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PRESERVATION AND VALORISATION OF THE BUILT CULTURAL HERITAGE IN ITALY
AS A RECOVERY STRATEGY AFTER THE SOCIO-ECONOMIC CRISIS
DUE TO THE COVID-19 PANDEMIC.
CASE STUDY: THE CONVERSION OF THE ABANDONED MILITARY SITE
OF MONTE SCINAUZ INTO A MUSEUM.

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*A mia sorella Alessandra,
da sempre luce del mio cammino*

Abstract

In 2022, Italy is in a condition of socio-economic instability due to evident damages caused by the global spread of the Covid-19 Pandemic and the uncertainty about the future evolution of the situation. In this context, new actions are adopted by the Italian government, but the implementation of further strategies seems to be necessary for a recovery to the pre-covid levels. Thanks to the presence of a rich cultural heritage, the tourism sector plays an important role in the Italian economy, especially in Friuli-Venezia Giulia region where the tourist offering is highly diversified and characterized by many historical war sites in abandoned conditions located in the territory of Carnia.

This thesis, therefore, aims to prove how the revival of a significant historical and cultural heritage provides a fundamental contribution in the socio-economic recovery intent, as it is a successful strategy able to produce an economic, environmental, cultural and social added value in the corresponding territorial context. In particular, a tangible demonstration of the approach is given by the case study of the military site of Monte Scinauz, the military base placed on the top of the mountain and hosting the 17° Radar Group of the Military Air Force. The project proposes to preserve the place authenticity and to valorise the existing heritage, converting the site into an open-air museum accessible to visitors and realising a suggestive guided tour supported by the implementation of an augmented reality system.

To assess the feasibility of the proposal, a series of technical and economic analysis is carried out showing the effectiveness of the idea and confirming the high probability in the achievement of the project goal. The strategy proposed is also evaluated on the basis of possible future developments, since it can be used as an interesting benchmark in the valorisation of other historical and cultural sites in abandoned conditions across the whole Italian territory.

Abstract (Italian version)

Nel 2022, l'Italia si trova in una condizione di instabilità socio-economica a causa degli evidenti danni dovuti alla diffusione globale della pandemia da Covid-19 e all'incertezza sulla futura evoluzione della situazione. In questo contesto, il governo italiano adotta nuove azioni, ma l'implementazione di ulteriori strategie sembra essere la direzione necessaria da percorrere per poter ritornare ai livelli pre-covid. Grazie alla presenza di un ricco patrimonio culturale, il settore del turismo gioca un ruolo importante all'interno dell'economia italiana, soprattutto nella regione Friuli-Venezia Giulia dove l'offerta turistica è altamente diversificata e caratterizzata da molti siti storici bellici in stato di abbandono situati nel territorio della Carnia.

Il presente elaborato di tesi vuole quindi dimostrare come la rinascita di un significativo patrimonio storico e culturale sia in grado di fornire un contributo fondamentale al tentativo di recupero della situazione socio-economica, mostrandosi come una strategia di successo in grado di produrre un valore aggiunto in termini economici, ambientali, culturali e sociali all'interno del contesto territoriale corrispondente. In particolare, una dimostrazione tangibile dell'approccio viene fornita tramite il caso studio del sito militare di Monte Scinauz, la base militare posta sulla cima della montagna che ospita il 17° Gruppo Radar dell'Aeronautica Militare. Il progetto si propone di preservare l'autenticità del luogo e di valorizzare il patrimonio esistente, convertendo il sito in un museo a cielo aperto accessibile ai visitatori e realizzando una suggestiva visita guidata supportata dall'implementazione di un sistema di realtà aumentata.

Per valutare la fattibilità della proposta, vengono effettuate una serie di analisi tecniche ed economiche che dimostrano l'efficacia dell'idea e che confermano l'alta probabilità di raggiungimento dell'obiettivo delineato nel progetto. La strategia proposta viene esaminata anche sulla base dei possibili sviluppi futuri, in quanto può essere utilizzata come interessante modello di riferimento nella valorizzazione di altri siti storici e culturali in condizioni di abbandono localizzati sull'intero territorio italiano.

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1 Introduction

1.1 General Context

Italy is a very popular destination for tourists all around the world. The first element of uniqueness is represented by the variety of its territory, in perfect balance between sea and mountains, hills and plains. Travelling through its regions, it's possible to discover a wide range of landscapes which goes from nature to urban sites. Relevant is the presence of many historical villages, monuments, churches and works of art making the Country a sort of open-air museum. Further source of richness is the Italian gastronomy characterized by a high quality and variety of typical products which differs from a region to another.

In 2019, according to the National Tourism Agency (ENIT), Italy is the third most visited country in the world with 94 million visitors. The tourism sector generates more than 5% of the national GDP and represents over 6% of the employment rate.

This positive situation is totally reversed between the end of 2019 and the beginning of 2020, when the infection broken out in the city of Wuhan in China, the so called Covid-19 virus, starts to be globally spread. Since in absence of both a specific medical care and a vaccine the contamination can be reduced through measures of social distancing, the national governments decide for a general lockdown. It consists of mandatory restrictions on individual mobility and establishes closure of schools, universities and public buildings, interruption of commercial activities and non-essential services, limitation of import and export operations and temporary annulment of tourist activities.

1.1.1 The Italian socio-economic crisis after the Covid-19 Pandemic

In 2022, the Italian framework is still characterised by the consequences of a socio-economic crisis deriving from the global spread of Covid-19 Pandemic during the previous year.

The health crisis impact recorded in 2020 is strong, with a GDP decrease of 8,9% mainly caused by the collapse of domestic demand and consumption. The reduction in investments is also evident, especially in the means of transport and equipment sectors. Concerning import-export balance, it

represents a negative injection to GDP trend since the reduction in exporting goods and services is only partially offset by the import contribution (Figure 1.1).

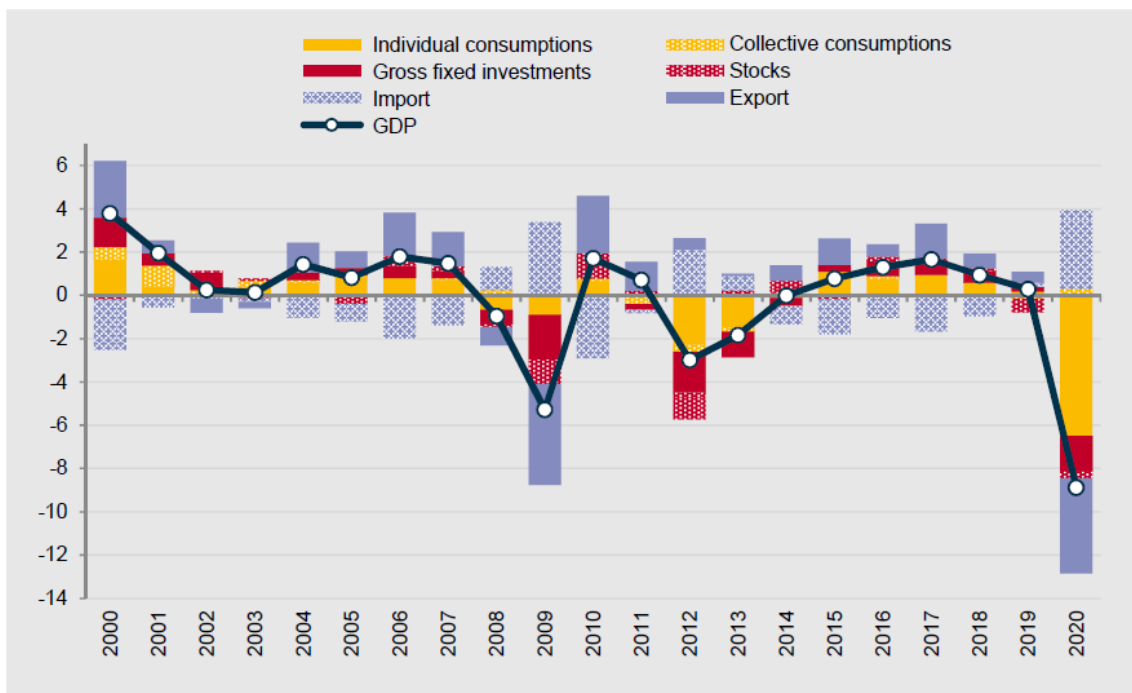


Figure 1.1 Italian GDP trend and contribution of demand components. Years 2000-2020.

Source: Istat, National Accounts

In the first quarter of 2021, despite the steady presence of health emergency, first signs of economic activity recovery are outlined in manufacturing, in construction and in some service sectors.

The highest rate of growth is recorded in the manufacturing sector, where the industrial production index exceeds the pre-crisis level of January-February 2020. Even the construction sector, after a sharp drop, shows a quick relaunch of the activities thanks to the building refurbishment measures taken by the government. The service sector is characterized by a diversified scenario: a strong growth is recorded in transport, storage and business support, while a medium increase is present in professional, scientific and technical activities. In the hospitality sector, instead, a strong crisis is still observed with a turnover equal to 40% of the one recorded in 2019.

Concerning export market, pre-crisis levels are achieved in the last months of 2020 thanks to sales on EU markets, higher than trading on extra-EU Countries.

The crisis also affects the labour market: the employment rate, growing between 2014 and 2019, in 2020 suffers a strong decline with evident impacts extended in the first months of 2021 (Figure 1.2).

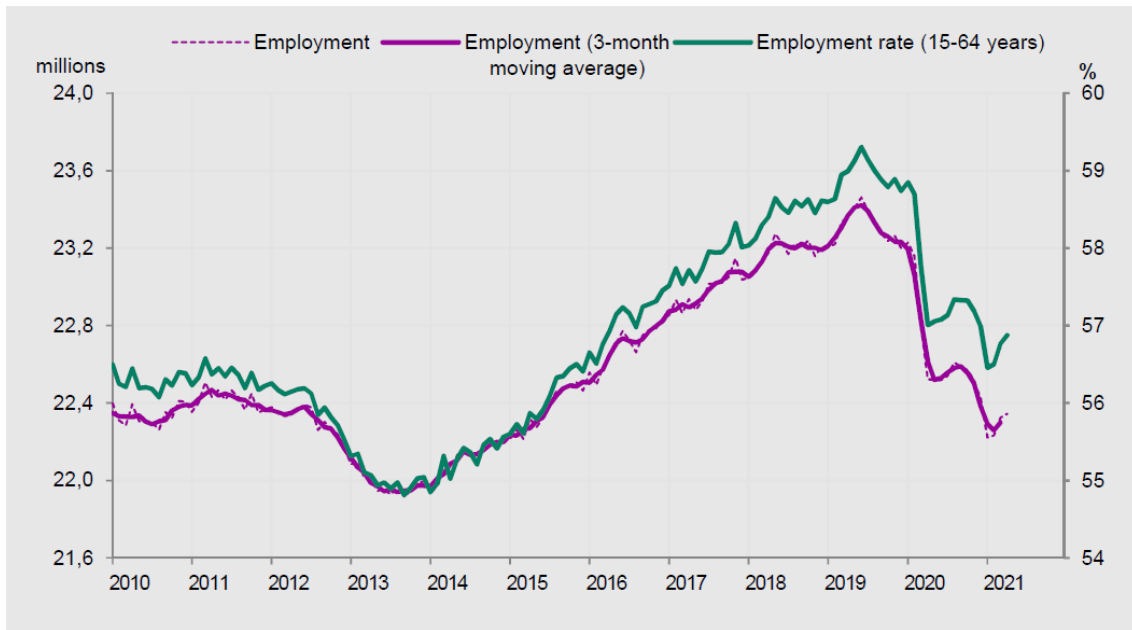


Figure 1.2 Employment trend in Italy. Employment (millions, left scale) and employment rate (percentages, right scale). Years 2010-April 2021. Source: Istat, Labor Force Survey

This situation involves, in a different way, the diverse work typologies and the various economic sectors. For the first group, the most affected categories are temporary employees, due to non-renewal of contracts, and self-employed persons, even if a portion of permanent workers is involved in the scenario. As regard the economic sectors, due to the restrictions introduced, the effects strictly depend on the possibility, or not, to provide the specific job service remotely. Services, in fact, are the most penalized sector recording about 93% of the overall employment loss in 2020. In particular, hotels and restaurants, household services, trade, rental, professional activities and business services highlights a drastic decline (Figure 1.3).

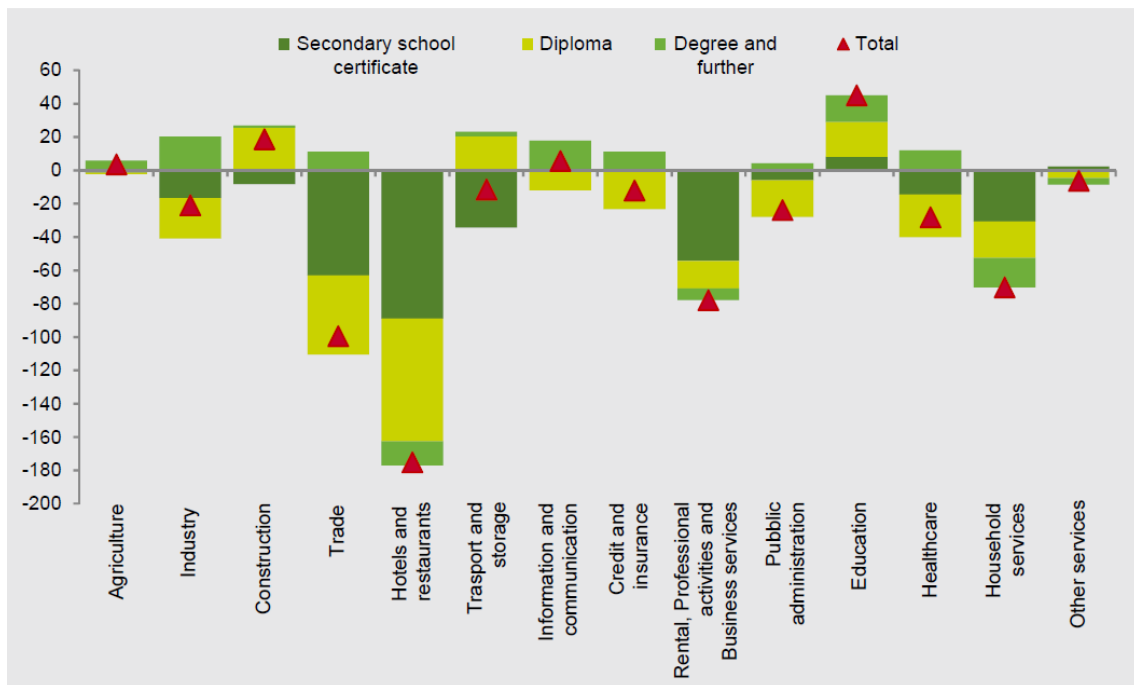


Figure 1.3 Employment dynamics in economic sectors by qualification. Year 2020 (absolute changes in thousands from 2019). Source: Istat, Labor Force Survey, old series

In this context, the level of specialization of Italian regions in the economic activities also plays a key role. Territories with a strong concentration in sectors most affected by the crisis show, for instance, greater difficulties in setting up recovery strategies with respect to regions with a diversified production system.

This concept is expressed through the specialisation index, a uniformity coefficient indicating how much a territory is diversified (value close to zero) or totally focused on a specific sector (value close to one). Italy is generally characterized by a medium-high diversification degree, even if, according to the considered sector, there are some regions with a higher concentration of employees. Such values are recorded in Trentino-Alto Adige, Valle d'Aosta, Sardinia, Tuscany and Lazio for the tourist sector and in Veneto, Tuscany, Umbria and Marche for the textile industry. For recreational, cultural and sporting activities the highest coefficients concern Valle d'Aosta, Liguria and Lazio, while in trade and restaurant the highest are Calabria and Sicily (Figure 1.4).

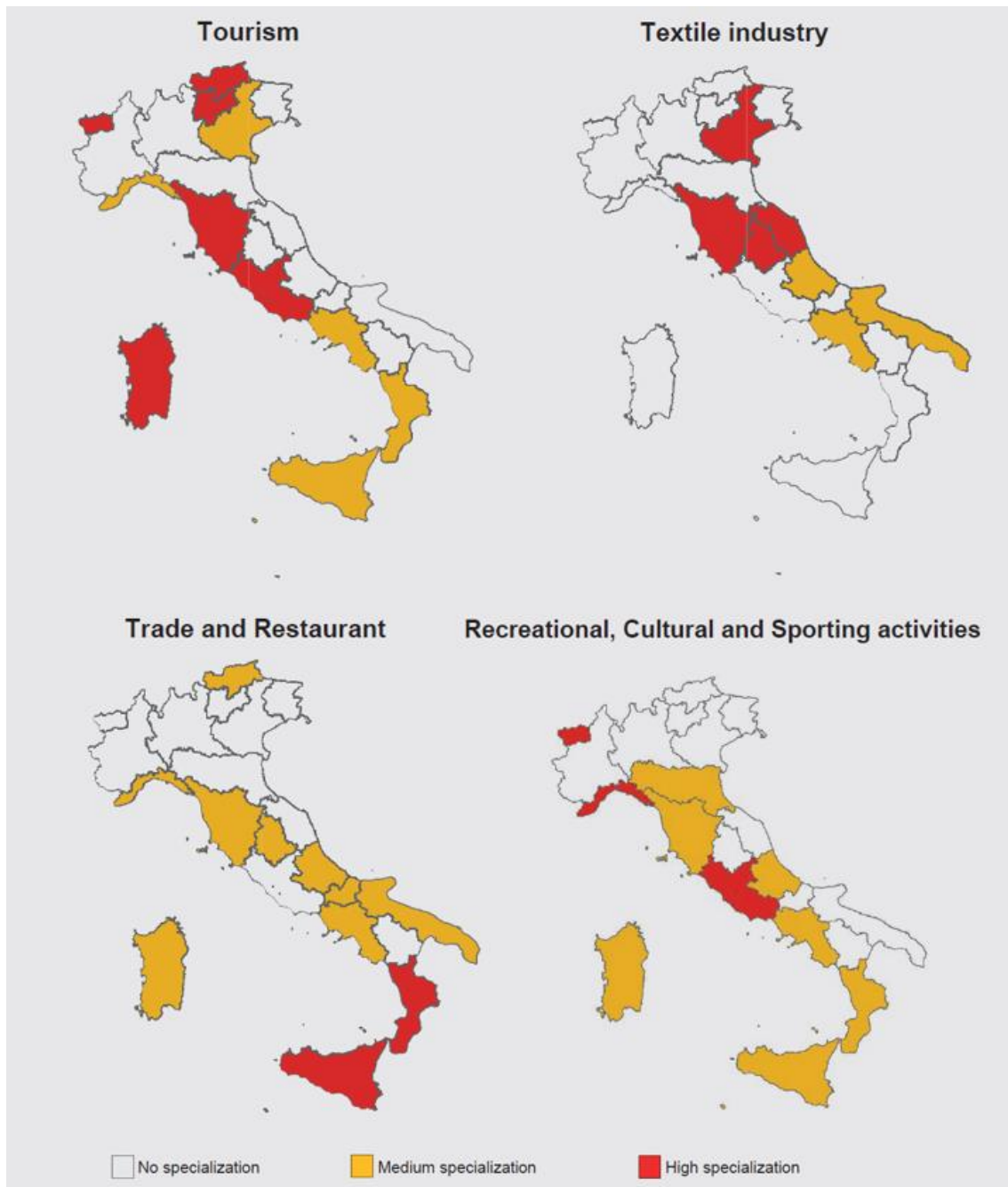


Figure 1.4 Level of specialization of Italian regions for sectors directly involved in the Covid-19 crisis. Year 2018. Source: Elaborations on Istat data, Territorial Frame-Sbs

As previously mentioned, any area of activity is differently involved in the process of economic recovery. If, on one side, sectors like manufacturing and construction follow a rapid growth, on the other the tourism sector, the most affected by the pandemic crisis, suffers from a slow retrieval. This segment is largely influenced by the drastic reduction in foreign tourist flows due to the persistence of movement restrictions among Countries and the non-immediate change in people's behaviour during the reopening phase.

Despite the situation, the positive short-term outlook, which is recorded for the most part of economic activities after the progressive mitigation of containment measures, is also evident for the tourist sector. As shown in the graph below, in June 2021, the business confidence climate index rises for the third consecutive month making a full recovery from the crisis (Figure 1.5).

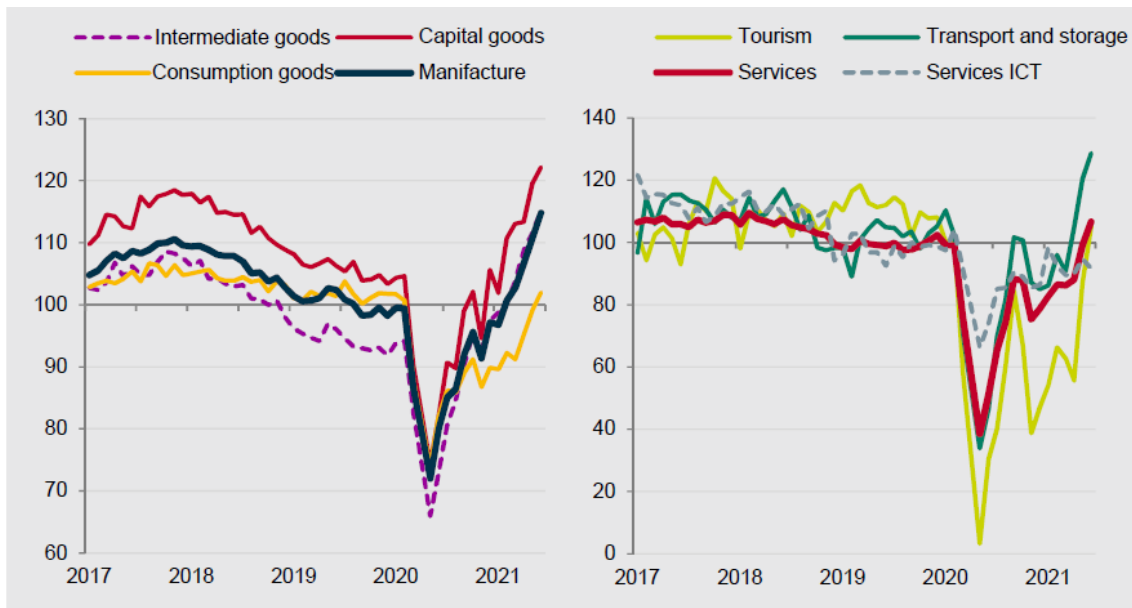


Figure 1.5 Business confidence climate by sector of economic activity. January 2017-June 2021 (seasonally adjusted indices). Source: Istat, Business confidence climate survey

This scenario incorporates, in addition, the effects coming from the introduction of the National Recovery and Resilience Plan (PNRR) interventions. To face the Covid-19 economic crisis, the European Commission approves the adoption of a temporary instrument, the Next Generation EU Program (NG-EU), which makes available to European economies 672.5 billions of resources between 2021 and 2026. In order to receive these funds, each Member State must prepare the PNRR, which is the program indicating investments and reforms to be implemented for economies restart and showing strategies for promoting areas such as innovation, ecological and digital transition and social inclusion.

