

Article

Sustainability of Underground Heritage; The Example of the Military Galleries of the Petrovaradin Fortress in Novi Sad, Serbia

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Abstract: This paper focuses on the underground military galleries and countermine system of the Petrovaradin Fortress near Novi Sad (Serbia). The Petrovaradin Fortress was presented within the working group Underground Built Heritage Reuse and Valorisation Strategies on the COST action Underground4value as a good example of tourist valorised underground cultural heritage in Serbia. The goal of the paper is to consider as widely as possible the options that could contribute to the sustainability of these galleries. Numerous field observations, complex research of the literature as well as other available sources, and interviews with visitors to the fortress were necessary for this goal to be achieved. The paper has special historical and practical significance. On the one hand, it represents a record in time concerning the condition of the Petrovaradin Fortress. The practical significance is reflected in the scientific contribution based on the critical analysis of the results obtained from authorities on the Fortress and visitors, as well as the ideas that the authors conceived or adapted from similar sites in the world, assessing that these ideas can be applied to the Petrovaradin Fortress. The results of the paper explain the aspects of ecological, economic, and social sustainability of the Petrovaradin Fortress, and indicate the need for it to be supported by various institutions.

Keywords: Petrovaradin Fortress; underground military galleries; Novi Sad; Serbia



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1. Introduction

Underground Built Heritage (UBH) is a unique cultural resource, which might contribute to individual and collective identity, social cohesion, and inclusion [1]. As defined by the COST Action Underground4value, typologies of UBH sites include natural and anthropic caves, underground burial/rites structures, mines and quarries, other human-made caves for exploitation and dwelling, underground infrastructures (cisterns, ancient drainage systems, tunnels, etc.), and ancient buried structures and settlements [1].

Underground areas can be created naturally [2], but also by human activity. Since the beginning of time, humans have taken advantage of the benefits offered by the underground (constant temperature, protection from external influences, and privacy) [3–5]. Often, the significance of these human creations from the cultural, civilizational, or other aspects is recognized, and they receive the right to be considered heritage. Salvarani [6] states functional reasons for using underground spaces as shelters, houses, cemeteries, passages, galleries, and organized systems for daily life. However, they are also used symbolically, for rituals and memorial ceremonies. There are eminent symbolic features of

underground spaces, as well as their close bond with the cultural dimension and identity of a community.

It should be emphasized that the sustainability of a tourist destination represents its capability to keep the quality of its physical, social, and cultural environment while competing with its products on the market [7]. Bandarin and Van Oers [8] state that the heritage is used as a catalyst for transformation in urban redevelopments to mobilise the past in the present for today's needs as well as tomorrow's. According to Varriale [9], regeneration of Underground Built Heritage (UBH) for sustainable reuse is becoming increasingly popular, being the focus of several internationally funded projects. Vučković and Dajč [10] say that an appropriate officially allocated budget is necessary for more complex maintenance and preservation of cultural heritage. Users must be conscious, aware, and responsible. This can be achieved through education, cooperation, and by encouraging affiliation with the community and the urban area.

There are numerous examples of the ways by which the sustainability of an underground facility is attained. Old, abandoned mines are given a role in tourism [11,12]. They are often so fascinating that they are referred to as underground architecture [13]. Most often, underground spaces are related to wine production and storage [14]. The problem of sustainability of the underground built heritage of the Petrovaradin Fortress is that a system is yet to be established that simultaneously: controls and supervises the use and maintenance; ensures unreserved cooperation between all responsible institutions; and provides stable funding and intensively promotes spatial opportunities.

This paper briefly presents the basic facts related to the Petrovaradin Fortress, and then provides data related to military underground galleries and countermine system, presents a critical overview of the current situation using SWOT analysis, and then discusses the possibilities of environmental, economic, and socio-cultural sustainability.

2. The Underground Military Galleries of the Petrovaradin Fortress

2.1. Geographical Position

Novi Sad is located in the northern part of the Republic of Serbia and in the south-eastern part of the Pannonian Plain. The area of the city is characterized by plain relief with an elevation from 80 to 86 m, and its climate is free from orographic lifts. The Danube River flows by the southern and southeastern edge of the city urban area [15]. Construction began at the end of 17th century, coinciding with the works on the Petrovaradin Fortress on the right side of the Danube [16]. According to the census from 2011, there are 277,522 inhabitants in the city, which makes it the second-largest city in the Republic of Serbia [17]. Today, Novi Sad is a university city, and the economic, commercial, and cultural centre of Vojvodina, a city full of events and the venue of one of the most famous European music festivals, EXIT. Novi Sad was declared the European Capital of Culture in 2022 by The Council of Ministers of the European Union [18,19].

The biggest potential tourist attraction of the city, the Petrovaradin Fortress, is located on the opposite bank of the Danube River (Figure 1 GeoPosition). It is an impressive example of the traditional European style of fortification planning and construction that was dominant in the 17th and 18th centuries, and was developed under the strong influence of the French, Italian, and Flemish schools of military architecture [20]. There are more than 16 km of underground military galleries with various functions in the fortress [21].

2.2. About The Petrovaradin Fortress

The base of the Petrovaradin Fortress is diorite rock which, when observed from the Danube side, gives the fortress a specific and magnificent appearance [22]. Čičulić-Trifunović and Rakić [23] say that the fortress was built on serpentinite. However, Djogo et al. [24] talk about the presence of the diabase, magmatic formation from the Triassic–Jurassic age, and Pliocene sandy–clayey–marl deposits. Marković et al. [25] state that some Quaternary loess deposits are present in the uppermost layers of the sedimentary sequence. According to Đorđević et al. [26], metamorphic serpentinites are usually severely cracked and

intersected by veins of chrysotile, asbestos, and other secondary materials. They are very crushed and broken. Diabase is a volcanic rock. It is more resistant than serpentinite. Djogo et al. [24], were evaluating the engineering geological conditions for constructing a bridge and a tunnel in the zone of the old Petrovaradin Fortress. They concluded that various sub-surface structures (galleries, corridors, and vertical shafts) are not in the zone which would be affected by settlement of the rocks over the tunnel. A detailed study of geo hazards on the Fruška Gora Mountain made by Mészáros [27], did not mark the Petrovaradin Fortress as an erosion vulnerable location. Finally, Marković et al. [25], concluded that the relative environmental stability identified in the investigated area during the last glacial period is also likely a key factor in human occupation. Erosional destruction of the bank of the Danube River is not one of the potential long-term threats to the fortress. Therefore, the anti-erosion protection of the riverbank under the walls of the fortress is not in reconsideration.



Figure 1. Geographic position of the Petrovaradin Fortress in Serbia. Source: Google Earth; <https://d-maps.com/> (accessed on 14 August 2021).

According to Google Earth [28] the highest elevations of the Petrovaradin Fortress are at 115 m AMSL, which means that 37 m of relative height rises over the Danube, which is located at 78 m AMSL. The profile of the direction east (the main road through Petrovaradin)–west (bank of the Danube) is up to 600 m long. On this stretch, it reaches a maximum slope of 32.2% over the Danube. In the direction northwest (bank of the Danube next to the roundabout near the railway bridge)–southeast (at the crossroads near the cemetery in Petrovaradin), the complex of the Petrovaradin Fortress stretches for 1.8 km.

