

Researching the satisfaction and needs of public transport users, Case study - Line 14, Bitola

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Abstract— Mobility is an essential prerequisite for social and economic connectivity, especially for residents of rural environments who depend on public transport to access services in the city. Urban public transport plays a key role in ensuring equal mobility opportunities, allowing rural communities regular access to jobs, education, healthcare and shopping centers. This work analyzes the mobility and satisfaction of public transport users in Bitola, with special emphasis on line no. 14 connecting Scheherazade, Bistrica and Kravari with the city. Public transport in Bitola is operated by the Public Transportation Enterprise, which serves multiple urban and suburban lines providing basic connectivity between rural and urban areas. Line 14 is a significant transportation link for residents of the suburbs, especially those traveling for work, education, health services and shopping. Through a survey conducted among the users, key problems such as irregularity of buses, technical malfunction, insufficient informativity and poor road infrastructure were identified. Respondents suggested improvements such as vehicle modernization, increased frequency, timely arrival, real-time information, and infrastructure improvements. Research indicates that quality public transport is key to good mobility of rural residents and their integration with the city of Bitola.

Keywords— Mobility, Rural areas, Public transport, Survey.

I. INTRODUCTION

Public transport in Bitola is the main transport network connecting the urban and suburban areas to the city center. The system of public bus lines operated by private carriers allows mobility for a large part of the residents, without the need for their own vehicle. In Bitola there are several bus carriers, namely: Luka EXPRESS, Transkop AD, Gopesh TRANS, Boby TURS, Gem TURS [1].

To improve accessibility and practicality, in 2025 the Bitola City Bus application was introduced which allows checking the schedule, map of lines and real-time tracking of buses [2]. Among the main bus lines in the network is line number 14, which connects the suburbs/villages to the city center. Line 14 is crucial for residents of the periphery, as it provides access to services, jobs and education that are not available in their place of residence. According to the announced train schedules, this line is included as part of the municipal transport. Among the main bus lines in the network is line number 14 which connects the suburbs/villages with the city center. Line 14 is crucial for residents of the periphery, as it provides access to services, jobs and education that are not available in their place of residence. According to the announced train schedules, this line is included as part of the municipal transport [3].

The village of Kravari is in the municipality of Bitola, about 5-6 kilometers from the center of Bitola. The village of Kravari (Bitola municipality) according to the 2021 census has 819 inhabitants.

- Of these, 423 are men and 396 are women;
- Structure by age: 106 children (0 - 14), 556 adults (15 - 64) and 157 elderly people (65+) [4];
- Ethnically predominant Macedonians.

- For comparison, according to the 2002 census, Kravari had 880 inhabitants, showing a decrease in population over time.

The village of Kravari is located in the southwestern part of Bitola and is one of the larger suburban settlements in the municipality of Bitola. Its strategic position allows good connectivity with Bitola and surrounding villages. Through Kravari passes the local road Bitola - Kravari - Bistrica, which connects with the regional road to: Bistrica and the villages to Pelister, the eastern part of the municipality of Bitola, and on to the villages that lead to Demir Hisar through the mountain passes. This local road serves as a key junction for public transport (line 14) and for automobile traffic [5]. Figure 1 shows the location and distance of Kravari village from Bitola.

