FINANCING ECO-FRIENDLY AND SMART URBAN PUBLIC TRANSPORT: A COMPARATIVE ANALYSIS BETWEEN GERMAN-SPEAKING COUNTRIES AND BOSNIA AND HERZEGOVINA[1]

Lejla LAZOVIĆ-PITA, Ph.D.
University of Sarajevo

E-mail: lejla.lazovic@efsa.unsa.ba

Jasmina MANGAFIĆ, Ph.D.
University of Sarajevo

E-mail: jasmina.mangafic@efsa.unsa.ba

Mario SITUM, Ph.D.
University of Applied Sciences Kufstein

E-mail: mario.situm@fh-kufstein.ac.at

Giuseppe SORRENTINO, MA
University of Applied Sciences Kufstein

E-mail: giuseppe.sorrentino@fh-kufstein.ac.at

Abstract

Out of 17 set goals, the UN 2030 Agenda for Sustainable Development in goal 11 defines the significance of sustainable cities and communities, giving priority to, inter alia, sustainable and expanding urban public transport. This actual and attractive topic increases the academic interest and research regarding different aspects of financing eco-friendly, smart and therefore sustainable

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urban public transport in cities and communities worldwide, but such research is parsimonious in the European transition countries. The research design employed mixed methods so that the gathered information could be compared and evaluated in addressing each of the research questions using different data sources: publicly available documents and semi-structured interviews regarding urban public transport conducted with key stakeholders in three German-speaking countries (Austria, Germany and Switzerland) and in the capital of Bosnia and Herzegovina (BiH), Sarajevo. After conducting 14 semi-structured interviews with representatives from the German-speaking stakeholders and 11 stakeholders in Sarajevo, the objective of the study is to answer two research questions: firstly, were stakeholders involved in financing smart mobility projects and what were the sources of such financing, and secondly, who needs to be involved in decision-making on financing smart city projects? Even though respondents agree that most financing in German-speaking countries as well as in BiH, ought to come from public sources of financing (budgets at different levels of government and EU-funded grants), significant differences exist in recognition of new, innovative, and alternative sources of financing that were recognized in German-speaking countries to a certain extent and not in BiH. These mainly relate to crowdfunding sources, green crowdfunding as possible PPP. The stakeholders in all countries agree that subcentral governments' representatives are the key stakeholders in the decision-making process regarding financing smart city/mobility projects, together with citizens and the private sector. Based upon the comparative analysis, our results indicate several financial, social and environmental lessons-learned and critical points that should be considered in the Bosnian case based on German-speaking countries' experiences.

Keywords: *eco-friendly, smart mobility, financing, urban public transport*

JEL Classification: *H41, H42, H61, L91, R42*

1. INTRODUCTION

Several strategic documents worldwide have emphasized the significance of transport as a critical objective. The United Nations (UN) Agenda for Sustainable Development defines 17 Sustainable Development Goals to be reached by the year 2030 worldwide. Goal 11, titled "*Sustainable cities and communities,*" deals with several aspects of urban living, from adequate housing, air pollution in the cities, and adequate urban infrastructure to urban waste management.

Since the UN estimates that by 2050, 7 out of 10 people will likely live in cities, the pressure to fulfill all the envisaged objectives represents a challenge for local governments globally. Currently, cities are places where 80 percent of the world's GDP is created with the opportunity cost of the highest greenhouse gas emissions (70 percent globally, United Nations, 2022). Under such circumstances and the forecast that by 2030, annual passenger traffic will increase by 50 percent, putting additional pressure on urban infrastructure and urban public transport. Most recent data from 2020 (United Nations, 2022) estimates that from 1,510 cities worldwide, only about 37 percent of urban areas are served by public transport, which makes slightly more than half (52 percent) of the worldwide urban population being provided with convenient access to public transport.

