

ENHANCING TRANSPORTATION THROUGH ROUTE STRATEGY PROPOSAL USING LOCALIZATION MEASUREMENT TECHNOLOGY: A CASE STUDY

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This case study investigates the revitalization of the Korytnica spa settlement in the Low Tatras, known for its rich natural and cultural heritage, including mineral springs. Despite its historical and therapeutic advantages, Korytnica currently experiencing challenges in renovation and development as a thriving spa and tourist resort. The article explores the strategic use of geolocation measurement technology and the potential of mineral springs to enhance the tourist infrastructure and promote the site. The article presents a multidisciplinary approaches, including sustainable development, and the integration of heritage into tourism products. It concludes with a proposal for optimizing transport routes and improving infrastructure in the area, thereby supporting accessibility and minimizing environmental impact. The main output of the article is a proposal for improving the route to the relevant area, improving accessibility by analyzing and improving infrastructure and transport processes.

KEYWORDS

Process improvement, Geolocation measurement, Tourist infrastructure, Sustainable development, Mineral springs, Place Branding

1 INTRODUCTION

Korytnica, located in the picturesque setting of the Low Tatras beneath the Prašivá peak, represents a compact spa settlement of the village of Liptovská Osada, situated at an altitude of 850 meters above sea level [Liptovska Osada 2023]. Its exceptional climatic properties, ideal for health and relaxation stays, combined with the beautiful mountainous environment, far from the bustling city agglomerations and industrial areas, make Korytnica the perfect place for those seeking an escape from the hectic urban life. The Korytnica Spa, renowned for its

mineral springs with a reputation for excellent quality [R_BK 2023], has attracted many visitors in the past who came for health improvement and relaxation in a natural environment, among them the Slovak codifier of the literary Slovak language, politician, philosopher, etc., Ľudovít Štúr [Slovander 2023]. However, despite its rich natural and cultural heritage, Korytnica currently faces challenges associated with the renewal and development of its status as a thriving spa and tourist resort.

The current efforts of the inhabitants of the spa settlement and the village of Liptovská Osada, together with the new owner of the Korytnica complex's lands, are aimed at finding effective ways to revive and develop tourism and spa services in the region [Velecký 2024]. The goal of this article is to present a strategic proposal for revitalizing the Korytnica spa settlement in the Low Tatras region. It focuses on harnessing geolocation measurement technology and the potential of mineral springs to bolster tourism infrastructure. The article explores multidisciplinary approaches, including sustainable development, and the integration of heritage into tourism products, aiming to enhance the appeal of Korytnica for both domestic and international visitors.

2 PLACE BRANDING AND COMPARATIVE ADVANTAGE - THE INFRASTRUCTURE

The development of tourist infrastructure in Korytnica represents a multidisciplinary field where place branding and the creation of a comparative advantage play a crucial role. In the context of Korytnica, where natural and cultural heritage forms an integral part of its identity, it becomes essential to understand and strategically utilize these elements to strengthen the tourist infrastructure.

The key to success in place branding and creating a comparative advantage lies in the integration of natural and cultural heritage into the overall development strategy of Korytnica. With its rich natural and cultural heritage, Korytnica has the potential to become a unique destination in the tourist market, not only dominating Slovak tourism but also attracting foreign tourists. This potential can be utilized through:

1. Preservation and presentation of heritage: With an emphasis on authentic and well-preserved natural sceneries and cultural monuments, which enhance the attractiveness of the destination [Ravankhah 2024].

2. Integration of heritage into tourist products: The creation of thematic trails, cultural events, and educational programs that highlight the local heritage in the area of Korytnica's mineral springs and their surroundings [Paskaleva 2007].

3. Sustainable development: Ensuring that the development of tourist infrastructure does not threaten the natural environment or cultural values, but instead protects and elevates their value [Zhang 2013], [Krajcovic 2019], [Krajcovic, 2011].

4. Increasing accessibility to the region: Improving transportation infrastructure and services to facilitate access to main attractions, thereby increasing convenience and reducing travel costs for visitors [Wong 2008], [Buckova 2020].

5. Marketing and promotion: Using digital media and social networks for effective promotion of Korytnica as an attractive tourist destination, offering a unique experience based on natural and cultural heritage [Cvitanović 2018].