During archaeological excavations in the early 2000s, numerous and previously invisible layers of the Petrovaradin Fortress' heritage were discovered [29,30]. This is the 6th Fortress in a row. The first Fortress was in prehistory, 3000 years before Christ, the second was a Celtic fortress, the third was a Roman fortress, followed by a Hungarian Fortress, an Ottoman Fortress, and finally the current Austrian one [31–34].

The cornerstone of today's fortress was laid after the demolition of medieval and Turkish buildings in 1692. It was in the southern part of the upper fortress, which was ordered to be built by Habsburg Emperor Leopold I [35]. The Austrians borrowed the conceptual design from the French military architect Marquis Sebastian Vauban (1633–1707), who was one of the leading fortress builders of 17th and 18th centuries. He designed large forts with underground galleries, built 33 completely new fortresses, and reconstructed over 300 [36,37]. The century-long construction of the Petrovaradin Fortress took place during the reigns of the Austrian rulers: Leopold I, Joseph I, Charles VI, Maria Theresa, and Joseph II [38]. Due to the rapid development of firearms at that time, the importance of the fortified underground began to grow. When the construction was completed, the fortress covered an area of 112 ha, with a garrison numbering 4000 people armed with 400 canons, and with gunpowder warehouses of 20 t capacity. At the beginning of the 19th century, it was the strongest and best-equipped fortress in the Austrian Empire [39].

While the four spatial-urban units have their purposes clearly defined by geographical and morphological features, the Upper Fortress was the core of defence. These enclosed buildings served for production and storage of food and weaponry, and accommodation of officers and soldiers. It covers 0.10 km square. The Hornwork was a two-horned bastion with established outer forts and countermine system (a system of underground tunnels that would enable defenders to reach beneath attackers' miners and blow them up). There were barracks and guard houses, artillery sheds and horse stables. Most of the underground military galleries' tunnels are located just below this southern part of the Petrovaradin Fortress.

The Wasserstadt is a system of ravelins, detached triangular fortifications. It was filled with water and mud. It served for defence from the riverside. With the Lower Town, it constituted the Lower Fort, which had four gates. The Lower Town was an urban settlement inside the city walls. It was the military, command, administration, and civilian centre. It had punitive, transit, trade, craftsmanship, and service functions. Civilians, fortress commanders, officers, soldiers, prisoners, and clerks of the military and civil administration lived and worked together in it [10]. The Lower Town covers 0.11 km². Milković [35] separates the island fortress—the Inzel trench and the Mostobran Brick trench on the opposite bank of the Danube—into two units. With certain interruptions, the construction of the fortress was completed in 1780.

The management of the Petrovaradin Fortress, since the demilitarisation of the Fortress in 1951, has always been under the responsibility of the local authorities [40]. To deal with all issues related to the management of the Fortress, the City of Novi Sad established the public company 'Petrovaradin Fortress', which existed only from 1992 until 1993 [37]. Today, the Petrovaradin Fortress houses the Academy of Arts, The City Museum of Novi Sad, Historical Archives, Equestrian club, Shooting club, the luxury hotel 'Leopold I', and several restaurants with panoramic views of Novi Sad. Moreover, there are numerous ateliers of renowned artists of Novi Sad who are always willing to present their works of art to visitors [22]. According to Tomka and Kisić [41] the Fortress is characterised by multiculturalism and is moulded by a mix of religious, civic, artistic, governmental, military, and business actors and their social relations. Jovanović [42] said that the Fortress never lacked plans, visions, and program ideas; implementation was problematic—everyone failed in realization. Krsmanović et al. [43] state that as there is no formally appointed manager of the Petrovaradin Fortress, no stakeholder considers themselves as the main one responsible, and all feel the lack of information and vision.

2.3. Past of Underground Military Galleries

A complex system of underground mine galleries with listening tunnels was built between 1768 and 1776 to the design of Major Schroeder. It increased the fortress's defensive strength and strategic importance [44]. Four floors with a difference of about 6 m and about 27 levels can be clearly observed. According to Espresso [45] 43 levels, over 8 floors, and 4 lines of defence are mentioned. Underground military galleries were created in two ways:

by tunnelling or bricklaying, after which the earth was applied. Forty million bricks were used in the construction of the underground structures. It is believed that it was dug by hand, about 4 m a day, and that the earth was extracted from the areas where they would later build ventilation shafts. Three thousand ventilation openings were counted; they meet over rifle embrasures and artillery ports and serve to release smoke. They are built with hot lime, sand, and brick, which excluded the presence of moisture. The ceilings are in the shape of arches and domes to make it easier to bear the weight of the earth under which they are located. Niches or extensions in the narrow underground passages were used for the absorption of light and sound due to the porous walls of brick and mortar, and for passing. They were lined with brick. Their arrangement was a barrier that directed the activities of the mine, i.e., the explosions (drywall—without plaster). Mine corridors are without masonry work. The floor, paved with bricks, is made of compacted earth allowing water drainage. The air is heavier in the great labyrinth. The “devil’s pentagon”, the middle pentagon on the third level, one of the deepest parts, has no direct exit, so there is no draft [46]. The Hornwork trenches are the widest and deepest. It has been determined that Hornwork also had a designed fire protection system.

It is assumed that the light was rarely used, as it would give away the position of a soldier. Daylight only passes through the rifle embrasures (Figure 2). A length of 16 km has been officially measured, but it is assumed that there is more. When the number of rifle embrasures is multiplied by the 1 m distance between them, added to the fact that there is an underground that is buried and has no direct contact with the surface, thus containing no rifle embrasures, then this assumption is confirmed.



Figure 2. The several hundred metre-long main defence line. The daylight only passed through the embrasures. Source: Milka Bubalo Živković, April 2021.

Two war wells were built within the underground area. The larger one is located near ‘Topovnjača’. It is 4 m in diameter and 60 m deep. It is popularly called the ‘Roman Well’. The well of Emperor Joseph II is smaller (Figure 3a Plaque next to the well). It is located in

the deep underground of the Hornwork. It is 2 m wide and 39 m deep. It is also known as the imperial or 'Kaiser well' [46].

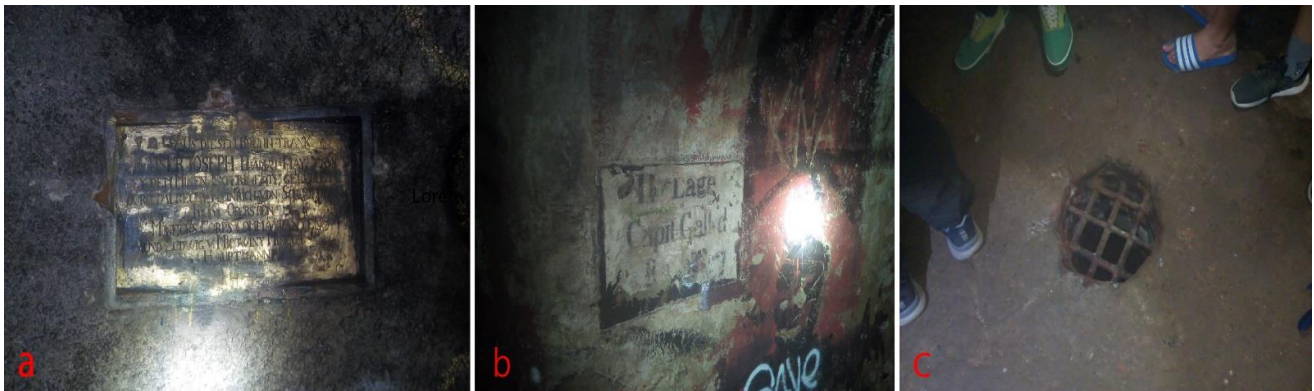


Figure 3. (a) Next to the well; (b) Table for orientation; and (c) Ventilation; Source: Tamara Lukić, August 2021.

