

Enhancing the Visitor Experience Along the Sibiu County Trails

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Abstract

Sibiu County, located in the Transylvania region of Romania, has a vast network of trails ranging from the Southern Carpathian Mountains to cultural trails connecting cities. The Sibiu County Tourism Association and Mioritics Association recognize the potential of these trails to become a major tourist attraction but currently have limited knowledge of the trail user experience. The team will help both organizations increase awareness of and enhance the trail user experience. To address this, the team will survey and interview trail guides and managers, develop a reporting system for trail users, and research counting systems for trails. By gathering and analyzing data, the team will present a set of recommendations and tools that can assist the promotion of the Sibiu County trails.

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1.0 Introduction

In 2019, 1.5 billion people traveled internationally, creating \$1.75 trillion USD in total international tourism exports—7% of all exports worldwide (World Tourism Organization, n.d.a). Mr. Zurab Pololikashvili, Secretary-General of the World Tourism Organization, claims that developing countries need a strong tourism sector to advance their economy, plus effective tourism practices that preserve their natural and cultural heritage (World Tourism Organization, n.d.c). According to an Adventure Travel Trade Association study, hiking is the single most popular outdoor activity for tourists (Martin, 2017). However, tourists prefer hikes with successful marketing, nearby tourism facilities (such as hotels or visitor centers), and well-maintained trails. These features are critical for the hiking tourism industry to grow to its full potential (Scuttari, 2016).

Romania attracts tourists eager to explore its association with vampiric legends and its communist history. However, this so-called “Dracula Tourism” and “Dark Tourism” often overshadow the nation’s other merits (Light, 2007; Light & Dumbrăveanu, 1999). Encompassing over half the Carpathian Mountain Range and with forests covering 30% of the country (World Bank, 2019), Romania has a natural environment well-suited for hiking. Sibiu County, located in Romania’s Transylvania region, is no exception. The county possesses several hundred kilometers of marked trails, which enable a wide variety of activities including hiking, mountain biking, climbing, horseback riding, and caving (Asociatia Mioritics, 2015; Turnock, 1999). Despite these natural assets, Sibiu County’s biggest draw is the capital city of Sibiu, and tourists typically do not recognize the county for its outdoor attractions (M. Dragomir, Personal Communication, February 18, 2021).

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To enhance Sibiu County's tourism industry, organizations in the region have expanded the hiking infrastructure. Since 2015, the Mioritics Association marked over 500 km of trails with signage in southern Transylvania and is currently working to mark the nearby Carpathian trails (M. Dragomir, Personal Communication, February 18, 2021; Cononovici, 2015). In September of 2021, the Sibiu region is set to host Eurorando, the largest pan-European walking event held in a different part of Europe every five years. The host entity expects Eurorando 2021 to draw over 3,000 hikers from 30 different countries and making Eurorando a prime opportunity to establish Sibiu as a tourist destination (Romania Insider, 2019).

Despite considerable progress, neither the Sibiu County Tourism Association nor the Mioritics Association have any system in place to profile trail users and their needs, determine the frequency of trail use, or monitor how trail conditions develop. Creating a trail user profile would help local businesses better cater to tourists by understanding exactly who their patrons are and what they need. Developing a feedback system could also assist trail managers, who currently have trouble maintaining the vast trail network because they lack the staff to manually locate issues (M. Dragomir, Personal Communication, February 18, 2021). Since trail users see these problems firsthand, enlisting their assistance could help trail managers service their property more effectively.

The goal of this project is to investigate how to promote trails and enhance the trail user experience in order to assist the Sibiu County Tourism Association and Mioritics Association in improving relationships and communication between visitors, trail managers, and local businesses. The team aims to accomplish the goal by achieving the following four objectives:

1. To understand the trail user experience
2. To identify how local businesses can address the needs of trail users

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3. To develop a reporting system for trail users
4. To propose a system to track the quantity and movement of trail users.

Conducting interviews, surveys, and research to complete these objectives will assist the project's collaborators in collecting, evaluating, and disseminating information to improve tourists' experiences on the Sibiu County trails and promote the region.

2.0 Background

This chapter begins with a brief history of Romania and Romania's tourism before introducing the project collaborators, the Sibiu County Tourism Association and Mioritics Association. The chapter then describes the current condition of the Sibiu County trails and room for improvements. Next, the background discusses systems used in other countries to determine the needs of trail users, count visitors, and obtain feedback. Finally, this chapter investigates possible solutions and existing reporting forms designed to meet these needs. Knowledge of these topics is essential to understand the social implications of the project, similar methods elsewhere with a potential reapplication in Sibiu, how to encourage better tourism practices, and how to improve the experience of trail users in Sibiu.

2.1 Geographical and Historical Tourism Context

2.1.1 Geographical Region

Romania is a southeastern European country bordered by Ukraine, Moldova, the Black Sea, Bulgaria, Serbia, and Hungary (see Figure 2.1). The landscape in Romania is roughly one-third mountainous, one-third forests, and one-third hills and plains, with great diversity in topography, geology, climate, hydrology, flora, and fauna (Mihai Dragomir, Personal Communication, February 9, 2021). Romania's geographical structure centers around the Transylvania Basin and the Carpathian Mountains, whose subranges form a series of crescents that divide Romania into ten regions. Bucharest, the nation's capital and main economic and cultural center, is located in the Muntenia region (Cucu et al., 2021).



Figure 2.1 Counties of Romania (Past and Present) (Nacu, 2007).

Sibiu County, located in the Transylvanian region in central Romania, is 2,097 square miles (5,432 km²) in area, with an estimated population of 401,168 (as of 2020-01-01). The Transylvanian Alps (Southern Carpathians), including the Sebeș, Lotru, and Făgăraș ranges, run through the southern portion of Sibiu. Sibiu County is more rural than other areas in Romania, with settlements found amongst intermontane valleys (Britannica, 2019). The capital of Sibiu County, aptly named Sibiu, lies along the Cibin River on the northern side of Turnu Roșu (“Red Tower”) Pass, which links Transylvania to southern Romania across the Southern Carpathians. The city of Sibiu is considered a “cultural and industrial center” because of its large production of machine tools, textile machinery, foodstuff, leatherware, textiles, and clothing. Possessing an

international airport, along with roads and railways connecting Sibiu to Cluj-Napoca, Braşov, and Bucharest, Sibiu is easily accessible from outside regions (Britannica, 2018).

2.1.2 Decline of Tourism in the Communist Era

Occupied by Soviet troops in 1944, Romania joined the Union of Soviet Socialist Republics (U.S.S.R.) and fell under communist control in 1948. Before the Second World War, Romania experienced a slow, steady growth in tourism as a result of establishing a National Tourism Office in 1936. However, this progress stopped due to the war and communist influence. By 1961, Romania had only 134,000 tourists annually. In the 1960's and 1970's, Romania invested in more tourism infrastructure, focusing on its border with the Black Sea. As an inexpensive alternative to Greece or the Spanish coasts, Romania attracted 2.9 million foreign tourists in 1972. Most of these tourists came from neighboring countries, but 0.6 million came from Western Europe (Light, 1999). The government also encouraged domestic tourism, and most people visited areas with spa and mountain resorts along with the Black Sea. However, tourism began to decline again as Dictator Nicolae Ceauşescu consolidated power in the mid 1970's. In 1974, he passed a law requiring all tourists to spend a minimum amount of currency each day during their visit. Additionally, Ceauşescu forbade local Romanians to accommodate tourists in their homes and required them to report all interaction with foreigners to the Securitate (the internal security services). This restricted tourism to the Black Sea and put tourists under surveillance. Ceauşescu's plan to reduce Romania's debt involved decreasing domestic consumption and investment, rationing energy supplies, and exporting nearly all agricultural produce. As a result, the Romanian standard of living significantly declined and citizens had to ration food, electricity, and fuel (Light, 1999). In the 1980's, tourism declined rapidly, making Romania an unattractive, repellent place for tourists (Light, 2000).

2.1.3 Tourism Stereotypes

After the end of Ceaușescu’s reign in 1989, Romania transitioned to democracy in 1990 which significantly increased the number of arrivals (Cucu et al., 2021). 3.1 million tourists visited Romania for holiday in 1990--a 67% increase from the previous year--with the majority from neighboring countries and about half a million from Western Europe. In 1992, the number of tourists arriving for holiday peaked at just over 3.5 million, as seen in Figure 2.2.