Investments in tourist infrastructure and the strategic use of natural and cultural heritage in Korytnica represent the key to creating a strong place brand and securing a comparative advantage in the competitive market. An approach based on sustainability and the integration of heritage into tourist

products can significantly contribute to strengthening the local economy and increasing the attractiveness of the destination for both domestic and foreign tourists. The challenge remains to find a balance between development and protection, which requires coordinated efforts from all stakeholders.

3 CO-CREATION AS A POSSIBILITY OF TRANSPORTATION IMPROVEMENT IN CITIES

Currently, we are facing increasingly significant challenges in urban planning and transportation, searching for innovative ways to improve the environment while preserving the cultural and historical heritage of our cities. The concept of co-creation offers a unique opportunity for cities to engage citizens and various stakeholders in the decision-making and development process, leading to more efficient and inclusive solutions. This approach is particularly relevant when addressing transportation issues in urban areas, where a balance between accessibility, sustainability, and the preservation of historical and cultural heritage must be found. The theme of the Korytnica spas and mineral springs illustrates how a multidisciplinary approach to the restoration and preservation of key historical and architectural values can contribute to the overall improvement of the urban environment and transportation.

As evidenced by the official website of the Korytnica Railway Civic Association in Ružomberok, since 2012, there has been an active initiative by the civic association, which formulated a vision for the restoration of the railway line based on the city's requirements. Reasons why and how the track could be restored and who it could serve were summarized [Korytnická železnica 2024]. The initiative for the proposed bike path is confirmed by documents on the cycling strategies of the Žilina Self-Governing Region from 2014, where the proposal for the location of the new cycling highway and the expected construction adjustments are thoroughly described [Zilinsky samosprávny kraj 2014]. In 2016, the civic association initiated a project called "Cyklokorytnička," where a unique educational bike trail was created on the remnants of the former railway line, which is still used every year from July 1 to September 3. The project is named "Vlak Korytko" where visitors can ride along the preserved track (3 km) by a historical motor railcar to the station named "Zápalkáreň," which also serves as an Info Center for cyclists and as the start of a separate bike trail to the Korytnica complex [Visit Liptov 2024].

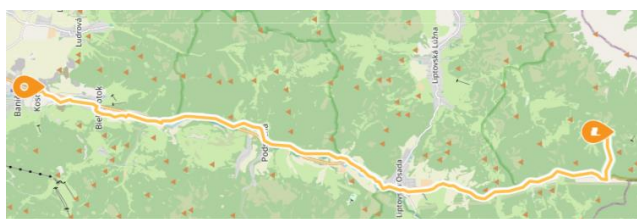


Figure 1. Cycle route Ružomberok - Korytnica Spa

The bike trail, as we have already mentioned, begins in Ružomberok on Šoltésová Street /direction Banská Bystrica/, also known as the "Zápalkáreň" stop, and follows the former narrow-gauge railway on the Ružomberok – Korytnica Spa route. It continues through the Revúcka valley, where tourists can learn interesting information through informational panels about the history and significance of the Korytnica railway. With its gentle terrain, it is suitable for families with children. The trail is 23 km long with an elevation gain of 300 m and leads through the border of two national parks – the Nízke Tatry and Veľká Fatra. It is important to note that this utilized bike trail promoted by the civic association is not a legally

established bike path and serves rather a touristic function [Zilinsky samosprávny kraj 2021].

Another option for tourists to reach the Korytnica spa area is the possibility of bus connections, which, however, only operated directly to the spa complex until October 2021, running once a day on the Ružomberok – Liptovská Osada - Korytnica spa - Donovaly route [Arriva 2021]. Currently, in 2024, the bus service only goes to the stop "Korytnica spa, crossroads" [Cestovne poriadky 2024], which is 1.7 km away from the complex on the third-class road III/2222. As we can see in figure no. 2, the walk takes approximately 29 minutes, while by car (figure no. 3) the journey takes about 3 minutes.



Figure 2. Walking route from nearest public transport option



Figure 3. Route by car from nearest public transport option

It is important to mention that the road of the third class III/2222 is currently in very poor condition – closed, due to damage to a bridge structure until 31.03.2024 [CUET 2024].

3.1 Theoretical frameworks of co-creation

Participatory planning focuses on the direct inclusion of the community into the planning process, thereby increasing the efficiency and relevance of the decisions made. Emphasizing participatory planning can contribute to a more accurate identification of community needs and more effective utilization of local resources. Evidence of this is a study on participatory planning for the management of community fishery resources in Bangladesh, where it was shown that support for community resource management was more effective when initiated through a process known as the development of a participatory action plan [Sultana 2008].

