to increase public transport usage by removing cost barriers, a move that significantly increased the number of passengers in the city (Štraub and Jaroš, 2019). The Hasselt initiative served as inspiration for various cities considering adopting similar free fare policies.

In Germany, the city of Templin introduced free public transport with the aim of promoting sustainable transportation habits and reducing dependence on private vehicles. Subsequent research has highlighted a noticeable shift towards sustainable modes of transport after fare abolition, reflecting the effectiveness of the policy in promoting public transport (Štraub and Jaroš, 2019). The French city of Aubagne represents another successful case where free public transport was introduced to increase accessibility and mitigate the environmental impact of the transport sector. This initiative was instrumental in reducing vehicle traffic and improving air quality, illustrating the environmental benefits of such policies (Štraub and Jaroš, 2019). Looking ahead, the Ministry of Transport of the Russian Federation has articulated plans to introduce free public transport by 2035, a visionary strategy aimed at increasing public transport usage and eventually charging fees to car owners for highway use, thus promoting a paradigm of sustainable transportation (Fadyushin, 2021).

Free-fare public transport in Tallinn resulted in an increase in public transport trip share from 55% to 63%, although more than half of the trips were derived from walking. The largest increase in public transport ridership was observed in the young, the elderly and people with lower incomes (Cats et al., 2017). Besides, as public transport in Tallinn is free only for registered residents, and the local government collects part of the residents' income tax, free-fare policy benefitted the local government, since the additional tax collection by new registrations exceeds the extra subsidies for public transport operation (Kębłowski et al., 2019).

While the benefits of free public transport, such as increased ridership and environmental benefits are evident, the implementation of such programs is not without challenges. The debate on the effectiveness and limitations of free urban public transport

continues (Dydkowski and Gnap, 2019). Fadyushin and Zakharov (2022) emphasize that the transition to free public transport may only result in a modest increase in public transport usage, accompanied by a reduction in individual trips by mode of transport. Studies using multimodal transport models have identified a significant shift towards public transport after the adoption of free fare policies, consequently reducing the use of private cars (Kilani et al., 2022). The experiences of cities such as Hasselt, Templin, and Aubagne focus on the potential of free public transport policies in the urban mobility process and in promoting sustainability.

3.2. Concept of free public transport in the Republic of Croatia

Research on the sustainability of implementing free public transport in Croatia requires a detailed analysis of several key factors, including economic sustainability, public sentiment, and the impact of tourism on transport dynamics. The appeal of free public transport lies in its promise to reduce traffic congestion, decrease pollution levels, and promote the sustainability of transportation itself. However, the feasibility of such an undertaking in Croatia requires thorough assessment. A significant element in this assessment is the economic consequences of introducing free public transport. Bubalo et al. (2020) emphasize the importance of economic considerations and public opinion in the context of significant infrastructure initiatives in Croatia. This research suggests that decisions surrounding the adoption of free public transport should not only be economically justified but also supported by public consensus to ensure long-term sustainability. Considering the significant impact of tourism on Croatian public transport, as described by Kos et al. (2020), all changes to the transportation system, such as the introduction of free services, must meet the needs of both tourists and the local population. This ensures the efficiency of the system and its ability to respond to increased demand during peak tourist seasons.

Insights into passenger demand dynamics and the transportation framework, as analyzed by Bubalo et al. (2020), are crucial. Before embarking on significant changes such as free public transport, a thorough understanding of existing infrastructure and user patterns is essential. Such data-driven perspectives assist policymakers in developing strategies that are truly aligned with the population's needs. Examining international experiences, such as the challenges faced by Poland in transforming non-urban public transport (Ciechański, 2021), provides valuable context. Drawing parallels and learning from the examples of other countries can provide Croatian policymakers with a comprehensive view of potential obstacles and successes in implementing free public transport.

The introduction of free public transport in Croatia is a complex issue that intertwines economic factors, citizen preferences, the role of tourism, and existing traffic dynamics with international experiences. A comprehensive analysis of these dimensions enables policymakers to discern informed paths toward the introduction of free public transport, aiming to improve urban mobility, environmental well-being, and meet the current and future transportation needs of the Croatian population. The proposal to adopt a free public transport model in Croatia has significant environmental implications, highlighting the potential to promote a more sustainable and less polluted urban future. One of the primary environmental benefits of introducing free public transport is the potential reduction in traffic congestion and vehicle emissions. By encouraging the public to switch from private cars to public transport, significant reductions in greenhouse gas emissions and other pollutants could be achieved, improving air quality and contributing to a healthier urban environment (Fadyushin and Zakharov, 2022; Sinha et al., 2019). This transition aligns with global efforts to combat climate change and local initiatives aimed at improving air quality in Croatian cities.