Providing efficient urban transport ought to bring several positive outcomes to local communities worldwide, from reducing urban air pollution to providing access to other public goods and services (health, education, employment, etc.). The accompanying problem of climate change is becoming more and more vacant at present (Delitheou et al., 2019). In the most recent academic literature, several terms are associated with urban public transport: eco-city or smart city. The term eco-city is closely interwoven with the smart city because implementing green energy and smart data-driven technology offers the possibility of achieving both environmental policy goals more efficiently, faster and through sustainable development by lowering energy consumption and pollution reach (Bibri, 2020). Hence, the academic solutions for the issues mentioned above might be in the implementation of smart, eco-friendly cities through economic restructuring and initiation of developments in urban intelligence management to be able to counter the problems outlined above (Li et al., 2015).

In addition, the European Union Green Deal 2019 puts transport as one of the critical policies into the spotlight. The ambitious EU criteria for greenhouse gas emission reduction in transport by 2050 of 90 percent is required to reach the climate neutrality objective. The objective of "*Accelerating the shift to sustainable and smart mobility*" defines several areas the European Commission plans to tackle in the coming years. These relate to greater investments into multimodal transport and smart traffic management systems, modifications in the Energy Taxation Directive, installations of about 1 million public recharging and refueling stations by 2025, and, most importantly, making city transport drastically less polluting, addressing the emissions, urban congestion, and improved public

transport (European Commission, 2019). In Europe, academic research evaluating best practices and smart, eco-friendly city financing has increased in the last fifteen years. For example, such research for medium-sized cities has already been conducted in the works of Griffinger et al. (2007) and Blanck & Ribeiro (2021), to name a few. After setting a benchmark in terms of best practices implemented in the EU and across the world, it becomes inevitable to evaluate the efficiency of the very backbone of every (smart) city –its transport services (Gudmundsson et al., 2005; Stone et al., 2012).

Hence, the significance of smart and sustainable transport, especially urban public transport, has been recognized as a critical determinant in reaching sustainability goals worldwide (Curiel-Ramirez et al., 2020; Gallo & Marinelli, 2020). However, adequate financing of urban public transport needs to be analyzed to reach any of the envisaged objectives. So, the purpose of the study is to answer two research questions: firstly, were stakeholders involved in financing smart mobility projects, and what were the sources of such financing? Secondly, who needs to be involved in decision-making on financing smart city projects? By employing the mixed methods design in evaluating the research questions, we analyze and validate publicly available documents with results gathered from semi-structured interviews regarding urban public transport conducted with key stakeholders in three German-speaking countries (Austria, Germany and Switzerland) and the capital of Bosnia and Herzegovina, Sarajevo.

The article is organized as follows: after the introduction, the paper is divided into four parts: a brief literature review, research design and methodology, the results and the discussion of financing eco-friendly urban public transport in the German-speaking countries, the results and the discussion of financing eco-friendly urban public transport in Sarajevo followed by comparative analysis and conclusions.

2. LITERATURE REVIEW ON FINANCING URBAN PUBLIC TRANSPORT

Several aspects of the vast available literature on financing smart and eco-friendly cities and their transport in the European context have already been highlighted (Gudmundsson et al., 2005; Stone et al., 2012). Hence, the literature that deals with eco-friendly, urban public transport is growing, and the basic Web of Knowledge all-fields research with two keywords of Public

transport and Eco-Friend* reveals some 89 results. However, further research into the Web of Knowledge in all fields by two key words: finance* and eco-friend* urban public transport* reveals only two results from the engineering sciences. Bartłomiejczyk and Połom (2016) focus on saving electric energy in public transport through eco-friendly solutions in urban municipal transport (trams, trolleybuses, light rail and underground). Based on extensive measurement research conducted in the Gdynia trolleybus network, the results of PKT Gdynia's experiences in energy consumption reduction are shown as ready to use. The article also highlights the impact of practical verification of energy reduction methods in electrified transport.