The concept of sustainable development in urban planning and transportation focuses on the need for a balance between economic growth, environmental protection, and social justice. Sustainable mobility aims to provide transportation services that are environmentally efficient, economically affordable, and socially inclusive. The goal of sustainable mobility is to reduce dependence on fossil fuels, promote alternative forms of transportation such as walking, cycling, and public transport, and improve the overall quality of the urban environment [Banister 2013], [Furmannova 2021], [Grzmar 2021].

Integrating participatory planning and sustainable mobility requires a multidisciplinary approach that combines technical, social, and environmental aspects of urban development. This approach allows cities to develop transportation systems that are not only cost-effective and performant but also consider the needs and preferences of local communities. Creating participatory platforms, such as public meetings, working groups, and online tools for gathering feedback, can strengthen citizen engagement and improve the quality of the decision-making process.

Within the Korytnica area, this method of communication with the public was previously applied by local citizens who took the initiative to create a collection for the reconstruction of St. Andrew's church in Korytnica, as well as the monument itself – the cross of gratitude from the healed in 1869 [Sokolsky 2023].

4 METHODOLOGY

Within the multidisciplinary approach to the restoration of the Korytnica Spa, emphasis is placed not only on its historical and architectural value but also on the precise geolocation identification of individual buildings within the complex. This approach is essential for efficient planning and management of the restoration and possible preservation of the layout of buildings in the Korytnica Spa complex, as well as for the integration of these historical parts into current and future urban transport systems in case of their reconstruction by new owners with an extension to improving tourism infrastructure through the implementation of a bicycle path utilizing educational panels.

Field research of the complex was conducted in September 2023 for the purpose of mapping the current state of buildings, as well as roads within the complex, with an emphasis on geolocation measurement.

4.1 Data

Geolocation measurement, conducted in September 2023 at 21 sites within the Korytnica Spa complex, serves as a fundamental point for any future planning and management of the entire area. The use of Pixel 7 PRO mobile phone technology and the GPS Logger app version 3.2.2 enabled the recording of precise GPS coordinates of individual objects with accuracy to within a few centimeters. This precision is crucial for the protection and revitalization of the complex, as well as for the integration of these objects into the broader context of urban planning and transportation.

The following table no. 1 provides the GPS coordinates of the measured points with precise timing and values.

Date	Time	Name of Measured Point	GPS Coordinates
9/9/2023	12:45:21	Kríž vďačnosti uzdravených 1869	48.88945060, 19.28357106
9/9/2023	12:53:35	Kostol sv. Ondreja	48.88930479, 19.28367996
9/9/2023	13:02:07	Štefánia	48.88903344, 19.28456030
9/9/2023	13:09:35	Minerálne pramene Vojtech 1 a 2	48.88892574, 19.28530109
9/9/2023	13:16:05	Akumulácia minerálnej vody	48.88850721, 19.28559250
9/9/2023	13:34:14	Kúpeľný dom	48.88852226, 19.28543237
9/9/2023	13:38:21	Plniareň minerálnej vody	48.88826411, 19.28530043
9/9/2023	13:39:45	Salatín	48.88816374, 19.28535201
9/9/2023	13:47:38	"Sklad"	48.88797805, 19.28529796
9/9/2023	13:57:16	Žofia	48.88773476, 19.28606378
9/9/2023	13:57:45	Anton	48.88758204, 19.28626415

9/9/2023	14:00:44	Jozef	48.88785263, 19.28564658
9/9/2023	14:14:09	Spoločenská miestnosť	48.88943341, 19.28655461
9/9/2023	14:17:42	Slávia	48.88938529, 19.28643210
9/9/2023	14:20:09	Oľga	48.88928503, 19.28677736
9/9/2023	14:33:47	Dom	48.88874254, 19.28735526
9/9/2023	14:34:13	Športové zariadenie	48.88846755, 19.28750622
9/9/2023	14:45:59	Zdravotné stredisko	48.88987703, 19.28584338
9/9/2023	14:55:03	Knižnica	48.88985473, 19.28590152
9/9/2023	14:58:55	Stravovacia miestnosť	48.89041420, 19.28667618
9/9/2023	15:02:03	Pamätník SNP	48.89052132, 19.28606111

Table 1. Geolocation measurement in the Korytnica spa complex

In our project, we used a Python library called Folium to put GPS coordinates on a map for easy visualization.