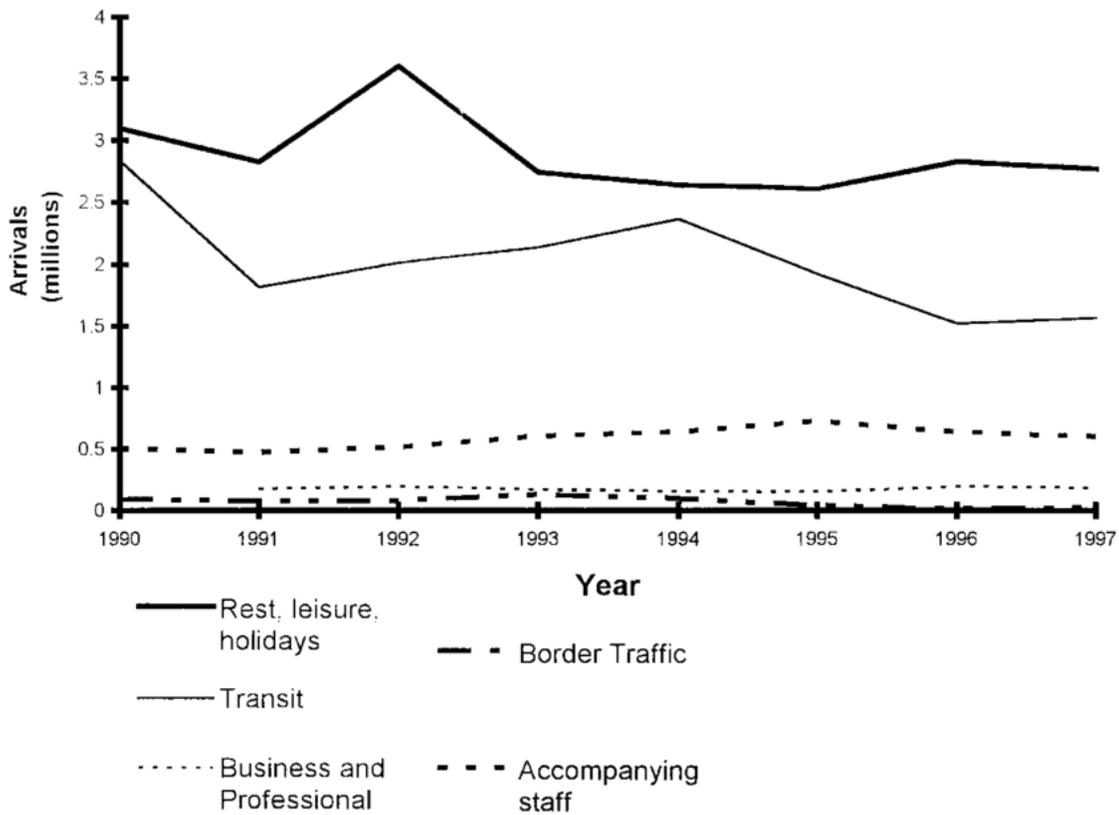


Figure 2.2 Foreign Arrivals by Purpose of Visit from 1990 to 1997 (Light & Dumbrăveanu, 1999).

With Ceaușescu’s downfall broadcast on national television, Romania wanted people to experience the revolution themselves. During the transition period, the Romanian government provided guided tours associated with sites highlighting the downfall of communism to help rebuild the economy (Light, 2000). Even after decades of post-communism, tourists are still

drawn to Romania to learn more about its communist legacy, a phenomenon now known as “Dark Tourism,” (Light, 1999) or “Communist Heritage.” This concept left Romanians in a dilemma between maximizing profit from tourism and moving past the country’s communist legacy (Light, 2000).

In addition to “Dark Tourism,” another reason tourists visit Romania is because of the association with the fictional character Dracula, whose castle (now known as Bran Castle) is located in Transylvania. So-called “Dracula Tourism” upsets Romanians because it does not display Romania as the modern, developed country it desires to be (Light, 2007). Even though sites associated with Dracula serve as a good marketing strategy to attract tourists, Romanians would rather have tourists visit to appreciate their society, culture, and vast natural attractions. This poses a dilemma on how to reconcile these two conflicting approaches.

2.2 Recent Tourism in Romania and Sibiu

The tourism industry in Romania is experiencing a significant upward trend. Figure 2.3 displayed below shows this trend and details the number of arrivals in tourist accommodations in Romania in the last fifteen years, which have grown from 6.22 million to 13.37 million. Note the drastic drop from 2019 to 2020 is most likely attributable to the reduction of travel in 2020 due to the outbreak of COVID-19. The most popular tourist locations in Romania are cities accounting for over half of domestic tourists and almost 90% of international tourists visiting cities in 2019. In comparison, only about 20% of domestic tourists and less than 10% of international tourists stayed in the mountains in the same year. (National Institute of Statistics Romania, 2020). Overall, the tourism scene in rural regions of Romania is less popular than that of more urban areas.

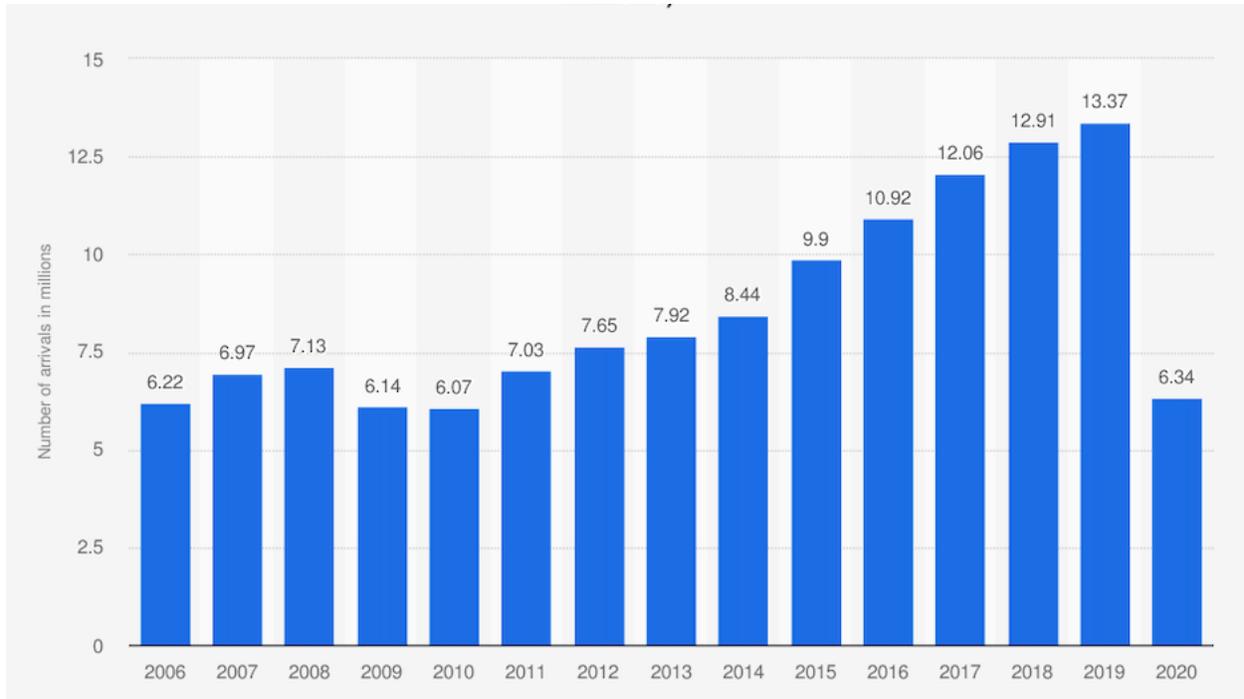


Figure 2.3 Number of arrivals in tourist accommodations in Romania from 2006 to 2020 (in millions) (Eurostat, 2021).