Similarly, by focusing on necessary improvements in eco-friendly solutions in urban transport, Kłos and Sierpiński (2021) identified and classified the parameters of a model of urban sharing services. After a detailed literature review on the parameters which describe and affect the use of sharing services and collective public transport, the main findings are classified and grouped into the following travel parameters: location (four parameters), demographics (two parameters), traveling (six parameters), economy (four parameters), quality (eight parameters), lifestyle (six parameters) and related preferences of the traveling population. Responsible and active management of financial resources is crucial to efficiently provide any public good or service, including urban public transport. The terms financial performance and financial analysis are in most financial literature alternatively used. We understand that the financial performance concept should be broader than the financial analysis, which may be verified in the world's giant Web of Knowledge scientific repository. Since public companies mainly operate urban public transport, most academic research today evolves around the financial (and sometimes non-financial) analysis of public companies (financial and non-financial) being or planning to become publicly listed companies.

Under such analysis, data is usually taken from the stock-exchange listed companies, making the entire analysis significantly easier for comparison (Guo et al., 2015; Zhang & Cai, 2018; Susilawati, 2019). The research related to the financial performance of any public companies in BiH, including urban public transport, is parsimonious. With the search result of the financial performance and public companies and BiH, we obtained one result that analyzes non-financial state-owned enterprises (SOEs) in 11 post-socialist Central-Eastern European (CEE) countries for 2014 and 2015. The results indicate the state's

dominant role in the energy and transport sectors in the CEE by share and financial performance of such companies (Matuszak & Szarzec, 2019: 561).

In the case of BiH, only recently, Cegar and Parodi (2019: 6) analyzed the status of public companies (state-owned enterprises) and their macroeconomic impact on the economy. Previous analysis regarding financial analyses and the performance of public companies in BiH is missing since the data was unavailable. Most recently (2019), the two BiH entity's business registration agencies have established a central registry of public companies operating in each entity. Even though this is a huge step forward, a unified registry at the level of BiH unfortunately still does not exist. Hence, evaluating the financial performance of the public companies in BiH was not possible since the entire public sector lacks transparent governance and therefore lacks accountability, transparency, and enforcement (Cegar & Parodi, 2019: 6). Under such circumstances, evaluating and analyzing the financial performance of the public companies in BiH remains challenging. The latest available data indicates that some 550 public companies operate in BiH, which inevitably affects the macroeconomic performance of BiH.

3. RESEARCH DESIGN AND METHODOLOGY

Our research design employed mixed methods approach based on an extensive desk review of currently available public documents with available databases and semi-structured interviews with 25 key stakeholders. All interviewed stakeholders demonstrably possessed specific practical and experiential knowledge (in the sense of duration of professional experience, their position and relation to the topic area, etc.) in the relevant research field so that it can be deduced that their statements allow meaningful and action-guiding conclusions for answering the research questions (Bogner et al., 2014: 13). Semi-structured interviews were conducted online and in-person at the same time in German-speaking countries and in Sarajevo over 20 days in April 2023. Each semi-structured interview lasted up to one hour. 14 semi-structured interviews were conducted in German-speaking countries (Austria, Germany and Switzerland) with the following structure:

- twelve critical stakeholders from the private sector
- two critical stakeholders from the public sector

11 semi-structured interviews were conducted in Sarajevo, Bosnia and Herzegovina (BiH) with the following structure:

- three critical stakeholders from the private sector
- three key stakeholders from the public sector
- two international consultants and
- three local consultants that provide technical support during an ongoing mobility project in Sarajevo.