First, we created a list called "points" which contains names and GPS coordinates of various locations. Then, we calculated the average latitude and longitude of all these points to center our map around that average location.

Next, we used Folium to create the map and set its starting zoom level. We added markers on the map for each point in our list, showing the name of the location when clicked.

Finally, we saved the map as an HTML file for later reference (can be seen in figure no. 4). This method helps us understand where each point is located geographically, making it useful for analyzing data related to different locations within our study area.

The following Python code snippet was employed to visualize geographical data by leveraging the capabilities of the Folium library:

```
import folium
# List of measured points with their names and GPS coordinates
points = [
    ("Kríž vďačnosti uzdravených 1869", 48.88945060, 19.28357106),
    ("Kostol sv. Ondreja", 48.88930479, 19.28367996),
    ("Štefánia", 48.88903344, 19.28456030),
    ("Minerálne pramene Vojtech 1 a 2", 48.88892574, 19.28530109),
    ("Akumulácia minerálnej vody", 48.88850721, 19.28559250),
    ("Kúpeľný dom", 48.88852226, 19.28543237),
    ("Plniareň minerálnej vody", 48.88826411, 19.28530043),
    ("Salatín", 48.88816374, 19.28535201),
    ("Sklad", 48.88797805, 19.28529796),
    ("Žofia", 48.88773476, 19.28606378),
    ("Anton", 48.88758204, 19.28626415),
    ("Jozef", 48.88785263, 19.28564658),
    ("Spoločenská miestnosť", 48.88943341, 19.28655461),
    ("Slávia", 48.88938529, 19.28643210),
```

```

("Olga", 48.88928503, 19.28677736),
("Dom", 48.88874254, 19.28735526),
("Športové zariadenie", 48.88846755, 19.28750622),
("Zdravotné stredisko", 48.88987703, 19.28584338),
("Knižnica", 48.88985473, 19.28590152),
("Stravovacia miestnosť", 48.89041420, 19.28667618),
("Pamätník SNP", 48.89052132, 19.28606111),
("Hygiea", 48.89019341, 19.28497377),
("Olívia", 48.89018515, 19.28459674),
("Strážnica", 48.89012781, 19.28372566),
]

# Create a map centered around the average location of the points
avg_lat = sum(p[1] for p in points) / len(points)
avg_lon = sum(p[2] for p in points) / len(points)
m = folium.Map(location=[avg_lat, avg_lon], zoom_start=16)

# Add markers for each point
for name, lat, lon in points:
    folium.Marker(location=[lat, lon], popup=name).add_to(m)

# Save the map to an HTML file
map_file_path = "/mnt/data/measured_points_map.html"
m.save(map_file_path)

map_file_path

```

The outcome of the aforementioned code execution, namely the visualization of GPS coordinates on a map, is presented below in Figure 4. This visualization serves to elucidate the spatial distribution of the measured points within the designated study area. Through the utilization of Folium, the depicted map encapsulates the geographic context of each location, thereby facilitating enhanced comprehension and analysis.



Figure 4. Visualization of geolocation GPS coordinates in the Korytnica spa area

We conducted a statistical analysis of the provided GPS coordinates. This involved calculating the median, mean, standard deviation, minimum, and maximum values. These statistics help us understand the distribution and characteristics of the geographical locations more clearly.

For the analysis, we utilized Python code leveraging the NumPy library. The code snippet for the analysis is provided below:

```

# Import the necessary library
import numpy as np