The implementation of free public transport may also deter the expansion of road infrastructure, which often comes with significant ecological footprints (Fadyushin, 2021). By making public transport more attractive and accessible, not only is urban fabric preserved, but there is also a reduction in the demand for new infrastructure that could disrupt existing natural and urban aspects. The fare model for public transport should be aligned with the objectives, capabilities and limitations of the mobility system. Achieving these goals requires establishing a balance between operating costs and public financing of services. Removing barriers related to ticket prices is likely to result in an increase in the number of users of public transport, as observed in other contexts where similar policies have been applied (Fadyushin, 2021). While this increase promotes a reduction in the use of private cars, it is crucial to monitor changes arising from pedestrian and cycling traffic, ensuring that the policy does not inadvertently discourage such sustainable modes of transport. Transitioning to a free public transport model in Croatia represents a sustainable strategy for improving environmental sustainability in the urban transport sector. By reducing reliance on private vehicles, such a model can significantly reduce traffic-related emissions, improve air quality, and support initiatives for sustainable urban planning. The challenge for policymakers lies in balancing these environmental benefits with the operational and financial aspects of public transport, ensuring that the transition to free services is in line with broader environmental goals and sustainability objectives. Careful planning and consideration of these environmental factors can propel Croatia towards a greener and more sustainable urban transport system. The introduction of free public transport in Croatia encompasses extensive social and cultural dimensions, impacting the structure of Croatian society and its cultural practices. Analysing the social

repercussions of introducing free public transport involves examining the interaction between passenger demand and transport dynamics within Croatia (Bubalo et al., 2020). Given the heavy reliance on road transport within the Croatian public transport framework, transitioning to free services could significantly alter travel behaviors and choices. Furthermore, the synergy between the transportation sector and tourism, vital components of the Croatian economy, suggests that free public transport could further intertwine these sectors, potentially boosting tourism and improving mobility for both residents and visitors (Kos et al., 2020).

The cultural consequences of implementing free public transport extend across various social aspects, influencing community cohesion and cultural engagement. Initiatives such as the development of pop-up rural social innovation hubs demonstrate the potential of transportation to facilitate social innovations and community cohesion in rural areas (Kantar and Svržnjak, 2020). Free public transport can improve accessibility to these centres, promoting cultural exchange and strengthening community ties. Furthermore, the adaptability of transport systems to crises, as observed during the COVID-19 pandemic, underscores the role of free public transport as a cultural strategy for maintaining and enhancing urban resilience and connectivity (Naletina, 2021). Based on a study of multimodal transport models in France, insights can be gained regarding the potential effects of introducing free public transport (Kilani et al., 2022). By examining the results and methodologies of such studies, Croatian policymakers can assess the practicality and potential benefits of adopting similar transport policies. Understanding these social and cultural dimensions is imperative for crafting transportation policies that are sustainable, equitable, and aligned with the needs of Croatian society.

Examples of free public transport in Croatia are still relatively few, but there are shining examples, primarily the city of Sveta Nedelja near Zagreb, which introduced free public transport for its citizens within the city limits in 2020. The annual cost to the city is around 600 thousand euros and has proven to be very successful, leading to the announcement of a new four-year cycle of free public transport. Following Sveta Nedelja's example, the city of Slavonski Brod recently launched a three-month pilot project of free public transport for its residents, and unlike Sveta Nedelja, public transport is free for visitors to the city as well. If the project proves successful and interest in using public transport services increases, a longer-term solution for free public transport will be developed. The introduction of free public transport in Croatia is a key political decision with profound social and cultural consequences. Considering the dynamics of passenger demand, the role of transport in cultural and social innovations, and adaptable responses to social challenges, Croatian policymakers can address the complexity of implementing free public transport. A thorough synthesis of research findings is crucial for understanding the full spectrum of social and cultural impacts, enabling informed

decision-making for policy that could transform the landscape of public transport in Croatia.