The fortress was intended for warfare with cold weapons (bayonets and spears) and firearms. In the underground military galleries, installations of minefields were planned, as well as rooms for soldiers, weapons, and 12,000 rifle embrasures. It is estimated that in emergency conditions, the underground military galleries can provide accommodation for over 30,000 people [46].

In the available sources, there is no confirmation of any alternative use of the underground, apart from the military use (countermine galleries). During the Kingdom of Yugoslavia, ammunition, gunpowder, and gasoline were stored in underground military galleries, as evidenced by the markings that can be seen on their walls.

Terek [47] writes that, in the past, corridors were also used as prison cells and weapon workshops. Documents were archived in them. Some served as stables. Additionally, in some, pagan rituals have been performed.

According to Savin [48], of the total length, only one kilometre is arranged and accessible to visitors. It was renovated in 1993 and 1994. School excursions accounted for 90% of visits to these military galleries. As architect Jovanović [42] noted, at the beginning of the new millennium the Fortress was 'a decrepit patient of one hundred and one diseases' which needed rehabilitation, revitalization, and care.

2.4. Current State of Underground Military Galleries

It was concluded by field observations that the underground military galleries were not under control, except for the 1 km occupied by the exhibition of the Museum of the City of Novi Sad. This means that anyone can enter them and bring anything in. According to Milković [49] there are other archaeological remains in the underground. Some of them are brought in. The fact that the underground is not finished can be seen in the unbuilt corridors, 'earthen tunnels', short 'blind' corridors that are narrower and lower, etc. Borocki [50] notes that, after the Second World War and incidents of children becoming lost in the underground, the army closed many corridors with reinforced concrete and turned a logical system into a labyrinth.

The underground is specifically isolated from radio waves, external noise, and light. Remote from electromagnetic radiation, even mobile phones do not receive a signal. Built-in metals that interfere with electronic devices were found in some walls. This fact makes it difficult to find those who get lost in it. Debuyst et al. [51] note that the orientation signs, painted arrows coded by numbers, were incomprehensible to the layman. Authentic old markings, as in Paris' arrondissement quarters, were also discovered. The underground military galleries have an orientation system. Roman numerals indicate the level of the countermine system (Figure 3b Table for orientation). The ordinal number of the corridor is written in Arabic numerals. Some complexes bore the names of Habsburg rulers. The originally placed markings indicated the type, purpose, and level of the gallery corridor.

Milković [46] discovered the regularity of intersections in the 1960s, which reduces the danger of losing orientation. Therefore, the correct interpretation still makes them useful today. Šeguljev [52] writes that, over time, other signposts appeared, for example boards from 1905 in colours (green, red, blue, and black), metal, plaster, and concrete [53]. For decades, visitors to the underworld have left various marks on its walls in an attempt to move through it without the help of a guide service. That is why today the walls of the underground often look ugly, untidy, and streaked, i.e., its ambient values are disturbed (Figure 4a Devastated walls).



Figure 4. (a) Devastated walls; (b) Inner embrasures; (c) Bat; and (d) Holes in the floor. Source: Tamara Lukić (a,b,d) and Tatjana Pivac (c), August 2021.

The underground is extensively devastated, neglected, and abandoned. It is exposed to usurpation and illegal use by individuals and self-organized groups, contrary to procedures and the law [10]. The presence of vandals, criminals, drug addicts, the homeless, and self-proclaimed guides [54] is noticeable.

In the last 70 years, the inhabitants of Petrovaradin have used a large part of the bricks from the floors to build gardens, houses, and garages. Borocki [50] writes that some users of the fortress released sewage into the countermine system and thus filled certain corridors with faces. Some tunnels were buried due to landslides on the nearby locality, Trandžament; road construction; or deliberate alterations.

According to popular belief, Jews hid their valuables in the corridors of the Fortress before the Second World War, so in the middle of the 20th century there was an invasion of those who were looking for hidden gold and secret passages, who took bricks out of niches and scattered them in tunnels. The NGO 'Urban Guerrilla Warriors from the Underground' (UGRIP) deals with restoring the underground to its original state. By restoring the original condition, paving the tunnels, opening the ventilation systems, rifle embrasures and artillery ports (Figure 3c Ventilation; Figure 4b Inner rifle embrasures), unclogging and letting the water out of the corridors, large parts of the corridors were drained, and the landslide calmed down. Therefore, there are opinions that the countermine system should be brought under control as soon as possible. According to Borocki [55], UGRIP removes waste, soil, and plant roots (Figure 5a Plant roots) that collapse corridors. They clean the ventilation and work on the rehabilitation and reclamation of the entire system, which has been neglected for centuries. Obradović [56] writes that in about 300 actions, they took out 250 tons of garbage in 25 months, without the help of the institutions that have jurisdiction over the fortress. According to Guzijan [57], it was taken for recycling. Of the approximately 10,000 niches, 1500 have been restored to their original condition. The members of this association come from different professions, and everyone in their field of expertise contributes to the study and better understanding of the underground military galleries.

For years, there has been controversy about the existence of underground connections, tunnels which lead from the Fortress in different directions [58]. A detailed overview of the understanding and written sources on this topic is given by Daljev [59]. UGRIP activists found closed tunnels that could be connected to the Petrovaradin Fortress in

nearby settlements, such as Sremski Karlovci, Sremska Kamenica, and Ledinci. They think that, with the help of competent institutions and serious machinery, they could be cleaned. The theory that there are tunnels under the Danube leading to Novi Sad was confirmed. One was used as a pumping station for the water supply of the Fortress, and the other served to deliver sewage downstream.



Figure 5. (a) Plant roots; (b) Insect; (c) Condensed water and snowdrop in August; and (d) Mushroom; Source: Tamara Lukić, August 2021.

Vučković and Dajč [10] note that Water Town has been under the jurisdiction of the military for almost 300 years. That is why the research of those parts is ‘on hold’. For a while, an amusement park and even a zoo existed in the Hornwork. Borocki [50] writes that there was an island fortress near the beach ‘Oficirac’ which, in the first half of the 19th century, during great floods and earthquakes, sank in perfect condition some 15 m. It is impossible to drain that part of the Danube and raise the fortress, but it is possible to build an identical replica of the building.

The articles of Zemoglyadchuk [60] and Khenzykhenova et al. [61] show that the fauna of the underground military galleries of the Petrovaradin Fortress can be interesting for zoologists and similar experts. Mosquitoes, wingless flies, bats, foxes, badgers, martens, moles, cats, etc. were seen in the underground (Figure 4c Bat; Figure 5b Insect).

Pajvančić Cizelj et al. [29] note that many existing narratives of experts are limited to the institutions where they work, only partially available to the other experts through professional literature, and are thus ‘invisible’ to the public. That is why the possibility of communicating expert knowledge to the unsupportive wider public is an important one.