However, there is potential for tourism in rural areas of Romania to grow due to its vast mountain ranges and cultural history. These areas offer a wide variety of tourist activities, such as hiking, biking, horseback riding, viewing historical monuments, and experiencing the traditional culture of the communities (Turnock, 1999). For example, one study examined the possibility for agrotourism (rural tourism specifically supported by farmers) to encourage sustainable development within Sibiu county, and found many tourists’ desire to reconnect to nature and to learn more about tradition and culture in the area strongly motivated rural tourism in the region (Mirela, 2017).

Though Sibiu contains the beautiful landscapes and deep cultural heritage that tourists seek, tourists often favor other destinations. In a survey assessing the attractiveness of Central European countries for hiking and winter sports by other Central Europeans, only 39.0% of respondents rated Romania as a desirable location for mountain hiking. Other countries such as

Austria and Slovakia respectively received 74.9% and 79.0% approval ratings for hiking, making it obvious that Romania is not the first choice for Central European hikers (Krzesiwo et al., 2018). Following the trends of the country at large, the main attraction of Sibiu County is the city of Sibiu itself. In 2007, the European Union recognized the city of Sibiu as a European Capital of Culture; and the city ranked sixth in the “20 Best European Destinations to Visit in 2020” by European Best Destinations (Romania Insider, 2019; Rodriguez, 2020). Unfortunately, Sibiu County in total receives only 4.20% of the total tourists in Romania (Popescu, 2015). Generally speaking, tourists overlook the rural regions of Sibiu in favor of staying in the city or traveling to other mountainous Central European countries.

2.2.1 Organizations Involved in Promoting Tourism in Sibiu

Currently, due to the limited tourism activity in the Sibiu region, some organizations aim to promote tourism and culture in Sibiu. The Sibiu County Council established the Sibiu County Tourism Association (SCTA) in 2005 as an organization focused on the management and marketing of Sibiu County as a tourist destination. Some of the goals of the SCTA are to develop and promote tourism in Sibiu County, create a framework for the development of various forms of tourism services, and to create internal and external promotion tools to support the implementation of local, regional, national and European tourism development strategies (Asociația Județeană de Turism Sibiu, n.d.). The organization’s website, www.sibiu-turism.ro, strives to make Sibiu an attractive tourist destination by listing a wide variety of useful information, such as popular destinations, activities, travel methods, and accommodations.

The Mioritics Association is another organization that promotes tourism in Sibiu, but with a specific emphasis on cultural tourism, which is a type of tourism activity where the visitor’s main motivation is to learn, discover, experience, and consume the cultural attractions

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or products in a tourism destination (World Tourism Organization, n.d.b). A non-governmental and non-profit organization founded in 2004, the Mioritics Association's main goal is to protect and promote cultural and natural heritage in Romania and to develop cultural tourism in Romania. The Mioritics Association contributed to the Sibiu and Transylvania region specifically by developing promotional materials for the Transylvanian area such as maps, brochures, and guides, and marking over 250 kilometers of hiking and biking trails in Sibiu (Asociatia Mioritics, n.d.). Figure 2.4 displays a map of the hiking and biking trails in the Transylvanian Highlands, located in the northern portion of Sibiu county. It also shows blue and red trail markings from the Mioritics Association. Since the rural population in Romania takes pride in their location and lifestyle (Turnock, 1999), it is important to the Mioritics Association to promote and take care of these rural regions in order to preserve that culture.



Figure 2.4 The network of hiking and biking trails in the Transylvanian Highlands (The Ecotourism Association of Romania, 2020).

2.3 The Relationship Between Trails and Trail Users Around the World

Most hiking in Sibiu County takes place in three main regions. Mărginimea Sibiului, a pastoral area with low and middling difficulty trails provides a cultural experience with the locals. Next are the Transylvanian Highlands, a hilly region boasting 500 km of hiking/biking trails, traditional villages with fortified churches, and the Via Transylvanica, a 1000 km long-distance trail comparable to the Appalachian Trail in the Eastern United States. Finally, the Țara Făgărașului area, also known as the Carpathian Gates, lies in the middle of the Southern Carpathians. Experienced hikers and mountain bikers favor this mountainous area for its higher difficulty and a stop along the 6000 km E8 path that snakes across Europe (S. Manea, personal communication, February 9, 2021).



Figure 2.5 Făgăraș Mountains, Romania
(Dragomir, n.d).

There are two important caveats about the trail networks in Sibiu County. Firstly, no single organization manages these properties. Local governments, private citizens, and non-governmental organizations (NGOs) own land containing portions of the trails depending on their location (M. Dragomir, personal communication, February 9, 2021). This makes trail management difficult. Secondly, the region's trail network is expansive but not well mapped. To combat this obstacle, there are organizations addressing this issue. In recent years, the Mioritics Association led multiple projects to map and mark existing trails, expanding the documented trail network by over 550 km in total (Asociatia Mioritics, 2015 and 2016). Despite these efforts, they have not yet marked and mapped all of the trails. While the added infrastructure is a sign of significant progress in the management of the trails, more work to mark all of the Sibiu trails remains.

2.3.1 Attracting Visitors

Natural attractions compete for visitors with other attractions like movie theatres. By analyzing parks across Europe, there are certain recurring factors that impact the popularity of national parks.

Researchers analyzing the factors that impact visitor numbers in the Czech Republic, Germany, and Austria found two key factors: park budget and the number of park employees (Stemberk et al., 2018). Interviews with park managers and a retrospective analysis of recorded park data provides evidence that increasing park budget increases the national park attendance (Stemberk et al., 2018). Conversely, increasing the number of park employees decreases the national park attendance (Stemberk et al., 2018). However, the researchers are not certain of the reasoning behind these trends and our team will need to further investigate these factors.

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Another study focused on Finland found that across 35 national parks the two key factors impacting the number of park visitors are: the number of recreational activities and the number of biotopes (Neuvonen et al., 2010). Increasing these two factors corresponds to growth in the number of visits to the parks, showing a deep importance to visitors. A biotope is a region with uniform environmental conditions and species (Merriam-Webster, n.d.). Parks with more biotopes are more popular. Parks with more unique ecosystems and breathtaking scenery attract more visitors (Neuvonen et al., 2010). In addition, increasing the number of recreational activities available within a park improves park popularity (Neuvonen et al., 2010). This includes lodging, viewing towers, and more extensive trail networks.

Considering the factors in parks across Europe, there are three important characteristics impacting the number of park visitors. The first is budgeting. While money is a concern, increasing park budgets for the Sibiu trails is not a possibility for this project. The next factor is biodiversity. From the peaks of mountains to the rolling hills and plains, Sibiu county has a diverse ecosystem. With a diverse geography and a numerous number of animals inhabiting the region, Sibiu has multiple biotopes. The last factor is the number of recreational opportunities. With over 500 km of trails, Sibiu county has the extensive trail network needed to attract trail users. The only piece missing is the amenities provided by local businesses, who need to adapt their practices to match the expectations of the trail users.

2.3.2 Understanding Trail Users

Businesses in Vietnam and Malaysia developed strategies encouraging tourists to spend more time and money in their locals. Customers in these areas have needs including access to information, nearby food and lodging, and often guided tours. Businesses adapted to customer needs experience increased customer satisfaction and spending. While businesses in both areas

addressed different needs, the general method and results of their efforts can help serve as an example for Sibiu businesses.

Vietnamese Traveler Cafes

Because of the language barrier between locals and tourists in Southeast Asia, backpackers have flocked towards traveler cafes (like an internet cafe). In Vietnam, these cafes became a part of backpacker enclaves, a cluster of cafes, cheap housing, and budget restaurants (Lloyd, 2006). Despite a lack of ‘up-scale’ tourist services, local businesses provide tourists with everything they need (food, accommodation, information), all with convenient access to transportation and the inner city (Lloyd, 2006). Workers in the tourist trade also adapted to the origins of their visitors by offering new cuisines and by learning to speak the basics of their language (Lloyd, 2006). The success of these cafes and other enclave businesses boils down to identifying the specific needs of the tourists. Understanding the geographic backgrounds, preferred languages, and reasons for visiting pushed entrepreneurs to communicate in French and English. The switch from Vietnamese to French and English improved traveler experience, making information more accessible and conversation more feasible between both visitors and locals. With an improved experience, travelers became more inclined to extend their stays while supporting local businesses.