4. CONCLUSION

This comprehensive analysis of the potential of free public transport in Croatia has traversed various dimensions, from theoretical foundations and economic considerations to social, cultural, and environmental implications. By examining insights from existing research and comparing the Croatian context with global trends, this work offers a clear understanding of what free public transport could mean for the nation. Theoretical research has provided a foundation for understanding the benefits and challenges associated with free public transport, highlighting its potential to increase social equality, environmental sustainability, and urban mobility. When contextualized within Croatia, these benefits align with national goals of improving the quality of urban life and reducing environmental impact. Economic considerations constitute a key part of the discourse on free public transport. The need for sustainable funding models and careful economic planning is of utmost importance, as evidenced by analyses from various studies and examples worldwide. The economic sustainability of such an initiative in Croatia depends on careful consideration of costs, potential savings, and long-term financial impacts. Social and cultural dimensions add depth to the discussion, revealing how free public transport can influence community dynamics, cultural engagement, and social norms. The potential of free public transport to serve as a catalyst for social innovation and cultural vitality in Croatia is significant, indicating broader implications beyond mere transportation. Environmental considerations further emphasize the urgency and importance of this discourse, especially in light of global sustainability challenges. Free public transport in Croatia could lead to significant environmental benefits, reducing carbon emissions, improving air quality, and contributing to a more sustainable urban future.

This analysis underscores the importance of ongoing research and policy evaluation. Identified limitations and proposed areas for further research indicate the continuous need for refinement and adaptation of approaches to free public transport in Croatia, considering growing social needs and global trends. Research on free public transport in Croatia reveals a multifaceted opportunity to enhance urban mobility, environmental sustainability, and social well-being. By learning from global experiences, acknowledging clear challenges, and strategically planning economic, social, and environmental factors, Croatia can embark on a path towards a more sustainable future in urban transportation. This work not only contributes to academic discourse on free public

transport but also provides valuable insights to policymakers and stakeholders aiming to shape the future of urban mobility in Croatia and beyond.

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ODRŽIVOST MODELA BESPLATNOG JAVNOG PRIJEVOZA U REPUBLICI HRVATSKOJ

Toni Kozina

Sažetak

Značaj ovog rada je višestruk, odražavajući širok spektar potencijalnih utjecaja koje besplatni javni prijevoz može imati na društvo, okoliš i urbanu strukturu. Kroz istraživanje ove teme, cilj je razjasniti potencijalnu transformativnu moć besplatnog javnog prijevoza, nudeći jasno razumijevanje koje može informirati politiku, planiranje i društvene perspektive. S društvenog stajališta, rad je ključan u istraživanju kako besplatni javni prijevoz može poboljšati dostupnost i mobilnost za sve segmente društva, osobito koristi onima u nižim socio-ekonomskim slojevima. Naglašava potencijal takve politike da djeluje kao izjednačivač u urbanim društvima, smanjujući razlike u pristupu mobilnosti i, šire gledano, društvenim i ekonomskim prilikama. Omogućavajući inkluzivniju urbanu mobilnost, besplatni javni prijevoz mogao bi igrati ključnu ulogu u promicanju društvene kohezije i jednakosti. S ekološkog stajališta, istraživanje besplatnog javnog prijevoza nalazi se u središtu suvremenih rasprava o održivom urbanom razvoju i ekološkim pitanjima. Ovaj rad nastoji rasvijetliti ekološke prednosti povećane upotrebe javnog prijevoza, poput smanjenja emisija stakleničkih plinova, zagađenja zraka i prometnih gužvi. Nudeći sustavnu analizu ovih aspekata, istraživanje doprinosi dubljem razumijevanju kako inovacije u urbanoj mobilnosti mogu biti usklađene s ciljevima ekološke održivosti, u skladu s globalnim naporima za ublažavanje utjecaja klimatskih promjena. U urbanom kontekstu, značaj rada ukorijenjen je u njegovom potencijalu da informira urbano planiranje i politiku. Istražuje implikacije besplatnog javnog prijevoza na urbanu infrastrukturu, korištenje zemljišta i opću kvalitetu života u urbanim sredinama. Rad istražuje kako bi takva politika mogla utjecati na urbanu formu, potencijalno vodeći ka kompaktnijim, učinkovitijim gradovima pogodnim za život. Nadalje, bavi se operativnim i strateškim dimenzijama implementacije besplatnog javnog prijevoza, pružajući uvid u njegovu izvedivost i integraciju u šire strategije urbane mobilnosti. Konačno, rad ima za cilj ponuditi sveobuhvatnu i empirijski utemeljenu analizu koja pojašnjava potencijalne prednosti i izazove besplatnog javnog prijevoza. Cilj je doprinijeti vrijednim znanjem akademskom polju, podržati informirano donošenje politika i potaknuti javnu raspravu o održivim rješenjima za urbanu mobilnost

u Hrvatskoj i šire. Kao temelj za rad korišteni su sekundarni podaci, odnosno pregled literature postojećih istraživanja.

Ključne riječi: *besplatan javni prijevoz; ekološka politika; urbano planiranje; urbana mobilnost.*