2.5. Tours of Underground Military Galleries

Today, the underground military galleries can be visited in several ways, with more guides. The City Museum of Novi Sad maintains one segment of the underground fortress space, which has been turned into a tourist attraction (Figure 6a CMNS). About a kilometre of underground military galleries is located within the exhibition of The City Museum of Novi Sad. According to Jokić [62], the main communication corridor, the main communication galleries (Figure 6b), and the battle line are presented. The defence installations are indicated: rifle embrasures, artillery ports, mine and counter-mine galleries up to the third level, gunpowder warehouses, horizontal and vertical auxiliary roads, ventilation openings, and auxiliary entrances. Within the counterguard, there are seven rooms for soldiers to rest and conduct manoeuvre exercises, and an expanded combat gallery (caponier with a whole series of rifle embrasures and reinforced with three artillery ports). It is the communication between the counterguard and the ravelin.



Figure 6. The City Museum of Novi Sad; (a) Illustrated map; (b) The main communication galleries; and (c) Elevator; Source: Jovana Miljković, April 2021.

The ravelin is the object that protects the Emperor Leopold 1 gate. At the top of the ravelin is a communication junction with a two-story elevation. You can see a wall, an obstacle, with internal rifle embrasures. In the second caponier, which is reached by a staircase, there are two large fireplaces in which food was made and a fire was kept. In the niches, there are panels with illustrations of the uniforms of soldiers of the Habsburg monarchy. Then, the Contragard of St. Innocent's Bastion with rifle embrasures is shown. At the end is one side hallway, flanked, for side fire. There are statues with four soldiers in a shooting combat position, in uniforms from the second half of the 18th century. At the top of the bastion is an elevator that descends three levels underground (Figure 6c Elevator). Next to the elevator, at the top of the counter guard, there is a communication junction with two corridors. Through the corridor of the counter-escarpment wall, you exit the underground route and enter the trench space in front of St. Innocent's bastion.

This space has been visited by more than 600,000 visitors in the last decade (Figure 7). According to Jokić [62], interest is declining, which indicates alternative ways in which the underground can be visited and that The City Museum of Novi Sad must enrich its tourist offer.

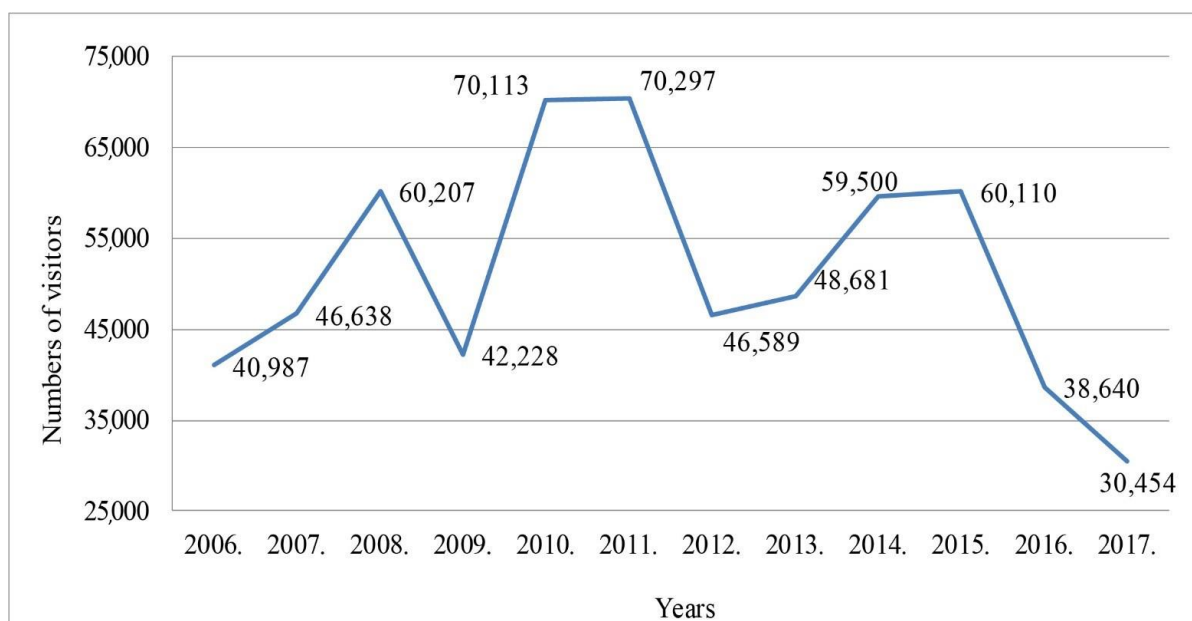


Figure 7. The movement of the number of visitors to The City Museum of Novi Sad between 2006 and 2017; Source: The City Museum of Novi Sad (2018).

UGRIP offers tours of underground military galleries. In the form of about twenty routes, little-known stories and parts are provided to the curious. Guides ensure that no one gets lost or enters the maze. They are also in charge of safety and first aid [50]. Matić et al. [63] wrote that it would be desirable for each route to have a name, slogan, price, and a description of the length and attractiveness it includes. Each should have a logo, as well. Such a comprehensive approach would indicate that thematic cultural routes are perceived as a serious tourist product. According to Savić [64], the project called ‘Creative Workshops’, which includes touring the underground of the Petrovaradin Fortress, was declared a top destination by Trip Advisor, the largest tourist site in the world. The members of the association ‘3D World’ hosted and guided over 50 thousand people. Still, Garača [65] wrote that the underground military galleries of the Upper Fortress cover 1800 m square and are only partially accessible to tourists. They could be made a unique first-class activity if tourists are enabled, with the help of contemporary technology, to enjoy different 3D animation programs depicting life from the period of Prehistory, Roman Empire, Ottoman conquest, Austro-Hungarian rule. Savić [64] states that the project of building a virtual fortress, above ground and underground, in 3D is in the final phase—mapping the system, photographing, and linking virtual tours.

2.6. Theoretical Background

The analysis of the condition of the underground military galleries represents an indisputable record of this historical moment. There is a huge gap between their potential and their actual use. In addition, the underground military galleries are only sporadically mentioned in scientific literature. That is why the need for this work arose. The paper aims to explain the basic thesis that such underground military galleries are realistically sustainable. These arguments can also be an inspiration for launching various entrepreneurial initiatives.

In order to protect and save cultural heritage for future generations, the concept of sustainability should be applied to the management of monuments and historical sites, having in mind that the preservation of heritage is included in the UNESCO Sustainable Development Goals [66]. The Fortress was proclaimed a cultural monument in 1948. It is categorized as immovable cultural heritage of great importance in 1991 [67]. The Petrovaradin Fortress is not yet under the protection of UNESCO, and this manuscript, by emphasizing the value of the Underground Military Galleries, which are the largest portion, hopes to contribute to bringing it under the protection of UNESCO as soon as possible.

According to Pajvančić Cizelj et al. [29] the importance of the Fortress and its surroundings are not adequately represented in public, which makes them invisible and unused. By interviewing tourists, Matić et al. [63] concluded that the biggest shortcomings are poor tourist offer and poor tourist presentation. Apart from the EXIT festival, there are almost no other events. It is said that, in future, it would be necessary for the appropriate criteria to be met and some changes should be made, i.e., adapting the existing infrastructure and building new for safety and entertainment.