Malaysian Mountain Climbers

Looking to create a successful marketing and management campaign, researchers in Malaysia studied the pull-factors of certain mountains. These factors are the accessibility, landscape, the tour company, and perceived risks (Mohd Taher et al., 2015). Analyzing mountains based on these factors can provide insight into the type of potential visitor. By surveying visitors at multiple mountains, the researchers drew conclusions based on visitor

perception and hiker demographics. One of these conclusions is that a mountain with higher perceived risks draws more experienced hikers while inexperienced hikers prefer mountains with lower perceived risks (Mohd Taher et al., 2015). Knowing about the type of hiker attracted to their region, businesses and tour companies can tailor their products to the specific needs of the visitors. By understanding the consumer base, tour companies can create tour packages targeting a specific type of hiker, improving the visitor experience.

While businesses in Vietnam and Malaysia adapted differently, there is similarity in the approach. First, both sets of businesses built profiles of their visitors. Next, businesses adapted to account for those needs, which positively impacts the businesses and their customers. The SCTA and Mioritics Association look to improve the entire visitor experience, on and off the Sibiu trails. Businesses contribute to the visitor experience, so it is crucial that they adjust their practices to meet and exceed the expectations of trail users. But before businesses can adapt to trail users, they need to understand the gaps between the expectations of trail users and reality of service provided. With the correct information, businesses can understand their customer's specific needs and adjust their practices accordingly.

2.4 Data Collection in Other Parks

National parks and trail systems require consistent visitor data and feedback to understand the behavior of visitors and how to effectively maintain the land. Counting systems track visitor quantity in particular areas, giving trail managers an understanding of the most popular trails, peak visiting times, and other important information. Feedback systems allow trail managers to gain insight on needed improvements. This section provides examples of counting and feedback systems that other trail systems and park areas have in place to collect visitor data.

2.4.1 Counting and Feedback Systems

Implementing a Socioeconomic Monitoring Program in the National Park Service

The National Park Service (NPS) of the United States has a strong need for a socioeconomic monitoring system (SEM) to track the economic impact their parks have on the populations living in and around them (NPS, 2021). Previously, the NPS conducted small-scale surveys on topics from park visitation to park progress measurement, but lacked a cost-effective, system-wide program to collect and organize the survey data. Therefore, the NPS developed and implemented a pilot SEM system into 14 of their parks in 2015 to assess the effectiveness of the system in improving management and visitor experiences.

The NPS designed the SEM questionnaire as a standardized survey to gather system-wide information. Chosen through a pilot development workshop, the survey questions mostly asked visitors to choose from a list of response options, providing open response opportunities where appropriate (NPS, 2021). The questionnaire used English as the primary language, but additional languages were available depending on the area. Researchers administered the SEM visitor survey at 14 pre-selected NPS locations as a personally delivered self-administered mail-back survey (NPS, 2021). The study population included visitor groups with at least one group member aged 18 or older in the park during the survey period. The NPS completed a nonresponse bias analysis for each park included in the pilot study. In an attempt to counteract the nonresponse bias and collect more information, park staff conducted a short, five-question interview of all eligible visiting groups. Results indicated that the pilot system served as an effective strategy to compile data. With at least two years of implementation, aggregated data from this system can reduce the margin of error in national studies and subsample analyses such as comparing park types and visitors (NPS, 2021).

Visitor Counting with Acoustic Slab Sensors in the Swiss National Park

For Swiss National Park (SNP), located in the Western Rhaetian Alps in eastern Switzerland, monitoring visitor flow is essential for park management. The SNP looked to develop an accurate counting system that required minimal human resources. It is forbidden for hikers to leave the trails, making acoustic slab sensors a viable option to indirectly count trail visitors (Siegrist et al., 2006). Caretakers installed four of the acoustic sensor slabs at the Mingèr and Margunet Valley, and two more at Trupchun Valley. Each sensor consists of two pressure sensitive slabs buried under an 8-10 cm thick layer of soil (Siegrist et al., 2006). Each sensor connects to a data logger that registers the visitors hourly. To calibrate and check the accuracy of the sensors' automatically collected data, caretakers manually counted the number of visitors for two days. The difference between the human-collected data and the automatically collected data provided the resources needed to calculate a calibration factor to apply to future data collections (Siegrist et al., 2006). However, the study left researchers with numerous questions and concerns, such as: What is the sensitive area of the counter? How does step length affect the counting? Can groups be counted incorrectly depending on how they pass the sensor? Does composition of covering material affect the sensors counting? Due to all these uncertainties, the sensors consistently underestimated or overestimated the number of passing visitors and the sensors ended up as an unreliable source of data. A sensor, no matter the type, will need further testing, but it is difficult to get perfect results when human behavior itself is unpredictable.

Real-Time Tourists Tracking System in Naturtejo Global Geopark (Portugal)

The Naturtejo Global Geopark located in Portugal features extensive walking and hiking trails for visitors to use at no charge. However, with no registry of visitors, there is no concrete knowledge about how the tourists use the various walking routes. In order to make more

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informed decisions, park managers proposed a two-phase visitor counting system to count and track tourists' movements in real-time using light beams and the MAC addresses of tourists' own smartphones (Dionisio et al., 2016).

In phase one, an electronic system remotely counted people passing on the trails. To withstand the elements, a small solar panel powered each sensor and its 3G/4G wireless communication module (Dionisio et al., 2016). For narrow paths, Naturtejo Geopark adopted an inexpensive sensor solution with low power consumption and easy installation. The system consisted of a horizontal infrared light beam with an opposite reflector (as seen in Figure 2.6). This type of light beam system counts a 'tick' each time a passing guest breaks the beam. However, people need to pass with a gap of at least 10 cm in between each other for the sensor to count them as two separate people (Dionisio et al., 2016). Despite this, the Fossils Trail in Penha-Garcia showed an accuracy level of 95 percent: enough to estimate visitor flow. The light counting system updates a Google Maps-based web interface that Geopark managers can monitor in real time.



Figure 2.6: Installed Light Beam Sensor in Naturtejo National Park (Dionisio, 2016).

Phase two of the visitor tracking made use of how most smartphones and other portable electronics use Wi-Fi for communication. A Media Access Control (MAC) address is a 12-

character identifier unique to a device (Dionisio et al., 2016). Smartphones use the MAC address to connect to public Wi-Fi spots and consequently broadcast this address around wherever they go. Naturtejo National Park implemented data collection using the MAC address by installing sensors that act as Wi-Fi receivers to pick up unique MAC addresses emitted from the smartphones with a range up to 100 meters (Dionisio et al., 2016). Monitoring the MAC addresses on different Wi-Fi hotspots located throughout the park allows for estimates of visitor movement. Despite not every guest having a smartphone, Wi-Fi tracking is still representative of the population due to the large sample size.

Background knowledge on both feedback and counting systems is essential for the team to understand prior to completing the project. The Sibiu Country Trails currently lack high tech data collection methods and can learn from other existing practices. The NPS posed a strategy to collect trail user information through surveys and interviews. The Swiss National Park and Naturtejo Global Geopark created unique mechanisms to count the number of people who use their trails. The Sibiu County Trails can potentially adapt these methods to implement their own feedback and counting systems in order to more effectively collect visitor information.

2.4.2 Crowdsourcing Information

While many parks desire to collect data to assist with park management, limited funding has led them to turn towards crowdsourcing their data. Crowdsourcing is a method of obtaining data through the Internet from a large number of people, typically unpaid. Several parks, like Asylum Lake Preserve (AL) at Western Michigan University have utilized a crowdsourced reporting system to decrease resource strain from park management. To test the effectiveness of crowdsourced data, developers created a reporting system for AL using a smartphone app as a platform. The reporting system serves as a low maintenance data collection service for the

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preserve managers, with each report including a location tag, description, and picture (Ebenstein, 2015). During a testing period, users submitted eight issues, including trash reports (bottles, plastic bags, styrofoam), trail maintenance issues (holes in the trail, large trenches, large stumps), and misplaced canoes (Ebenstein, 2015). Because of the crowdsourced nature of the reporting system, managers found that they did not have to traverse the park's trails themselves to find problems since trail users provided all relevant information. The app, with its integrated reporting system, greatly sped up the response time of the park management, decreased the number of issues present, and left more trail users satisfied with their visit.