The structure of the interview guideline combined questions from various academic journals and studies about sustainable, eco-friendly, and smart mobility. The questions blended several previously conducted studies and research across the world (Real et al., 2021; Oke et al., 2022; Peters et al., 2018; Finck et al., 2020; Sørensen & Paulsson, 2020) whereby the questions were adapted (where necessary) to reflect local peculiarities (Flick, 2018: 84-85; King et al., 2017: 64-66). In order to ensure the content validity and completeness of the interview guide, it was pre-tested by four experts and adapted based on their feedback (Häder, 2019: 413; Hulland et al., 2018). In the pre-testing phase, the interview was translated into the local languages and then back to English to avoid possible misinterpretation. During the semi-structured interviews, key stakeholders were asked general questions regarding eco-friendly and smart mobility. However, the focus was on two questions regarding the financing of smart mobility: firstly, were stakeholders involved in financing smart mobility projects, and what were the sources of such financing? Secondly, who do they consider needs to be involved in decision-making on financing smart city projects? The interviews were conducted in BiH in German, English and local languages and fully transcribed (King et al., 2017: 193-194). The study's main limitations may include possible response bias, recall bias, and selection bias. These limitations were mitigated by drawing on multiple sources of information, carefully designing and conducting data collection, and ensuring to include as many key stakeholders (experts) as possible (Bogner et al., 2014: 92).

4. THE RESULTS AND THE DISCUSSION OF FINANCING ECO-FRIENDLY URBAN PUBLIC TRANSPORT IN THE GERMAN-SPEAKING COUNTRIES

Strategy papers have dealt with sustainable mobility in German-speaking countries for several years. In addition to the national mobility strategies for Austria and Germany, the strategy for sustainable and intelligent mobility of

the European Union must also be considered. The transport and mobility sector in the EU is the second-largest area of expenditure for European households, contributes 5% to European GDP and employs around 10 million workers. In the vision presented, the most significant challenges in the transport sector are reducing emissions and increasing sustainability. Nevertheless, mobility should be affordable for everyone in the European Union. The main goal is to reduce 90% of emissions caused by the transport sector by 2050. This is to be achieved through the three objectives of sustainable mobility, smart mobility and resilient mobility, for which individual action plans have been developed (European Commission, 2020; Gallo & Marinelli, 2020).

For Austria, the Mobility Master Plan 2023 is available, allowing the mobility sector to reorientate to fulfill the Paris Climate Agreement. The main objective of this plan is to show ways to achieve climate neutrality, whereby the mobility transition creates a multifaceted contribution to society. It aims to improve access to mobility, noise and air pollution control, resource needs and recycling solutions, etc. In 2040, passenger transport should be distributed as follows: 22% walking, 42% motorized private transport, 23% public transport and 13% cycling. A system of indicators measures the progress toward achieving the desired goals to control the planned measures. The key points here are the creative and innovative realignment of the legal framework, the reform of mobility law and both innovations and climate protection in transport law.

Concerning the financing of the projects, several possibilities are mentioned in the Master Plan. For the financing of passenger transport, local authorities are expected to contribute. For mobility in tourism, indirect financing options such as tourism taxes or surcharges on overnight stays are proposed. From an Austrian perspective, green finance options appear to be particularly important (e.g., green leasing, green crowdfunding, green subsidy programs, etc.), which can be used individually or in combination with government support (Federal Ministry Republic of Austria Climate Action, Environment, Energy, Mobility, Innovation and Technology. 2021).

In Germany, the National Platform for the Future of Mobility was founded, which promotes the development of cross-modal and linking paths for a largely greenhouse-neutral and environmentally friendly transport system (for freight and passenger transport). Mobility should be efficient, high-quality, flexible, available, safe, resilient and affordable. A total of 6 key topics (climate protec-

tion in transport, alternative drives and fuels for sustainable mobility, digitization for the mobility sector, securing the mobility and production location, linking transport and energy use and standardization, certification, and type approval) were defined (Bundesministerium für Verkehr und digitale Infrastruktur, n.d.). In addition, the National Competence Network for Sustainable Mobility was founded as the central point of contact for sustainable mobility issues. There, actors' networks and experiences are exchanged, and expertise is contributed in order to be able to promote clean mobility in Germany. With this network, comprehensive knowledge management on the topics of urban or rural mobility, logistics, cycling, electromobility, digitization and funding opportunities were established, and network partners can find solutions there or find network partners to develop solutions (NaKoMo Geschäftsstelle im Bundesministerium für Digitales und Verkehr, 2021).