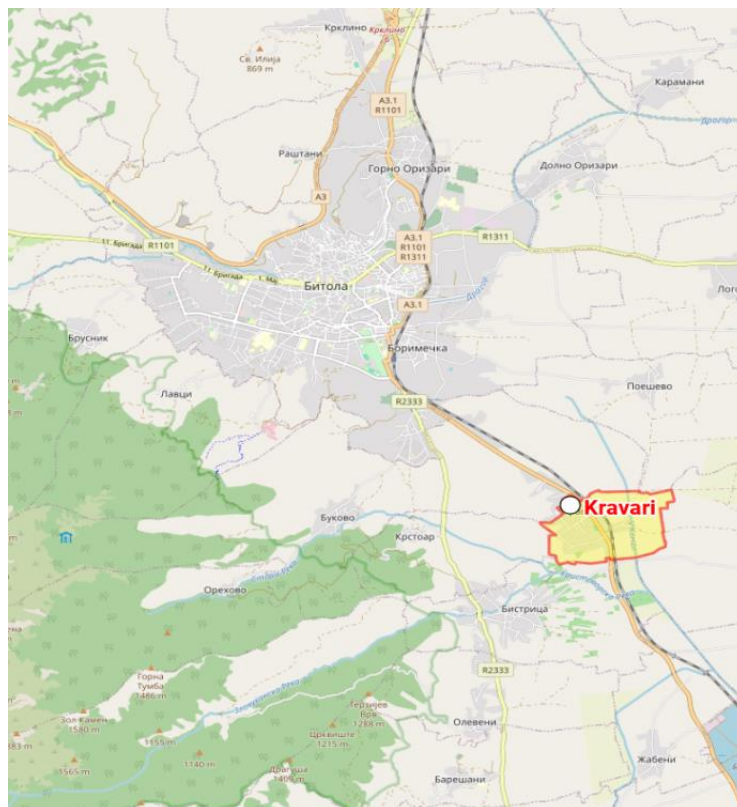


FIGURE 1: The location and distance of Kravari village from Bitola

II. MATERIALS AND METHODS

For the purposes of this research, a quantitative method was applied by conducting a survey with the inhabitants of the village of Kravari, who use or need line 14 of the public urban transport in Bitola. The methodology was designed to obtain relevant and valid data on their daily movement, satisfaction with the service and the factors affecting their mobility. The main tool was a survey composed of closed and open questions, divided into several thematic groups:

- demographic data (age, education, occupation, number of family members),
- motor vehicles (whether they own a car),
- travel habits (how often they travel, for what purposes, by what means of transport),
- use and perception of line 14, level of satisfaction with public transport,
- identifying problems and proposing solutions.

This provided both numerical and descriptive data.

The target group were residents of Kravari. The survey was conducted with a random selection of respondents, providing a representative sample by gender and age, to obtain real data on travel habits.

The survey was carried out: on the ground, with direct face-to-face questioning, one-day, at multiple locations in the village (by households, around shops, bus stops, etc.). Such an approach allowed for greater openness and honesty of the respondents.

First, we collected data on the rural environment of Kravari, whether they have a public urban transport service, which line it crosses and in what time period.

Line 14 has 28 stations. It starts from Scheherazade, makes a full circle from Pedagogical Faculty, Hospital, City Park, goes first to the village of Bistrica, then to the village of Kravari where it stops at three stops and then returns back through the stop at the Railway Station, Karposh 4 to Bela Ceshma. The first public transport vehicle starts from the Scheherazade station at 6 a.m. and the last departure is at 7:30 p.m. The first vehicle in the rural area of Kravari, at the Kravari 1 stop is at 6:35 minutes, the same vehicle is at an interval of 1 hour, i.e. at the same stop will be at 7:35 minutes.

At the same Kravari 1 stop, the public transport vehicle stops at 6:35 and 7:35 minutes, then the next stop is at 11:35 to 15 hours. The vehicles are transported at 1 hour distance, at 15 hours does not appear at the stop, also at 18 and 19 hours. This analysis shows that the vehicles traffic with irregular frequency of movement, late or do not appear at all in the parking lot, which makes the public urban transport less attractive for the inhabitants of Kravari. Figure 2 shows the line of public urban transport No. 14, together with the stops [1].