While crowdsourcing worked well in AL, there are limitations to consider. Since crowdsourced data is sampling data from a group of individuals, it is important to not include any sampling bias when choosing participants (Palmer & Strickland, 2016). Gathering data representative of a given population is crucial to producing an accurate conclusion. With inaccuracies of data collection, further analysis and conclusions drawn from the data lack confidence when applied to a larger population.

The Mioritics Association has expressed interest in crowdsourcing information from trail users in Sibiu. With insufficient staff, it is nearly impossible to keep the trail network well-maintained year-round. For AL, the crowdsourced reporting system decreased the number of staff needed to properly manage and oversee park land. The Sibiu County Trails can apply the same principle. Additionally, the trail managers can use crowdsourcing information for other purposes such as obtaining and synthesizing trail user feedback to help address other issues and share positive experiences as a promotional strategy.

2.5 Considerations for Possible Solutions

2.5.1 Romanian Internet Speed and Access

Romania has the third fastest average fixed broadband speeds in the world as of August 2020 (Speedtest, 2020). However, Romania is not exempt from technical issues typically found in rural areas. In a survey regarding how respondents would rate high-speed access in rural areas of Romania, one third of participants claimed “fairly bad” or “very bad” transmission speeds (European Commission, 2020). While the ready availability of technology (especially smartphones) in Romania makes it tempting to use online platforms, solutions should not rely heavily on high-speed capacities given that Sibiu is a mostly rural county. In addition, while a purpose-built application could be a convenient option for hikers, the cost of developing and maintaining such an app may be prohibitive. In fact, the cost of developing an app in Romania starts at 570 euros but could potentially cost hundreds of dollars more (Marcoianu, 2019). As a result, the following research details some applications that already exist on the market.

2.5.2 Existing Reporting Forms

Many parks and trail networks make use of reporting forms to ascertain knowledge of when to address issues along the trails. The issues include but are not limited to sign damage or vandalism, impassable trail conditions, and abundant trash along the trails. Trail visitors fill out reports and send them directly to trail managers, allowing trail managers to assess and solve problems in an effective and timely manner. Reporting forms can benefit understaffed areas like Sibiu, which are unable to constantly monitor the trails in search of problems.

The project collaborators provided the team with four examples of online reporting forms for trail networks in the United States, Canada, and France. The four organizations that created and actively monitor these forms are Keystone Trails Association in Pennsylvania (KTA, 2021),

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Island Trails in Canada (Report, 2021) (see Figure 2.7), Tahoe-Pyramid Trail in California and Nevada (Tahoe-Pyramid, 2020), and Suricate in France (Signaler, 2021). Each of the reporting forms has similar questions that enable trail managers to address issues as they appear. Each form asks the user to identify the problem through a drop-down menu, written description, photos, or a combination thereof. The other important question that all the forms have in common is reporting the location of the issue. There are several apparent methods to gathering location information including selection of the trail name from a drop-down menu, GPS coordinates, description of nearby landmarks, and connecting location with the location of the users' smartphone. Lastly, each form requests contact information of the reporter to allow trail managers to contact them for further information if needed.

Report a Problem

Although we strive to keep the trails as problem-free as possible, it's not possible to constantly monitor every trail. We rely on our trail users to help report any problems they come across in order to get things back to normal as quickly as possible.

If you have encountered a problem on one of the trails, please fill out this form to let us know. Thank you!

Name *

First Last

Email *

Trail *

Select a Trail

Location of Problem (coordinates or a description) *

[Set to my Current Location](#)

Description of Problem *

Attach Photos (Optional)

Drop files here or [Select files](#)

May we contact you if we have further questions?

Yes, you may contact me.

I'm not a robot 

[Submit](#)

Figure 2.7: Example reporting form from Island Trails, Canada (Report, 2021).

2.6 Summary

This chapter reviewed the history and dynamics of tourism in Romania. The Sibiu County Trails have great potential as a tourist attraction, but the key to unlocking that potential is information. Land managing organizations in other countries proactively gather data on how many people use trails, who the users are, the problems they encounter, and what these trail users need—all of which enables them to directly address tourists' needs. If land managers in Sibiu County adopt these practices, they can better cater to tourists, which in turn will attract more visitors and yield local economic benefits.

Before advancing with the project, the team must consider the project stakeholders: the Sibiu County Tourism Association and Mioritics Association, the local businesses in Sibiu, and the trail users (such as hikers and bikers). The Sibiu County Tourism Association and the Mioritics Association are official collaborators for this project and serve as connections to the Sibiu region. The intent is to build off these organizations' previous work and deliver a useful product. Local business owners depend on the success of their business, the end result will ideally deliver useful information to keep them profitable. And of course, the project will heavily impact trail users. Whether they are domestic, international, interested in Transylvanian culture, or keen for outdoor activities, this project ultimately aims to better the trail user experience.

3.0 Methodology

The goal of the project is to investigate how to promote trails and enhance the trail user experience in order to assist the Sibiu County Tourism Association and Mioritics Association in improving relationships and communication between visitors, trail managers, and local businesses. The team will achieve this goal by meeting four objectives:

1. To understand the trail user experience
2. To identify how local businesses can address the needs of trail users
3. To develop a reporting system for trail users
4. To propose a system to track quantity and movement of trail users.

To achieve these objectives, the team has established a set of tasks to complete remotely with collaborators in Sibiu, Romania from March 24, 2021 to May 13, 2021. The team's focus is on the Sibiu region, specifically targeting the hiking, biking, and cultural trails. These trails have varying levels of signage and infrastructure, but all require improved promotion and data collection (M. Dragomir, personal communication, February 18, 2021). These objectives seek to improve the user experience on the Sibiu County trails by creating a profile of trail user and by proposing both reporting and counting systems for the trails. To achieve this, the team will conduct interviews and surveys, research data collection systems, and evaluate the findings to provide recommendations to the collaborators for improving the relationship between visitors, trail managers, and local businesses. This will help the team identify the issues to address so the collaborators can promote the Sibiu County Trails more effectively. Figure 3.1 illustrates the relationship between the goal, objective, tasks, and deliverables of this project, as seen below.