The Italian PNRR, sent by the government to the European Commission at the end of April 2021, outlines six areas of intervention or “Missions” (Figure 1.6):

1. Digitization, innovation, competitiveness, culture and tourism;
2. Green revolution and ecological transition;
3. Infrastructure for sustainable mobility;
4. Education and research;

5. Inclusion and cohesion;

6. Health.

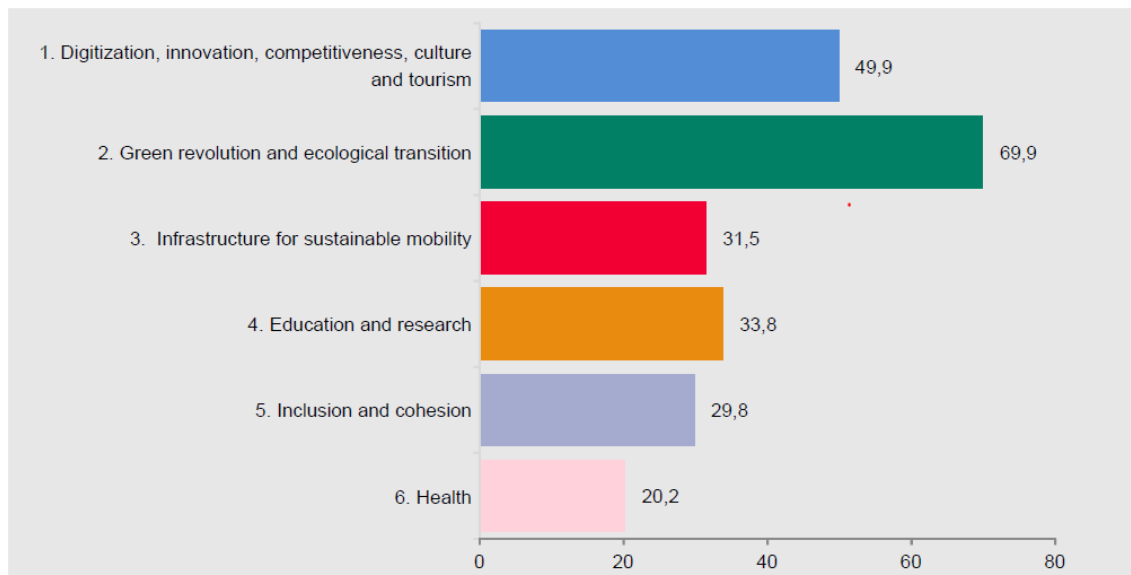


Figure 1.6 Resources allocated in the Italian PNRR for each Mission (billions of euros). Source: PNRR

As clearly described in the chapter, the first two years after the global spread of the Covid-19 pandemic are characterized by a high instability with a general situation of crisis, only partially offset by few signs of recovery. The positive effects mainly derive from the vaccination campaign and the strong monetary and fiscal policy support carried out at national and international level, which, however, are not sufficient to bring back the socio-economic situation to pre-covid levels.

In the first quarter of 2022, despite the presence of still evident damages caused by the crisis, Italy seems to be ready to restart, looking at the effective containment of the new variants of the virus in the last months without the intervention of any lockdown. The GDP growth expected in the first half of 2022 is equal to 4,1%, especially thanks to an increase in the level of consumptions and in the number of constructions, building interventions and real estate investments (Figure 1.7). Even the commercial sector, with import-export activities, and the employment rate show a positive outlook, intended to record respectively an increase of 4,5% in export of goods and a rise of 0,3% in the number of employed people. Many factors, however, are intended to still slow down the economic growth, such as the increase in raw material prices and the difficulty in finding them on the market. In addition, despite the future perspective seems to be positive, an ongoing uncertainty about the strength of the recovery is present since it is not possible to determine the evolution of the pandemic in the next months and years.

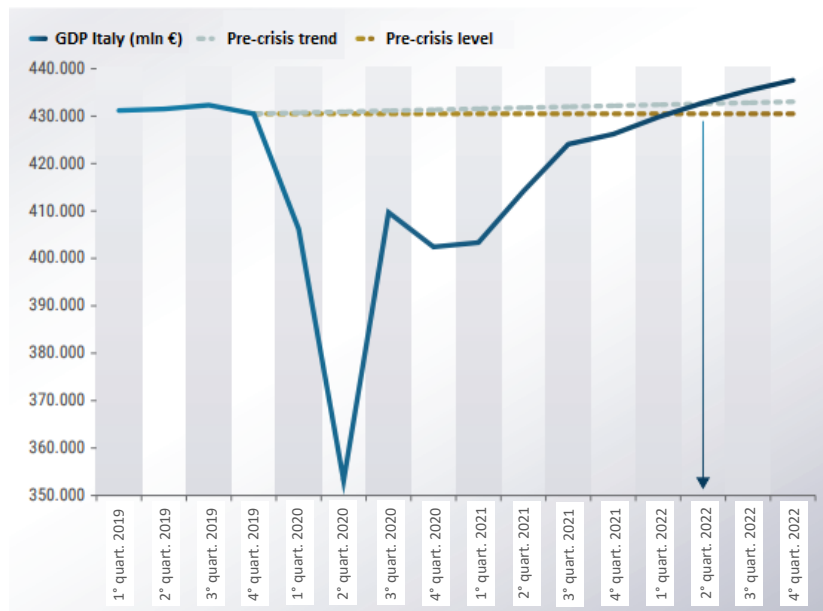


Figure 1.7 Italian GDP trend and forecast (quarterly data, millions). Years 2019-2022.

Source: Analyses on ISTAT data from Confindustria Study Center

1.1.2 The tourism sector as a strength for the Italian economic recovery

As previously mentioned, the tourism sector plays a fundamental role in the Italian economy. In 2017, according to the World Trade and Tourism Council (WTTC) estimates, the impact of this sector on Italian GDP is equal to 5,5%, a higher value with respect to EU Countries and world averages. Fundamental is also the impact on employment rate which is equal to 6,5% and covers almost 1,5 jobs (Figure 1.8).

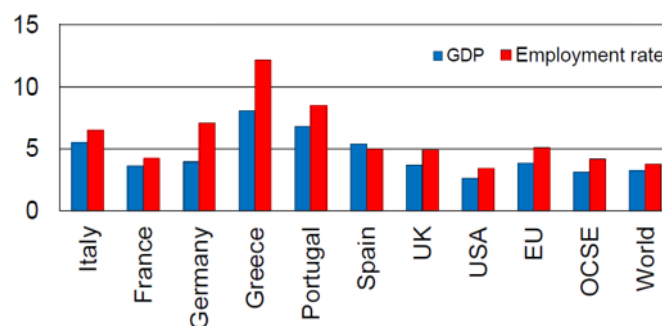


Figure 1.8 The contribution of tourism to GDP and employment in 2017 (percentage values).

Source: World Travel and Tourism Council data

In the last few years before the pandemic, Italian tourism lies in a situation of strong expansion thanks to different drivers such as advantageous prices of hotel and restaurant services, fear of terrorist attacks in many foreign Countries or strong interest in cultural holidays. In addition, as

shown by a Bank of Italy survey on international tourism, touristic demand seems to be characterized by an increasing complexity. Holidays experience a progressive hybridisation, with the simultaneous presence, even within the same trip, of multiple motivations combining culture with other contents. Italy, in this sense, is the best destination able to satisfy the request thanks to an exclusive heritage for variety of landscapes and visiting sites.

The analysis of this context reveals, therefore, the opportunity to exploit the tourism sector as a strength for the Italian economic recovery. Despite this area of activity is one of the most exposed to the crisis, after the mitigation of pandemic restrictions, the presence of many locations with high tourist demand remains a focal point for the Country income. In particular, an important role in the recovery process is played by the valorisation of those abandoned sites or exploited below their potentiality.

1.2 Specific Context

1.2.1 The Region: Friuli-Venezia Giulia



Figure 1.9 Friuli-Venezia Giulia region and provinces. Source: https://it.wikipedia.org/wiki/Friuli-Venezia_Giulia

Friuli-Venezia Giulia is an Italian region of 7.845 Km² and 1.197.392 people (data of 2021) in the north-eastern part of the Country. The territory is composed of two geographical regions characterized by historical and cultural differences: Friuli portion including the provincial areas of Pordenone, Udine and part of Gorizia, and Venezia Giulia section, covering the remaining part of Gorizia and Trieste (Figure 1.9). The region borders Austria to the north, Slovenia to the east, Veneto to the west and Adriatic Sea to the south. Friuli-Venezia Giulia is also one of the five autonomous regions with special statute which, beside Italian, recognizes as regional official languages Friulian, Slovenian and German tongues.

The regional capital is Trieste, a municipality of about 200.000 people and point of major commercial exchanges by sea through its port. In the 20th century, during the two World Wars, the city has a role of historical relevance: this area is the theatre of fighting and tensions between Italy and the neighbouring Yugoslavia for territorial possession.

From the economic perspective, the regional territory is supported by an important industrial activity with a manufacturing excellence internationally recognized. Some segments of the secondary sector date back to the Middle Ages such as the production of furniture, household appliances and fine fabrics like silk. Furthermore, some shipyards and iron, steel and mechanical factories characterize the area of Trieste capital.

Even agriculture is a leading sector where, next to traditional crops like wheat, corn or potatoes, there are some new specialized and technological cultivations from which typical DOP and IGP certified products derives. These include, for instance, Tergeste Olive Oil and some popular wines such as Prosecco. Significant is also the economic contribution guaranteed by fishing, offering quality products on national markets, and by cattle and pig farming which result, for example, in the famous production of San Daniele ham and Montasio cheese.

A large slice of the Friulian economy is finally represented by the tertiary sector, with particular attention to cultural and naturalistic tourism characterizing the region.

1.2.2 The regional tourist offering: an experience among mountains, sea and culture

As previously mentioned, Friuli-Venezia Giulia is a touristic destination perfect for any type of visitor. From a cultural viewpoint, the region is full of villages and cities of art distinguished by unique features such as the capital Trieste, famous for its square on the sea, historic cafes and the

Miramare Castle, and the multicultural Gorizia, with its medieval castle and the First World War Museum. Two important municipalities are Aquileia, recognized as UNESCO heritage for richness of history and art evidence, and Spilimbergo, headquarter of the internationally recognized Friuli Mosaic School. The reasons of attraction also derive from the geographical position on the Country border, which makes the territory a melting pot of different traditions and cultures.

Overlooking the Adriatic Sea, Friuli-Venezia Giulia is then a place for leisure holidays characterized by the long beaches of Grado and Lignano Sabbiadoro and by the rocky coastline of the Trieste gulf. The mountain landscape is another distinctive feature of the region, allowing for a wide variety of winter and summer activities such as skiing, trekking and mountain biking.

This combination of sea, mountains and culture perfectly fits with the modern demand for "Experiential travel", the new way of experiencing a trip not only focused on leisure and relax but also on cultural and gastronomic activities bringing in contact with history and traditions of the visited place. "Experiential travel" represents the driving force of Friuli-Venezia Giulia which promotes and manages the development of tourism through an agency, whose aim is showing the richness and variety of the Friulian territory. With the same intention, the region follows the "Social Ambassador" project, a communication and tourism promotion campaign aimed at helping visitors to discover the area through the eyes of its inhabitants. It consists in storytelling publications on the "Friuli-Venezia Giulia Experience" blog, where local people share their passions, interests and activities.

In accordance with the Italian context explanation, the strong tourist offering characterizing Friuli-Venezia Giulia can be seen, therefore, as an effective tool for the economic recovery of the region. However, to better exploit this opportunity, it is necessary not only to leverage on the most popular and well-known locations, but also to valorise the several abandoned and unknown places that the territory offers.

1.2.3 The historical heritage of Alpi Carniche

Friuli-Venezia Giulia is an Italian framework full of places with a relevant cultural background but generally unknown and not exploited from a tourist perspective. One of most relevant examples is represented by the Carnia territory, an historical and geographical region located in the north-western part of the Udine province.

Carnia is an alpine area dominated by unspoilt nature which, due to its border position with Austria, looks as one of the necessary passages from Italy to Northern Europe and vice versa. More specifically, the main pass between Friuli Venezia Giulia and Carinthia is represented by Monte Croce Carnico, the central scenario of the First World War in Carnia. This is the focal point of the entire military front where, both for Italian and Austro-Hungarian commands, the entrance into the enemy territory allow the conquest. In summer 1915, all the surrounding mountain peaks are contended and heavily militarized by both sides, leaving the territory full of fascinating traces of these battles (Figure 1.10).

The open-air museums of Alpi Carniche offer naturalistic itineraries, leading to the discovery of barracks and high mountain trenches able to give evidence of the soldiers life. The downstream area, as well, is rich of museums, exhibitions and memories of the First World War.



Figure 1.10 The military traces of Italian defences on Monte Croce Carnico Pass.

Source: <https://www.turismofvg.it/it/111269/carnia>

The greatest part of the above-mentioned sites is abandoned, but in Carnia there are also few examples of valorised historical heritage. One of the most important is the Museum of Monte San Michele, a great revival of the historical memory of First World War.

1.2.4 Monte San Michele Museum: one of the few examples of valorised historical sites

Monte San Michele is the theatre of strong battles on the Isonzo front, especially during the first year of the First World War. The mountain is defended by the Austro-Hungarian commands to protect the domain over the city of Gorizia and it is conquered by the Italian army in the Sixth Isonzo battle, in August 1916.

In 2022, Monte San Michele is an open-air museum developed along its four peaks, which offers a suggestive itinerary through history and nature (Figure 1.11).

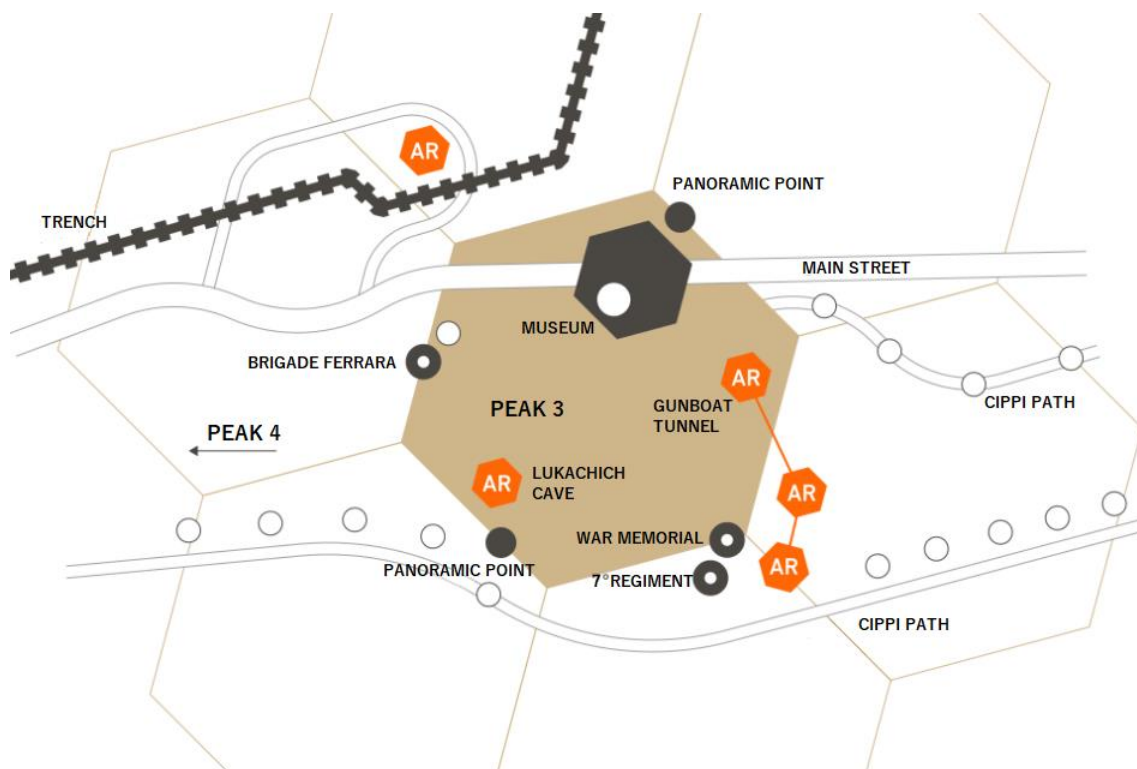


Figure 1.11 The external visit path. Source: <https://www.museodelmontesanmichele.it>

Thanks to different easy paths suitable for everyone, it allows to discover old structures and monuments dating back to the First World War. The tour of the museum partially follows the so called “Cippi Path”, a route characterized by the presence of 53 commemorative monuments. Between the peaks 2 and 3, there is the entrance of the “Schönburgtunnel”, one of the main defence structures of the Austro-Hungarian army used as shelter for soldiers and passage of provisions towards the front line. The heart of the museum is represented by the peak 3, where the so called “Gunboat Tunnel of the Third Army” and the “Austrian Cave of the General

Lukachich” are located. The Gunboat Tunnel of the Third Army is an underground complex characterized by some fire emissions to hit the enemy defensive lines, while the Austrian Cave of the General Lukachich is a karstic cavity dedicated to the commander of the Hungarian army. Relevant is the fact that the external tour is carried out through the augmented reality experience: a signage on-site allows the activation of multimedia contents through the mobile app, letting the visitor to see 3D holograms on the screen inserted in the framed environment and to listen to some stories related to the events of the places (Figure 1.12).

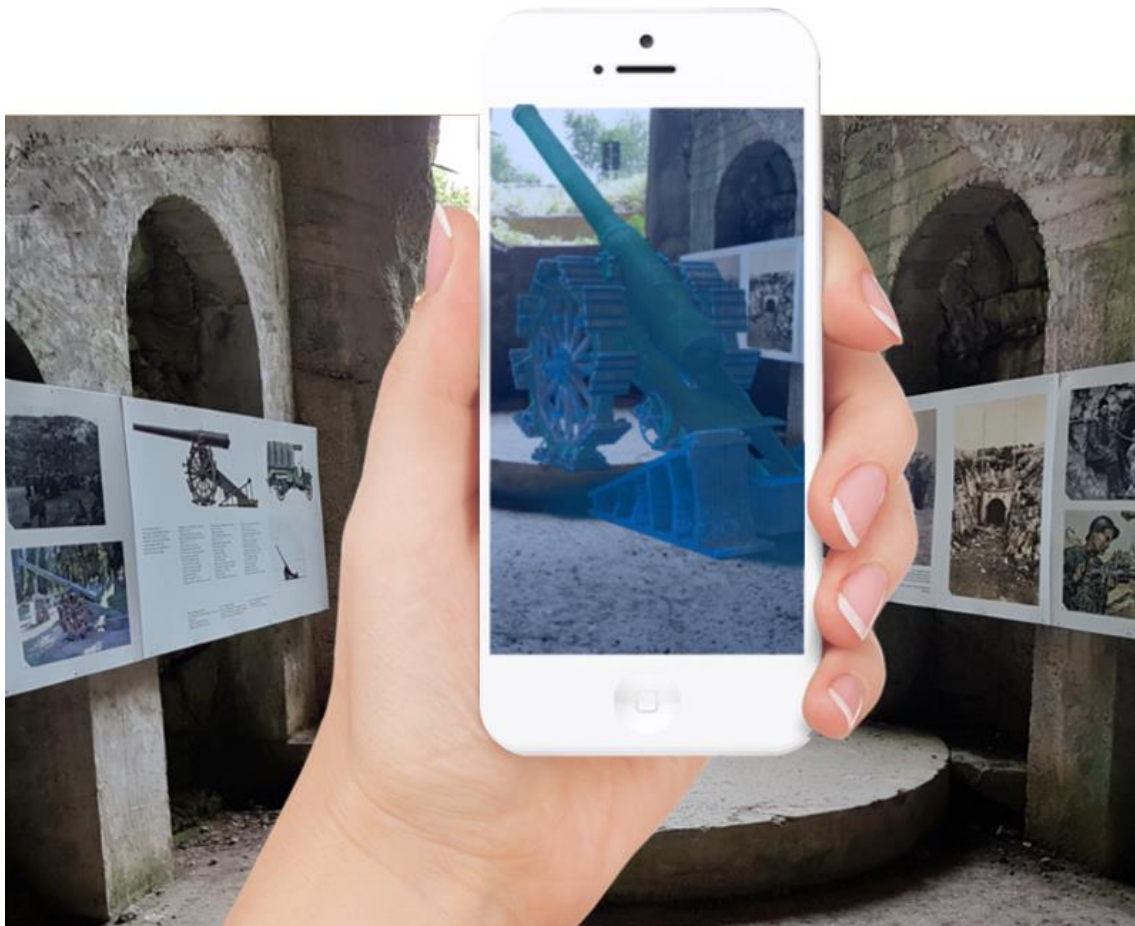


Figure 1.12 San Michele VR mobile app. Source: <https://www.museodelmontesanmichele.it>

A last interesting part of the tour is represented by the Virtual Museum, a completely renewed building offering a unique experience thanks to interactive tools and contents. It is characterized by some multimedia rooms with touch screens, maps, videos, and 3D reconstructions. A great innovation is the room dedicated to the virtual reality 360: it consists in 15 workstations with viewers and headsets which allow visitors to see scenes of life in the trenches and to listen to some stories of the fighters (Figure 1.13).



Figure 1.13 The Virtual Museum. Source: <https://www.fondazionecarigo.it>

The augmented and virtual reality sections are implemented in 2018 as a valorisation project of the museum. The intervention is sponsored by the CariGO GREEN Foundation with the idea of revisiting the historical memory of the place in a contemporary view through innovative and creative tools. One of the purposes of the Foundation through this project is, in fact, stimulating reflection on the cultural and landscape heritage available, with the aim of bringing out its full potentiality. In this sense, Monte San Michele Museum stands as an example of important valorisation strategy which can be applied in both similar and different territorial contexts.