```

```

# GPS coordinates
gps_coordinates = np.array([
    [48.88945060, 19.28357106],
    [48.88930479, 19.28367996],
    [48.88903344, 19.28456030],
    [48.88892574, 19.28530109],
    [48.88850721, 19.28559250],
    [48.88852226, 19.28543237],
    [48.88826411, 19.28530043],
    [48.88816374, 19.28535201],
    [48.88797805, 19.28529796],
    [48.88773476, 19.28606378],
    [48.88758204, 19.28626415],
    [48.88785263, 19.28564658],
    [48.88943341, 19.28655461],
    [48.88938529, 19.28643210],
    [48.88928503, 19.28677736],
    [48.88874254, 19.28735526],
    [48.88846755, 19.28750622],
    [48.88987703, 19.28584338],
    [48.88985473, 19.28590152],
    [48.89041420, 19.28667618],
    [48.89052132, 19.28606111],
    [48.89019341, 19.28497377],
    [48.89018515, 19.28459674],
    [48.89012781, 19.28372566],
])

# Extract latitudes and longitudes
latitudes = gps_coordinates[:, 0]
longitudes = gps_coordinates[:, 1]

# Calculating statistics
def calculate_statistics(data):
    return {
        "Median": np.median(data),
        "Mean": np.mean(data),
        "Std Dev": np.std(data),
        "Range": [np.min(data), np.max(data)]
    }

# Calculate and display the statistics for latitudes and longitudes
latitude_stats = calculate_statistics(latitudes)
longitude_stats = calculate_statistics(longitudes)

print("Latitude Statistics:")
print(latitude_stats.items())

print("\nLongitude Statistics:")
print(longitude_stats.items())

```

```

# Calculating statistics
def calculate_statistics(data):
    return {
        "Median": np.median(data),
        "Mean": np.mean(data),
        "Std Dev": np.std(data),
        "Range": [np.min(data), np.max(data)]
    }

# Calculate and display the statistics for latitudes and longitudes
latitude_stats = calculate_statistics(latitudes)
longitude_stats = calculate_statistics(longitudes)

print("Latitude Statistics:")
print(latitude_stats.items())

print("\nLongitude Statistics:")
print(longitude_stats.items())

```

Utilizing the provided Python code with the NumPy library, the analysis yielded the following statistical results, presented in the table below:

Text	Median	Mean	Std deviation	Min	Max
latitude	48.889159235	48.889075285	0.0008787532583158206	48.88758204	48.88758204
longitude	19.28561954	19.285602754166664	0.0010416235971782266	19.28357106	19.28750622

Table 2. Statistical analysis of GPS coordinates

4.2 Proposals

We are focused on creating a trail and integrating educational-informational panels that will serve as educational and orientation points for visitors. A route intended for such purposes has never been implemented in the Korytnica area. We utilize geolocation data obtained from field research conducted in September 2023 for accurate mapping of existing and planned elements in the complex. This data provides a foundation for the design of the path and the placement of informational panels. In the field of proposals, we have created two proposals for the possibility of integrating educational and informational panels.

The proposed layout of educational and informative panels, as depicted on figure no. 5, provides essential information about historical landmarks and noteworthy natural sites in the selected area. This layout aims to guide visitors through points of interest, highlighting key historical and natural features.

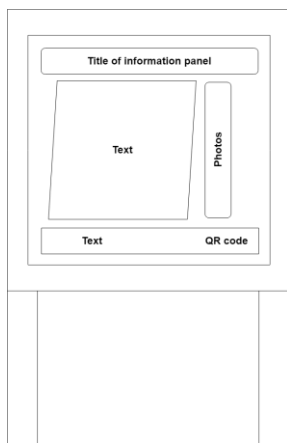


Figure 5. The proposal layout of educational and informative panels

The first proposed route for the educational trail spans 2.13 km, with six informative panels along its length. This route is designed primarily for cyclists, serving as an extension of the cycling path from Ružomberok, focusing on three educational-informational panels leading into the Korytnica spa area. Within the spa area, based on geolocation data, three educational-informational panels were strategically placed to mark significant locations. These panels are positioned to allow cyclists to follow the proposed route without frequent dismounting.

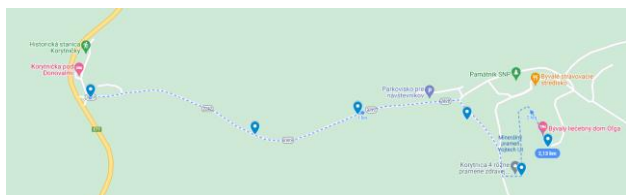


Figure 6. Proposal of a cycle path in the Korytnica spa area

The names of the informational panels are:

1. Welcome
2. Forests
3. Fauna and Flora
4. Church of St. Andrew
5. Mineral Springs
6. Historic Buildings in the Area

Each panel is designed to provide detailed insights into its respective theme, ensuring a comprehensive learning experience for visitors. The trail offers a balanced approach to historical and natural education, allowing visitors to explore the region's rich heritage and ecological significance.