In the Swiss Transport Perspectives, it is assumed that traffic will grow in the future. It is stated that transport performance will increase by only 11%, while the population will grow by 21% by 205 (Bundesamt für Raumentwicklung, 2022). The main goal for the future of Switzerland's mobility is to make the overall transport system efficient by 2040. This means that available technologies are used optimally, fewer financial and natural resources are consumed, and thus maximum benefits are created for society. In the process, 14 strategic goals were formulated, covering the aspects of framework conditions and prerequisites, demand, supply and infrastructures, financing and environment, energy and space. Goals 8 and 9 deal with financing and state that a.) the mobility offer and the transport infrastructure should be financed cost-effectively with the available public funds and b.) the users of all mobility offers should increasingly bear the internal and external costs they cause themselves (Bundesamt für Raumentwicklung, 2017). In addition to the goals mentioned above and principles, Swiss transport policy, in general, has been aligned with European transport policy (Eidgenössisches Department für Umwelt, Verkehr, Energie und Kommunikation, 2011).

The results of the interviews are summarized in Table 2. Most public transport projects in German-speaking countries are financed through national funding and grants. Funding can come from the state itself or the individual provinces/cantons. The cities/municipalities themselves are also firmly integrated into the financing. It can therefore be deduced that the financing of public transport is shared between the state and cities/municipalities and is primar-

ily assumed by them. This finding aligns with the mobility strategies described earlier and shows that states, countries and cities/municipalities see themselves as responsible for enabling and essentially financing public mobility.

Interestingly, the respondents repeatedly mentioned private participation as another possible funding source. In some cities/municipalities, it is already used; in others, this form of financing is seen as an attractive future option. Crowdfunding was mentioned particularly frequently. Some interviewees said that, in some cases, it is challenging to implement because a) crowdfunding seems more feasible for local projects, and b) it takes a lot of convincing to get the population excited about a specific project. Only one interviewee mentioned the concept of public-private partnership (PPP) as a possible funding option for the future. This is an exciting result, as, in the past, PPP was classified as a sensible form of financing and operation, especially in transport infrastructure, because it allowed various advantages to be realized (Langhagen-Rohrbach, 2007).

Concerning the stakeholders involved in the decision-making process, it can be seen that attempts are always made to involve several groups of stakeholders. In all cases, it was stated that the city/municipality representatives must be present. These can be represented by different departments/persons. It was often mentioned that the responsible persons of traffic planning, the city administration and political decision-makers are involved in some instances. In almost all cases, community participation was also considered relevant. This can be done through citizen representatives, public events, and public discussions with citizens. Thus, an attempt is made to obtain arguments from different perspectives to develop and implement a solution accepted by most stakeholders finally.

Table 2. Summary of responses in 14 interviews in the German-speaking countries

Research qu. 1: Were you involved in financing smart mobility projects, and what were the sources of financing?					Research qu. 2: Who needs to be involved in the decision-making process on financing smart city projects?
1. Private funding (8 responses)	2. National subsidies/ grants received (11 responses)	3. EU funds/ EU projects (4 responses)	4. Loans - Municipal loans or investment loans - (2 responses)	5. Municipal budgets (9 responses)	City/municipality (14 responses), citizens (8 responses), private sector experts (3 responses), Funders (2 responses)

Source: authors.