1.2.5 Valorisation of the numerous abandoned war sites as a tourism promotional tool

During the World Wars period, Friuli-Venezia Giulia is the most militarized region in Italy, with particular attention to the border area of Carnia territory. Over 50% of the regional territory is served by military structures and defensive works which, after the fall of the Berlin Wall, are disposed from their original functions.

In 2022, the war sites in abandoned conditions regards numerous defensive structures such as trenches, observatories, barracks, military accommodations, shooting ranges, powder storages

buildings and battalion stations. These buildings not only refer to the World Wars period, but also to the Cold War, a moment of further militarization of the region in prevision of possible attacks. In particular, a place of relevant importance during the Cold War phase is the military site of Monte Scinauz, a completely abandoned space on the top of the mountain connected through an ancient cableway.

Beside the military side, the territory is also full of old abandoned villages with a relevant architectural and cultural value which are disappearing within woods vegetations.

The preservation of the existing heritage, together with the valorisation of the abandoned areas above described, represents the way through which economically enhance the Friulan territory. The region is, in fact, an open-air museum able to attract the interest of tourists offering a wide range of treasures to discover.

2 Cableway and military site of Monte Scinauz



Figure 2.1 Location map of Monte Scinauz.

Source: https://it.wikipedia.org/wiki/Monte_Scinauz

Monte Scinauz is a massif of the Catena Carnica Orientale, a mountain group of Alpi Carniche rising between Italy and Austria, more precisely between Friuli-Venezia Giulia and Carinthia regions. The mountain is located within the municipality of Pontebba, in Udine province, a territory entirely included in the Canal del Ferro valley which separates Alpi Carniche from Alpi Giulie. Its peak is 1.999 meters high and it is visible from the A23 highway, travelling towards the Italy-Austria state border.

Monte Scinauz is the site of the 17° Radar Group of the Military Air Force, a base consisting of two military stations, a downstream and an upstream station, linked by a cableway. Despite its visibility, the place is quite unknown and surrounded by a mystery atmosphere. The secrecy is connected to the strong military restrictions imposed by NATO, due to national defence and control reasons. The building complex of Monte Scinauz is, therefore, defined as “The ghost base” which, thanks to its strategic position, dominates the Alpi Carniche landscape.

2.1 Historical background

The radar base mentioned above is set in the complex historical background of the Cold War.

The “Cold War” term refers to the political, ideological and military conflict originated around 1947 between the two winning powers of the Second World War, the United States and the Soviet Union. The conflict concerns the political and economic contraposition among two completely different ideologies: the capitalist democracy on one hand, with its system of enterprises owned and controlled by private citizens to make profits, and the real socialism-communism on the other, based on absence of private property and total control of the State in any aspect of life.

This opposition context, which strongly influences the world public opinion for decades, is concretely proved by the division of Germany into West and East through the Berlin Wall and by the so called “Cortina di Ferro” defining the territorial division between Western and Eastern Europe, respectively under the influence of the United States and the Soviet Union.

The resulting tension, lasting about 50 years, never materialises into a direct military conflict and this is the reason why the “Cold War” term arises. The hostility, in fact, cannot be solved by a frontal military collision, but it is played out on different fields such as technological, space, psychological and sporting plans. In particular, the testing of the first nuclear weapons starts as a result of the two main powers to demonstrate an absolute superiority. Beside that, another important competition area regards the space exploration. In 1957, Soviet Union launches into space the first artificial satellite of the world, the so called “Sputnik”, while in 1969, United States send the first human on the moon, the well-known Neil Armstrong of the Apollo 11 Mission.

The radar base of Monte Scinauz is, therefore, placed in this context characterized by continuous arms races and militarization of territories. The site, built in 1972, is part of the extensive NATO radar network and it has the task to control the airspace of Central and Eastern Europe from possible attacks. The construction reason dates back to 1969, when a Hungarian fighter plane, flying towards Italian territory, lands on the runway of the abandoned Osoppo airport realized during the Second World War. The event highlights the existence of some hidden areas from the radar control available along the Eastern Italian border and, consequently, requires an immediate intervention.

2.2 The Pontebba-Monte Scinauz Cableway

The military site hosting the radar base is located on the top of Monte Scinauz. Due to its high slope, the mountain is extremely difficult to climb on foot, especially in winter months, and requires a cableway able to provide an easy and alternative access to the helicopter (Figure 2.2). For this reason, in 1972, the Monte Scinauz Cableway is built, connecting the peak of the mountain to the underlying Laglesie San Leopoldo hamlet, in the municipality of Pontebba. Realized by Agudio Engineering Company, it is an innovative system for the historical period, able to overcome an altitude difference of about 1.400 meters. The Pontebba-Monte Scinauz Cableway is considered, in fact, the highest altitude installation built at that time (Figure 2.3).



Figure 2.2 Photograph of Monte Scinauz Cableway in operation during winter months.

Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>

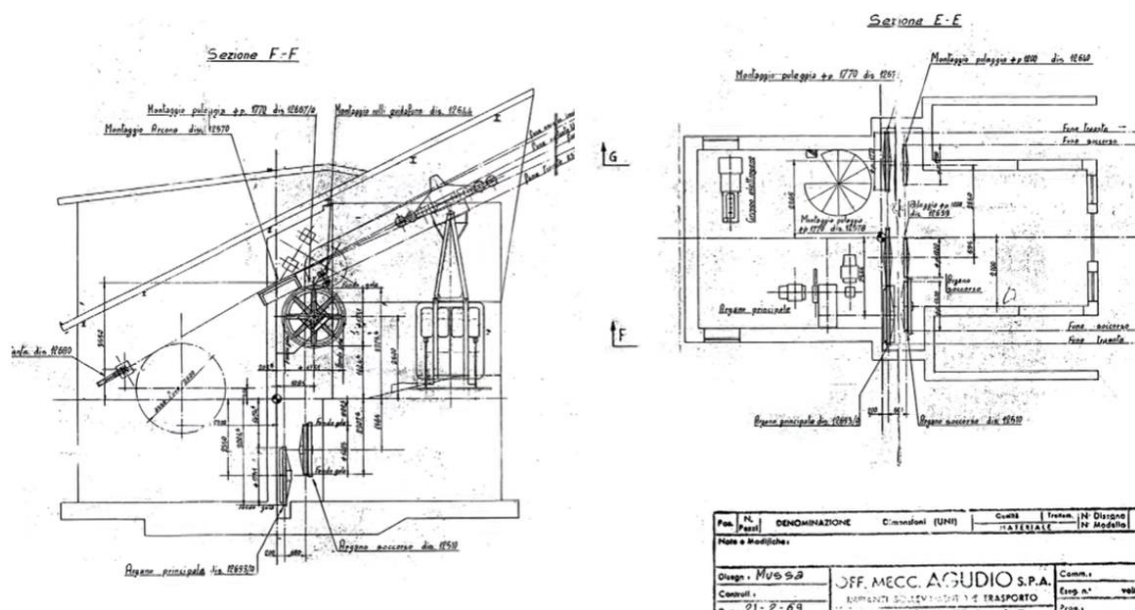


Figure 2.3 Project design of the cableway system by Agudio Engineering Company.

Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>

In 2003, the Cableway is closed from its functioning and, during summer 2009, ropes and supports are disposed for security reasons due to the abandoned state of the system.

In 2022, the remaining part consists of an upstream and a downstream building with a reinforced concrete structure (Figure 2.4 and Figure 2.5). The downstream station is placed within a complex of other small structures representing the old logistic base with the warehouses and the command station, previously guarded by the commanding officer and four military soldiers. The upstream station is built beside a structure intended as power station and boilers room. In the past, the power station hosted four generator sets providing power supply for the whole military site. Despite no longer present in the generator room, historical photographs show their existence: they were 40 kW units with an Iveco Aifo 8041 engine, with a small shape and low weight in order to facilitate replacement and transport by cableway (Figure 2.6).



Figure 2.4 Downstream station of Monte Scinauz Cableway.

Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>



Figure 2.5 Upstream station of Monte Scinauz Cableway.

Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>



Figure 2.6 The power station of the military site in the upstream station.

Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>

The cableway section was 2.861 meters long and divided into three spans of 600, 100 and 2.161 meters, moving from downstream to the top of the mountain. The run took 12 minutes with a maximum speed of 4,5 m/s. The third span, in particular, provided for a 995 meters drop into the void. The system was characterized by a double rope, a carrying and a hauling rope of 38 and 19 mm diameter respectively. In addition, there was a rescue rope of 15 mm diameter.

The control room and the motor winch, still present in the structure, are located in the downstream station where it is possible to notice the two cableway cabins. More in detail, there is a cabin for transporting people with a maximum capacity of 1.000 Kg (corresponding to 12 people) and a carriage for moving goods, like materials and supplies. The power of the motor winch was 60 kW for the primary engine, while 44 and 25 kW for the reserve and rescue engines respectively (Figure 2.7). The set of counterweights is placed, instead, in the upstream station and it is another visible element of the historical installation.



Figure 2.7 The cableway motor winch in the downstream station.

Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>

The cableway was powered by diesel. Every day, due to the high consumption levels, the two external tanks connected to the motor winch room were refilled. The diesel barrels, typically 600 litres each, were also sent to the peak station by cableway in order to supply the power station and the boilers.

Despite the whole buildings results in bad maintenance conditions from a structural viewpoint, the cableway has an advanced technological and safety system, thanks to the refurbishment intervention carried out around 1990. The abandonment state of the site represents a loss of value for the region, both from a landscape and an economic viewpoint. This historical heritage, in fact, since characterized by technical components comparable to modern systems open to the public, could be better exploited and valorised.

2.3 The military site of Monte Scinauz

The military site on the top of Monte Scinauz, formerly accessible through the cableway above described, consists of a set of buildings realized in 1972, simultaneously with the radar installation. Before starting construction works, to avoid paying for high altitude work allowances over 2.000 meters, the peak of the mountain is artificially flattened and lowered by 8 meters. This is the reason why Monte Scinauz is 1.999 meters high.

The structures of the military site are intended for different uses: beside the cableway building there is a power station which hosted generator sets, while, following in the direction of the highest part of the peak, a barrack for military accommodation, an electronic apparatus station with the radar base and a cell towers building are visible. All installations are interconnected by a tunnel running over the top of the mountain and, thanks to the presence of a heliport, the site can be also reached by helicopter (Figure 2.8 and Figure 2.9).

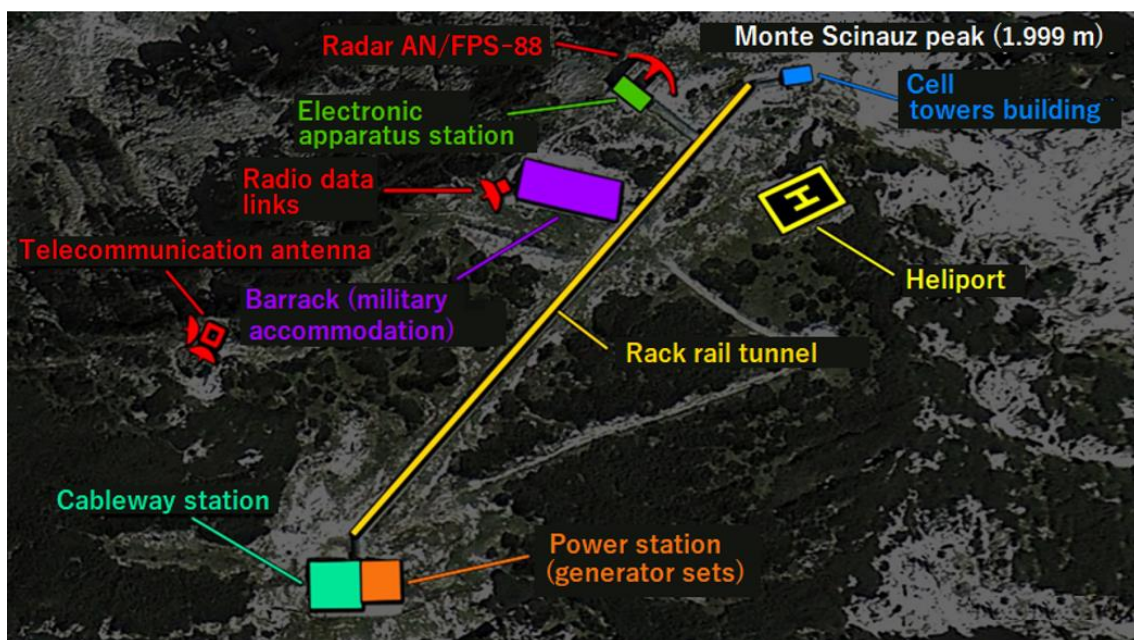


Figure 2.8 Map of the military site of Monte Scinauz.

Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>



Figure 2.9 Military structures of the site: barrack, electronic apparatus station and cell towers building.

Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>

The connecting tunnel is a 300 meters long passage in galvanized metal sheet, built in 1995 to replace the old and inadequate wooden structure (Figure 2.10). When the base was operational, the purpose of this structure was to provide a link between the military site installations and the cableway station, protecting from cold and snow during the winter months. Inside the tunnel there is an inclined rack rail with a sliding carriage system used for transporting water, food and diesel supplies (Figure 2.11). In 2022, the carriage system is in good conditions, as well as the components of its electrical system renewed in the 1990s.



Figure 2.10 The old tunnel in wooden structure.

Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>



Figure 2.11 The galvanized metal sheet tunnel with the inclined rack rail and the carriage system.

Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>

The largest building on the site is the barrack intended as accommodation for the altitude military staff. In general, the staff was composed of two technical non-commissioned officers and three conscripts to the VAM, the Military Air Force Vigilance. Besides the accommodation part including bedrooms, bathrooms, a living room, a kitchen and a pantry, the building hosted a storage room, an arms room, an office, a radio room and a thermal power station (Figure 2.12). In this last technical room, there are two boilers with a double circuit able to guarantee heating to the structure even in case of breakdown of the operational boiler.

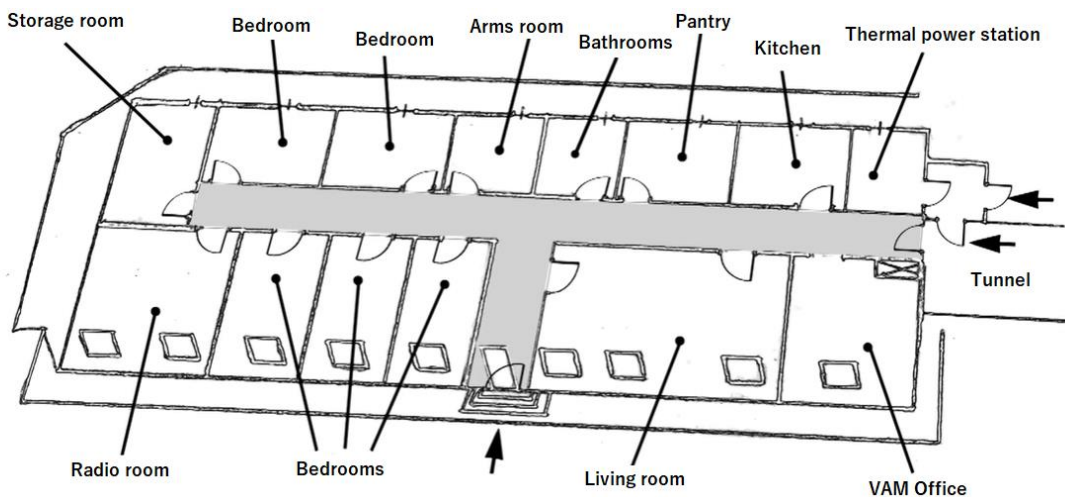


Figure 2.12 Plan of the barrack for military accommodation.

Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>

2.3.1 The radar base and the electronic apparatus station

The heart of the military site is represented by the radar base located in the electronic apparatus station.

The “Radar” term, standing for “Radio detection and ranging”, refers to a system able to detect speed and positions of different objects and phenomena such as planes, ships, vehicles and atmospheric formations. A radar installation is composed of a transmitter of electromagnetic waves, in particular radio waves, an antenna with both transmitting and receiving functions, a transfer waveguide and an electronic equipment to process the received signal. Other two important components are a clock device, able to accurately measure small intervals of time, and a bidimensional viewer showing speed and distance of the identified object.

Any radar system works on the basis of the electromagnetic radiation backscattering: this physical phenomenon occurs when the radio waves, after hitting an object larger than the wavelength of the incident radiation, return to the radar receiving antenna. The returning pulse is processed by an equipment which, measuring the interval of time between transmission and reception of the signal, defines the distance of the object. Considering the propagation speed of the electromagnetic wave in the air, the distance is calculated using the following formula:

$$D = \frac{299.792,458 \times s}{2}$$

where:

- D is the object distance in Km, also called “Radar distance measurement”;
- $299.792,458$ is the number of Km covered in one Second moving at the speed of the electromagnetic wave in the air (approximately equal to the speed of light);
- s is the number of seconds taken by the wave to get the object and return to the antenna.

As already mentioned, a radar system can be adopted in different fields, thanks to a useful technology able to detect an object or phenomenon in advance. In 2022, it is widely used for civil air traffic control, meteorological forecast and measurement of vehicle speeds. Besides that, the radar application is still widespread in the military sector with the presence of the Italian Air Force bases which, within their area of responsibility, constantly monitor the airspace and ensure the transfer of information to the other units of the control chain.

The historical phase most interested in the use of radar technology in the military field is the Cold War period. In 1980 the Italian air defence is part of the NATO organization and the radar units are integrated into an automated system called NADGE, NATO Air Defence Ground Environment. The NADGE system is a modernization programme of the NATO radar network that includes the addition of components for automatic data processing and transmission. It allows a real-time update of the airspace situation, reducing the margin of data approximation due to the activity of manual operators.

During the operating years, the 17° Radar Group of the Military Air Force, the so-called radar base of Monte Scinauz, was part of the NATO programme above described. The system, identified with the “Pedro” name in radio communications, was remotely controlled through the operational base located in Portogruaro, a municipality of the Venice province in Veneto region. The function of Portogruaro base consisted in receiving the air picture captured by the unit installed on Monte Scinauz and processing the data. Thanks to this link, the high-altitude radar base did not include any operational room and only required the presence of the staff responsible for equipment operation. Originally, the idea intended to locate the radar operational base in an area called “Lame” near Concordia Sagittaria, a Venetian municipality next to Portogruaro. However, due to the high exposure to flooding, only the logistic base was built in this site.

Monte Scinauz radar system was a medium power unit developed by General Electric, the most powerful multinational company active in the field of technology and services. The model, produced in the 1950s in United States and updated in 1960 with an improved signal processor, was installed on the mountain peak in 1972, the year of construction of the military site (Figure 2.13).

The radar was an AN/FPS-88 model operating along a range of 407,4 Km and reaching a maximum altitude of 30.480 meters. Average power was equal to 1,1 kW, peak power could achieve 1 MW, while work frequency was between 1.280 and 1.380 MHz. The electronic apparatus, as the whole military site, was powered by the generators sets in the upstream station (Figure 2.14).

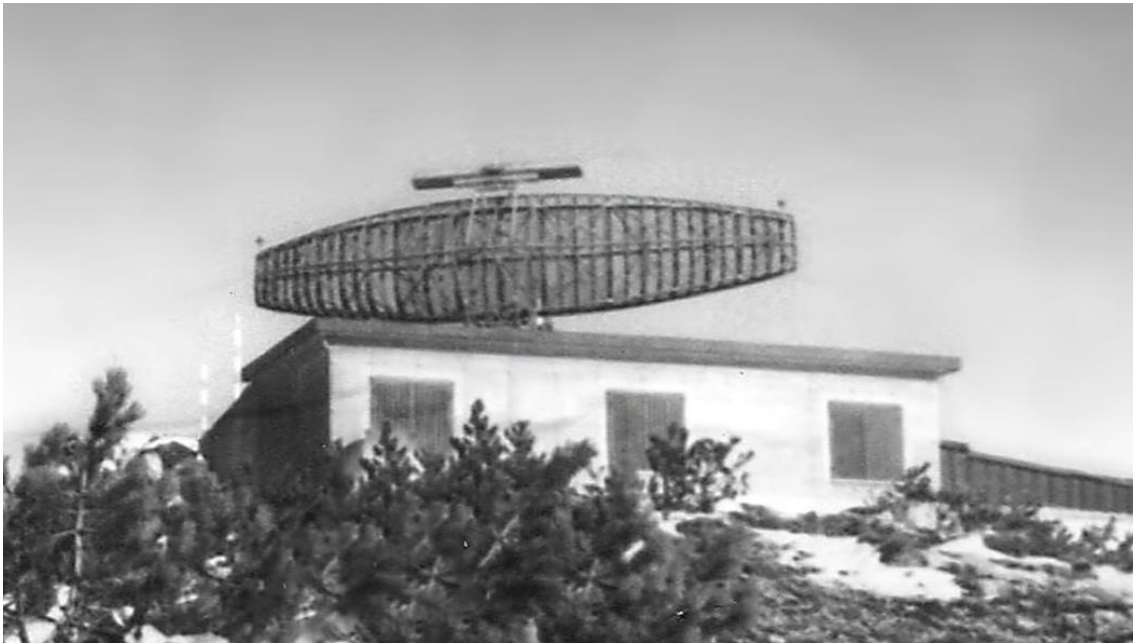


Figure 2.13 Photograph of the 17° Radar Group of the Military Air Force during the operating years.

Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>

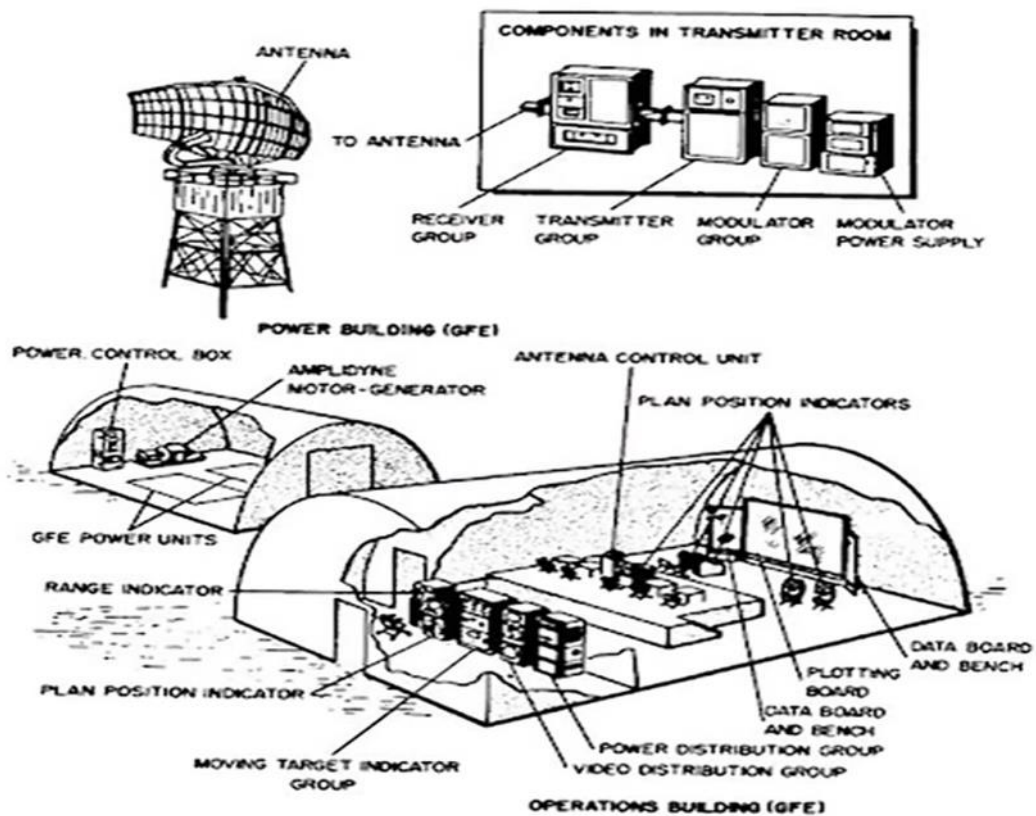


Figure 2.14 Picture showing the electronic apparatus station supporting the radar.

Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>

In 2001, the system is disabled and two years later, in 2003, the radar is removed with the consequent closure of the operational base in Portogruaro. The remaining part only concerns the rotating support with the waveguide, still in good conditions (Figure 2.15).



Figure 2.15 The remaining rotating support with the waveguide.

Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>

In 2022, the military site is in a state of abandonment, but it still shows all the ancient structures exploited during the Cold War period. The idea of valorising the place, disclosing its cultural heritage, can be an interesting tool through which preserve the memory of an important historical phase.

3 Objective and valorisation reasons

3.1 Objective: revival of a significant historical and cultural heritage

As revealed in the two previous chapters, the tourism sector is a strength of Italy. The exploitation of the most popular sites, for cultural and leisure activities, and the valorisation of the numerous abandoned places represent a fundamental contribution to the economy of the Country. In a situation of global crisis, such as the spread of the Covid-19 pandemic at the beginning of 2020, Italy can leverage on this wide heritage as successful strategy in the economic recovery intent. More in detail, Friuli-Venezia Giulia is a territory characterized by a diversified touristic offering and a high number of historical war sites which, due to their state of abandonment, make the region the perfect location to carry out the analysis.

Objective of this thesis is, therefore, the demonstration of the approach just described, showing its effectiveness through an application in a tangible case study, the military site of Monte Scinauz. The project proposed is intended to prove how the revival of a significant historical and cultural heritage is able to produce an added value in the corresponding territorial context. The added value has to be intended from different viewpoints concerning, beside the classical economic sphere, also the environmental, cultural and social levels. The economic value of the proposal derives from the implementation of the project itself, allowing to get a financial profit through the touristic exploitation of an already existing heritage. Similarly, the project is able to produce an environmental benefit as a result of an abandoned area regeneration and landscape valorisation. Other two relevant advantages concern the cultural and social fields, respectively correlated to the revival of a specific historical knowledge and to the promotion of a local identity. These areas, also defined as the “Four pillars of sustainable development”, represent a goal of this project and provide clear evidence of the positive impact generated by the valorisation of a cultural and historical asset.

3.2 Valorisation reasons

3.2.1 An important military base related to the Cold War

From 1950s, Italy represents a crucial area in the Cold War conflict between United States and Soviet Union. In 1949, the Country joins the NATO military alliance, the North Atlantic Treaty

Organization, with the aim of defending all the Member States from the possible Soviet attacks. To carry out its task, the Organization establishes a set of radar bases under the control of the Air Force, since the prediction of aircraft movements is the most effective tool in the defensive field. The centrality of Italy into the conflict is, therefore, explained by its geographical position, which, in proximity to the Soviet territory, allows a more efficient use of the radar technology.

The 17° Radar Group of the Military Air Force, displayed on the peak of Monte Scinauz, represents a fundamental military base operating on the Italian territory during the Cold War. Its importance is given by the strategic location, able to detect military aircrafts beyond the national borders and distinguish them from civil planes. Another relevant aspect is the capability of this radar operating range to reach the region of Bavaria with a 24 hours per day supervision, sending, at the same time, the warning signal to the nearby radar groups. The importance played by this military installation during the Cold War is, therefore, one of its valorisation reasons, aimed at pointing out a relevant historical phase.

3.2.2 Interesting historical and cultural sites in the surroundings

Monte Scinauz is characterized by the presence of many historical and cultural sites visitable in its surroundings. The underlying map shows some of the most important (Figure 3.1).

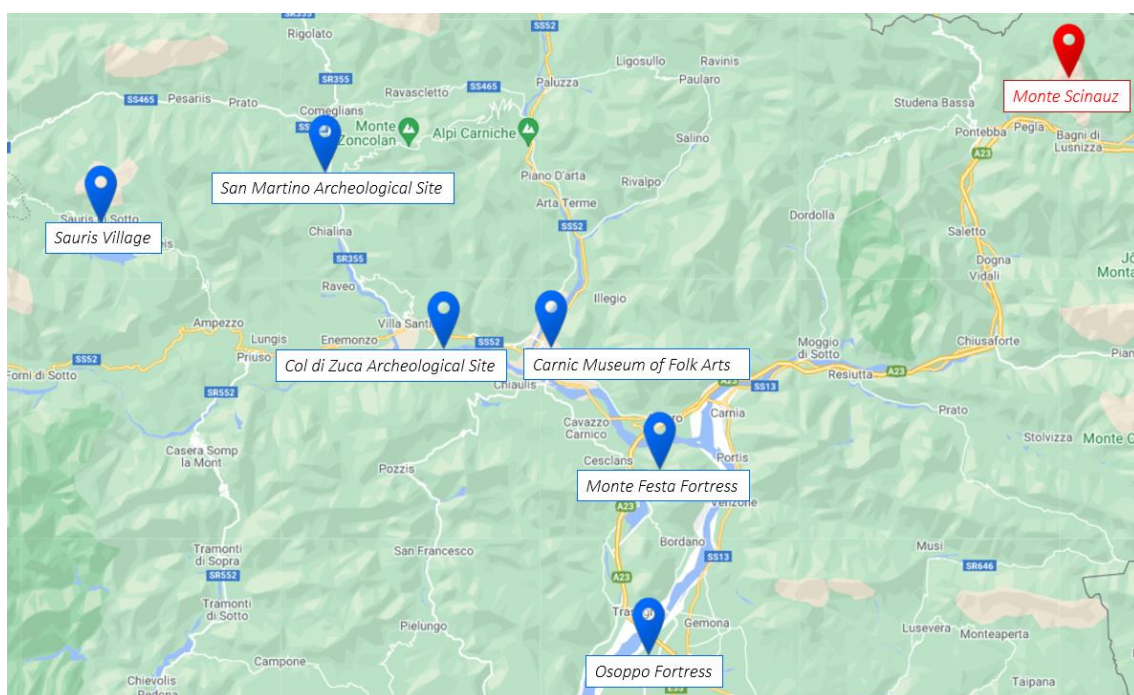


Figure 3.1 Location of some historical and cultural sites in the surroundings of Monte Scinauz.

Source: <https://www.formaps.it/>

3.2.2.1 Col di Zuca Archeological Site

The archeological site of Col di Zuca concerns the remains of a Paleo Christian Cathedral, discovered between 1972 and 1974 on the homonymous hill in the municipality of Villa Santina, in Udine province. The architectural complex had a rectangular plant of slightly more than 400 square metres, with perimeter walls of 60 cm thick and built using the herringbone technique. The access was placed on the short west side of the Cathedral, connected to the major area of the church through a vestibule. The central space was characterized by the presence of a semi-circular altar and a square presbytery, both on a raised pavement, and it was decorated with precious geometric mosaics on the floor (Figure 3.2 and Figure 3.3). The presbytery gave access to a series of rooms and, in particular, to the trichora, a space with three apses and intended for baptisms and relic veneration.



Figure 3.2 Remains of the Paleo Christian Cathedral.
Source: <https://www.carnia.it/it/argomento/sito-archeologico-col-di-zuca/identificatore/1858>



Figure 3.3 Mosaic floor decorations and iron-plexiglass roof. Source: <https://www.carnia.it/it/argomento/sito-archeologico-col-di-zuca/identificatore/1858>

The Cathedral remains, visible in the archeological site in a good state of preservation, are protected by a large iron-plexiglass roof and refer to some parts of the perimeter walls, to the raised pavements of the altar and the presbytery and to some pieces of the mosaic floor decorations. The position of the site, located near an ancient important road, as well as the size of the Cathedral remains and the richness of its decorations, shows the Paleo Christian complex of Col di Zuca as one of the central worship places in Carnia. The church was probably used by a large community and it was also known as pilgrimage destination.

3.2.2.2 San Martino Archeological Site

The archeological site of San Martino concerns the remains of a Paleo Christian architectural complex, discovered in 1990s under the church of the municipality of Ovaro, in Udine province. More in detail, the site concerns the remains of an ancient Cathedral characterized by a surface area of over 400 square metres and perimeter walls built a few metres beyond the actual gothic church (Figure 3.4).



Figure 3.4 The actual gothic church of San Martino with the archeological site.

Source: <https://www.carnia.it/it/argomento/sito-archeologico-san-martino/identificatore/1859>

The Paleo Christian Cathedral, dating back to the 5th century, was structured into three main parts: a baptistery, a north area and a south area. The baptistery was an independent building, detached from the Cathedral, and centred on the walls of the actual church. The only remaining element of the structure is the hexagonal baptismal font, emerging from the floor of San Martino church and representing the main element of the archaeological site (Figure 3.5). The northern and southern areas remains are visible, instead, in the external part of the excavations (Figure 3.6). The northern area was intended for the catechesis of the baptismal candidates, while the southern one was used for the Eucharist Celebration and it was characterized by the “Presbyteral bench”, a typical element of the Paleo Christian architecture in Aquileia reserved for the presbyters during liturgies.



Figure 3.5 The hexagonal baptismal font.

Source: <https://www.archeocartafvg.it/portfolio-articoli/ovaro-ud-la-chiesa-di-san-martino/>



Figure 3.6 Remains of the Paleo Christian Cathedral.

Source: <https://www.archeocartafvg.it/portfolio-articoli/ovaro-ud-la-chiesa-di-san-martino/>

Thanks to the importance that the Cathedral covered in the Christianisation of the ancient Alpine populations and to the considerable extension of the archeological remains, the Ovaro site represents an important historical evidence for the Carnia territory. Even on a national level, the archaeological site shows its uniqueness as one of the largest baptismal complexes found in Italy.

3.2.2.3 Carnic Museum of Folk Arts



Figure 3.7 Campeis Palace in Tolmezzo: building hosting the Carnic Museum of Folk Arts. Source:

<https://www.archeocartafvg.it/portfolio-articoli/tolmezzo-ud-museo-delle-arti-e-tradizioni-popolari-m-gortani/>

The Carnic Museum of Folk Arts, also known as “Michele Gortani Museum”, is the most important exhibition of Carnic tradition displayed in a 17th century palace in Tolmezzo, a municipality in Udine province (Figure 3.7). The exposed material concerns a rich ethnographic, artistic and craft collection involving all the aspects of Carnia traditions and life, from the 14th to the 19th century.

The museum is organised in 30 rooms, part of which is devoted to the reconstruction of typical ancient spaces such as the kitchen, the bedroom and the carpenter workshop (Figure 3.8). Some specific sections host the exhibition of portraits, handicraft and pastoral tools, ceramics, music instruments and popular clothing (Figure 3.9). The collection of clothes and embroideries is particularly relevant for the Carnic tradition, since the experience gained in the area is exported on the national territory and abroad. A special room is dedicated to the popular religiosity, documenting how this aspect is fundamental for understanding daily life habits of the Carnic community.



Figure 3.8 Museum reconstruction of a typical kitchen. Source: <https://www.carniamusei.org/museo.html?entityID=416>

Figure 3.9 Museum portraits section. Source: <https://www.carniamusei.org/museo.html?entityID=416>:

Thanks to the richness and quality of the witnesses collected, the Carnic Museum of Folk Arts is one of the major ethnographic museums in Europe. The extensive research and collection work is carried out since 1920 by the Senator and Professor Michele Gortani, an Italian scholar from which the museum takes its name.

3.2.2.4 Monte Festa Fortress



Figure 3.10 Monte Festa Fortress on the mountain peak.

Source: <https://caisag.ts.it/m-festa-2021/>



Figure 3.11 Remaining parts of the fortress.

Source: <https://www.turismofvg.it/forte-di-monte-festa>

The fortress of Monte Festa is one of the major military structures realized in Friuli-Venezia Giulia in the early 1900s. Monte Festa is a mountain of pre-Alpi Carniche, located between the Cavazzo Lake and the Tagliamento River, under the municipality of Bordano, in Udine province.

The complex, rising on the top of the mountain at an altitude of 1060 meters, consists in a defensive building operating in the First World War and characterized by a shape that follows the natural morphology of the peak (Figure 3.10). The fortress is used as a military observatory until 1917, when, due to the Italian failure in the Caporetto battle, Austrian-German military forces cross the Italian borders and start to move towards the Friulan plain. In that specific occasion, Monte Festa becomes the defensive heart of Italy, contrasting the enemy access for about a week and allowing the Italian soldiers to recover from their defeat. The fortress resistance lasts as long as munitions are available and then, the structure is abandoned with a consequent Italian retreat.

Despite the extensive weather damages, the building is still in place and it is reachable through the CAI path n. 838. At an altitude of 980 metres, there are the first remains of the complex: ruins of some barracks, storages and structures intended as accommodation of soldiers. On the top of the mountain, there is the centre of the fortress characterized by two armed batteries with a hosting capacity of four cannons (Figure 3.11). Other important elements are represented by the two caves with the function of munitions storage and freight elevator and some tunnels connecting the different parts of the structure.

3.2.2.5 Osoppo Fortress



Figure 3.12 Northern area of the Osoppo Fortress.

Source: <https://www.cherryintrip.com/cosa-vedere-alla-fortezza-di-osoppo/>



Figure 3.13 Southern area of the Osoppo Fortress.

Source: <https://www.cherryintrip.com/cosa-vedere-alla-fortezza-di-osoppo/>

The fortress of Osoppo is an historical and naturalistic heritage characterizing the Friulan territory for its secular importance. The complex, started as an ancient Celtic settlement, becomes a Roman fortress and one of the fundamental defensive structures of the Venice Republic that, in the middle 1800s war, fights against the Austro-Hungarian forces. In 1900, the fortress is included in the defensive system of the Alto Tagliamento-Val Fella with the addition of some military structures related to the First World War. Thanks to the historical significance of the site, in 1923, Osoppo Fortress is declared “National Monument” and becomes an open-air museum, also used for holding cultural events.

The site is located on a hill rising in the northern part of the municipality of Osoppo, in Udine province. It is accessible following the so called “Napoleonic Road”, which connect the centre of the town with the above fortress. The Osoppo site is divided into two parts, a northern and a southern area both characterised by the presence of an armed battery. The north area shows the ruins of an old structure known as “The house of the Commander”, the accommodation of the highest military ranks with some Roman pavement remains. The location is also characterized by several underground passages leading to the Osoppo-North Battery, some barracks, a 17th century church and a structure hosting a permanent exhibition on the fortress history (Figure 3.12). The south area, instead, displays the ruins of an ancient castle with the name of Castel Novo, a building consisting of three c-shaped curtain walls arranged around a square courtyard. The most relevant

aspect of this site part is represented by the Osoppo-South Battery consisting of four concrete cavities used to place cannons (Figure 3.13). The two sites constituting the fortress are connected through a naturalistic path characterized by a suggestive panoramic view over the underlying municipality of Osoppo.

3.2.2.6 Sauris Village



Figure 3.14 Sauris Village landscape.

Source: <https://www.sauris.org/photogallery/>



Figure 3.15 Wooden houses realized with the blockbau

technique. Source: <https://www.sauris.org/photogallery/>

Sauris is a municipality of 390 inhabitants of the Carnic territory, in Udine province, divided in the two localities of Sauris di Sopra and Sauris di Sotto. More precisely, Sauris is a small mountain village set in a natural landscape which, due to its poor accessibility, preserves intact its history, traditions, language and architecture (Figure 3.14). The history of the village has ancient origins: according to the legend, the first inhabitants were two soldiers coming from a valley between Carinthia and Tyrol who were seeking for a shelter. For this reason, the spoken language is the so called “Sauran dialect”, a synthesis of the German and Carnic culture. The carnival tradition is the best known in the area, characterized by beautiful and ugly masks which usually wear old clothes. Typical element of the village is the set of stone and wooden houses realized with the blockbau technique, a construction style which consists in building walls by stacking whole logs one on the other (Figure 3.15). Sauris is also known for its ham, a gastronomic product that owes its uniqueness to the special method of smoking, carried out by burning local woods. Two interesting sites to visit are the sanctuary and the museum of Sant Osvaldo located in Sauris di Sotto. The

sanctuary dates back to 1300 and represents an important pilgrimage destination, while the museum, collecting ancient parchments, describes the religious life of this small community.

The relevance of Sauris village lies, therefore, in the capacity of this place to preserve its origins: keeping evidence of the traditions, it represents, in fact, a symbol of the Carnic territory.

3.2.3 The presence of naturalistic hiking paths

The area of Monte Scinauz is characterized by the presence of naturalistic hiking paths inserted in a fascinating landscape. The mountain is located, in fact, in the Tarvisio Forest, a woodland area extended along Alpi Carniche and Alpi Giulie, on the border with Austria and Slovenia. Tarvisio is the largest Italian State Forest with an extension of 24.000 hectares which, thanks to the variety of flora and fauna offered, represents one of the most valuable naturalistic area in Italy. More in detail, the East and South sides of the Scinauz fall within the Rio Bianco State Reserve, a protected area in the Tarvisio Forest at an altitude between 700 and 1.000 metres.

There are three hiking paths connecting to the peak of Monte Scinauz: "Santa Caterina" path, "Vallone degli Uccelli" path and "Passo Pramollo" path. The first two routes, presenting some destroyed portions due to the 2003 flooding, are not accessible. Santa Caterina path runs along a ridge of the mountain in direction from south-east to north-west, while Vallone degli Uccelli path is an impervious way opened by hunters and bordering Monte Brizzia and Monte Bruca. Both of them are characterized by the presence of tunnels and military constructions from the First World War in their proximity.

Passo Pramollo is the only practicable path along the North side of the mountain which, due to the extensive length, the high slope and the difficult identification, is intended for experienced hikers. The starting point is located at Passo Pramollo, the alpine pass between Italy and Austria in the Pontebba municipality. In particular, the route starts near the hotel restaurant "Gallo Forcello", placed in front of the Pramollo lake at an altitude of 1.500 meters, and follows the CAI path n. 504. With a length of 23 Km, an altitude difference of about 500 metres and a walking time of approximately 5 hours, the path leads to the top of Monte Scinauz passing through an alpine pasture, the so called "Biffil Alpine Hut", and an exposed section known as "Gola degli Uccelli" (Figure 3.16).

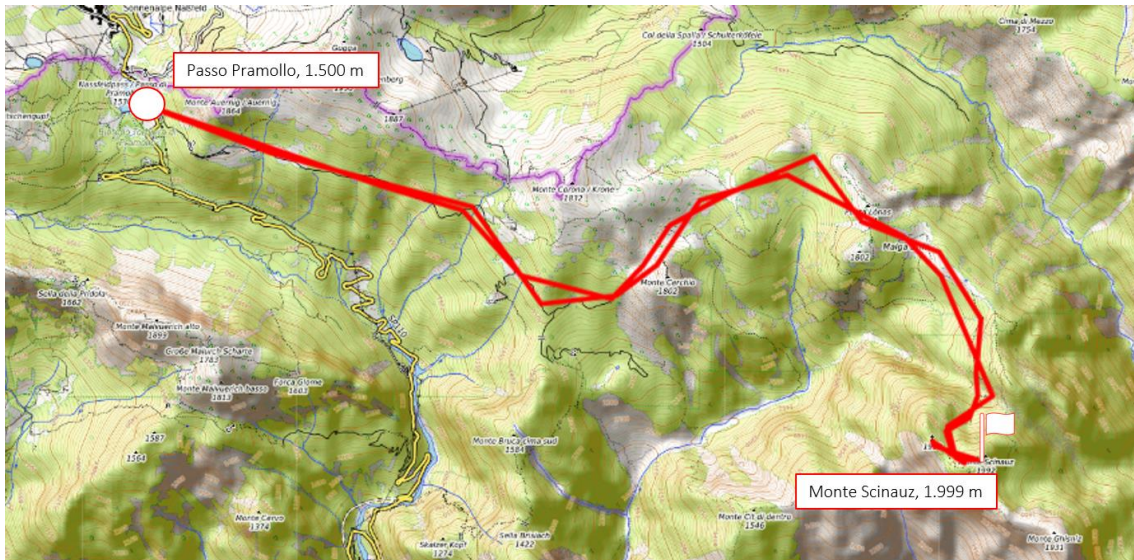


Figure 3.16 Passo Pramollo hiking path. Source: <http://www.sentierinatura.it/>

Beside the Monte Scinauz hiking paths, Carnia territory offers a wide range of tracks allowing to discover hidden places only accessible on foot. Carnia routes have different levels of difficulties, from the easiest ones for the beginners to the most difficult reserved to the hiking experts.

Two important easy tracks are represented by “Pian delle Streghe” path and “Campanili Lander” path. The first one, starting from Pian delle Streghe locality at an altitude of 1.454 metres and following the CAI path n. 154, leads to Monte Tenchia, a mountain inserted in a suggestive landscape setting at 1.840 meters (Figure 3.17). The second one follows the CAI path n. 408 from Piano d’Arta locality, at an altitude of 560 metres, to Monte Bivacco at 1.175 meters. The relevant aspect of Monte Bivacco is the presence of impressive rock pinnacles, up to ten metres high, known as “Campanili del Lander” (Figure 3.18).