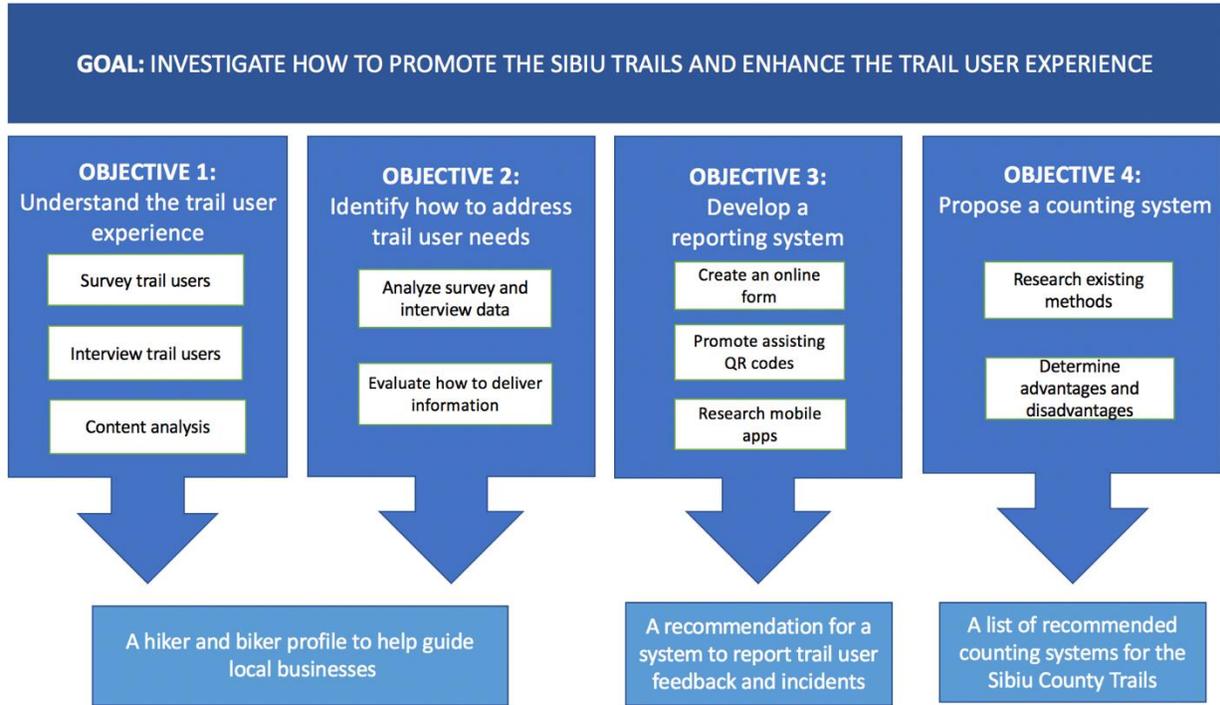


Figure 3.1 Flow chart of the project goal, objectives, tasks, and deliverables

3.1 Understand the Trail User Experience

The first objective is to understand the trail user experience. Understanding the current trail user experience will help increase awareness of needs between visitors, trail managers, and local business owners. The methods in this section will collect data on common remarks trail users have about their experiences, so that the team can analyze trends and improve the trail user experience. They will collect information from trail users, trail guides, and trail managers in order to achieve this objective. Both the team and Mioritics Association will administer surveys and conduct interviews with these groups to gain insights regarding their first-hand experience of the trails. In addition, they will conduct a content analysis by studying videos, blog posts, reviews, and any other online sources that provide information about trail user experience.

3.1.1 Survey Trail Users

The purpose of the survey is to determine the demographics of tourists that use the trails and to learn about the opinions tourists have regarding their visit to the trails and the surrounding communities. The team has prepared a survey in Qualtrics that contains both open and closed ended questions (see Appendix A) that allows for both structured and detailed responses.

Additionally, the team will first translate the survey questions into Romanian through Google Translate, and then run them by the collaborators for fine-tuning. Since Qualtrics allows participants to select a language before beginning the survey, participants can respond in the language of their choice. The topics covered in the survey will include trail user demographics (questions Q.3 – Q.10), their experiences using the trails (questions Q.11 – Q.14), their thoughts on using a mobile application to help improve their experience (questions Q.15 – Q.20), and their experiences of the accommodations in nearby communities (questions Q.21 – Q.35).

The collaborators will distribute the survey online (likely on Facebook, through newsletters, and on other social media) to the general public. Ideally, participants interested in the trails will take the survey because they interact with the collaborator's social media. The team will guarantee confidentiality and anonymity of survey responses since the final report will not contain any names or direct quotes from the participants. The next step after distributing the surveys involves waiting one week to receive responses. Once the survey closes, the collaborators and Google Translate will assist converting the responses to English.

3.1.2 Interview Trail Guides and Trail Managers

Trail guides are individuals hired by hikers to help them navigate the Sibiu region. They have extensive knowledge about the region's trail networks, and because of the nature of their job, they are intimately familiar with visitor expectations and concerns. In addition, since the

cost of living in Romania is relatively low (1 Leu = 0.24 USD), they often associate with tourists from wealthier countries who can hire trail guides at little cost (WorldData.Info, n.d.). On the other hand, trail managers are individuals associated with the NGOs that maintain the trail networks. They could include rangers, executives, or maintenance workers. Interviewing trail managers and trail guides can clarify the perspectives both of those maintaining the trails and of current trail users' experiences. For this reason, the team plans to interview between 4-8 trail guides and 4-8 trail managers with a list of core guiding questions (Appendix B), plus additional questions related to their specific occupation (Appendix C). The resulting semi-structured interviews cover topics including the interviewee's general thoughts about Sibiu as a hiking tourism destination, what a typical day on the trails involves, and their thoughts on trail conditions.

The collaborators will provide contact information of willing trail guides and trail managers to interview. The next step includes emailing the participants to inquire setting up an interview. The interview will take place over a video conferencing platform such as Zoom or Skype and will occur at a time convenient for the interviewee. At the start of the interview, the team will obtain verbal consent to record the session and use the interviewee's responses in their research.

3.1.3 Content Analysis of Online Resources

While the team schedules the interviews and waits for the survey results, they will conduct a content analysis of online resources in parallel. Online sources such as travel blogs, vlogs, and reviews will often contain information about a trail user's experience using the trails and would add a different perspective of the trail user experience in comparison to interviews and surveys. The team will search for information in relation to visitor experience along the trails

and in Sibiu County itself and anticipates that online blogs and reviews will contain information regarding accommodation hospitality, ability to use the trails, and positive or negative experiences with shops and restaurants. Videos will likely show footage of the trails including physical aspects such as obstacles, signage, and wildlife presence. During the first week of the project, the team will determine the exact websites, blogs, and videos for which they will conduct the content analysis. Two members of the team will conduct this analysis, and then they will analyze the information, alongside interview and survey data, as detailed in the next section.

3.1.4 Analyze Information Collected from Interviews, Surveys, and Content Analysis

After the team closes the survey, conducts the interviews, and performs the content analysis, the final step is data analysis. This step involves examining the responses as a whole and then creating cross-tabulations between demographic groups. From these responses, the expected topics are visitor experience while hiking or biking the Sibiu County trails and visitor experience in Sibiu County (off the trails). From these two topics, the team will break them down into positive and negative experiences. The team anticipates that positive experiences on the trails will include the ability to easily navigate the trails, the beautiful scenery, and the close proximity to nearby villages. Negative experiences may include poorly maintained trails, close encounters with wildlife, and not having enough information to properly plan the trip. For visitor experience in Sibiu County, the team expects that positive experiences will include relatively cheap pricing, friendly service, and available lodging. The team infers that negative experiences could include trouble communicating with business owners and visitors having difficulty locating shops to purchase certain commodities. Coding analysis will help the team identify what specific issues the collaborators can address in order to improve the overall trail user experience.

These topics and third level attributes are subject to change depending on the responses that the team receives.

3.2 Identify How Local Businesses Can Address the Needs of Trail Users

The second objective is to identify how local businesses can address the needs of trail users. A large issue in Sibiu's ecotourism industry is the lack of communication between the local businesses and trail users. This causes a discrepancy between what businesses currently provide and what trail users hope to find in Sibiu, leading to disappointed visitors and subpar sales (Mihai Dragomir, Personal Communication, February 9, 2021). By identifying the needs of the trail users, the team can provide businesses with information about trail users that will allow them to cater more effectively towards their customers.

3.2.1 Develop and Deliver a Trail User Profile

Using the coded and analyzed information from the interviews and surveys with visitors, trail guides, and trail managing companies explained in the previous objective, the team will construct a profile of the average trail user in Sibiu. The profile will include a summary of the third level attributes associated with the positive and negative experiences in Sibiu County from the coding analysis. The profile will help local businesses understand the type of people who use the trails, what they currently do well to meet their needs, and what they could change to accommodate visiting trail users better. In addition to a general summary, the profile will feature subcategories that will sort survey responses by demographics (e.g., gender, age, nationality) to address where needs differ. However, the profile's primary focus will remain on issues that span all age groups, countries of origin, and other demographics.

Once the team produces the profile, they will need to effectively relay it to local stakeholders. Using Google Translate, along with edits from the collaborators, the team will

develop the profile in both English and Romanian. Next, the collaborators will then use their networks to distribute the profile to businesses, local government, tourism organizations, and other interested parties.

3.3 Develop a Reporting System for Trail Users

The third objective is to develop a reporting system for trail users to inform trail managers of any maintenance issues that emerge. Some examples include inadequate or damaged signage, incidents with shepherds' dogs, or weather-related trail damage.

The envisioned reporting system is similar to the SEM system discussed in the background. With the SEM, the NPS gathered information on park management and visitors on a large scale. With this information, the NPS effectively assessed and addressed internal issues impacting visitor experience. Seeing their success, the team hopes to emulate the same results and accomplishments as the NPS for the Sibiu County trails.