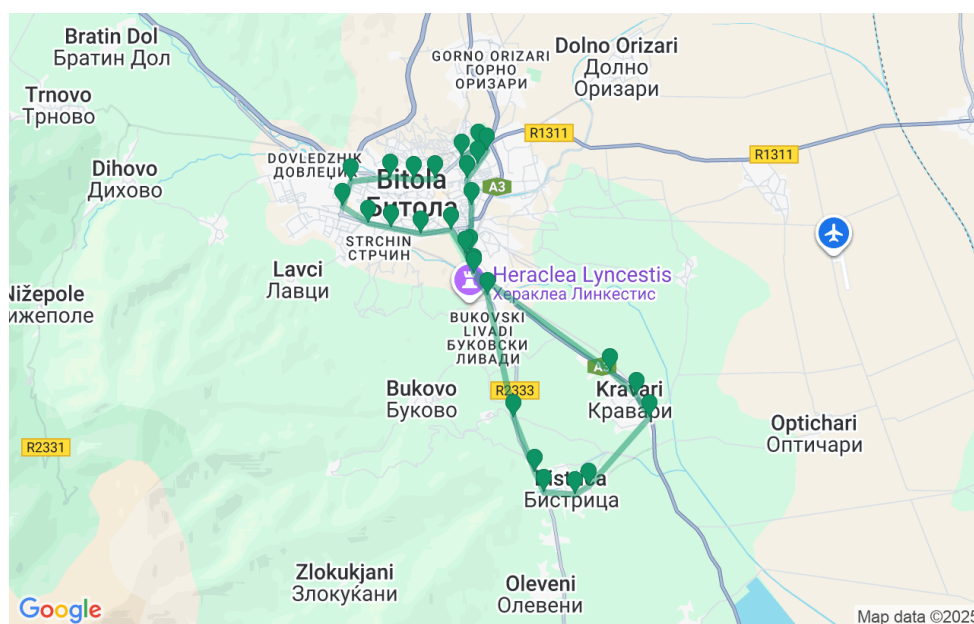


FIGURE 2: The line of public urban transport No. 14, together with the stops

III. RESULTS AND DISCUSSION

In a survey conducted by households, in the rural environment of Kravari the following outputs were obtained:

- In the survey, most respondents were women, 53% and 47% men.
- Of those surveyed, 40% were aged between 36 and 65, 33% were over 65, 20% were aged between 18 and 36 and the rest were under 18.
- Most of the respondents were pensioners 40%, unemployed 27%, employed 23%.
- The respondents had a secondary education and that 56%, the percentage of basic and higher were the same.
- Most families have two or four members.
- When it comes to income, it usually ranges from 30.000,00 to 50.000,00 dinars, and above 50.000,00 denars.
- When asked how many family members are employed, most responded that they are not employed, and some one to two of the members, and the same travel outside of Kravari to get to the workplace.
- Most of the respondents don't take a motorized trip.
- The families of the respondents did not have students or students traveling, and that's 70%, and those who have the trip do it by public transport 23% and 7% by car.

- To travel to Bitola as a means of transport they use the car, and the trip is done with the motive of protecting, for a walk or for work. The motive for the journey is shown in Figure 3.

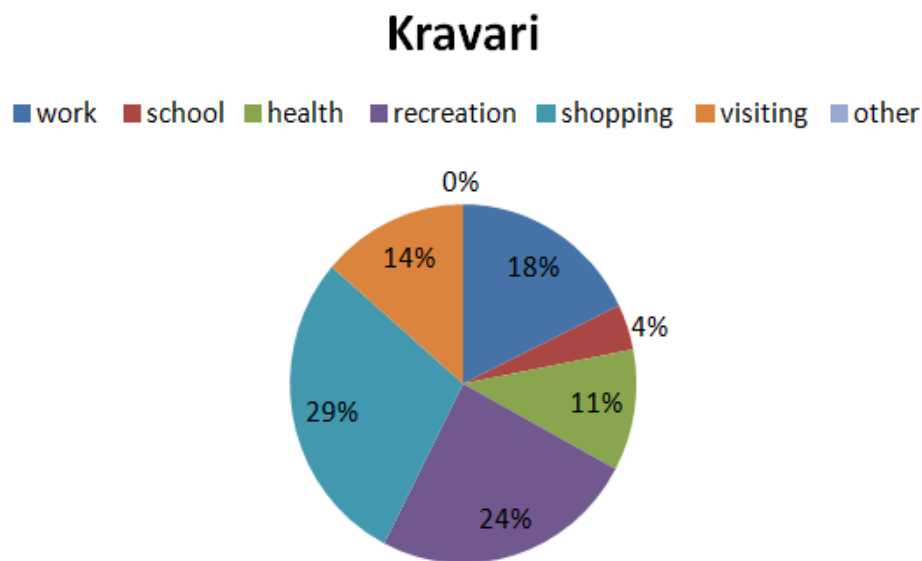


FIGURE 3: The motive for the journey

- Of the vehicles offered, most of the respondents own a car and most have one in the family.
- If there's an on-call car, would you use it? A huge percentage will use it, 77%. Maybe 13%, not 10%. This is shown in Figure 4.

If there's an on-call car, would you use it?

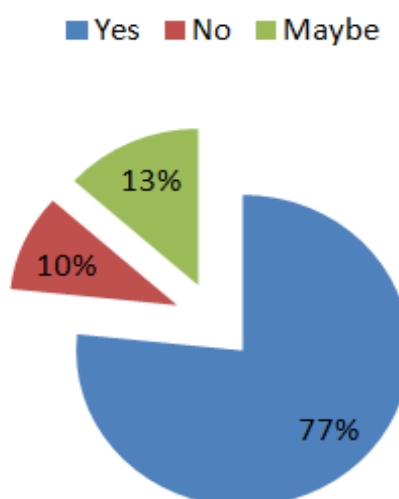


FIGURE 4: If there's an on-call car, would you use it?