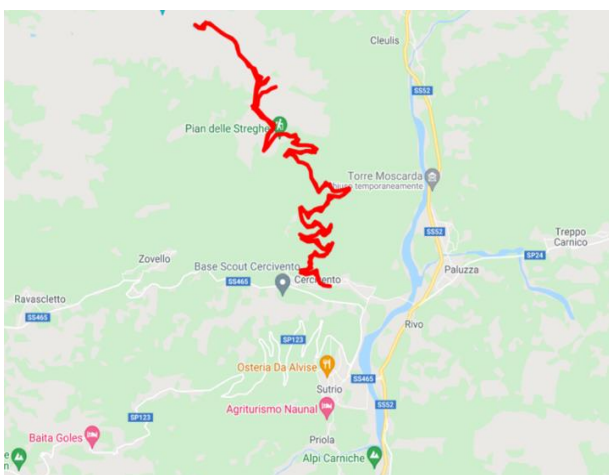


Figure 3.17 Pian delle Streghe path. Source:

<https://www.carnia.it/it/idea-vacanza/percorsi-trekking>

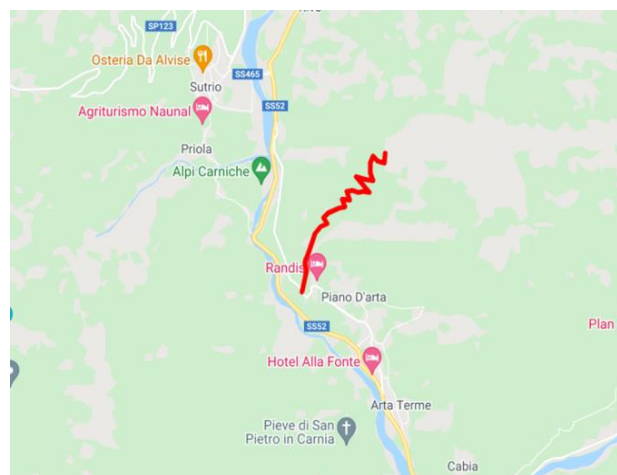


Figure 3.18 Campanili Lander path. Source:

<https://www.carnia.it/it/idea-vacanza/percorsi-trekking>

The most difficult tracks allow, instead, to reach some important Carnic peaks. “Monte Dauda” path, for instance, is a circular route leading to the top of the homonymous mountain going through forests, alpine pastures and an alpine hut. It starts from Felis municipality at an altitude of 835 metres and get to Monte Dauda peak at 1.765 meters (Figure 3.19). Another example is represented by “Monte Arvenis” path which connect the municipality of Noiaris, at an altitude of 550 metres, to the top of the Arvenis at 1.968 meters (Figure 3.20).

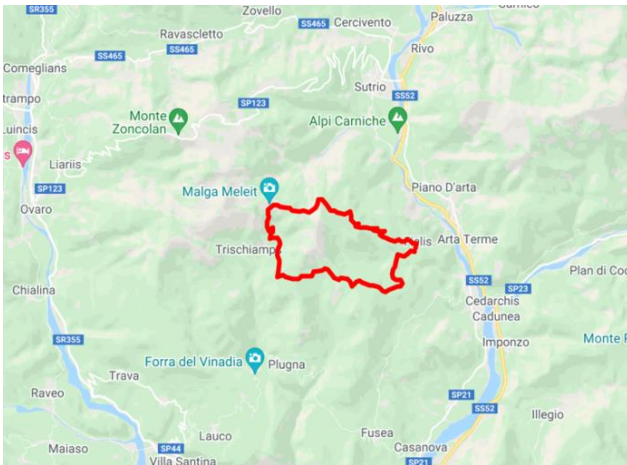


Figure 3.19 Monte Dauda path. Source:

<https://www.carnia.it/it/idea-vacanza/percorsi-trekking>

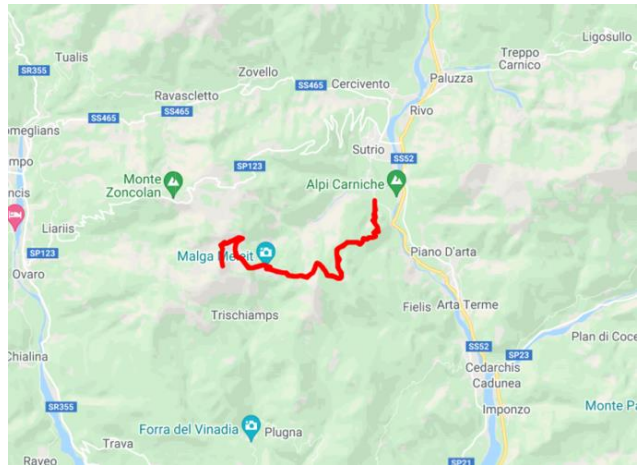


Figure 3.20 Monte Arvenis path. Source:

<https://www.carnia.it/it/idea-vacanza/percorsi-trekking>

3.2.4 Location accessibility

As already mentioned in chapter two, the Pontebba-Monte Scinauz Cableway connects the peak of the mountain to the underlying Laglesie San Leopoldo locality. Laglesie San Leopoldo is a hamlet of the Pontebba municipality which, thanks to the proximity with the A23 Palmanova-Tarvisio Highway, presents a very good accessibility with private vehicles. The Pontebba highway exit is, in fact, at 1,7 Km from the downstream station of the cableway following the State Road SS13 (Figure 3.21).

Accessibility is also good by public transport: the hamlet, in fact, is served with a bus stop located 500 meters from the downstream station of Monte Scinauz Cableway. The bus line is the n. 200 and it connects Laglesie San Leopoldo with the Pontebba train station at a distance of 3,3 Km. The station is served by several regional train lines to Tarvisio, Udine and Trieste (Figure 3.22).

Concerning the service offered, Laglesie San Leopoldo is characterized by the presence of two typical restaurants, while the nearby town of Pontebba hosts two hotels, some restaurants, bar and supermarkets. In addition, following the SS13 from Laglesie San Leopoldo in the Tarvisio direction, many facilities distinguished in hotels and restaurants are displayed along the road.

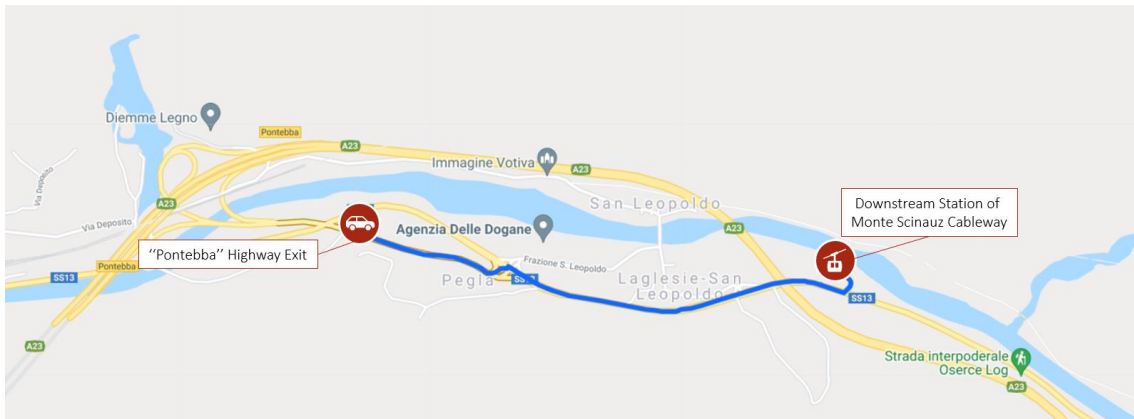


Figure 3.21 Distance of the cableway site from the A23 Highway.

Source: <https://www.google.com/intl/it/maps/about/mymaps/>

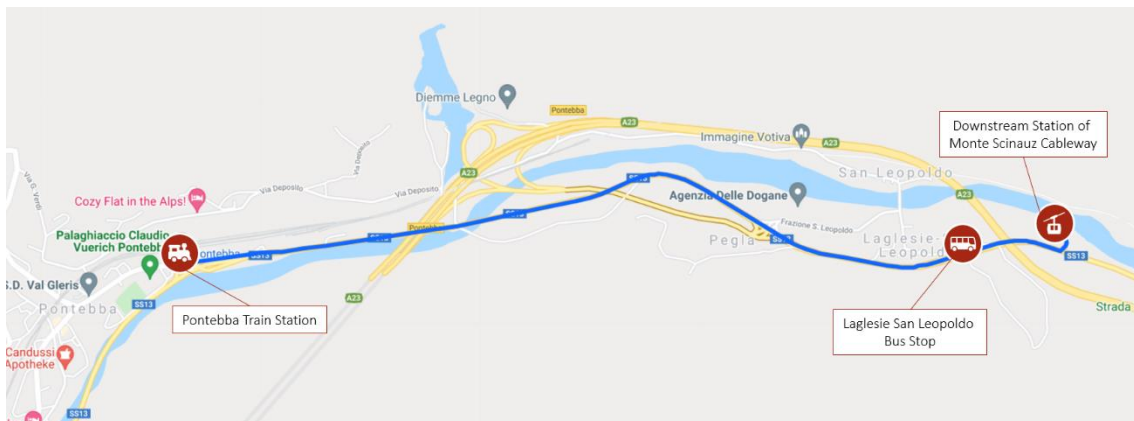


Figure 3.22 Accessibility to the cableway site by public transport.

Source: <https://www.google.com/intl/it/maps/about/mymaps/>

Despite the site is inserted in an alpine territory, the area is easily accessible by both private and public transport and it is served with some restaurants and accommodation structures. This aspect has to be considered a valorisation reason since, facilitating arrival and permanence of visitors, it helps to attract more tourists. They include, in fact, not only people coming into the area with the purpose of visiting the military site, but also those tourists who, already present in the Friulan territory, takes the opportunity to explore an interesting historical and cultural destination.

4 Project: Monte Scinauz Museum

The proposal of converting the military site of Monte Scinauz into a museum opened to visitors comes from the idea of preserving an important built cultural heritage. In the architectural field, the “Preservation” concept has a very complex meaning which goes beyond the mere refurbishment of a structure. The notion is correlated, in fact, to the importance of conserving the authenticity of an asset as it represents the real sense of a place. The word “Authenticity” refers to a matrix of dimensions characterizing a built heritage such as form, materials, location, use, function and intangible qualities like the significance of a place for its community. When a valorisation project is implemented, all these factors must be taken into account in order to provide a proper reuse of a building able to respect its historical, cultural and architectural value. This means that a refurbishment work, necessary to make an old structure accessible to visitors, is only the final step of a long analysis process aimed at preserving an asset through the protection of the whole authenticity features. Any replacement or maintenance intervention applied on the historical materials and on the form of a structure is carefully studied, as well as the new intended use of a built heritage. The identification of a proper use of a building represents the first stage of a project which, in accordance with the preservation concept above described and with the objective of the project itself, should be the most profitable one from an economic, environmental, social and cultural viewpoint. In this sense, the ideal use of the military site of Monte Scinauz seems to be the museum function, as it is the best way to make evidence of an abandoned place inserted in a relevant historical background. A museum, in fact, is not only a structure collecting and exposing works of art or objects of historical and scientific interest, but it is also a place that, thanks to its geographical location and cultural context, is able to tell a story rising up the emotional sphere of visitors.

This chapter of the thesis, therefore, aims to present the project of the Monte Scinauz Museum, a valorisation work of the military base and the cableway characterizing the mountain site.

4.1 Benchmarks

In order to understand how to develop the Monte Scinauz Museum project, the first step involves a qualitative analysis of some similar structures built in Italy. The first two benchmarks taken into account refer respectively to an innovative and modern cableway system and a war military site

converted into a museum; the following involve, instead, two high-altitude permanent exhibitions accessible through a cableway plant.

4.1.1 Skyway Monte Bianco Cableway



Figure 4.1 Intermediate station of Pavillon du Mont Frèty.
Source: <https://www.h-b.it/it/portfolio-view/mont-blanc-pavillon-du-mont-frety-funivia-courmayeur-ao/>



Figure 4.2 Upstream station of Punta Helbronner.
Source: <https://sertec-engineering.com/blog/skyway-monte-bianco/>

Skyway Monte Bianco is the highest cableway plant built in Italy from 2011 and opened to the public in 2015. The structure is located in Courmayeur, a municipality under the province of Aosta, in Valle d'Aosta region and it consists of three stations: the downstream station of Pontal d'Entrèves at an altitude of 1.300 meters, the intermediate station of Pavillon du Mont Frèty at 2.172 meters (Figure 4.1) and the upstream station of Punta Helbronner at 3.466 meters (Figure 4.2). The two cableway sections are equipped with four large cabins, two for each track, with a maximum capacity of 80 people. The installation is considered an excellent engineering work thanks to an advanced innovative technology able to provide safety and comfort at high altitude. The cabins, for instance, are characterized by heated floors and windows and perform a 360-degree rotation providing a complete view of the landscape. The Pavillon middle station offers an amazing view over Val Veny and Val Ferret and hosts a lot of services such as an auditorium, a restaurant, a bar, a shopping area and a conference hall. The station of Punta Helbronner is famous for its panoramic terrace which overlooks some of the highest peaks of Alps, on the Italian French border. These refer to Gran Paradiso Mountain (4.061 meters), Monte Cervino (4.478 meters), Monte Rosa (4.634 meters) and, especially, Monte Bianco (4.810 meters), the highest

peak of Alps and the nearest to Punta Helbronner station. The building also offers a restaurant, a bar and an exhibition of crystals taken from the Monte Bianco massif.

Skyway Monte Bianco is, therefore, one of the greatest engineering challenges built in recent times and, for this reason, it can be considered as an interesting project benchmark. In a similar way, in fact, the Pontebba-Monte Scinauz Cableway is defined as the most innovative system and the highest altitude installation realized in the 1970s. Moreover, despite the distance among the temporal contexts and the diverse construction purposes, both the structures put in place new construction and architectural techniques ready to be applied in many other projects.

4.1.2 Dossaccio di Oga Fortress



Figure 4.3 Dossaccio di Oga Fortress.

Source: Book "Forte Dossaccio di Oga, Il baluardo della Valtellina", Autore Leonardo Malatesta

Dossaccio di Oga Fortress represents the most important evidence of the First World War in the territory of Valtellina. More precisely, the military site is located in the locality of Oga, a hamlet of the municipality of Bormio, under the province of Sondrio, in Lombardy region. The structure is built in 1911 with the aim of protecting the major alpine passes, such as the Stelvio road, against a possible conflict with the Austro-Hungarian forces. During the First World War, in fact, the fortress operates in a strategic position as main defence barrier along the frontline border.

The building remains intact for a long time period and, for this reason, it is converted into a museum opened to visitors in 2005 (Figure 4.3). The fortress is accessible through a drawbridge and a large iron door and it is protected by a series of defensive elements such as a moat, high walls and an armed battery. The top of the structure is characterized by four big steel domes which, in the past, hosted long-range machine guns. These elements represent the heart of the fortress, thanks to their ability to disappear inside the structure and come out in the moment of attack. The internal spaces are very suggestive since they are organized in order to recreate the war living conditions. The building includes different living spaces full of daily use items such as a kitchen area, some accommodations for the commanding officers, many rooms for troops and an infirmary room. An important element still present in the military complex is the old power generator able to guarantee the full functioning of the fortress. From a military perspective, the structure is characterized by many munition storages and arms rooms.

Dossaccio di Oga Fortress provides a relevant benchmark for the project development; it represents, in fact, an authentic war heritage whose historical evidence is preserved through the conversion of the structure into a museum. In addition, as well as the military site of Monte Scinauz, the fortress is inserted in a naturalistic mountain setting with many hiking paths and a fascinating landscape.

4.1.3 Marmolada mountain: the Cableway and the First World War Museum



Figure 4.4 Marmolada Cableway.

Source: <https://www.funiviemarmolada.com/>



Figure 4.5 Marmolada Museum First World War.

Source: <https://www.funiviemarmolada.com/museo-marmolada-grande-guerra/>

Marmolada is the highest massif of the Dolomiti, a mountain group of Alpi Orientali rising between Trentino Alto Adige and Veneto region, more precisely between Trento and Bolzano provinces. The mountain is characterized by the presence of a cableway installation which, operating since 1970, connect the Marmolada peak with the underground locality of Malga Ciapela (Figure 4.4). The plant is composed of three sections with large cabins and four stations, a downstream and an upstream base and two intermediate ones. The downstream station of Malga Ciapela is at an altitude of 1.450 meters, while the upstream station of Punta Rocca is at 3.265 meters overlooking an amazing view and the Marmolada glacier. The two intermediate cableway buildings are Coston d'Antermoja at 2.350 meters and Serauta at 2.950 meters; this second structure, in particular, hosts the First World War Museum, the highest museum in Europe. During the first world conflict, Marmolada is, in fact, one of the fronts between Italy and Austria-Hungary and it represents the theatre of numerous fights. The museum, opened in 1990, is a permanent exhibition showing old photographs, videos and many war items such as arms, uniforms, letters and documents of soldiers (Figure 4.5). It is organized according to a multimedia tour which is able to tell the hard life of the mountain trenches, constantly characterised by cold and snow conditions. A part of the museum is placed in the Marmolada glacier, in the so-called "City of Ice", a 12 km tunnel with some caves used by the soldiers as dormitories, kitchens, infirmaries and radio rooms.

Marmolada mountain offers an important example of high-altitude museum accessible by cableway and, for this reason, it represents an element of inspiration for the project. The most relevant aspect in connection with Monte Scinauz site, however, lies in the fact that the museum is located in the same setting of the war fighting, allowing the celebration of soldiers memory and involving visitors in an exciting experience.

4.1.4 Messner Mountain Museum Coronas



Figure 4.6 Architectural shape of Messner Mountain Museum Coronas. Source: <http://www.messner-mountain-museum.it/it/corones/museo/>



Figure 4.7 The alpinism exhibition. Source: <http://www.messner-mountain-museum.it/it/corones/museo/>

Messner Mountain Museum Coronas is a permanent exhibition located on the top of Plan de Coronas, a 2.275 meters high mountain of Alpi Sud-Orientali, rising in the province of Bolzano, in Trentino-Alto Adige region. The site offers a panoramic view of the surrounding mountains, between Val Badia and Val Pusteria, and from 2015, it hosts one of the six museums dedicated to Reinhold Messner, one of the major Italian alpinist. The building, designed by the famous architect Zaha Hadid, has a particular shape set into the rock which perfectly merge with the natural environment (Figure 4.6). Through the exposition of many works of art and remains, the museum tells the story and the evolution of the alpinism discipline, and it describes the equipment improvements get over time and the triumphs or tragedies taking place on the most famous mountains (Figure 4.7). Due to the high altitude, the museum can only be reached through the different cableway plants which connect the mountain peak with the municipalities below. In particular, there are five cableway installations connected to the museum with the downstream stations located in Valdaora, Passo Furcia and Riscone localities.

Plan de Coronas is another important reference point for the project since, similarly to Marmolada Mountain, it hosts a museum accessible by cableway. However, Messner Museum is much more than a simple exhibition about the mountain climbing; it is a peaceful place in close contact with the mountain nature which allows the visitors to live at the same time a cultural and sensorial experience. This aspect represents the connection with Monte Scinauz Museum project, a

proposal which, in the same way, has the aim of reviving an important historical place from a cultural and emotional viewpoint.

4.2 Structural refurbishment: definition through acceptance tests

The following step of the project concerns a technical study of the structures constituting the cableway and the military site of Monte Scinauz. The buildings involved have a reinforced concrete structure which, from a visual inspection, shows a state of degradation. In order to make this place accessible to visitors, it is necessary to apply several structural interventions able to comply with the modern security standards required by the government regulations. The refurbishment interventions to put in place are usually defined on the basis of different acceptance tests performed on the building materials in laboratory or directly on site. The reinforced concrete characterization tests may be of a destructive or non-destructive typology and they allow to discover fundamental information such as the internal morphology of a structure or its load-bearing capacity.

The most used test of the destructive typology is the “Coring test”, a method useful to identify the compressive strength value of a concrete mixture. The analysis is carried out in laboratory on cylindrical samples (the cores) taken out from the building under valuation. The material must be extracted from a part of the structure free of reinforcements and out of structural nodes, while the sample must verify two dimensional relations:

$$D \geq 3d_{max}$$

$$H \approx 2D \text{ or } H \approx D$$

where:

- D is the diameter of the cylindrical sample;
- d_{max} is the maximum diameter of concrete aggregate;
- H is the height of the cylindrical sample.

In the laboratory, the sample is inserted in a hydraulic press which exerts an increasing uniaxial pressure on the concrete, until the breaking load is reached (Figure 4.8).

According to the Technical Construction Standards of 2018 (NTC 2018) the compressive strength value is calculated using the following formula:

$$R_{cub} = \frac{R_{cyl}}{0,83}$$

where:

- R_{cub} is the value of the cubic or characteristic resistance;
- $0,83$ is the conversion factor;
- R_{cyl} is the value of the cylindrical resistance corresponding to the breaking load of the sample.

The definition of the characteristic resistance is a fundamental step of the process since it allows to identify the compressive strength class of a concrete mixture. A direct correspondence exists, in fact, between the two resistance values, used to establish the conformity of an operating structure with the standard limits. More specifically, the test is verified if the reference class is higher than the minimum class set by the designer in relation to the location and the intended use of the structure. However, for the validity of the methodology, it is necessary that the procedure of extraction and compression of the material is carried out in accordance with UNI EN 12504-1 standard, the rules monitoring the concrete testing in buildings.

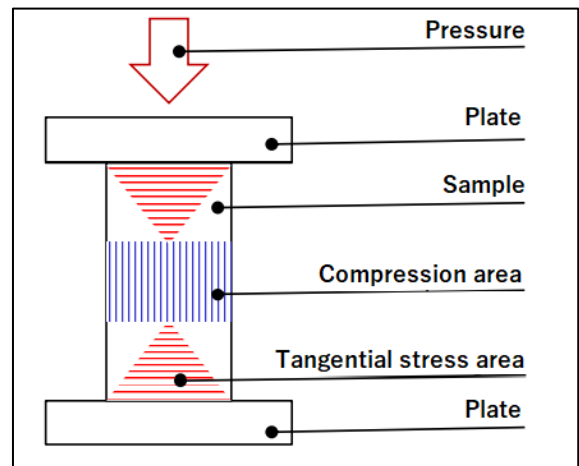


Figure 4.8 Uniaxial compression test on a cylindrical concrete sample and its schematic replication. Sources:

https://it.wikipedia.org/wiki/Prova_su_carote#/media/File:Concrete_Compression_Testing.jpg;

Presentation "Determinazione dei parametri meccanici degli elementi lapidei", Prof. Lorenzo Cantini.