The social impact of the transformation of spaces within the fortress is evident when they are re-used as destinations for socializing in a historic environment. Çalişkan et al. [68] see the need that people from different professions, including social scientists, artists, historians, archaeologists, and landscape and urban designers, should be involved in the process of transformation.

The underground military corridors are the most famous attractions, in addition to the clock on the tower and its history [69]. This unique system, more than 16 km long, had planned installations of minefields, rooms for storing weapons, quarters for soldiers, and a series of rifle embrasures [70]. At the end of the 20th century, Savin [48] noticed that the disintegration of the Socialist Federal Republic of Yugoslavia (SFRY) and sanctions reduced visits, but also that they would have been higher if there had been, for example, a direct bus line connecting the Fortress with the city. For the last 50 years, there have been ideas about a cable railway that would connect the Novi Sad Quay and the Petrovaradin Fortress [71,72] but nothing has been achieved on that issue to date.

Although Debuyst et al. [51] warn that there is a danger of losing the terrain to an urban quality due to excessive interventions and planning, a situation in which nothing would change is de facto unsustainable. Recent approaches advocate for the adaptation of military heritage to modern needs [73], even housing [74], and the introduction of new uses, which can help diversify and attract different types of activities and audiences.

Šeguljev [75] talks about the attempts to protect, arrange, and revitalize the Fortress during the second half of the 20th century. According to Kisić and Tomka [41], the existing management structure of the Fortress is dispersed. Diverse local authorities, public companies, and institutions of the City of Novi Sad have some level of jurisdiction. None of them has explicit and clear statutory responsibilities which specify concretely how they should work together when it comes to the Fortress. They do not meet, do not communicate regularly, and do not coordinate their annual plans, activities, and budgets related to the Fortress.

It is important to note that a distinction should be made between catacombs and underground military galleries. The only catacombs, i.e., tombs (a crypt with 109 graves), in Novi Sad are located in the Lower Town of the Petrovaradin Fortress, below the church of St. George in Petrovaradin, which is written about by Đukanović [76].

3. Methods

The analysis of the sustainability of the underground military galleries of the Petrovaradin Fortress is based on field observations of the site. Google Earth software was used, and the literature was consulted. The communication with the foremost experts of the Petrovaradin Fortress, its guides, was of invaluable significance. Among them, the members of UGRIP, who are volunteers, enthusiasts, and experts in everything that exists in underground military galleries, stand out. Based on the above, a SWOT analysis was performed.

By performing a field observation of the site and comparing it to similar examples in the world in which sustainable development has been achieved, constructive ideas have been developed, the applicability of which is realistic with minimal investment. Visitors to the Fortress, who were interviewed during June 2021, contributed to the ideas of sustainability. According to Sapu [77] and Cvetković et al. [40] interviews and focus groups are highly beneficial for gathering detailed information about people's values, beliefs, anxieties, and opinions, and for finding out how a 'group' or perhaps a community feels about a particular issue. Respondents had to answer three questions related to socio-demographic characteristics, and three questions based on which the SWOT analysis and proposals for the sustainability of the Fortress were formed. The respondents' conversations were recorded on mobile phone, and the most useful and expedient answers were selected during the desk research. The first question, regarding whether the respondents visited the underground military galleries, was answered by exactly 500 respondents. Only those who answered in the affirmative were asked the other two questions. There were 104, a fifth, or 20.8% of them. The majority of respondents were women (72.8%), aged between 20 and 29 years (43.7%), university-educated (29%) (Table 1). The most constructive answers are given in the paper.

The other two questions were:

What are the strengths and opportunities of the underground military galleries?

What do you consider to be the weaknesses and what threats do you notice in the underground military galleries?

Numerous pieces of literature were consulted, but the most comprehensive, one that refers exclusively to underground military galleries, is older than 15 years. By considering all written sources, as well as the answers of the respondents, the authors performed a SWOT analysis.

Table 1. Socio-economic structure of respondents.

	Number	Percent
Gender		
Male	48	46.2
Female	56	53.8
Age		
20–29	42	43.7
30–39	36	37.4
40–49	26	18.9
Education		
Primary school	2	1.9
High school	48	46.2
Faculty	54	51.9
Total	104	100

Source: Authors' findings.

4. Results

The SWOT analysis is conceived as a set of the most interesting suggestions, proposals and ideas that can be found in scientific papers or obtained by surveying the visitors to the Petrovaradin Fortress (Table 2).

Table 2. SWOT analysis underground military galleries of the Petrovaradin fortress.

<p>Strengths</p> <ul style="list-style-type: none"> - Geographical position; - Physical preservation; - Microclimate; - Useful for education; - Internationally recognized; - Volunteer support; - Proven place to survive; - Great inspiration for legends and myths. 	<p>Weaknesses</p> <ul style="list-style-type: none"> - Not enough signposts; - Insufficient facilities for the reception of tourists; - Questionable security; - Lack of toilet facilities; - It is disturbed by nature and man; - Both everyone's and nobody's.
<p>Opportunities</p> <ul style="list-style-type: none"> - Adrenaline lovers; - Support from people who understand it; - By facilitating movement, it is possible for all potentially interested visitors; - The size of the space allows different forms of tourist movement at the same time; - Presence of other visitors; - Pedagogic aspects; - Inexperience as a challenge to scientists of different interests - Virtual tours; - Entrepreneurship in the exploitation of gallery mysteries; - Discipline in managing funds collected on various bases. 	<p>Threats</p> <ul style="list-style-type: none"> - Disorganized management permanently damages the site; - Passionate adventurers; - 'Underground roulette'; - Collapse of some micro-locations; - Uncontrolled devastation; - Security that is violated by malice.

Source: Authors' findings.

4.1. Strengths

A good geographical position means that it is located on the banks of the European river Danube, where ships with tourists from all over the world cruise for most of the year and dock in the port of Novi Sad, a city with about 300,000 inhabitants. According to Dragin et al. [78] at the foot of the fortress, over 50,000 foreign tourists pass on ships alone. According to Gunjić and Samardžić [79], Novi Sad recorded 75,837 domestic and 138,484 foreign tourists in 2018, all of them potential visitors to the underground military galleries.

Considering that they are located within the magnificent Petrovaradin Fortress, the underground corridors are largely well preserved. It is possible to arrange them on the

model of other similar examples in the world, such as the quarried limestone galleries in the Saumur region of the Loire valley [80] or Petra in Jordan [81]. According to Aničić [82], no corridor has caved in for over 300 years, except where the humans deliberately caused it.

The microclimate of the underground is constant throughout the year. The temperature in winter in some parts reaches 21 °C, and in summer it ranges between 12–14 °C [82]. That is why it is pleasant during hot days and very attractive for those who are looking for healthy and interesting ways of cooling down.

The value and significance of the underground military galleries of the Petrovaradin Fortress are internationally recognized. Gunjić and Samardžić [79], researching the opinions of visitors on Trip Advisor, mention the recommendation to visit the underground tunnels.