5. THE RESULTS AND THE DISCUSSION OF FINANCING ECO-FRIENDLY URBAN PUBLIC TRANSPORT IN SARAJEVO

After BiH gained independence from Yugoslavia in 1992 and after the human, economic and infrastructural losses during the war in BiH (1992-1995), starting from 1995, BiH also obtained a new Constitution under the Dayton Peace Agreement, which organized the country as two entities, Federation of BiH (FBiH) and Republika Srpska (RS) and one district (Brčko District). The latest Census data (2013) indicates that there are 3.5 million living in BiH, and its capital is Sarajevo. Because of the new Constitution, the position of its capital city Sarajevo changed, so now Sarajevo belongs to FBiH and is one of the ten cantons in FBiH – Sarajevo Canton. Due to inter-entity arrangements between RS and FBiH, and the fact that new municipalities were formed at the inter-entity borderline (in RS, where the City of East Sarajevo is formed with six new municipalities forming the City), the territory of Sarajevo Canton now occupies 1,276.9 km^2 (Federal Institute of Statistics, 2022a: 7) which is approx. 4.9% of the territory of FBiH and 2.5% of BiH territory. Some 419,918 inhabitants live in Sarajevo Canton (Federal Institute of Statistics, 2022b, p. 13). Sarajevo Canton consists of nine municipalities where four inner-city municipalities (Centar, Stari Grad, Novo Sarajevo, and Novi Grad) from the City of Sarajevo, and the remaining five (Vogošća, Ilijaš, Ilidža, Trnovo and Hadžići) are outer city municipalities.

The urban public transport in Sarajevo Canton, which has been neglected for almost two decades, has only recently (as of 2018) started to gain the local public stakeholders' interest in necessary improvements in urban public transport. International financial institutions began the process and projects related to eco-friendly, smart and sustainable cities in Sarajevo, too, with a focus on smart mobility, for example, UNDP with its Smart City project in 2018, GIZ in 2020-2022 with its Smart Urban Mobility Plan (Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, 2022) or the EBRD's 2020 Green Action Plan for Sarajevo Canton (Atkins Limited, 2020). In December 2022, Sarajevo and its Sarajevo Functional Urban Area project related to public mobility became the only BiH city to become a part of the European Commission's "100 Net Zero Emission Cities" that aims to achieve 100 climate-neutral and smart European cities within a decade.

So, during 2022, the Sarajevo Canton Assembly adopted the Sarajevo Canton Development Strategy for the 2021-2027 period, which foresees investments of over two billion BAM, of which 660 million BAM is planned for strategic projects and activities related to the construction and reconstruction of public transport infrastructure. Two-thirds of the resources necessary for constructing and reconstructing public transport infrastructure (tramroad and purchasing new trams and trolleybuses) will be financed through Sarajevo Canton's budget (public funds). The rest will be financed from other sources, such as funds from the EU and other international donors, higher levels of government, municipalities, or loans from the international financial institutions operating in BiH. The measures also include investment in the improved and new infrastructure of public transport vehicles, new bicycle paths and pedestrian zones and paths, the inclusion of railways in the unique system of public passenger transport, the development of urban city logistics, as well as the construction of additional parking spaces (Sarajevo Canton, 2021; Sarajevo Canton, 2023).

Additionally, the Strategy for the Development of the City of Sarajevo for the 2021-2027 period, which was adopted in 2022, defined as one of the priorities for Sarajevo to become a smart city, which was envisaged through the establishment of Smart Hub, which would have the task of implementing projects to develop Sarajevo as a smart city, as well as opening a business center and incubator that will support start-up businesses. Also, in its strategy, the City of Sarajevo stated the need for the development of infrastructure for electric cars and other means of transportation that will reduce the use of cars on fossil fuels. In mobility, the purchase of city bicycles and e-scooters and their organizational aspects are planned (City of Sarajevo, 2022). Both strategies are harmonized with the documents of higher levels of government - the Development Strategy of the Federation of Bosnia and Herzegovina for the 2021-2027 period, as well as the sustainable development goals from the UN Agenda 2030, which Bosnia and Herzegovina together with other countries signed in September 2015.

However, the current situation regarding public transport in Sarajevo Canton/City of Sarajevo shows a gloomy picture. The overarching institution in charge of urban public transport is the Sarajevo Canton Ministry of Traffic. The Green Action Plan for Sarajevo Canton - Atkins Limited provided information about urban public transport in Sarajevo Canton, which is carried out by trams, trolleybuses, buses, minibusses, cable cars and a funicular railway operating by registered timetables. The latest available data indicates that there were

six tram lines and six trolleybus lines, 55 bus and 44 minibus lines, and one funicular rail (Atkins Limited, 2020: 20). There were 112 public and suburban transport lines in the city with a total length of 2,267km. Sarajevo also has a relatively well-developed network of taxi services in the entire area of Sarajevo, with around 669 taxis available.