The non-destructive typologies include many methods for the analysis of reinforced concrete buildings such as the "Pacometer test", the "Sclerometric investigation" and the "Ultrasonic

method”. These tests do not require any breaking of material and, due to their inability in providing exhaustive information individually, they are usually performed on site in a combined way.

The pacometer test is a methodology based on the use of the so called “Pacometer” as analytical instrument. The apparatus is composed by a probe emitting electromagnetic waves and connected to a digital and acoustic processing unit (Figure 4.9). The execution of the test consists of moving the instrument along vertical and horizontal directions, in contact with the structure, in order to detect position, direction, number and diameter of the reinforcement bars within a concrete wall. The pacometer is, therefore, able to indirectly provide the thickness of the concrete cover, an essential architectural element protecting the reinforcement from the external environment corrosion. In accordance with UNI EN 1992-1-1 standard, every structural class has, in fact, to guarantee its own minimum cover thickness.



Figure 4.9 Pacometer test. Source: <https://www.structuralsurveys.it/indagini-su-strutture-in-calcestruzzo-prove-pacometriche/>

The sclerometric investigation is a method for the analysis of concrete structural elements used to define the mechanical strength of the material. The apparatus involved in the test is the so called “Sclerometer”, a tool consisting of a spring-loaded steel piston which is released to hit the concrete surface (Figure 4.10). Thanks to a graduated scale running on the instrument, the sclerometer is able to measure a value corresponding to the size of the rebound produced by the impact with the element. This value is called “Rebound index” and it records the amount of elastic energy absorbed by the material. Then, some empirical relations allow to calculate the mechanical strength of the concrete through the exploitation of the measured rebound index. For the validity

of the methodology, the test shall be conducted on a surface free of irregularities, plaster coatings and reinforcements in the proximity, and it must be repeated at least 10 times for each selected area. This last operation, in fact, allows to obtain a more accurate calculation of the index, resulting as an average value of the different measurements taken. In addition, the test is accepted only if at least 80% of the rebound indexes deviate from the mean value by less than 6 units.



Figure 4.10 Sclerometric test. Source: <https://www.volta.it/prodotti/misure/diagnosi-strutturale-per-edifici/sclerometri/sclerometro-calcestruzzo-meccanico/>

A useful test able to define quality and preservation state of a concrete structure is the ultrasonic method. The investigation is based on the propagation of elastic sound waves through the analysed element at a frequency range between 40-60 kHz. The analysis is carried out using two probes, an emitting one and a receiving one, and a pulse-generating control unit with the task of recording and processing data. The test is performed by placing the probes at two different points on the concrete wall and measuring, through the control unit, the crossing time of the ultrasonic wave and the distance among them (Figure 4.11). The last step concerns the velocity calculation as a ratio between the distance covered and the time spent; this is a fundamental part since it allows to qualify the material. In accordance with UNI EN 12504-4 standard, a good quality concrete has an ultrasonic velocity greater than 4.000 m/s, while a bad quality concrete records a value lower than 3.000 m/s. The crossing time from the emitting to the receiving probe is, in fact, strongly increased by the presence of defects or cavities in the material which, damping the ultrasonic wave, reduce its speed. Due to the punctual form of the methodology, the test needs to be repeated in different points of the material surface in order to provide a reliable characterization of the structure. In the probes positioning, in addition, it is essential to avoid areas with metal reinforcements which, increasing the wave speed, lead to a result distortion.

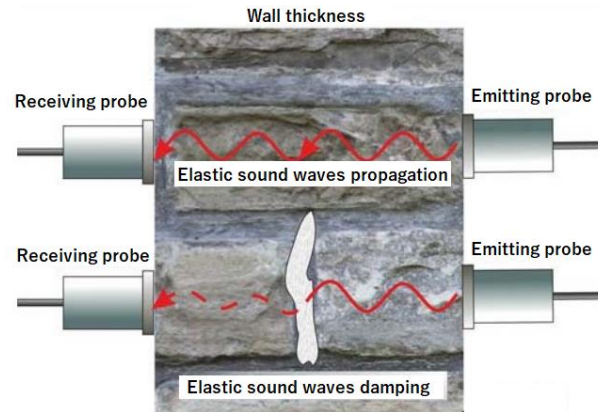


Figure 4.11 Ultrasonic test and its schematic replication. Sources: <http://cmgtesting.it/prove-non-distruttive/pnd-calcestruzzo/>; Presentation “Caratterizzazione delle strutture in calcestruzzo armato”, Prof. Lorenzo Cantini.

The project of this thesis is based on the assumption that the tests above described do not reveal any relevant criticality. The idea is that, despite the presence of some structural damages which prevent a full compliance with the acceptance standards, all the structures of the abandoned site do not require to be demolished and they can be recovered through refurbishment interventions. The renovation works concern the application of some stability operations and reinforcement techniques, such as cladding of pillars or interventions in the connection joints between structural elements. A particular attention is required for the cableway buildings, which are characterized by some high stress points due to the tie systems anchoring. It is also important to state that the hypothesis is taken on the basis that the construction materials, dating back to the 1970s, still have the right qualities for an operational structure. The only exception of the site is represented by the tunnel, a passage installation realized in the 1990s in galvanized metal sheet. This part results in good maintenance conditions and only require some works for an insulation improvement.

4.3 The new Pontebba-Monte Scinauz Cableway

As just described, the cableway refurbishment of Monte Scinauz concerns the preservation of the original concrete structures of both the downstream and upstream stations, with some reinforcement and stability interventions (Figure 4.12). These buildings, however, show other important components characterizing the old cableway in its operating period. Regarding the external shape, some steel pillars and beams graft into the load-bearing concrete structure,

supporting the roof and the cabins arrival floor. This part needs to be replaced instead of applying a maintenance intervention because of the high degradation state of the steel and the easy disassembly process. For what concerns the original cableway equipment, the motor winch, the counterweights, the two cabins, the technological control system are still present on the site. To ensure accessibility, also these elements must be substituted with the new modern systems able to guarantee an efficient functioning in compliance with the regulations. The project, however, plans to save all the removed components exposing them in the museum exhibition arranged next to the upstream cableway station. The missing part refers to ropes and supports, but this is a good aspect since they should have been replaced anyway for a new safe installation.

The project proposed for the new cableway is the “Continuous motion system”, a plant which moves many loads along a closed loop always in the same direction. The loads are small cabins with a maximum capacity of 6 people disposed along a single rope, with both a load bearing and movement function, which is held in tension by a set of counterweights and powered by a motor winch. The old cableway plant of Monte Scinauz was, instead, a “Coming and going system”, a plant which differs from the previous one for the presence of only two larger cabins that move alternately in both the directions. In addition, this second typology is characterized by more than one rope diversifying load bearing and movement functions. The choice of changing the plant typology is strictly connected to the new intended use of the military base, converted into a museum site. The continuous motion system allows, in fact, a fluent access of visitors which, thanks to the numerous small cabins, come in distributed small groups. The mechanism is also more appropriate for the Covid-19 situation, easily ensuring the social distancing measures required by the regulations.

The cableway project also includes the implementation of a parking space in correspondence of the downstream station, to improve the accessibility by private transport. The building is inserted, in fact, in a large green space which can be exploited for this function. In addition, since the downstream station area is characterized by the presence of some small structures representing the old logistic base, the project proposes the refurbishment of these constructions and the realisation of a food and beverage area for the site visitors.

The opening to the public of the new Pontebba-Monte Scinauz Cableway requires, therefore, a project characterized by some change interventions able to guarantee the correct level of security and the proper functioning of the structures. However, the idea follows and respects the concept

of preservation; a cableway structure in fact, in order to be valorised, cannot only be observed as a museum collection but needs to be brought back into operation. According to the notion of reuse, in addition, a good valorisation proposal refers to a project able to show a proper balance between conservation and an acceptable degree of change.



Figure 4.12 Downstream station before and after refurbishment interventions.

Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>

4.4 The guided tour of the military site

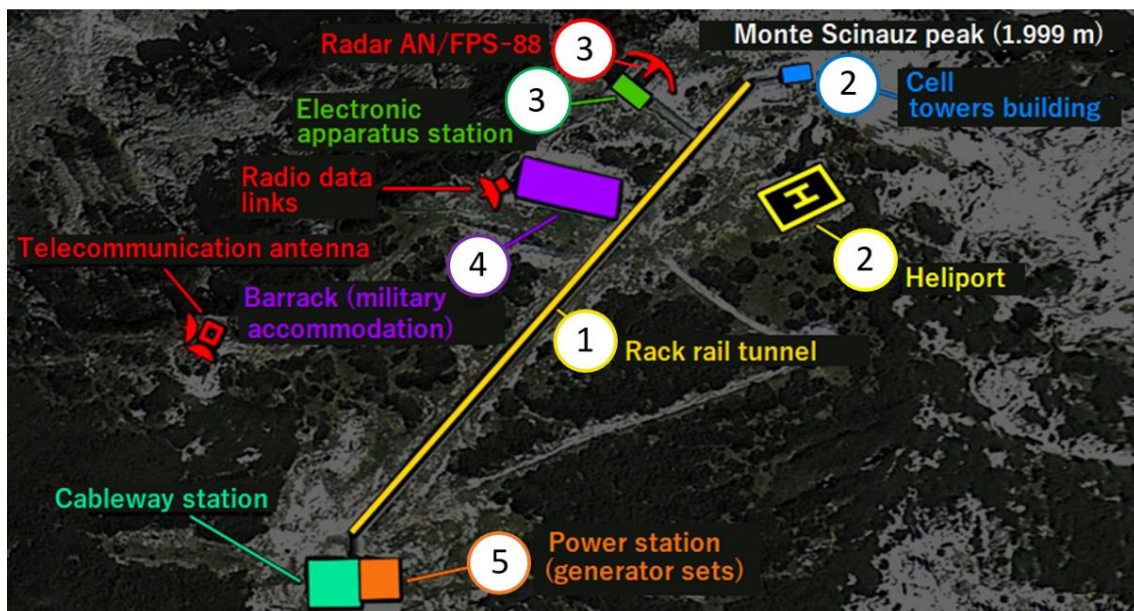


Figure 4.13 Map of the guided tour in the military site.

Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>

The project of Monte Scinauz consists in the realization of an open-air museum spread across the entire military site abandoned on the peak of the mountain. The idea is to offer a guided suggestive itinerary through history and nature which is able to revive and valorise the place in a proper way (Figure 4.13).

The tour starts in correspondence of the cableway upstream station which is directly connected to the tunnel. The project includes the realisation of a new rack rail system with a small cable car intended for the transportation of tourists to the highest part of Monte Scinauz peak. Inside the tunnel a recorded voice is foreseen in order to introduce visitors into the setting they are going to explore and to explain them the steps of the guided tour. Any visitor, in addition, is provided with a map of the museum which illustrates positions and distances of the installations constituting the military site.

The second step of the tour concerns the panoramic area accessible from the tunnel finish, passing through the cell towers building. The amazing view over the surrounding mountains is one of the interesting aspect characterizing Monte Scinauz which can attract the interest of many mountain lovers. The project proposes, in fact, the provision of a fence able to guarantee the safety of tourists and the installation of a large information panel showing the names of the visible peaks (Figure 4.14). These include, for instance, Monte Jof di Montasio, Monte Jof Fuart and Monte Mangart, three impressive peaks of Alpi Giulie. Moreover, a short downhill path on the east side of the mountain allows to reach the old heliport where, during the operating years of the site, the helicopter landing provided an alternative access to the cableway.



Figure 4.14 Panoramic area on the highest part of Monte Scinauz peak.

Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>

The third step represents the heart of the museum: it consists of the radar base located in the electronic apparatus station. The building can be easily reached from the panoramic area, walking along a short path on the west side of the mountain, and it shows on its roof the remaining part of the radar. This portion concerns the rotating support with the waveguide which can be observed both externally and internally to the structure of the electronic apparatus station. In the past, the station contained some radar equipment linked to the remote-control base located in Portogruaro which, unfortunately, have not been found. According to the project, this building is intended to host a permanent exhibition of old photographs and descriptions about the radar components and their functioning in the Cold War period.

The itinerary across the military site follows towards the barrack accommodation for the altitude military staff, always going through a descending short path. Thanks to the recovering of old furniture and daily use items, such as crockery, the museum intended to recreate the realistic setting experienced by the people working in the military site (Figure 4.15 and Figure 4.16). The idea is, in fact, to capture the visitor attention and bringing him back in time.



Figure 4.15 Central corridor of the barrack. Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>



Figure 4.16 Living room of the barrack. Source: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>

The last point of the museum concerns the power station building which, in the past, hosted four generator sets able to provide power supply for the whole military site. The project proposal refers to the realisation of a permanent exhibition inside the structure, showing all the available material about the site. In particular, a first part is intended to contain all the removed components from the original cableway and from the buildings, such as the motor winch, the two

cabins, the technological control panel and the sliding carriage system inside the tunnel. Another part is dedicated, instead, to the exposition of historical photographs depicting not only the military site since its installation, but also the staff members who worked there. A small part of the structure is also exploited for a small shop where visitors can buy different souvenirs such as books, pens or t-shirts before returning to the upstream station and complete the guided tour.

4.5 Augmented reality through the “ScinauzAR” smartphone application

The project proposal of Monte Scinauz Museum plans to support the guided tour through the implementation of an augmented reality system. The augmented reality technology is a modern digital tool, in constant evolution, able to reproduce on a device screen, such as a smartphone or a tablet, a real picture with the integration of virtual images. The advantage of the system refers to the possibility of displaying an existing element with the addition of missing parts or with some aesthetic adjustments.

The idea of exploiting the augmented reality in the tour of the museum, comes from the fact that the heart of the military site, represented by the radar base, has an incomplete structure only showing the rotating support of the transmitting and receiving antenna. Due to the relevance of this section, in comparison with all the other parts of the site, the project outlines the necessity to carry out the visit with the use of a digital support integration able to recreate the radar missing part (Figure 4.17). The augmented reality experience, however, does not only include the radar base structure, but also all the assets constituting the military installation. In this case, the idea is to show a comparison between the current structures, subjected to the conservative refurbishment put in place for the conversion into a museum, and the old buildings operating during the Cold War period and testified by some available photographs. One of the most interesting variations is represented by the galvanized metal sheet tunnel which replaces the ancient wooden structure; the augmented reality system allows, in fact, to visualize the former construction looking at the existing one. The introduction of the augmented reality world into the project proposed has, therefore, a specific aim: it refers to the realization of a complete discovery experience of the built cultural heritage characterizing Monte Scinauz.

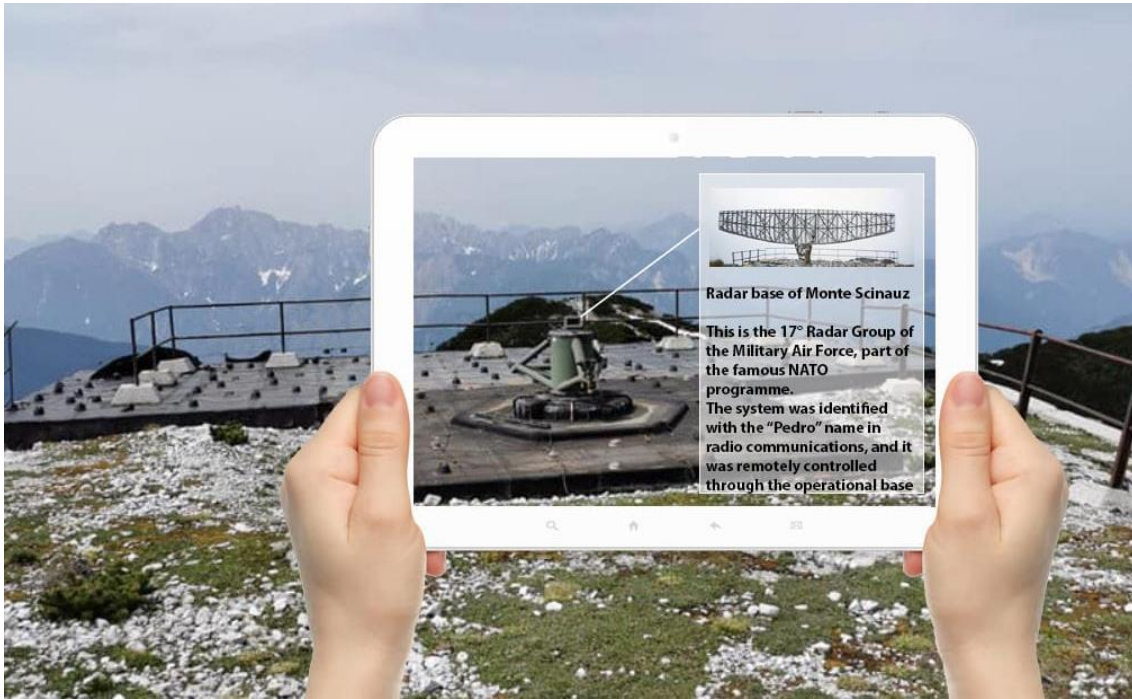


Figure 4.17 Radar reconstruction through the augmented reality smartphone application.

Pictures from: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>

In order to develop the augmented reality tour, the project proposes the creation of a smartphone application for both Apple and Android devices, free downloadable from the respective Apple Store and Play Store. The application, with the name of "ScinauzAR", is accessible through a QR-Code provided on the museum entrance ticket and it is organized in four sections, everyone referred to a specific part of the military site. The sections concern, in particular, the rack rail tunnel, the radar base, the barrack accommodation and the power station, and they also allow tourists to listen to a storytelling narration about the assets considered (Figure 4.18). Concerning the augmented reality function, the use process involves visitors in the action of pointing the mobile phone camera on the site installations and observe the gap between screen and reality. The function, however, is activated only for the external vision of the buildings since the internal spaces are recreated through the application of realistic interventions.

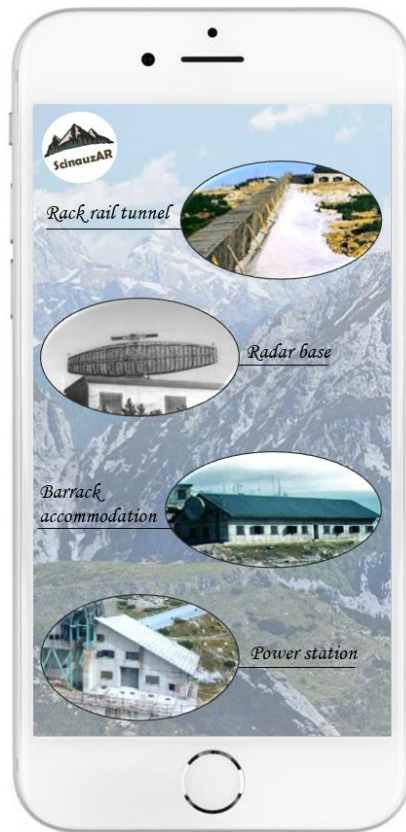


Figure 4.18 "ScinauzAR" smartphone application.

Pictures from: <https://www.funivie.org/web/ex-funivia-militare-12-atw-pontebba-monte-scinauz/>

4.6 Possible sponsorships and potential sources of financing

In order to understand how to support the project from an economic viewpoint, a research for possible sponsorships available in Friuli-Venezia Giulia region is carried out. The aim is to find entities or associations interested in the creation of a partnership with Monte Scinauz Museum and willing to provide a financial contribution for the project realization. In this sense, three potential sources of financing are detected (Figure 4.19):

1. "PromoTurismoFVG": it is a big regional entity responsible for the management and promotion of tourism in Friuli-Venezia Giulia. Its task is to expand the territory offer through the diffusion of nature, art, culture and gastronomy. The organization relies on four subsidiaries companies, GIT S.p.A., LISAGEST S.p.A., Terme FVG S.p.A. and MIB - Trieste School of Management, which involve more than 700 people in different operational areas such as administration, finance, products promotion, communication and digital marketing, advertising campaigns, territorial design and tourists InfoPoint. Thanks to its strong position, fully integrated in the tourist

organization of the region, PromoTurismoFVG can be considered as the main sponsorship and the most important source of financing for the project.

2. “C.A.I. – Club Alpino Italiano Sezione di Gemona”: it is an association founded by people who share the same love and passion for the mountain. Its mission is to valorise the mountain territory of Friuli-Venezia Giulia, with a particular attention to the protection of the existing hiking paths. The group has a future oriented vision which sustain the realization of new projects intended to create an environmental added value. In line with the values shared by the project, a partnership with the C.A.I. Association can be seen as another useful source of financing, able to provide a small amount of money.
3. “L’Oppure”: it is a non-profit association with the aim of promoting the Friulan territory through the publication of articles about its cultural, artistic and environmental heritage. The group consists of a young and dynamic organization with voluntary members which, in cooperation with public and private entities, organizes public events and advertises the territorial peculiarities through social pages and websites. In accordance with its task, L’Oppure can be considered as an indirect source of financing which, even without offering a cash compensation, can provide a relevant project sponsorship useful to attract many tourists. The association, in fact, can be interested in a partnership with Monte Scinauz Museum since it can represent an opportunity to increase the organization visibility and a possibility to raise many funds for the survival of the group.



Figure 4.19 Logos of the three possible sponsorships. Sources:

<https://www.promoturismo.fvg.it/>; <http://www.caigemona.it/dati/>; <https://www.loppure.it/>

4.7 Business Plan

The last step of the project concerns the development of a business plan required to show, in quantitative terms, the economic-financial value of the investment proposed. As explained in detail in the previous chapters, the investment involves the conversion of the military site of

Monte Scinauz into a museum and the refurbishment of the respective cableway installation, with the purpose of reviving the cultural and historical significance of the abandoned place.

The methodology used to carry out the business plan is the so called “Discount cash flow analysis (DCFA)”, a valuation technique which estimates the value of a property investment as the residual amount between the revenues deriving from income and the expenditures related to costs. The residual value is defined as the “Net benefit” of the asset and it is calculated through the establishment of the future cash flows generated by the investment and discounted back to the present.