We propose the second variant of the proposed route of the educational trail as the creation of a pedestrian route that will pass through historically and culturally significant places in the campus with respect to the existing access roads and with minimal impact on the natural environment. In terms of materials and construction, we advocate for the use of ecological and durable materials that harmonize with the natural and historical character of the area.

In figure no. 7, we can see our design of a pedestrian route, where blue points on the map indicate geolocation measurement data of selected sites within the Korytnica complex. The sites include the currently reconstructed St. Andrew's Church (Kostolík sv. Ondreja), mineral spring Vojtech 1 and mineral spring Vojtech 2 (Prameň Vojtech), mineral spring Jozef (Minerálny prameň Jozef), mineral spring Žofia (Minerálny prameň Žofia), mineral spring Anton (Minerálny prameň Anton), subsequently the Hygiea spa house (registered as a national cultural monument) (Kúpeľný dom Hygiea), the SNP monument (Pamätník SNP), and the sports center (Športové centrum).



Figure 7. Proposal of a pedestrian route in the Korytnica spa area

We propose that the bike path begins near a designated parking area, which is located near the third-class road III/2222, due to better accessibility for families with children. We have marked a pedestrian route in two colors, where red represents a 1.2 km long, existing, utilized path with an asphalt surface in good condition. Purple represents a 670 m long, unmaintained asphalt path that is more extensively damaged and indicates obvious reconstruction for future planning of a pedestrian route circuit. Currently, this part of the path is also used by visitors, but it is definitely not suitable for families with children due to significant damage from natural elements (cracked paths, overgrown with high grass, and long-term unmaintained surroundings).

Overall, we are discussing a pedestrian route approximately 1.8 km in length, suitable for families with children in beautiful nature with the possibility of utilizing mineral springs, which are among the best mineral springs in the world, in case of reconstruction.



Figure 8. Proposal of a pedestrian route for the layout of educational and informative panels in the Korytnica spa complex

In the field of educational-informational panels, we propose the installation of 7 signs placed at each mineral spring, as well as at the Church of St. Andrew (Kostolík sv. Ondreja), the national cultural monument Hygiea (Kúpeľný dom Hygiea), and the SNP memorial (Pamäťník SNP). These signs would highlight important information about each location, with the possibility of linking to organizations offering assistance within the Korytnica spa area via QR codes.

4.3 Comparison of the proposals with a survey from locals

As part of planning a new educational project in the Korytnica region, we focused on two route options: the first is an educational cycling path, while the second is an educational pedestrian trail. Both options focus on historically and culturally significant sites in the area, emphasizing existing access routes and minimizing environmental impact.

In October of 2023, we conducted a survey among the residents of Korytnica and the surrounding areas during the second field study, focusing on the type of educational trail that would attract the most interest. The survey included various questions about people's preferences and their opinions on environmental impact. On-site, we approached local residents and visitors (inhabitants of nearby villages), concentrating on the areas around the Korytnica springs. This approach allowed us to gather direct feedback from those who are well-acquainted with the area or interested in its restoration and preservation. In total, we collected 40 responses over the course of five hours.

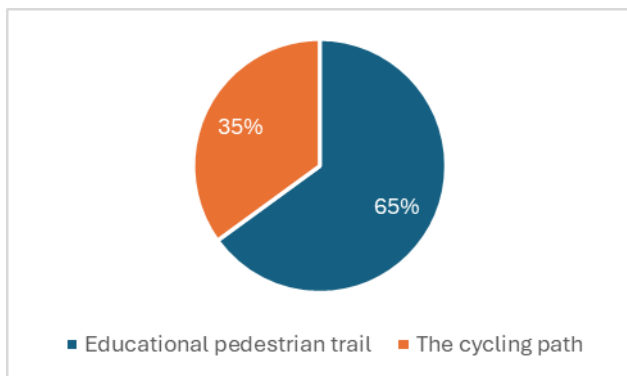


Figure 9. Preference for cycling or pedestrian routes among local residents

The survey results showed that 65% of respondents preferred an educational pedestrian trail, considering it more suitable due to the potential for closer contact with historical and cultural landmarks. Additionally, some respondents noted that a pedestrian trail allows for better appreciation of nature and contributes to environmental protection.

On the other hand, 35% of respondents preferred the cycling path, as it provides faster connections between different locations and allows for integration with other cycling routes in the area. This option was also perceived as more attractive for tourists and recreational cyclists.