Regarding bicycle use, the bicycle is mainly perceived as a recreational means of transport (Atkins Limited, 2020). Although significant progress has been made in constructing bicycle paths in recent years, the total length of 6.8 km has not yet reached the "green" reference value of 25 km (Atkins Limited, 2020: 22). The installation of new parking infrastructure should accompany the improvement of bicycle paths throughout the city. For Sarajevo, it is proposed to provide 30-50 parking spaces per km of cycling path. A similar situation is with e-scooters, whose use and parking remain unregulated.

Due to the most recent reconstruction of the tramroad, the impact of COVID-19, and a fall in public urban transport trust over the years, there has been a significant fall in the number of passengers. For example, in 2008, 112,047 passengers were transported by trolleybuses, trams and city buses, while in 2021, that number dropped to 72,171. In Table 2, we can see a falling trend in the number of passengers in urban public transport by all means of transport (trams, trolleybuses, buses) and an increasing number of registered motor vehicles and motorcycles, indicating a clear 'switch' from public transport to private motor vehicles (mostly diesel run cars) in Sarajevo Canton/City of Sarajevo.

Table 2. Number of passengers in urban public transport and number of registered motor vehicles in Sarajevo Canton, 2015-2021

	2015	2016	2017	2018	2019	2020	2021
Total passengers (000)	95,876	95,487	94,230	93,396	90,356	64,907	72,171
Trams	44,844	42,396	41,861	41,795	41,795	28,945	30,758
Buses	36,563	36,797	36,280	37,176	36,674	25,912	29,591
Trolleybuses	16,469	16,294	16,089	14,425	14,262	10,050	11,822
Total registered motor vehicles	120,981	126,554	129,690	134,191	140,679	139,169	142,663
Motorcycles	1,229	1,333	1,487	1,854	2,984	2,067	2,285

Source: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, 2022 and Sarajevo Canton Institute of Informatics and Statistics, 2022[2].

[2] available at: https://zis.ks.gov.ba/statistika?field_istrazivanja_period_value=5&field_istrazivanja_oblast_value=9&field_godina_value=&field_mjesec_value=All, access May 12, 2023.

The average price for a single ticket for urban public transport in zone A (an area covering the City of Sarajevo) is less than 1 Euro. However, passengers still do not use urban public transport. This has been reflected in the financial statements of the two public urban transport operators in Sarajevo Canton (one public and one private). The public company provides all horizontal transport services (tram, trolleybus, bus and minibus), while the private company provides transport services by buses and minibusses only. Currently, the ticketing service between the two companies is not integrated, meaning that the ticket bought for the public company's transport service cannot be used for the private company's transport service and vice versa. So, in 2020 (latest available data), the public company has accumulated a loss of more than 100 million BAM, while the private company, as of 2021 (latest available data), has no fixed assets, making comparing the financial position challenging. The private company is 100% owned by its related parent company that operates buses and minibusses transport domestically and internationally. Regarding the research questions, the summary of responses per research question is summarized in Table 3.

Table 3. Summary of responses in 11 interviews in Sarajevo

Research qu. 1: Were you involved in financing smart mobility projects, and what were the sources of financing?					Research qu. 2: Who needs to be involved in the decision-making process on financing smart city projects?
1. Private funding (3 responses)	2. Subsidies/ grants received through projects (2 responses)	3. EU funds (3 responses)/ EU projects (1 response)	4. Loans - International financial institutions' loans – EBRD, EIB and the World Bank (3 responses) and commercial loans (2 responses)	5. Municipal budgets (4 responses)	Sarajevo Canton and City of Sarajevo (2 responses), Government of Sarajevo Canton (2 responses), municipalities (2 responses), citizens, private sector, experts

Source: authors.