In order to perform the DCF analysis it is required, at the beginning of the procedure, to fix some specific assumptions which allows to create the business plan in the most realistic way. The first hypothesis concerns the definition of the time projection of the plan which is assumed equal to 10 years; this is the period after which it is possible to observe if the project produces a monetary added value. In particular, it is considered a time span going from 2022 to 2032 during which 2 years are allocated to the refurbishment works and the remaining part is covered by the museum operation. The museum annual opening is established for 4 months a year, from June to September, as it is an open-air museum at high altitude. The renovation period is defined on the basis of the required interventions which refers to the consolidation of concrete structures, the installation of cableway components, the arrangement of finishes over buildings and the realization of a walking path across the site; in addition, it is considered the fact that works are not carried out during winter months, due to the typical cold and snow conditions of a mountain setting. More in detail, for the realization of the following interventions a total cost of 18 million € is estimated, of which 12 million € concern the cableway portion. The working start is set at the beginning of June 2022 and, as a consequence, the opening of the museum is expected for June 2024. It is also important to state that the predicted scenario is established in accordance with a positive vision oriented towards a recovery from the crisis in the next periods of 2022. For this reason, it is assumed a traditional supply schedule of the building materials, without considering any delay for the Covid-19 situation.

As regard the revenues, an income of respectively 20 million € and 100 thousand € is considered to come from PromoTurismoFVG and C.A.I. funds, in connection with the capital owned by the associations. PromoTurismoFVG, in particular, benefits from a large amount of money received from the PNRR funds. The remaining part of revenues derives from the payments of tourists

visiting the site: these refers to the ticket costs of cableway, museum and parking. In order to define the average prices, the following fees are considered:

- Cableway full ticket = 27 €; cableway reduced ticket = 19 €; cableway ticket for groups = 23 €
- Museum full ticket = 12 €; museum reduced ticket = 8 €; museum ticket for groups = 10 €
- Half-day parking ticket = 3 €; Full day parking ticket = 7 €

The cableway tickets refer to round trip fees, while the museum tickets are inclusive of disposable headphones. Concerning the parking income, due to the presence of 150 parking lots, a minimum value is estimated for the first operating year (2024), considering the maximum capacity of the parking area every day:

$$\text{Number of vehicles} = 150 \frac{\text{vehicles}}{\text{day}} \times 30 \frac{\text{days}}{\text{month}} \times 4 \frac{\text{months}}{\text{year}} \approx 18.000 \frac{\text{vehicles}}{\text{year}}$$

In addition, a portion of revenues derives from the food and beverage area and the souvenirs shop. For the first one a daily profit of 500 € is considered, resulting into a yearly income of 60.000 €, for the other one an annual income of 150.000 is estimated:

$$\text{Food and beverage income} = 500 \frac{\text{€}}{\text{day}} \times 30 \frac{\text{days}}{\text{month}} \times 4 \frac{\text{months}}{\text{year}} = 60.000 \frac{\text{€}}{\text{year}}$$

Then, a presence of about 30 thousand visitors is predicted for the first operating year (2024), calculated assuming the arrival at the site of around 30 people per hour and considering the cableway in operation 8 hours a day:

$$\text{Number of visitors} = 30 \frac{\text{people}}{\text{hour}} \times 8 \frac{\text{hours}}{\text{day}} \times 30 \frac{\text{days}}{\text{month}} \times 4 \frac{\text{months}}{\text{year}} \approx 30.000 \frac{\text{visitors}}{\text{year}}$$

Thanks to an expected increase in the number of tourists visiting the site, a yearly increase of 3% is pointed out in the number of visitors and vehicles and in the income earned from the food and beverage area and the souvenirs shop. Moreover, in the revenues calculation, an inflation rate of 1,60% is adopted in accordance with the provisions of the Treasury Department in the Economic and Financial Document and the target level of the European Central Bank, which requires a value below but close to 2%.

As regard the costs, there are 2 typologies of start-up costs to take into account at the beginning of the plan and some fixed costs which incur every year. The first start-up cost refers to the

creation of the smartphone application for the augmented reality which, due to its complexity, has a price of 200 thousand €, higher than a basic application cost around 50 thousand or 100 thousand €. The second one concerns the expenses for the purchase of the equipment required to set up the food and beverage area, the museum exhibition of photographs and old components and the souvenir shop. The equipment includes machineries and furniture, like tables, chairs and shelves, and amounts to a total of 100 thousand €, estimating a cost for food and beverage area, museum exhibition and souvenir shop of respectively 60 thousand €, 30 thousand € and 10 thousand €.

Fixed costs are calculated, instead, as a percentage over total revenues. The highest costs involve ordinary and extraordinary maintenance, which must be supported in order to guarantee the level of security required by the site structures and, especially, by the cableway installation. In particular, ordinary maintenance is set equal to 30% of revenues due to the mandatory controls and interventions which must be carried out every year over the cableway components. Another important expenditure is related to the staff costs, deriving from the payment of salaries to the staff working in the cableway and in the museum. Particular attention must be paid also to insurance costs which, allowing the protection of the built complex against possible damages to the structures or to third parties, need to be set equal to a quite high percentage. The remaining outlay refers to operating and administrative costs, calculated as a low percentage over total revenues. In particular, operating costs include for instance, electricity, plumbing services, heating system and food and beverage supply expenses. A final consideration concerns the amount of taxes which are not taken into account in the business plan as it refers to a public property; in accordance with the Legislative Decree n. 23 of 2011, in fact, properties owned by territorial or non-territorial public entities are exempt from the payment of municipal taxes.

The following step of the DCF procedure consists in the calculation of the net operating income as the difference between total revenues and total costs, and in the definition of the total net cash flow obtained subtracting the marketing and refurbishment costs from the net operating income. The refurbishment costs (the capex) are already described in the first part of the chapter, making reference to the specific interventions carried out; the marketing costs, instead, concern the project promotion through advertising and website campaigns.

The last step of the analysis regards the estimation of the discounted cash flow through the application of the discount rate, an interest percentage used to determine the present value of

future cash flows. Considering the high-risk profile of the investment, due to its location in a mountain area and the presence of many structural damages of the assets, the discount rate is established equal to 7%. The risk profile of an investment is associated, in fact, to the size and the typology of the project, to the building maintenance conditions and to the required structural interventions. Moreover, the discount rate is influenced by the market conditions which, due to the uncertainty for the Covid-19 situation, are unstable and tend to raise the percentage value.

The result of the DCF analysis is represented by the net present value, the sum of the actual values of the net cash flows that an investment is able to generate in the planned timeframe. In order to consider a project as a good investment, the NPV must be a high positive value, meaning that it is able to generate a monetary added value. In particular, the investment project of Monte Scinauz Museum, despite the involvement of high initial cost of structural refurbishment, produces a largely positive net present value, equal to 3.870.679,50 €. The sum is achievable especially thanks the fund available from PromoTurismoFVG Association, which allows the sustainability of the project in economic terms.

All the performed calculations are shown in the underlying table (Figure 4.20).

Income from visitors	
Cableway average ticket cost	23,00 €
Museum average ticket cost	10,00 €
Parking average ticket cost	5,00 €
Annual income (food and beverage area)	60.000,00 €
Annual income (souvenirs shop)	150.000,00 €
Number of visitors (First year=2024)	30.000
Number of vehicles (First year=2024)	18.000
Annual increase of visitors	3,00%
Annual increase of vehicles	3,00%
Annual increase of income (food and beverage area)	3,00%
Annual increase of income (souvenirs shop)	3,00%

Inflation rate	1,60%
Discount rate	7,00%

Monte Scinauz Museum - Discounted cash flow analysis (DCFA)											
Years	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
numbers	0	1	2	3	4	5	6	7	8	9	10
Funds from "PromoTurismoFVG"	20.000.000,00 €										
Funds from "C.A.I. – Club Alpino Italiano Sezione di Gemona"	100.000,00 €										
Cableway income			701.040,00 €	722.071,20 €	743.733,34 €	766.045,34 €	789.026,70 €	812.697,50 €	837.078,42 €	862.190,77 €	888.056,50 €
Museum income			304.800,00 €	313.944,00 €	323.362,32 €	333.063,19 €	343.055,09 €	353.346,74 €	363.947,14 €	374.865,55 €	386.111,52 €
Parking income			91.440,00 €	94.183,20 €	97.008,70 €	99.918,96 €	102.916,53 €	106.004,02 €	109.184,14 €	112.459,67 €	115.833,46 €
"Food and beverage area" income			60.960,00 €	62.788,80 €	64.672,46 €	66.612,64 €	68.611,02 €	70.669,35 €	72.789,43 €	74.973,11 €	77.222,30 €
Souvenirs shop income			152.400,00 €	156.972,00 €	161.681,16 €	166.531,59 €	171.527,54 €	176.673,37 €	181.973,57 €	187.432,78 €	193.055,76 €
Total revenues	20.100.000,00 €		1.310.640,00 €	1.349.959,20 €	1.390.457,98 €	1.432.171,72 €	1.475.136,87 €	1.519.390,97 €	1.564.972,70 €	1.611.921,88 €	1.660.279,54 €
Creation of smartphone application	100.000,00 €	100.000,00 €									
Equipment costs	50.000,00 €	50.000,00 €									
Ordinary maintenance	30,00%		393.192,00 €	404.987,76 €	417.137,39 €	429.651,51 €	442.541,06 €	455.817,29 €	469.491,81 €	483.576,56 €	498.083,86 €
Reserves of extraordinary maintenance	15,00%		196.596,00 €	202.493,88 €	208.568,70 €	214.825,76 €	221.270,53 €	227.908,65 €	234.745,91 €	241.788,28 €	249.041,93 €
Operating costs	5,00%		65.532,00 €	67.497,96 €	69.522,90 €	71.608,59 €	73.756,84 €	75.969,55 €	78.248,64 €	80.596,09 €	83.013,98 €
Administrative costs	2,00%		26.212,80 €	26.999,18 €	27.809,16 €	28.643,43 €	29.502,74 €	30.387,82 €	31.299,45 €	32.238,44 €	33.205,59 €
Staff costs	20,00%		262.128,00 €	269.991,84 €	278.091,60 €	286.434,34 €	295.027,37 €	303.878,19 €	312.994,54 €	322.384,38 €	332.055,91 €
Insurance costs	10,00%		131.064,00 €	134.995,92 €	139.045,80 €	143.217,17 €	147.513,69 €	151.939,10 €	156.497,27 €	161.192,19 €	166.027,95 €
Total costs	150.000,00 €	150.000,00 €	1.074.724,80 €	1.106.966,54 €	1.140.175,54 €	1.174.380,81 €	1.209.612,23 €	1.245.900,60 €	1.283.277,62 €	1.321.775,94 €	1.361.429,22 €
Net operating income (NOI)	19.950.000,00 €	-150.000,00 €	235.915,20 €	242.992,66 €	250.282,44 €	257.790,91 €	265.524,64 €	273.490,38 €	281.695,09 €	290.145,94 €	298.850,32 €
Marketing costs	8,00%		18.873,22 €	19.439,41 €	20.022,59 €	20.623,27 €	21.241,97 €	21.879,23 €	22.535,61 €	23.211,68 €	23.908,03 €
Capex	9.000.000,00 €	9.000.000,00 €									
Total net cash flow (NCF)	10.950.000,00 €	-9.150.000,00 €	217.041,98 €	223.553,24 €	230.259,84 €	237.167,64 €	244.282,67 €	251.611,15 €	259.159,48 €	266.934,26 €	274.942,29 €
Discounted cash flow (DCF)	10.950.000,00 €	-8.551.401,87 €	189.572,87 €	182.486,04 €	175.664,13 €	169.097,25 €	162.775,85 €	156.690,78 €	150.833,18 €	145.194,55 €	139.766,72 €
Net present value (NPV)	3.870.679,50 €										

Figure 4.20 Business plan performed through the DCF analysis

5 Project Analysis

After the definition of the valorisation proposal, the project follows with the execution of a feasibility study, the analytical process required to prove the technical and economical sustainability of the project itself. In particular, the analysis is developed through the implementation of a Gantt Chart, a Pestle Analysis, a Gap Analysis, a Swot Analysis, a Risk Analysis and an Impacts Analysis.

5.1 Gantt Chart

The first analytical step concerns the development of a Gantt Chart, a common technique used to represent the phases of a project with their time schedule. The diagram allows to illustrate start and finish dates of each activity performed from the conception of the idea to its physical realization, and it clarifies if the project implementation is feasible in a certain time period. This management tool is also fundamental to confirm the success of the proposal from an economic and financial viewpoint, as it represents the basis of the business plan development. In order to guarantee the expected positive result, it is necessary, in fact, to fulfil the project time schedule established through the Gantt Chart methodology.

The Gantt Chart is performed through Microsoft Project, a software used in the project management field to define time schedules and verify the observance, to plan and allocate resources to specific tasks and to organize the management of a budget. In this project, the timeline considered is divided in 7 macro-phases split, in turn, in specific sub-phases which prove the feasibility of the proposal in accordance with the business plan performed in the previous chapter.

The first phase consists in the research and data collecting, the activity performed across Friuli-Venezia Giulia with the aim to discover an interesting built heritage to valorise. The process, which allows the identification of Monte Scinauz military site, derives from the economic recovery intent existing at regional and national level after the spread of the Covid-19 pandemic. The step also includes the territorial, historical, socio-economic and market analysis of the context in which the asset is inserted, in order to gather the information required to proceed with a possible project development.

The second phase refers to the conception of the valorisation proposal as a result of the performed analysis. The choice of converting Monte Scinauz military site into a museum seems to be, in fact, the most interesting in accordance with the territorial, historical and economic framework considered.

The third phase is the feasibility study, the methodical assessment of features, costs and possible results of the project proposed, carried out on the basis of a preliminary outline idea. The process includes the technical analysis of concrete structures, performed through investigations and acceptance tests run on site and in laboratory, and the economic analysis of possible costs and revenues deriving from the project implementation. The economic feasibility is also correlated to the research activity of possible sponsorships willing to provide a financial contribution. Then, the feasibility study is characterized by the execution of a series of analysis able to identify strengths, risks, impacts and shortcomings of the project; these refers to Gantt, Pestle, Gap, Swot, Risk, and Impacts Analysis.

The fourth phase consists in the subscription of contracts with the construction company which carries out the refurbishment intervention. Since the project refers to a public work, the society is selected through a public tender process performed at regional level. After that, the step involves the execution and the control of the whole documentation required to start with the project execution.

The fifth phase¹ refers to the project implementation which starts from the cableway section, with the consolidation of the structures and the installation of the new components, and follows with the site portion, consisting in the realization of the walking path and the structural interventions. Then, the execution step involves the arrangement of finishes over buildings, equipment and furniture, and it ends with some checks over buildings and final tests of the cableway installation. In addition, when structural works are almost completed, the creation of the smartphone application for the augmented reality starts.

¹ *Data developed thanks to a collaboration with the owner of Ikon Multimedia, the company behind the creation of the augmented and virtual reality experience in Monte San Michele Museum.*

The last two phases involve the museum opening and the monitoring and maintenance actions carried out to preserve the status of the buildings and the cableway functioning. In particular, the museum annual opening is established for 4 months, from June to September, and the ordinary maintenance actions are carried out 2 times a year, in the periods immediately before the opening of the museum, in May, and after its closure, in October.

The underlying table shows the Gantt Chart of the project performed through Microsoft Project (Figure 5.1). As already mentioned in the previous chapter, the diagram confirms the necessity of 2 years for the execution of works, from June 2022 to June 2024, and it displays a time span of 1 year to perform the previous four phases.

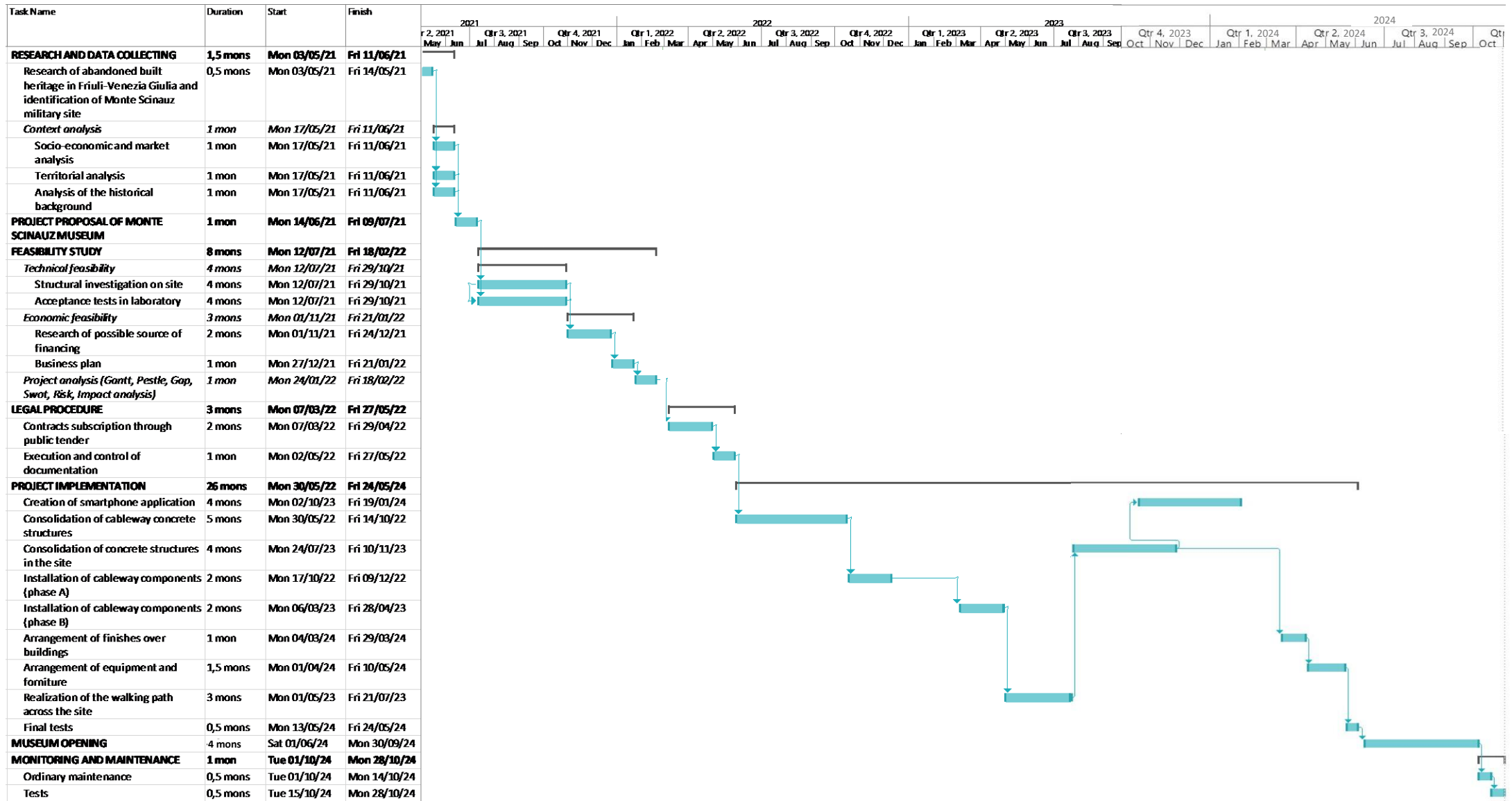


Figure 5.1 Gantt Chart performed through Microsoft Project

5.2 Pestle Analysis

The Pestle Analysis is a methodology used to study the context in which the built heritage is inserted. In particular, it evaluates the external factors which can have a decisive impact on the project proposed. The term “Pestle” is an acronym for the words “Political”, “Economical”, “Social”, “Technological”, “Legal” and “Environmental”, identifying six fundamental factors to consider for a correct project development. In the proposal of Monte Scinauz Museum, a Pestle analysis is conducted pointing out the externalities which can emerge in the given framework.

The political factors refer to legislative measures which can significantly affect the success of the project. These regulations mainly concern tourism policy actions, such as improving public transport and connections in the area or allocating funds with the intent to valorise the territory from an economic, cultural, social and environmental viewpoint. The National Recovery and Resilience Plan (PNRR) adopted by the European Commission from 2021 is, in fact, a fundamental factor on which the economic sustainability of the project is based. Another political element relates to the mandatory restrictions on individual mobility, which the government can decide to impose in case of new emergency for the Covid-19 Pandemic. The consequent reduction or annulment of tourist activity for a certain time period can, in fact, cause a strong decrease in revenues.

The economic factors have a strong influence on the project proposal. The economic trend of the Italian Country is, in fact, the first analytical framework to study in order to understand the necessity and the feasibility of the projected type of investment. The crisis after the Covid-19 Pandemic, beside the importance of the tourism sector in the Italian economy, represents the origin of the project, intended to revive an abandoned heritage as successful strategy in the economic recovery intent. In financial terms, the project result is also affected by the inflation rate which, along the time projection defined in the business plan, can vary in accordance with the economic situation. An increase or decrease in the inflation rate can produce, respectively, a reduction or growth of the project income.

Concerning the social sphere there are many factors to take into account. In relation to the Covid-19 situation, many families show a greater economic instability with a consequent reduction in holiday opportunities. In addition, some individuals, especially middle-aged and elderly people, despite the application of social distancing measures prefer to avoid the visit of public places full

of tourists. Therefore, a number of visitors lower than expected can be recorded in the museum proposed. In the same direction, another factor to consider is the birth's drop which affects the Italian Country in the last years. This element is intended to negatively impact on schools which represent the didactic contribution of the museum visitors. Then, given the fact that the project refers to an historical site of cultural interest, the touristic attendance is strictly correlated to the education level of people, which can be more or less attracted by the museum in proportion to their knowledge on the topic. A last important factor to underline concerns the safety area connected to the cableway installation. After the Stresa-Mottarone Cableway disaster of May 2021, in fact, many people show a greater diffidence towards this category of plants and a drop in the cableways turnout is recorded.

As regard the technological field, the part of the project related to the cableway refurbishment is strongly influenced by the technological evolution, able to provide innovative systems in the design of the modern installations. Beside the interest for the historical site displayed across the museum, many people can be attracted, in fact, by the excellent engineering work which guarantees safety and comfort at high altitude.

During the project development, many problems can be faced in relation to the legal factors. Firstly, it is important to state that the intervention involves an historical site which, as usually happens, is regulated by some monumental constraints. This aspect is difficult to manage both from an architectural and a bureaucratic side, as it requires a greater design attention in the refurbishment works and many permissions and authorizations from the superintendence. Moreover, due to the frequent delays characterizing the execution of bureaucratic procedures in Italy, the museum opening can be postponed with respect to the scheduled date, waiting for all the required documentation.