Support in its cleaning, study, and respect comes from volunteers from Ireland, Croatia, France, Japan, and Germany. Cvetković et al. [40] said that volunteering is very important in raising awareness about the significance of heritage. Volunteers can play an important role as a 'bridge' between heritage organizations and the rest of the community. Krsmanović et al. [43] say that the mobilization of local community volunteers is considered essential to supporting the organization and helping it achieve its goals. Depending on the interests, style, and knowledge of UGRIP volunteers, everyone gets their task. The association is becoming popular in a quality way. Parents bring their children for pedagogical reasons. Working with youth communities could help ensure continuity and make the cultural products more diverse. Including the voices of young citizens in the official interpretation would also encourage intergenerational dialogue [83]. According to Guzijan [57] each action has its own name and tasks are known in advance. The rubble and garbage was brought in by hoarders, artists, researchers, the army, and it was removed by thousands of volunteers. One respondent said: 'It is not about coming to the fortress and drinking coffee, it is about helping it'.

The underground military galleries of the Petrovaradin Fortress were a place for hiding and survival during the war. Condensed water on the ceilings is good for drinking (Figure 5c Condensed water and snowdrop in August). There is food collected by, for example, badgers (walnuts, almonds). 'The roots of the plants from the surface disturb the corridors, but it served the lost individuals until someone found them'. In addition to the roots, the upper parts of plants, such as mushrooms or snowdrops, are also found sporadically. (Figure 5c,d Mushroom and Figure Condensed water and snowdrop in August). They are attractive to nature lovers.

Gajić et al. [83] say that many tunnels can become a source of inspiration for various in situ installations. For lovers of the past, they are a great place to explain the specific forms of warfare that were used during the 18th and 19th centuries in fortifications.

Respondents see the power of the underworld in the fact that little is known about it, little is written, and many mysteries and legends are told: 'The underworld has its stories. That can be charged well'. It revitalizes and inspires some respondents: 'I reset in its silence, it inspires me and I always come back from it with constructive inspiration'. Some just feel good: 'Those are miles of good energy. Of course, when you are in 'safe hands' and good company'. Others are fascinated by the architectural point of view: 'I was there once and I'm amazed at the expanse that isn't even hinted at from the surface. It had to be designed, excavated, and arranged. Simply put—fascinating'. Some see its importance as a way to encourage diversity: 'I see in it a model that calls for cooperation between professions, between generations, between different people'.

4.2. Weaknesses

The most valuable statements about weaknesses were obtained from the respondents. They note that 'information in the city, around the fortress, and the marketing on the topic of underground military galleries is poorly transparent and modest, inconspicuous'. 'Information boards leading to galleries are missing'. They would also serve for promotion and marketing: 'Lack of information for tourists, the absence of tourist signage, the fact

that gates and attractions of the Fortress are not marked, and the lack of info centers where tourists can inquire or take maps and brochures’.

Some of them criticized accessibility: ‘Access to the galleries for those of us who find it harder to walk up the slopes and stairs is only possible by taxi. It would be good to install a cable car’. Movements are also hampered by unforeseen obstacles. Volunteers try to remove them as much as possible; thus, one of the guides tells how ‘in the underground military galleries there are various traps such as hooks, hidden holes, hills formed from soil, classic animal traps, etc.’ (Figure 4d Holes in the floor). In order to avoid inconveniences, the guide and the visitors should be concentrated at all times. Some visitors saw it as ‘a challenge with no room for a second of boredom’.

Above-ground vegetation with its roots and atmospheric water flowing through tunnels disrupt the statics of corridors [84]; ‘It can cause fear in visitors’. However, a much bigger weakness is that ‘the underground military galleries are very lacking in sanitary blocks’. Visitors expect a minimum of comfort. In addition, it happens that unscrupulous visitors, in an emergency, pollute the galleries. This may have multiple negative effects on the site, both from an ecological and a hygienic point of view. Many respondents concluded that ‘there can be no sustainability without an urgent solution to the problem of sanitary blocks’.

The lack of financial resources for the implementation of all entrepreneurial ideas is also recognized in the decades-long appeals of Milković [85], a man who has dedicated a significant part of his working life to the study of the underground of the Petrovaradin Fortress. Cvetković et al. [40] say that the problems are deepened by insufficient communication, incoherent vision, and ignorance towards the needs of others. In addition, the tendency to arrange agreements surreptitiously regarding the uses of the space operates as an obstruction to the regulated function of the Fortress. According to Borocki [55], 16 official institutions deal with the Fortress, and 500 people receive salaries on that basis. Dontcona and Zanini [86] say that management procedures are non-transparent, and there is not enough communication between stakeholders. Many of the current problems are caused by the lack of a sense of ownership and responsibility among the main stakeholders, as well as the lack of clear guidelines to follow.

‘Poor presentation and lack of tourist facilities and activities that could sustain cultural tourism’. This weakness is the easiest to overcome.

4.3. Opportunities

A great opportunity is recognized in the trend for alternative forms of tourist movements [87,88]. The chance for someone to decide to visit the underground is in the uniqueness of the offer in relation to those in the surroundings. ‘The underground military galleries are a space that needs to be explored, experienced and felt in order to be able to understand them’. This seems like a real slogan that could immediately attract all adventure lovers. The most important thing is that the potential exists, and with it the countless chances of people who have understanding. ‘They are for discovering and observation, not for those who are suspicious’.

It is possible to see how positions were held from bunkers and tunnels below the ground, it would be interesting to organize the reconstructions of historical events that took place while visitors can participate in some of them. There is plenty of work for conservators in the underground. Zorzini and Urdeniz [89] point out that archaeology, with the help of other disciplines (architecture, history, ecology, biology, urban landscape, etc.), should be able to display the complexity and richness of the past of a place such as the Petrovaradin Fortress area, and make its ‘silent narratives’ audible. One respondent notes that ‘it should awaken curiosity and discovery of the ‘hidden’ and ‘lost’ Fortress by subtly interpreting invisible spaces and archaeological heritage’.

The length of the tunnels allows the simultaneous use of space for different purposes. That is why some can be adapted to mass tourism visits, and some can be equipped for high-paying clients. According to similar ideas of Čuk [90] and Knez et al. [91] the width

of the corridor in some parts enables the installation of a mini railway of several kilometres. The presence of this mode of transport would enable visits to those interested who have difficulties with movement, such as people with special needs, the disabled, the elderly, etc.

Lyons and Wearing [92] talk about promising volunteer tourism. Research in the function of sustainability, clearing approaches, corridors, and similar activities are great for strengthening the habit of cooperation, mutual care, understanding, and tolerance among young people.

The chance to increase visits and promote the space is to offer one of the shorter routes to the visitors who are visiting an event (EXIT, Street Musicians Festival in the Lower Town, or Art Circle) or who are there for some other reason, depending on their interest.

Doğan and Simolin [93] think that sustainable long-term economic impact can be achieved through creating career development opportunities for artists and integrating art into the urban culture. The story of the fortress can be enriched by using a number of modern multimedia tools. Pierdicca et al. [94] say that it is possible to examine the interior environment by using a static or mobile laser scanner. The integration of 360° photos taken along the route offers the possibility of creating a virtual reality (VR) tour that can be integrated with a 3D model of the entire underground environment. This allows the space to be visited from a virtual point of view when they are closed for restoration work, or in cases of emergencies, such as the 2020 pandemic. One of the gallery's visitors sees them as 'a future space, and the city would have to allocate special funds from the budget for this part of the fortress'.