- Usually, the trip to Bitola is done once at the bottom level.
- The quality of the street network is considered good.
- Although public transportation is available, respondents rarely or never use it.
- To improve living conditions, they believe there should be more jobs, more income.
- Table 1 shows tabularly what are the problems with the public urban transport in Kravari [7].

TABLE 1
PROBLEMS FACE WITH RURAL TRANSPORT?

What problems do you face with rural transport?	
Kravari	• Non-regular city public transport • Failure of vehicles • Low frequency of vehicles • Small number of lines

- Table 2 shows in tabular form the proposals for improving services and mobility [8-9].

TABLE 2
PROPOSALS FOR IMPROVING SERVICES AND MOBILITY

The proposals for improving services and mobility.	
Kravari	To have direct transport to Kravari, regular, to improve public transport, to increase the frequency, to educate the population to use public transport, to publish the driving schedule, to have a direct line not to pass through Bistrica, to have transport every 1h

Figure 5 shows a proposed urban public transportation line, which will run from Scheherazade to Kravari and there will make a circular turn and return on the same route.

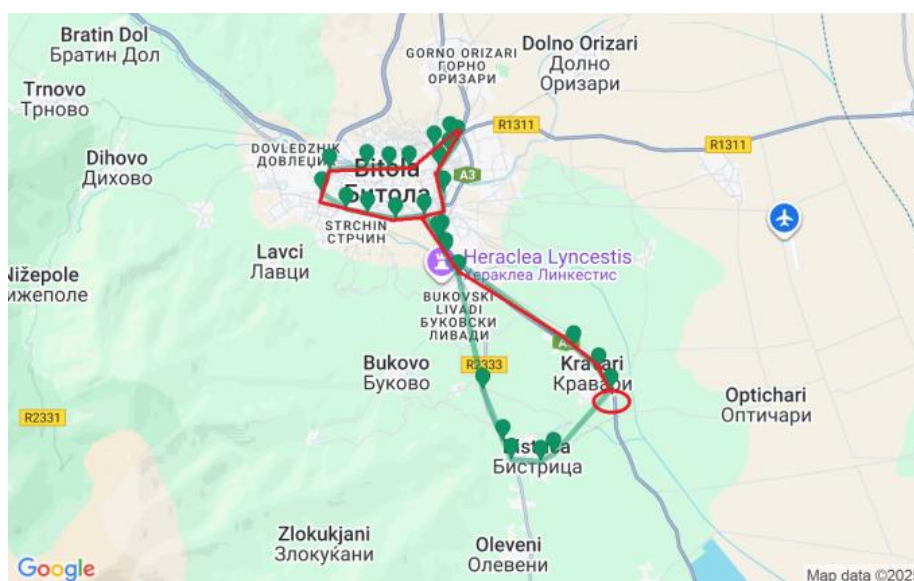


FIGURE 5: Shows a proposed urban public transportation line

IV. CONCLUSION

Mobility is a key element in the development of any society, especially in rural environments where access to services, jobs and institutions directly depends on the quality of public transport [10]. Urban public transport, as a sustainable transport system, has the task of providing accessible, regular and economically beneficial movement of the population, thereby reducing dependence on automobiles and encouraging more even regional connectivity [6].

In that direction, the village of Kravari, as one of the larger rural settlements near Bitola, has a real need for functional public transport. Line No. 14, which runs on Scheherazade - Bistrica - Kravari, is the only public transportation option available to residents. To get a glimpse of the real situation, a survey was conducted with the aim of determining the travel habits, the level of satisfaction and the specific problems faced by the inhabitants of Kravari [12].

The results showed that although public transportation is available, a significant proportion of the population does not use it. The reasons for this are numerous: traffic irregularities, delays, frequent cancellations, and bus-free hours. Due to these shortcomings, residents often travel by their own car to Bitola, which reduces the role of public transportation as a sustainable

and affordable alternative. The survey also provided clear suggestions for improvement.

The most common requests are:

- the introduction of a direct service to Kravari,
- increased frequency and regularity of traffic (every 1 hour),
- improvement of the quality of public transport and renewal of the fleet,
- publication of a clear and accessible driving schedule,
- the possibility that the line does not pass through Bistritca,
- educating the public on the benefits of using public transport.