The last important factors refer to the environmental situations which can unexpectedly impact on the asset considered. The museum site is located in a mountain area which, during winter months, can be subjected to the risk of avalanches able to severely damage the building structures. This natural disaster is more frequent than in the past, due to the global warming process caused by the high pollution levels resulting from the extensive use of fossil fuels. In addition, the mountainous part of Friuli-Venezia Giulia region is mainly occupied by wooden areas which, due to climatic and morphological conditions of the territory, are highly exposed to fire risk. Wind and humidity, in fact, can reduce or eliminate in a very short time the effects of the abundant

precipitations characterizing the region and, besides that, the natural composition of Alpi Carniche, made of calcareous stones, is not able to retain rainfall in its surface layers. Friuli-Venezia Giulia territory is also a seismic area which may be subjected to strong earthquakes. In 1976, the region records one of the strongest Italian seismic events of the 20th century, which destroys entire villages and causes many victims.

5.3 Gap Analysis

The Gap Analysis is an evaluation tool used to compare the current state of an asset, or generally of a business, with its potential desired performance. In the project proposed, the analysis is carried out in order to highlight the requirements on which the attention needs to be focused to ensure the achievement of the expected results. The aim is, in fact, to outline the areas where, due to the presence of a large gap, it is useful to concentrate a lot of energies and resources. The underlying table shows the Gap Analysis performed for the project of Monte Scinauz Museum (Figure 5.2).

Gap Analysis				
Areas	Current State (From)	Desired State (To)	Gap	Action Plan
Structural conditions of the site buildings	Abandoned conditions: - structural damages; - unsafe and inaccessible structures	Good conditions required to get the structures accessible to visitors in terms of environmental, structural and operational safety	Large	Refurbishment interventions including: - consolidation of concrete structures; - arrangement of finishes over buildings
Cableway functioning	- Outdated cableway components; - lack of some cableway parts such as ropes and supports; - "Coming and going" system	- Innovative plant; - compliance with modern security standards; - "Continuous motion" system	Large	- Installation of new cableway components; - execution of acceptance tests
Intended use	Former military site, now abandoned and quite unknown, operating during the Cold War as important radar base	Relevant open-air museum about the Cold War accessible to visitors	Large	Adaptation of the site in accordance with the museums standards: - structural interventions; - provisions of emergency exits from buildings; - realization of a walking path across the site; - definition of a guided tour; - arrangement of permanent exhibitions with old components and photographs; - arrangement of a small souvenirs shop and a food and beverage area inside the available structures; - realization of a parking area
"ScinauzAR" smartphone application for the augmented reality	An on paper project since it does not exist	Free downloadable application from Apple and Android devices with complete functionality	Large	Involvement of expert IT technicians in the advanced stages of the project implementation for the creation of the application.
Hiking paths	Presence of many hiking paths in the area of Monte Scinauz which, due to some destroyed portions and the abandoned state of nature, are not practicable	Arrangement of all the existing hiking paths of Monte Scinauz area in order to guarantee their fruition	Large	Full regeneration of the naturalistic mountain area as a result of the valorisation intervention intended to convert the military site of Monte Scinauz into a museum opened to the public
Monte Scinauz Museum revenues	No revenues due to the abandoned conditions of the site	Revenues mainly deriving from the museum and the cableway tickets, with a smaller portion coming from the food and beverage area and the payment for parking lots	Large	Promotion of the new museum through advertising and website campaigns able to attract a high number of tourists
Construction company	Not defined	Contract signed with the construction company intended to carry out the refurbishment works of site structures and cableway section	Medium-sized	Selection of the construction company with the best offer through a public tender process performed at regional level
Flow of tourists	High tourist demand in Friuli-Venezia Giulia region concentrated in the most popular and well-known locations	High flow of tourists not only in the most popular locations, but also in the numerous abandoned war site placed in Carnia territory	Medium-sized	Valorise the several abandoned and unknown places, such as the site of Monte Scinauz, offered by the territory and exploited below their potentiality
Historical knowledge	Historical knowledge of people about the Cold War mainly deriving from school studies and personal researches	Knowledge of Cold War events also coming from the revival of historical and cultural heritage	Small	Valorisation of Monte Scinauz military base, and consequent opening to visitors, as an opportunity to increase people knowledge about the historical events happened during the Cold War period
Local identity	Local identity of Carnia territory identified in the presence of numerous war sites in abandoned conditions	Stronger common identity of local people thanks to a decrease in the abandoned built heritage; it is preserved and opened to visitors	Small	Valorise the several abandoned and unknown places, such as the site of Monte Scinauz, offered by the territory and exploited below their potentiality

Figure 5.2 Gap Analysis

5.4 Swot Analysis

The Swot Analysis is a basic technique used to assess strengths, weaknesses, opportunities and threats of the project proposed. Strengths and weaknesses are internal sources, respectively correlated to the strong points and the fragile elements that the project displays. Opportunities and threats are, instead, external factors which may influence the future development of the proposal; in particular, opportunities correspond to the positive dynamics able to impact in a favourable way on the project, while threats are the negative elements which can damage the project performance. The aim of the methodology is to define the probabilities of achieving the expected result, performing an enhancement of the strongest factors and a containment of the main problems.

➤ Strengths:

- *Preservation of a built cultural heritage with an important historical background:* the military site of Monte Scinauz consists of a set of buildings realized in 1972 and characterized by the presence of the 17° Radar Group of the Military Air Force, a fundamental base operating on the Italian territory during the Cold War.
- *Valorisation of a symbolic place for local people:* the military site of Monte Scinauz is one of the numerous war places in abandoned conditions which represent the local identity of Carnia territory and that, for this reason, need to be valorised.
- *Amazing view over mountains:* the peak of Monte Scinauz, 1.999 meters high, offers an amazing view over the surrounding mountains able to attract the interest of many tourists.
- *Use of new technological tools²:* the guided tour of the museum is supported through the implementation of an augmented reality system which allows a complete discovery experience of the built cultural heritage characterizing Monte Scinauz.
- *Innovative project:* Monte Scinauz is one of the few example of open-air museum at high altitude accessible through a cableway plant.
- *Modern cableway installation:* the new cableway installation is a modern system with an advanced innovative technology able to provide safety and comfort at high altitude.

² Data developed thanks to a collaboration with the owner of Ikon Multimedia, the company behind the creation of the augmented and virtual reality experience in Monte San Michele Museum.

- *Good accessibility:* the Pontebba-Monte Scinauz Cableway, which connects to the museum, is easily accessible by both public and private transport thanks to the proximity with the A23 Palmanova-Tarvisio Highway and the presence of a bus line and a railway station.
- *Interesting historical and cultural sites in the surroundings:* Monte Scinauz is characterized by the presence of many historical and cultural sites visitable in its surroundings such as archeological sites, museums, fortresses and villages.
- *Presence of many naturalistic hiking paths in the area:* Carnia territory offers a wide range of tracks with different levels of difficulties allowing to discover hidden places only accessible on foot.
- *Presence of possible sponsorships as potential source of financing:* Friuli-Venezia Giulia region shows the presence of entities and associations interested in the creation of a partnership with Monte Scinauz Museum and willing to provide a financial contribution.

➤ Weaknesses:

- *High initial costs:* the project proposal implies high initial costs due to the refurbishment interventions required to open the military site of Monte Scinauz to visitors.
- *Seasonal opening of the museum:* the project income is limited by the fact that the museum annual opening is established for 4 months a year, from June to September, as it is an open-air museum at high altitude.
- *Risk of damage to the built cultural heritage:* the historical structures and the old components exposed in the museum may be subjected to damages due to the opening to visitors.
- *Risks related to high altitude works:* due to the mountainous location, the refurbishment works of the military site structures and especially, of the cableway, require specialized workers for high altitude interventions which are subjected to high risks in terms of accidents and falls.

➤ Opportunities:

- *Economic recovery after the Covid-19 pandemic:* valorising the abandoned site of Monte Scinauz represents an opportunity to economically enhance the Friulan territory after the Covid-19 pandemic, as it represents a new cultural offering able to attract an increasing number of tourists.

- *Implementation of the diversified tourist offering of the region:* the touristic exploitation of an already existing heritage is a way to implement the diversified offering of the region, able to involve the interest of many tourists thanks to the presence of mountains, sea and culture sites.
- *Arrangement of abandoned walking paths in the area of Monte Scinauz:* the conversion of the military site of Monte Scinauz into a museum opened to visitors is a possibility to full regenerate the naturalistic mountain area in the surroundings.
- *Creation of a stronger common identity of local people³:* the preservation and valorisation of an abandoned war heritage in Carnia territory is an opportunity to enhance the sense of common identity of local people.

➤ Threats:

- *Natural hazards:* the buildings of Monte Scinauz Museum may be subjected to natural hazards such as earthquakes, avalanches and fires able to severely damage or destroy the structures.
- *Lack of interest of people in cultural activities:* some people may not be interested in the knowledge of historical events happened during the Cold War period.
- *Uncertainty about the future situation of the Covid-19 pandemic:* despite the future perspective seems to be positive, an ongoing uncertainty about the strength of the recovery is present since it is not possible to determine the evolution of the pandemic in the next months and years.
- *Risk of future competitors:* Carnia territory is full of war sites in abandoned conditions which, following the example of Monte San Michele and Monte Scinauz, could be valorised and opened to the public representing possible competitors.
- *Few visitors in the days with unfavorable weather conditions (especially rainy days):* the weather conditions can affect the museum attendance since it is an open-air site on the top of a mountain.

5.5 Risk Analysis

The risk analysis is a methodology used to identify and analyse factors which may compromise the success of the project presented. The goal of this technique is to mitigate internal and external

³ Data developed thanks to a collaboration with the owner of Ikon Multimedia, the company behind the creation of the augmented and virtual reality experience in Monte San Michele Museum.

risks associated to the project, in terms of reduction of probability at which an event occurs or in terms of decrease in magnitude of an impacting event. Any factor is identified, in fact, in a risk matrix as a combination of two variables, probability and magnitude, which define the hazard level to take into account in the project development (Figure 5.3). The probability represents the degree of possibility that a risky event occurs, while the magnitude is an index showing the severity of the harmful consequences. The risk level can vary from an extremely low value, which only requires a monitoring action, up to a high critical condition which can jeopardize the achievement of the final objective.

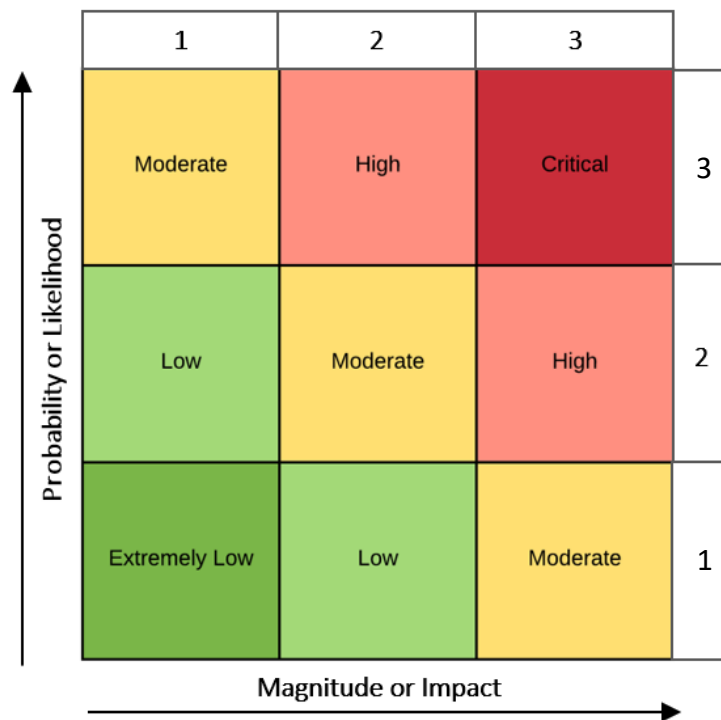


Figure 5.3 Risk matrix.

Source: <https://www.lucidchart.com/techblog/2019/09/04/startup-security-conduct-risk-analysis/>

The first step of the analysis consists in the categorization of the identified factors within the matrix, in accordance with their risk degree. Then, the methodology requires the definition of mitigation actions for each specific element of risk, useful to find possible solutions to implement in relation to the project. The underlying table shows the Risk Analysis performed for the project of Monte Scinauz Museum (Figure 5.4).

Risk Analysis					
	Risk Factors	Probability	Magnitude	Risk Level	Mitigation Action
External risks	<i>Natural hazards (such as earthquakes, avalanches and fires)</i>	1	3	Moderate	Consolidation of concrete structures and refurbishment interventions implementing anti-seismic solutions, such as carbon fibres supports and reinforced plasters, and fire prevention actions
	<i>Uncertainty about the future situation of the Covid-19 pandemic</i>	2	3	High	Ensure compliance with the anti Covid-19 standards inside the museum and the cableway, limiting the number of simultaneous accesses and asking, in mandatory terms, the use of masks in all indoor spaces
	<i>Few visitors in the days with unfavorable weather conditions (especially rainy days)</i>	2	2	Moderate	Application of a slight discount on the cableway and museum ticket costs in rainy days
	<i>Future competitors</i>	2	2	Moderate	Keep a high level of tourist attractiveness; this is possible, for instance, through the introduction of innovations in the augmented reality application and storytelling narration, or the promotion of new activities inside the museum in collaboration with local schools.
	<i>Lack of interest of people in cultural activities about the Cold War historical period</i>	1	2	Low	Project promotion through advertising and website campaigns, emphasizing the presence of a modern cableway installation and an augmented reality experience inside the museum
Internal risks	<i>Risk of damage to the built cultural heritage due to the opening to visitors</i>	2	2	Moderate	Imposition of rules of conduct which must be respected by tourists within the museum site and introduction of monetary penalties in case of damage to structures or components
	<i>Cableway breakdowns during the operating months</i>	2	2	Moderate	Constant execution of monitoring and maintenance actions, both of ordinary and extraordinary nature, in accordance with the planning programme
	<i>Problems in a proper functioning of the augmented reality smartphone application</i>	1	2	Low	Regular monitoring and updating of the smartphone application made by expert technicians
	<i>Risks related to high altitude works</i>	1	3	Moderate	Adoption of the security measures required by the standards for high altitude works such as anchorage and anti-fall systems

Figure 5.4 Risk Analysis

5.6 Impacts Analysis

The last analytical step concerns the development of an Impacts Analysis, an evaluation tool whose aim is the definition of the outcomes expected by the project. More in detail, the assessment refers to the presentation of the areas of impact highly influenced by the project effects. The methodology is useful, in addition, to point out the measures applied to disseminate and communicate the project results and to specify the target group to which the work is addressed.

In order to perform an Impact Analysis, it is necessary to start with the definition of the specific needs that trigger the project proposed. In this sense, Monte Scinauz Museum has two main reasons which justify the implementation of the work and which, joint together, testify the relevance of its realisation. The first point is represented by the Italian socio-economic crisis after the spread of the Covid-19 pandemic in 2020, which drags heavy consequences in the following years. The second condition is related, instead, to the presence of numerous war sites in abandoned conditions in the Carnic territory of Friuli-Venezia Giulia region. The specific need leading to the origin of the project proposed has to be found, therefore, in the importance of reviving a significant built heritage and in the necessity of implementing a strategy able to positively intervene in the crisis situation. In particular, given the strength of the tourism sector in the Italian economy, the idea is intended to valorise an abandoned historical site as successful strategy in the economic recovery intent.

In terms of expected results, the project is designed to prove how the revival of a significant historical and cultural heritage is able to produce an added value in the corresponding territorial context. Specifically, Monte Scinauz Museum project is expected to generate a positive outcome in the Friulan territory in relation to all the four spheres of the sustainable development. These refers to the economic, environmental, cultural and social fields, the areas of impact mostly influenced by the project effects and where the production of benefits and advantages represents the achievement of the project goal.

An important step of the analysis concerns the definition of exploitation, dissemination and communication measures to be applied to the results in order to disclose the success of the project. In terms of exploitation, the innovative idea of a mountain open-air museum connected

through a cableway installation can be applied in many other historical and cultural sites in abandoned conditions. In particular, the valorisation proposal can be taken up as an interesting benchmark not only in the numerous war sites widespread in Carnia territory, but also across the whole Italian Country characterized by a wide heritage of mountains. As regard the dissemination part, scientific publications seem to be the most useful strategies which, allowing a large-scale demonstration of the project results, ensure their application in future projects. Beside that, local newspaper articles, websites and, especially, social media must be considered as other important dissemination channels which allow to gain a public attention in the project outcomes. Communication measures refer, instead, to the organisation of local events which, opened to tourists across the Carnic territory, are used to sponsorship and attract visitors towards the new museum of Monte Scinauz. These events can be entertainment shows organized in squares or public spaces of the most popular and well-known tourist locations, or they can include different activities, such as sports events and village fairs, exploited to present a new and interesting cultural opportunity offered by the territory.

As just said, Monte Scinauz Museum project is expected to generate a positive outcome in the Friulan territory within the economic, environmental, cultural and social areas. In this sense, there are different target groups who directly and indirectly benefit from the project results. In direct terms, Friuli-Venezia Giulia region and, therefore, the Italian Country, makes an economic profit from the opening of the museum structure. Then, Italian population take advantages from a cultural viewpoint, with the possibility to improve its knowledge about the Cold War historical period. The local community of Carnic territory, in addition, has the possibility to exploit the valorisation project as a tool to strengthen its cultural identity. In indirect terms, even if not concerning an entity or a group of people, the environment in the surrounding of Monte Scinauz benefits from the valorisation intervention which results into a full regeneration of the naturalistic mountain area. Furthermore, it is also important to state that the project results can be largely taken up by the scientific community, in particular engineers and economists, to implement the development of their study projects.

After a successful exploitation, dissemination and communication of the project results to the target groups, the expected outcome refers to the implementation of new valorisation proposals for the numerous abandoned war sites located in Carnia territory. These historical places, following the example of Monte Scinauz Museum, will be converted in a different intended use

able to enhance their cultural features in the best possible way. Consequently, the project proposed is addressed to produce a great change in its territorial context, from an economic, environmental, cultural and social perspective. In general terms, the most important result expected by the project refers to a large increase in the flow of tourists in Carnia territory, corresponding to a higher regional income able to positively contribute to the Italian socio-economic recovery after the Covid-19 Pandemic.

6 Conclusions

In 2022, the Italian crisis deriving from the global spread of Covid-19 Pandemic is one of most important and widespread issues: the Country is still characterized by evident damages caused by the negative impact recorded in the greatest part of socio-economic activities of the two previous years. Despite the presence of few signs of recovery clearly visible in the GDP growth, the uncertainty about the future evolution of the pandemic confirms the instability of the situation and slow down the restart perspectives.

In front of this situation, new actions are adopted by the Italian government such as the presentation of the PNRR program to the European Commission, intended to outline the areas of interventions where the available funds are allocated. However, the implementation of further strategies is fully required to pursue a positive growth and bring back the socio-economic conditions to pre-covid levels. The idea of this thesis derives, exactly, from this strong necessity, with the intent to find a possible solution able to lead Italy towards a condition of well-being and stability.

In order to define the best action to put in place, a general analysis of the context has been carried out revealing the importance of the tourism sector in the Country economy. Beside that, the richness of the Italian territory, characterized by a variety of landscapes and an interesting built cultural heritage, is another strength taken into account during the first phase of the study. In particular, Friuli-Venezia Giulia appears as one of the regions with the most diversified touristic offering and characterized by a high number of historical war sites. Most of these sites are in Carnia territory and they are in a state of abandonment, quite unknown and exploited below their potentiality.

The objective of the thesis has been established in accordance with this investigation, clarifying the opportunity to exploit the tourism sector in Friuli-Venezia Giulia context. The region, in fact, is the perfect location to carry out the analysis, since the tourist contribution can leverage not only on the most popular locations, but also on the several abandoned and unknown places that the territory offers. More in detail, the goal of the proposal refers to the revival of the significant historical and cultural heritage characterizing the Carnic territory, seen as a possible strategy of success in the economic recovery intent. Object of the thesis has been, in particular, the case

study of the site of Monte Scinauz, the military base placed on the mountain peak and hosting the 17° Radar Group of the Military Air Force. The project proposal refers to the preservation of the place authenticity and the valorisation of the existing heritage through the conversion into an open-air museum accessible to visitors. The intervention, consisting in a structural refurbishment of the site structures and the cableway installation connecting the top of Monte Scinauz with the underlying municipality, is intended to realise a suggestive guided tour across history and nature supported by the implementation of an augmented reality system.

Before a practical implementation of the idea, a series of analysis has been carried out in order to understand the feasibility of the project in terms of technical and economical sustainability. This step brings, in fact, to some important considerations which must be highlighted in the project results. The Gap Analysis has shown that a large gap exists in some areas of the project between the current and the desired state, especially referred to the change in the intended use of the site. This point, in fact, is strictly correlated to other important fields such as the structural conditions and the cableway functioning, where many action plans have been established to fulfil the expected results. Concerning the Swot Analysis, the methodology has displayed the presence of a higher number of strengths and opportunities with respect to weaknesses and threats, revealing a high probability in achieving the project goal. In particular, strengths and opportunities involve all the spheres of the sustainable development showing the presence of positive dynamics not only in the economic framework, but also in the environmental, cultural and social contexts. Weaknesses and threats have been analysed, instead, through the Risk Analysis which has clearly defined the mitigation actions to perform in relation to the level of risk. In general terms, all the external and internal factors identified present a low or moderate risk degree, except for the uncertainty about the future situation of the Covid-19 pandemic. This element represents, in fact, the most critical aspect of the project proposal since, despite the mitigation actions put in place at national level and the positive future perspective, it is not possible to determine with certainty the evolution of the pandemic in the next months and years.

Another important consideration refers to the economic-financial results emerged from the business plan, which reveals the project proposed as a good investment able to generate a largely positive income in terms of money. This step, combined with the analysis previously discussed, confirms the effectiveness of the idea in relation to the production of an economic, environmental, cultural and social added value in the territorial context considered.

In conclusion to the previous considerations, it is possible to observe that the idea presented within this thesis is a valid opportunity to preserve and valorise the abandoned historical heritage of Monte Scinauz and, at the same time, to face the difficult socio-economic situation which involves the national territory. The relevant aspect, however, lies in the fact that Monte Scinauz Museum project, characterized by the innovative proposal of a mountain open-air museum connected through a cableway installation, is an interesting benchmark for many other future projects. The idea, in fact, can be applied in many other historical and cultural sites in abandoned conditions across, not only the Carnic territory, but also the whole Country with the aim to valorise the uniqueness of the Italian built cultural heritage and to give a further contribution to the socio-economic recovery.

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