Under the ground, a domain of mystery opens; as perception weakens, the light disappears or dwindles and everything fades, but precisely this absence of contours unlocks the field to the imagination [95]. Various mysteries, myths, and legends are connected to this place. Based on them, some searched for the treasure of Maria Theresa, who never visited the fortress, or the valuables of the criminals who once hid in it. The fact is that at the time of Napoleon's conquests, valuables from the Vienna Treasury were kept here for some time, but they were subsequently returned. Latas [58] mentions a married couple who went through a tunnel under the river in 1913. Milković [85,96] talks about a large snake that was seen in the middle of the 20th century. Interesting stories are untold, and they concern prisoners (Figure 7 CMNS—look right part of photo), people who supplied the fortress with food, or the daily life of soldiers. These stories open boundless inspiration for organizing various tourist tours, which represents one huge, untapped, and inexhaustible potential. By tracking the interest of visitors, they can be changed and adapted to demand.

The chances of obtaining funding lie in 'applying for international projects that are announced in various fields, such as cultural tourism, heritage protection and management, education, cross-border cooperation, etc.' Regular fundraising could be achieved 'by charging entrance and guides, by renting part of the space for various events, and selling souvenirs'.

4.4. Threats

The fortress is damaged by nature, but also by human negligence. Repairs, demolition, and alterations do not support the sustainability of underground military galleries. Eventual collapse can be caused by natural disasters, such as an earthquake or anthropogenic intervention for a variety of reasons. According to one respondent, 'the huge area covered by the fortress is currently used, but not managed'. In order to minimize and avoid these threats, it is necessary to react as expeditiously as possible, following similar positive examples in the world.

The biggest threat is related to 'desecration, pollution and endangerment by frivolous visitors'. If left unchecked, the space can easily be abused. Only a kilometre of underground military galleries is under control. Entrance to other areas is free and uncontrolled. There are as many as 47 free entrances in the lower part of the Fortress (Figure 8 Entrance). The younger population, i.e., 12–18 years old, is especially prone to adventure, and the most vulnerable. Aničić [82] records the self-initiated entries of teenagers during spring and early autumn, who play 'Catacombs Roulette'. On these occasions, they could get lost in the deep

underground and risk their safety. De Gregorio [97] sees the absence of adequate security for the protection of historical attractions at the destination. This represents a problem even in more popular tourist localities. One respondent was categorical when he said that ‘the lack of care can be felt and as long as that is the case there is no point in talking about sustainability’.



Figure 8. Entrance or Exit; Source: Tatjana Pivac, August 2021.

On one hand, some people, carried away by passions, but without enough knowledge, organise different events and sensations, neglecting the real and the possible damage these could cause. ‘I love the Exit Festival, but I believe that underground military galleries are damaged by its musical vibrations’. Respondents most often pointed out that ‘security must come first, because otherwise no one will want to see the military galleries’. The other extreme is made up of sceptics who lightly devalue still undiscovered colossal buildings. Using the underground without the help of a professional guide service increases the possibility of getting lost. The most dangerous is the deep underground, with stagnant air and tunnels of smaller dimensions than in the first level.

5. Discussion

Urban heritage conservation is perceived as a primary approach for sustainable development, leading to poverty reduction through economic growth, tourism, and job creation [98]. To foster real sustainability, there is a need for contrasts, to meet and adapt to the different aspiration among the inhabitants, to focus more on the social process of decision making, and to consider that sustainability is an inclusive notion, which integrates environmental, social, cultural, and economic aspects of the concerned societies. There is a need for planning and managing these transitions [99]. The active protection of urban heritage and its sustainable management is a condition sine qua non of development [100].

The local population and volunteers from abroad, of various professions, organized themselves and collected solid waste (glass, batteries, plastic, metal, etc.), which was left for years by visitors who visited or illegally inhabited the Fortress for a short or longer time. The waste was sent for recycling. In this way, they showed that they understand the importance of the ecological sustainability of the site, but also the sense of community. The cleanliness of the site is a prerequisite for any other action. Among them were experts

in wildlife who contributed to the knowledge of the flora and fauna of the underground military galleries. The potential of the living world can be interesting at different levels of education, but also to other nature lovers, ecologists, and those who deal with survival in the wild. In the function of sustainability of this locality, it is expedient to organize routes intended for these target groups. Ecological vision implies protection of the environment and sustainable management of natural resources. Entering the underground under the influence of alcohol is not recommended for safety reasons and in order to preserve concentration. Due to the maintenance of air quality, cigarettes are also undesirable. This gives the underground an ecological quality.

Economic sustainability is a consequence of good marketing and organization. It is possible if the potentials are adequately presented, logistic support is put in place and cooperation between tourism workers and the guide service is well organized. Tourist spending, which includes the purchase of tickets, food and drinks, souvenirs, photographs, etc., does not currently exist in the immediate vicinity of the entrances to the underground military galleries. This primary or direct impact of tourism, as classified by Stojanović [101], could be most quickly and realistically organized in nearby spaces that exist and that do not officially belong to anyone. The calculation is simple. There are potential visitors. A minimum of 30,000 visitors pass through the City Museum of Novi Sad annually (The City Museum of Novi Sad, 2018), Street Musicians Festival was visited by about 70,000 [102], and in 2019 the EXIT Festival had 200,000 visitors [103]. Other visitors of the Fortress are rarely counted. Therefore, tens of thousands of people can potentially visit the galleries. The gross amount of the average salary in Serbia is 82,984 Serbian dinars, or about 700 Euros, according to Grba et al. [104]; RZS [105]. Ticket prices could be at least 3 Euros, as in similar, insufficiently well-known destinations in Europe. This means that 234 visitors in one month, or 10 people per day, are enough for sustainability of one employee. Guides say that one tour is optimally for up to 30 visitors. Therefore, only tickets from one tour during the day, which can realistically be possible with organized marketing of good quality, can provide two working positions. Hypothetically, there can be many tours during the day, especially during other events, when potential visitors meet for other reasons as well. The price of food products and souvenirs could include a percentage intended for the needs of maintaining the galleries. The need to procure these items employs artists, craftsmen, salesmen, etc. Stojanović [101] also points to the secondary, indirect or induced influences that have the form of entrepreneurial investments in the site, but also the financial resources that can be obtained from various sources by presenting the attractiveness of the site and an objective business plan. The tourist multiplier can only be estimated later. Following the example of similar spaces, the underground military galleries can be enriched with various contents where the dimensions allow. According to Krsmanović et al. [43] a new management organization should be comprised of representatives from six primary interest groups—the army, the city administration, the Institute for Protection of Cultural Monuments, local residents, relevant NGOs, and businesses. Apart from this, a development, review, and approval of a management plan for the Fortress is essential. Implementation of management objectives can be targeted into the medium and longer-term, with a variety of associated benefits stemming from this core mission. Given their length, the corridors are primarily a potential exhibition space. The escape room mentioned by Wiemker et al., and Brown et al. [106,107] is a type of entertainment that would make good use of underground corridors. Older respondents expressed goodwill to tours, but cited limitations in physical fitness. In some parts of the underground military galleries, it is possible to install tourist vehicles, as in Postojna Cave. They would make it easier for visitors to tour several kilometres of tunnels, definitely increasing the number and age diversity of visitors. All routes that would be organized in different sectors and with different topics could at least finance the work of the guide service. The implementation of the chosen strategy of sustainable tourism development depends on financial support. It can come from the local, regional, or state budget, or even from European Union funds. It can be obtained by organized renting of space, charging

for tickets, and selling souvenirs. Therefore, it is necessary to stimulate innovation and productivity and strengthen entrepreneurship. However, the most important thing for economic sustainability is control, discipline, and rational financial management.