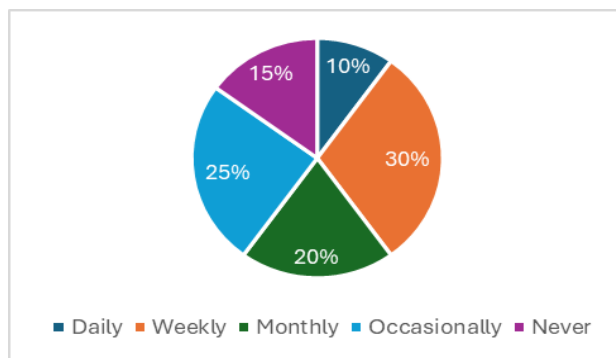


Figure 10. Survey results on local residents' use of proposed educational trails

A question aimed directly at the use of the chosen route by local residents provided interesting results. The results indicate that the majority of respondents plan to use the educational routes at least occasionally, with the largest group planning to use them weekly. A relatively low percentage of respondents indicate that they plan to use the routes daily or never.

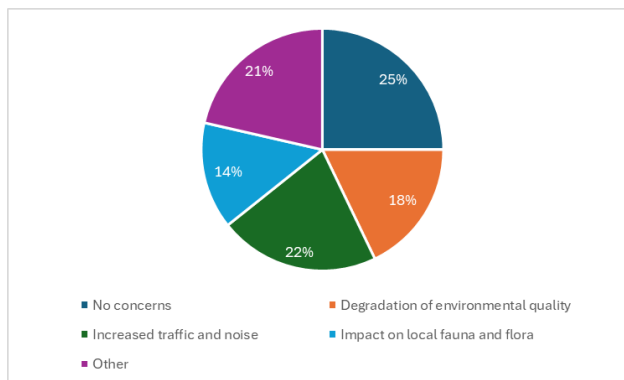


Figure 11. Environmental concerns from local residents regarding educational routes

We also asked local residents about their concerns regarding the impact of educational routes on the local environment (multiple answers possible). The results show that although a significant number of respondents are not concerned about the impact of educational routes on the local environment, several others expressed concerns about increased traffic, noise and possible deterioration of the quality of the environment. Some respondents are also concerned about the risk of damage to historical monuments and the increased cost of route and road maintenance associated with possible increased traffic.

These findings allow us to better understand the needs and expectations of the local community and serve as a crucial input for the final decision regarding the future configuration of educational trails in Korytnica. Based on this information, we will continue to optimize the project to meet local conditions while preserving the cultural, historical, and natural character of the site.

5 CONCLUSIONS

The journey to revitalizing Korytnica Spa underscores the significance of harmonizing historical preservation with modern development. The multidisciplinary approach—encompassing sustainable development, geolocation measurement, and strategic transportation planning—paves the way for transforming the spa into a thriving tourism center. However, challenges such as funding, coordination among stakeholders, and legislative constraints persist, reminding us that effective revitalization requires ongoing commitment and collaboration.

The innovative use of GPS coordinates to design accessible pathways and transportation infrastructure not only promotes visitor engagement but also supports environmentally conscious initiatives. Yet, the proposed changes invite crucial discussions around maintaining the balance between growth and conservation, particularly in a region with such rich natural and cultural heritage.

Currently, this is a pilot study representing the initial phase of research aimed at the revitalization of the spa settlement of Korytnica and the optimization of transportation routes. In the future, we plan to expand the current case study by conducting more specialized studies focused on improving tourist infrastructure and protecting cultural heritage. The existing questionnaire will be expanded to include more detailed questions about visitors' experiences, needs, and preferences regarding transportation services and infrastructure.

To validate the obtained results, we plan to conduct long-term studies with a larger number of respondents to ensure higher accuracy and data representativeness. Additionally, we intend to incorporate analytical tools to assess the impact of various types of infrastructure changes on tourism and local economic conditions.

Future directions may require also deeper community involvement, exploring additional funding sources, and assessing the broader environmental impact. It is essential to ensure that increased tourism does not compromise the area's unique character or contribute to environmental degradation.

Overall, the proposed strategies represent a positive step forward. However, the success of this revitalization will ultimately depend on continuous dialogue among stakeholders, flexible adaptation to emerging challenges, and a steadfast commitment to sustainable practices. It is in this collaborative spirit that Korytnica Spa can rediscover its place as a vibrant and attractive destination for both domestic and international visitors.

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