As indicated in Table 3, key stakeholders in Sarajevo consider five types of financing as options: private funding, subsidies received through projects, EU funding and EU projects, loans - either domestic or international and public funding provided by subcentral governments' budgets (municipal, city, canton). Apart from expected sources of infrastructural funding coming from subcentral governments' budgets or private funding in the case of private companies, most key stakeholders recognize international financial institutions and commercial banks as primary funding sources. Crowdfunding, funding coming from green

funding options or PPP, as BiH respondents did not consider types of additional funding.

Respondents in Sarajevo Canton have verified that critical stakeholders in the decision-making process regarding financing smart city projects are sub-central governments' representatives - Sarajevo Canton (the Government of Sarajevo Canton and its Ministry of Traffic) and the City of Sarajevo (by two responses each). However, in this process, citizens, private sector representatives, and experts ought to be included (two responses).

6. COMPARATIVE ANALYSIS, RECOMMENDATIONS AND CONCLUSIONS

This study aimed to conduct a comparative analysis of eco-friendly and smart urban public transport financing between the German-speaking countries of Austria, Germany and Switzerland and Bosnia and Herzegovina. The comparison shows that in German-speaking countries, the combination of state funding/support and funding from municipal budgets is the dominant way eco-friendly and smart urban public transport is financed. There are no differences between the three German-speaking countries. This finding aligns with the statements in the strategy papers on the future of mobility in individual countries. The countries see it as their responsibility to ensure that public transport and mobility develop further, and that the necessary infrastructure is provided. This combination is also given to a certain extent in Bosnia and Herzegovina. However, the responsibility for financing - in the example of the Canton of Sarajevo - remains much more with the limited sub-central government's budgets (Cantonal and local government units- municipalities and city) and international sources of financing through loans. Due to their EU membership, Austria and Germany can also access EU funds, an advantage over Switzerland. Bosnia and Herzegovina can also access such funds selectively through specific calls for proposals in which they must participate. Adequate access to public funding appears essential for this country to accelerate the development and implementation of an environmentally friendly smart city (Cecera et al., 2020). In German-speaking countries, private funding is seen much more strongly as a current and future form of financing, which was not mentioned in Bosnia and Herzegovina.

According to the DAC list, this striking difference could be attributed to Bosnia and Herzegovina being categorized as a developing country. It seems impossible to push private funding due to the economic situation (low earnings per capita, high unemployment rate, etc.). Bosnia and Herzegovina have limited subcentral government budgets, so this country needs to attract private investors (Noh, 2019). Implementing crowdfunding and green crowdfunding appears to be an easy-to-implement and alternative form of financing, primarily through digital platforms (Maehle et al., 2020). However, the experts in the German-speaking countries expressed concerns about the implementation. It is more likely to be possible to work with it regionally and to have to do enough convincing work with potential financiers. Only very few respondents from the German-speaking countries argued that direct taxes or other direct levies (e.g., tourism levy) could be used to finance the project because there is still a lack of widespread acceptance among the population, which is a contrary result to proposals in the literature (e.g., Hyung & Baral, 2019; Saboori et al., 2019).

In German-speaking countries, different affected stakeholders are involved in the decisions to give the possibility of articulation and increase the acceptance of the implementation (Hosseini et al., 2018). This can also ensure that the different interest groups' requirements are considered and then implemented (Rocha et al., 2023). Every region/city/community has its characteristics, so they usually have individual solutions for their problems (Pfäffli et al., 2018). In addition, involving public and private stakeholders can exchange ideas so that creative solutions can emerge (Hossain, 2019; Rana et al., 2019). In Bosnia and Herzegovina, this extensive involvement of different stakeholders is given to some extent. However, it should be significantly strengthened compared to the German-speaking countries to achieve greater acceptance and allow different perspectives on projects.

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