In summary, the research indicates that the residents of Kravari have a real need for modern, efficient and affordable public transport that will enable better mobility and greater functional connectivity with the city. The upgrading of Line 14 represents a key step towards a sustainable transport system that will contribute to a better quality of life in rural areas.

V. RECOMMENDATION AND FUTURE SCOPE

Based on the research conducted and the survey results obtained, several measures can be proposed to improve the mobility and quality of public transport on line No. 14 and in the village of Kravari in general:

5.1 Improving bus regularity and frequency:

Establish a stable schedule with buses running every 1 hour, allowing for greater predictability and use of public transport as the primary transportation option.

5.2 Introducing a direct line to Kravari:

Many residents point out that routing through Bistrica prolongs travel time and creates unnecessary stops. The direct line Scheherazade -Kravari would increase the efficiency and attractiveness of public transport.

5.3 Renewal and modernization of the fleet:

To provide a quality service, it is necessary to use technically correct, economical and comfortable vehicles that offer safety and comfort to passengers.

5.4 Digital availability of the driving schedule:

Posting the timetable on a website, mobile app, social networks and putting up physical tables of the standings in the village. The availability of information is key to increasing trust and use of the service [11].

5.5 Monitoring and controlling the operation of the line:

The carrier should regularly monitor the line, carrying out checks for delays, cancelled deadlines and technical problems, in order to maintain continuity in the service.

5.6 Improvement of road infrastructure in Kravari:

Sanitation of the street network, and installation of appropriate signalling and lighting will increase safety, as well as the possibility for public transport to operate without interruptions.

5.7 Educating residents on the benefits of using public transport:

There is a need to raise awareness of the environmental, economic and traffic benefits of using public transport, thereby reducing congestion and pollution.

5.8 Introduction of additional carriers or alternative services:

If the existing carrier cannot provide sufficient frequency, the possibility of hiring other carriers or introducing minibus lines should be considered.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

- [1] Cileva E, Talevski A. City bus routes and stops in Bitola: lines and bus stops. 2024.
- [2] Municipality of Bitola. Bitola City Bus. 2025.
- [3] Stojanoska M. Planning of public urban transport in small towns with the application of PTV VISION VISUM software. 2023.
- [4] City Population. Bitola – Kravari population data. Available from: https://www.citypopulation.de/en/northmacedonia/pelagoniski/bitola/400858_kravari/
- [5] Panov M. *Encyclopedia of villages in the Republic of Macedonia*. Skopje; 1998.
- [6] Atanasova V, Stojanoska M. Sustainable transportation system: a case study. In: *Proceedings of the International Conference "Information Society and Sustainable Development (ISSD 2023)"*; 27–28 April 2023; Valletta, Malta.
- [7] Atanasova V, Stojanoska M, Krstanoski N. Problems and proposed solutions for the planning of public transport in Bitola. In: *IX International Symposium "New Horizons 2023 of Transport and Communications"*; 24–25 November 2023; Doboj.
- [8] Stojanoska M, Atanasova V. Practices from planning sustainable transport systems in urban environments. In: *XV Naučno-stručna konferencija sa međunarodnim učešćem "Klimatske promene i urbanizacija"*; 26 May 2023; Belgrade, Serbia.
- [9] Stojanoska M, Atanasova V, Krstanoski N. How to better the quality of public city transport. In: *13th Congress on Transport and Transport Infrastructure – Roads*; 19–20 September 2024; Sarajevo.
- [10] Stojanoska M, Atanasova V, Krstanoski N. Mobility analysis of the peripheral traffic zones of the city of Bitola. *Revista de Gestão Social e Ambiental (Environmental and Social Management Journal)*. 2024;18(8):e07232:1–21. doi:10.24857/rgsa.v18n8-147
- [11] Stojanoska M, Atanasova V, Krstanoski N. Analysis of public transport information: example for the city of Bitola. *International Independent Scientific Journal*. 2024;68:32–36. ISSN 3547-2340.
- [12] Stojanoska M, Atanasova V. Characteristics of the mobility of the inhabitants in rural areas. In: *XVII Naučno-stručna konferencija sa međunarodnim učešćem "Energetska efikasnost, životna sredina i održiv razvoj"*; 23 May 2025; Belgrade, Serbia.