3.3.1 Implementation of an Online Reporting Form and QR codes

To collect up-to-date trail information, the team will create an online form, either through Qualtrics, Google Forms, or a page implemented on the SCTA's website, for trail users to fill out and report any incidents or damage throughout their trip. The form will ask a series of questions to record an accurate depiction of the issue reported including date of the incident along with photos and a detailed description of the problem. To address the issue as quickly as possible, the trail managers need the report to provide an accurate location of the problem. The reporting form will ask the user to choose the trail they are on from a drop-down menu of options. To get more information on the report location, the form will also include a section that allows the user to share their current location using GPS technology on their mobile device. An additional section to manually type in a description of their location including GPS coordinates, prominent

landmarks, or any other location identifying factor is essential to include if the user is not willing to or has a device incapable of sharing their location. At the end of the form, the user will have the option to provide their name and phone number or email if the trail managers need to follow up with them for additional details.

To promote the availability of the reporting form and encourage trail users to utilize the resource, the team will encourage the collaborators to post QR codes at each major trailhead. Trail users can scan QR codes with their smartphone cameras. Once scanned, the QR code will redirect the user to the reporting form to have on hand throughout their time on the trails.

3.3.2 Researching European Hiking Apps

In the future, the collaborators look to promote the Sibiu County trails through a popular hiking app, in order to spread awareness and knowledge of their existence and obtain visitor reviews. The reporting system detailed in section 3.3.1 will allow trail managers to address small incidents and problems as they appear. However, this system does not return any overarching feedback about visitor experience that is valuable to make large improvements to visitor experience. Hiking apps such as AllTrails and Komoot provide general information about trails for the user to plan their trip, but also allow them to leave ratings, reviews, and pictures for other potential visitors to see. Partnering with one of these apps to expand the trail database to include Sibiu County will give trail managers access to any visitor reviews. Time permitting, the team will begin research on popular European hiking apps and compile a list of these apps to deliver to the collaborators as potential partners.

3.4 Propose a System to Track the Quantity and Movement of Trail Users

The fourth objective is to propose a counting system that can track the number of people that use the Sibiu trails each day. The proposal will include a review of successful counting

practices worldwide, guidance on how to adapt them to the Sibiu trails, a list of equipment required to implement the system, and an accompanying online platform for data analysis. The Sibiu trail managers have limited knowledge about how frequently people use the trails. A counting system will enable trail managers to analyze trends in trail usage, like seasonality patterns and if the number of trail users increases or decreases over time. Implementing a counting system allows the Sibiu County Tourism Association and Mioritics Association to recognize these trends and respond accordingly—such as increasing promotion, changing promotion strategies, or no change at all.

3.4.1 Research and Recommend Other Counting Practices

Since the project objective will result in a proposal for a counting system rather than a developed one, the proposal will rely on researching other counting systems for trails used worldwide. The initial iteration of the background covers two potential counting systems: acoustic sensor slabs and light beams. The proposal will consider more than these systems, so researching other methods will help develop better recommendations. The proposal requires continued research on how to adapt each system to the Sibiu region, since the trails vary in terrain ranging from plains to mountains. In addition, the system needs protection from wildlife such as bears and lynx, durability in the climate, and invisibility from visitors to prevent theft. The system also must have compatibility with an outside organization for data analysis. The proposal will include advantages and disadvantages of each system in the context of the collaborators' opinions and requirements. The team will present their findings to the collaborators, who will ultimately determine the best suited methods for the Sibiu County trails.

3.5 Gantt Chart

Figure 3.2 depicts a Gantt chart detailing the tasks the team will complete and the tasks each member will take the lead on throughout D-term. The tentative task completion timeline is shown to the right of the task list, in which green highlights indicate the tasks to work on and complete each week. Each green cell contains a checkbox for the team to record their progress and ensure they stay on track throughout the term. Certain tasks will not have priority over others, and the team will complete them based on availability of data and the time frame. The team will inform the collaborators of infeasible tasks. The collaborators indicated that they value each task, but it is not necessary to deliver all of them if time does not permit.

Task	Week 1 3/24-3/31	Week 2 3/31-4/7	Week 3 4/7-4/14	Week 4 4/14-4/21	Week 5 4/21-4/28	Week 6 4/28-5/5	Week 7 5/5-5/13
Send out surveys to trail users	<input type="checkbox"/>						
Contact trail managers	<input type="checkbox"/>						
Contact trail tour guides	<input type="checkbox"/>						
Observe trail user vlogs and blog posts	<input type="checkbox"/>	<input type="checkbox"/>					
Interview trail managers		<input type="checkbox"/>	<input type="checkbox"/>				
Interview trail tour guides		<input type="checkbox"/>	<input type="checkbox"/>				
Analyze interview/survey/observational study content		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Decide delivery method of trail user profile to businesses					<input type="checkbox"/>		
Create the trail user profile to deliver to businesses					<input type="checkbox"/>	<input type="checkbox"/>	
Research the different visitor counting methods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Decide which counting method is most viable for the trails			<input type="checkbox"/>				
Research on the decided counting method				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Develop a trail visitor feedback form to report damage			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Prepare and showcase final presentation						<input type="checkbox"/>	<input type="checkbox"/>
Adjust and add to written report	<input type="checkbox"/>						

Figure 3.2: Gantt Chart describing the anticipated timeline for each task

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Appendix A: Trail User Survey Questions

Note: The following screenshots from Qualtrics display every possible question asked in the survey. However, some questions are only shown depending on the participants responses. These conditional questions are explained within the screenshots below.



WPI

Q0.

Informed Consent Agreement for Participation in a Research Study

Investigators: Burnon Chen, Meredith Eddy, Edward Philippo, Marissa Thomas, Nicole Whipkey

Contact Information: gr-sibiu-d21@wpi.edu

Title of Research Study: Enhancing the Visitor Experience Along the Sibiu County Trails

Collaborator: Sibiu County Tourism Association and Mioritics Association

Introduction

You are being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits, risks or discomfort that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation.

Purpose of the study: To understand the needs of trail users in Sibiu County, how those needs are currently accommodated, and how that accommodation can be improved.

Procedures to be followed: The participant will answer the multiple choice and open response questions provided by the researchers. The expected time to complete the survey in full is under 20 minutes.

Risks to study participants: Participants are not obligated to answer all questions. If a question makes the participant uncomfortable, the participant may abstain from answering

Benefits to research participants and others: None

Alternative procedures or treatments available to potential research participants:

The surveys will be made available in English and Romanian, so participants can respond in the language of their choice.

Record keeping and confidentiality: All surveys will be administered through the platform qualtrics. Confidentiality will be maintained. The survey will gather information on opinions about the current state of the Sibiu trails and experience with others along the trails.

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Only the investigators will have access to the data, and they will be recorded and coded for common themes to compliment our research. Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or it's designee and, under certain circumstances, the Worcester Polytechnic Institute Institutional Review Board (WPI IRB) will be able to inspect and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you.

Compensation or treatment in the event of injury: There is no expected risk of injury or harm. You do not give up any of your legal rights by signing this statement.

For more information about this research, contact: gr-sibiu-d21@wpi.edu

For more information about the rights of research participants, contact: IRB manager, Ruth McKeogh at 508 831- 6699 or irb@wpi.edu

For information in the case of research-related injury, contact: Human Protection Administrator, Gabriel Johnson at 508-831-4989 or gjohnson@wpi.edu

Your participation in this research is voluntary. Your refusal to participate will not result in any penalty to you or any loss of benefits to which you may otherwise be entitled. You may decide to stop participating in the research at any time without penalty or loss of other benefits. The project investigators retain the right to cancel or postpone the experimental procedures at any time they see fit.

By signing below, you acknowledge that you have been informed about and consent to be a participant in the study described above. Make sure that your questions are answered to your satisfaction before signing. You are entitled to retain a copy of this consent agreement.



Q1. Please print your name

Q2. Enter today's date (mm/dd/yyyy)

Questions 0-3 are the only questions that require an answer as it is necessary to gain consent of the survey participants. All subsequent questions are optional.



WPI

Q3. What is your gender?

- Male
- Female
- Non-binary / third gender
- Prefer not to say

Q4. How old are you?

- 0-20
- 20-39
- 40-59
- 60+

Q5. What language(s) do you speak/read? (select all that apply)

- Romanian
- English
- Hungarian
- German
- Italian
- French
- Other

Q6. Do you currently live in Romania?

- Yes
- No



If the user answers 'yes' to question 6. Question 7 will appear, allowing them to specify their county of residence, and they will skip question 8 automatically.