According to Maksin et al. [108] sociocultural sustainability, as a development with respect for social equality, provides opportunities for all (tourists, employees, and local population) and supports the preservation and strengthening of social integrity, cultural identity, and traditional values of the local community. Social sustainability includes the protection of the most vulnerable groups of the population who visit the Fortress and the underground for existential reasons. In order to reduce poverty, in order to distribute the benefits of economic development equally, the possibility of including these social groups to help, i.e., in mechanisms that are in the function of sustainability, should be considered. 'Heritage should be at the service of locals, and not the other way round'.

Instrumental values that cultural heritage assets possess should be seen not only as an opportunity for territorial development, but also an opportunity to ensure that assets of cultural heritage values are maintained. These are scientific, aesthetic, cultural/historic, landscape related, educational, and economic values, as well as its uniqueness and importance for the local community [109]; the Petrovaradin Fortress has all these values. Further challenges in ensuring sustainability of these values still exist.

The Petrovaradin Fortress, as tangible, cultural heritage, testifies to human's creativity and represents a solid foundation on which the identity of the citizens of Novi Sad is built. As a significant cultural asset, it can serve as a strategic revenue-generating tool. By providing funding for various cultural programs and services, support through subsidies to artists who have ateliers in the Fortress, a better and higher quality tourist product will be created and will attract more visitors. The visitors are the financiers of the improvement of the tourist offer. Quality offer is an accelerator of new visitors [110]. They can bring more money, which should be put exclusively into the function of sustainability.

Information and communication technologies should be used as a tool to bring the cultural good closer to all citizens and tourists. In order for the site to be sustainable, it must be equipped in accordance with contemporary standards. It is necessary to introduce interactive whiteboards, make games with the theme of the Fortress Underground, etc. This cultural asset needs to be accessible to people with special needs as far as possible. The way the Petrovaradin Fortress is treated affects the way our descendants will remember. The more preserved it is, the more open it will be to external influences.

With the exception of sustainable subways [111], which may have a cultural form, as in Moscow [112], heritage located in the underground is underused, insufficiently known, and partially protected. Even a cultural metropolis such as Paris does not control the vast expanses of its underground [4,113]. It is rare to find an underground that stretches for tens of kilometres and has a similar microclimate as the underground military galleries of the Petrovaradin Fortress. According to Cujbă and Sîrbu [114], Cricova in Moldova uses tens of kilometres of underground to store wine. The spaces under the ground are most often used in their own way. However, according to characteristics and potentials, they can often be put into other functions as well. The most remote parts of underground military galleries can, according to such a model, be put into economic functions (production of mushrooms, cheese, etc.). Rental income could provide a significant contribution to economic sustainability.

Each underground is unique, but it also has some similarities with others. The underground of the Petrovaradin Fortress is harmoniously integrated into the natural terrain and ecosystem as, e.g., 'The Sassi and the Park of the Rupestrian Churches of Matera'. Both of them have a number of significant stages in human history. However, the UNESCO protected Sassi has Special Law 771 [115] which led to the establishment of a management plan between private and public parties to ensure the architectural, urban, environmental, and economical conservation of the ancient Sassi districts, and to safeguard the Murgia highland plateau. There is a need to pass a similar law that would regulate the underground space of the Petrovaradin Fortress. Meignan [116] valorised the tourist offers

of the limestone underground of France. Her conclusions say that the scenarios of the visit, the content, and the speeches developed by these facilities are based mainly on history, local tradition, and human stories. Some tourist places are branded on fictional stories [117]. The Underground Military Gallery has so many true stories. For decades, they sustained the image of mysticism and uniqueness. The underground of the Petrovaradin Fortress lacks an engaged placement of an offer based on human stories. The self-awareness of the scientific community about the existence of shortcomings is evident; there is simply a need to find the mechanisms to overcome them.

The underground military galleries of the Petrovaradin Fortress do not have a defined purpose. However, it seems that they could have different purposes. New ideas are numerous; for example, promoting the idea of combining the provision of assistance in arranging the underground military galleries and healthy physical activity would be mutually beneficial. The local population of good will could spend their time for recreation, which they often pay for, helping with maintenance. The galleries are naturally air-conditioned, and better ventilated than any gym. This idea only needs the support of aggressive marketing. Galleries can inspire young multimedia artists for a variety of performances. Innovative cultural contents could be included in different routes, for which, depending on the topic, there is enough space in over 16 km of galleries. As a prevention of transmission of COVID-19 virus infection, social distancing has been recommended, among other things [118,119]. Therefore, during the pandemic, the applicability of the virtual world in culture was affirmed [120,121]. In light of this, the underground military galleries of the Petrovaradin Fortress can be an inspiration for adrenaline lovers, who would get involved in their research and mastering from home. It would take a lot of people, knowledge, and skills to realize this idea, but in this way its promotion would be complete. Potentially needed material resources could be secured if such a project were organized among graduates in the different fields of programming that the faculties of the University of Novi Sad have, under the idea of volunteerism for the promotion of cultural heritage. Realistically observed, these ideas can be applied in other European localities with similar characteristics.

6. Conclusions

The sustainability of the underground military galleries of the Petrovaradin Fortress is certain within the tourist offer of the fortress. It is ideal for tourists whose interests tend towards adventure, 'dark' tourism, and alternative forms of tourist movements in order to experience something new. The underground of the Petrovaradin Fortress can also be offered in routes adapted to lovers of history, architecture, strategists, and also biologists. This area is unique; there is no similar one in the immediate surroundings. In the hot summer days, it is more than a pleasant place to stay, so it can be suggested as a natural shade where you can find engaging content for everyone's interests.

Some see sustainability in bringing more people through the opening of museums, coffee galleries, the establishment of an alternative guide service, the shooting of films and shows, and publishing different propaganda material in various world languages.

The underground military galleries of the Petrovaradin Fortress, given the proximity of Novi Sad, the European Capital of Culture 2022, is a desirable destination which can add to the duration of a stay. However, due to its characteristics, it can also be included in offers related to educational tourism.

In support of the sustainability of this architectural masterpiece, it is necessary to invest efforts towards more aggressive marketing. In addition, it is necessary to adhere to environmental and hygienic standards. Although the dimensions of the Petrovaradin underground are suitable for mass tourism, their value should be adequately assessed and offered as an exclusive offer.

It is necessary to form an institution that will seriously deal with the Fortress and be in constant cooperation with volunteer associations from which useful information and ideas can be drawn, and various types of additional assistance can be obtained.

To conclude, there is enough potential. A clear vision of development and strategies for eliminating deficiencies, compensating for what has been identified as deficiencies (sanitary blocks, improving access, improving safety, continuing remediation, and preserving the quality of space, etc.) are needed. However, without control of all entrances, no activity makes sense.

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