Q7. What county in Romania do you live in?

If the user answers 'no' to question 6, they will be redirected to question 8 to identify their country of residence.



Q8. What country do you currently live in?

- Moldova
- Bulgaria
- Serbia
- Hungary
- Ukraine
- Poland
- Czech Republic
- Germany
- Other

Q9. Why did you come to Sibiu? (select all that apply)

- Hiking/biking
- Cultural experience
- Explore the city
- Other

Q10. Please rate your experience level in each of the following activities

	Rate your experience in the listed activities			
	No Experience	Limited Experience	Some Experience	Extensive Experience
Hiking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mountain Biking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Backpacking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>





Q11. How long ago did you visit the trails in Sibiu County?

- 0-6 months
- 6 months - 1 year
- 1-2 years
- 2-5 years
- 5+ years

Q12. What difficulties have you experienced on the trails? (select all that apply)

- Problems with maps/navigation
- Lack of signage/trail markings
- Poorly maintained trails
- Unsafe trail conditions
- Close encounters with wildlife (ex. bears)
- Close encounters with shepherds' dogs
- Other
- None



If the participant selects any of the options above, except 'None,' they will be prompted to answer question 13. If they select 'None,' they will automatically skip ahead to question 14.



Q13. Please briefly explain the difficulties you have encountered.

Q14. Overall, how satisfied have you been with your trail experiences in Sibiu?

	Extremely dissatisfied	Somewhat dissatisfied	Neither satisfied nor dissatisfied	Somewhat satisfied	Extremely satisfied
Trail user satisfaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>





Q15. Do you carry a mobile device (i.e. cell phones) while hiking/biking?

- Always
- Most of the time
- Sometimes
- Never
- I do not own a mobile device



If the participant selects 'Always,' 'Most of the time,' or 'Sometimes,' for question 15, they will be prompted to answer questions 16-18. Otherwise, they will automatically skip to question 20.



Q16. How often do you have internet access along the Sibiu County trails?

	Never	Rarely	Sometimes	Most of the time	Always
Internet access	<input type="radio"/>				

Q17. How would you rate the internet speed on the trails?

	Very slow	Slow	Moderate	Fast	Very fast
Internet speed	<input type="radio"/>				

Q18. Do you use any mobile applications before or during trips on the trails (planning, navigation, weather, etc.)?

- Always
- Most of the time
- Sometimes
- Never
- I do not own a mobile device.



If the participant selects ‘Always,’ ‘Most of the time,’ or ‘Sometimes,’ for question 18, they will be prompted to answer question 19. Otherwise, they will automatically skip to question 20.



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Q19. What services do you use before or during trips on the trails? (select all that apply)

- AllTrails
- Komoot
- Singletracks.com
- ViewRanger/Outdooractive
- Other



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Q20. What features of a hiking/biking-related mobile app would you find helpful? (select all that apply)

- Trail maps
- Trail information
- User reviews
- General problem reporting form
- Information on trail facilities (visitor centers, campsites, etc.)
- Information on nearby amenities (restaurants, lodging, etc.)
- Other
- None

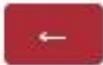




Q21. Have you ever encountered difficulties in Sibiu due to a language barrier?

Yes

No



If the participant selects 'Yes' for question 21, they will be prompted to answer question 22. Otherwise, they will skip to question 23.

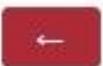


Q22. Please briefly explain your language barrier difficulties.

Q23. Have you stayed overnight in Sibiu County?

Yes

No



If the participant answers 'Yes' to question 23, they will be prompted to answer questions 24-27. Otherwise, they will automatically skip to question 28.



Q24. How easily could you find lodging?

	Extremely difficult	Somewhat difficult	Neither easy nor difficult	Somewhat easy	Extremely easy
Finding lodging	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q25. Did your lodging have all the accommodations/amenities you needed and expected?

- Yes
- No
- I don't remember

Q26. How would you rate the prices of lodging?

	Extremely cheap	Somewhat cheap	Neither cheap nor expensive	Somewhat expensive	Extremely expensive
Price of lodging	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q27. Did anything stand out about your experiences with lodgings?

Q28. Have you eaten at a restaurant in Sibiu County?

- Yes
- No



If the participant answers 'Yes' to question 28, they will be prompted to answer questions 29-31. Otherwise, they will automatically skip to question 32.



Q29. How easily could you find a place to eat?

	Extremely difficult	Somewhat difficult	Neither easy nor difficult	Somewhat easy	Extremely easy
Finding restaurants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q30. How would you rate the restaurant prices?

	Extremely cheap	Somewhat cheap	Neither cheap nor expensive	Somewhat expensive	Extremely expensive
Price of restaurants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q31. Did anything stand out about your experiences with restaurants?

Q32. Have you bought anything in Sibiu County?

- Yes
- No



If the participant answers 'Yes' to question 32, they will be prompted to answer questions 33-35. Otherwise, the survey will end.



Q33. How easy was it to find the products you were looking for?

	Extremely difficult	Somewhat difficult	Neither easy nor difficult	Somewhat easy	Extremely easy
Finding products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q34. How would you rate the price of products?

	Extremely cheap	Somewhat cheap	Neither cheap nor expensive	Somewhat expensive	Extremely expensive
Price of goods	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q35. Did anything stand out about your experience with merchants?





We thank you for your time spent taking this survey.
Your response has been recorded.

Appendix B: Core Interview Guide

This is the layout of an interview that would be conducted by two team members. It contains questions to ask all participants (both trail guides and trail managers).

One team member will be the primary person asking questions for a section of questions while the other will work off the answers of the interviewee to ask follow-up questions and let the conversation flow.

Introductions

Team member 1: Hello, my name is _____.

Team member 2: Hello, my name is _____.

Informed Consent

We are undergraduate students at WPI which is located in Worcester, Massachusetts in the United States. This interview is for a qualitative research project on promoting trails in Sibiu County and enhancing the trail user experience. Do you understand that your participation in this interview is voluntary and that you may freely refuse to answer any questions? Do you consent to the researchers recording this interview for future analysis?

Opening questions

Thanks for volunteering your time! We want start with some questions about your experiences in Sibiu and what your job is like.

1. How did you end up in the Sibiu area?
2. What do you enjoy most about working on the trails?
3. Have you worked in or visited other regions of Romania or Europe?
 - a. How does Sibiu compare to that region?
 - b. Are there any things that Sibiu does especially well or poorly?

Typical day

Now we want to discuss a little more in depth about a typical day on the trails.

4. What are your day-to-day responsibilities?
5. Which trails and attractions are the most popular and what makes them stand out?
6. How many people might you encounter while out on the trails?
7. When are the trails busiest in terms of seasons, part of the week, and time of day?

People that use the trails

We have some questions about the people that use the trails.

8. Are they usually local, or do they come from other countries?
 - a. What languages do they speak?

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9. What are some things that trail users typically like or dislike about their visits?
10. How long is an average trip (a few hours or several days)?
11. Do people tend to travel in groups or alone?
12. Is it common to hire a trail guide?

Trail conditions

Next, we are going to shift to talk more about the conditions of the trails.

13. What sort of problems do you typically encounter on wilderness trails?
14. Are the trail signs and markings effective in showing where the trails lead?
15. Do you have any major concerns with the trails?

Occupation-specific questions

We'd like to ask some questions specifically about your job as a [*trail manager/trail guide*].

- *See appendix C for occupation-specific questions*

Closing remarks

Thank you for your time and for your help with this project.

16. Is there anything else that you would like to say or anything that we didn't discuss that you would like to add?

Thank you again for your input! We will be sure to send you a copy of our final report.

Appendix C: Occupation-Specific Interview Questions

Interviewers should ask these questions as part of a larger interview. They are designed for specific audiences, so no one participant should hear every question.

Trail Managers

1. What are the biggest challenges to maintaining the trails?
2. How do you hear about problems along the trails?
3. Do you have any way for trail users to report problems they encounter?
4. Do you have an accurate count of how many people use the trails?
5. How might you benefit from a way to count the number of users on the trails?

Trail Guides

1. How long have you been giving tours?
2. How does someone book a tour with you?
3. Are there ways to communicate problems to trail managers?