TYPES OF NON-CONVENTIONAL TOURIST TRANSPORTS

VĂDUVA LOREDANA*[1], PETROMAN CORNELIA[1], ADAMOV TABITA [1], IOSIM IASMINA[1], MARIN DIANA[1], PETROMAN IOAN[1]
[1]Banat's University of Agricultural Sciences and Veterinary Medicine"King Michael I of Romania" from Timisoara, Faculty of Management and Rural Tourism
*Corresponding author's e-mail: loredana_heber@yahoo.com

Abstract. *Unconventional tourism refers to any type of transport in which either rolling stock or infrastructure is fundamentally different from conventional transport, being used by national and international tourists, in areas with special natural and anthropogenic tourism potential, the means of transport itself being tourist attractions in turn, through the ingenuity of the construction. The most common types of unconventional tourist transport are railway with rack in high-mountain areas where single-gauge locomotives cannot effectively drive train cars, railways with linear electric motor, air-cushion vehicles and transportable rail and suspended, funicular, monorail and special means of transport for white sports.*

Key words*: tourism, unconventional transport, types*

INTRODUCTION

Unconventional transports include different types of transport in which differ:

- infrastructure;
- rolling stock. [1,7,9]

These unconventional transports are also different from the conventional ones and because they are used in areas with large slopes and with great tourist potential, the means of transport itself being tourist attractions by their ingenuity of construction. In high-mountain areas high-strength locomotives cannot train effectively train wagons. The solution found to increase adhesion was to introduce, on the runway axis, between the rails that support the rolling stock of a toothed rack called a rack that engages the teeth of an additional wheel of special construction locomotives. The invention belongs to the Swiss Roman Abt, the system being perfected by Riggenbach, who built the first mountain railroad track in Europe in 1863 between Vitznau and Rigi (Switzerland). [4,5,8,16]

In order to prevent the decrease of adhesion and the increase of the dynamic loads between the wheels and the rail caused by the increase of the train speed, the solution for introducing the linear induction motors (Figure 1), which according to the studies of the specialists has the following advantages: [3,17,18]

- the drive is made without mechanical contact;
- without producing wear;
- the traction force applies directly to the vehicle,
- the traction force does not depend on the adhesion between the wheel and the rail;
- engines have no moving parts, they are simple;
- the engines operate silently;
- engines are not polluting.

In Romania, weas created at the "Traian Vuia" Polytechnic Institute of Timisoara the ROM-U-LIM linear induction motor system and ROM-V-LOM homopolymer linear linear system. [2,6,11,12,14]

In Europe, funiculars appeared in the fifteenth century, being made of textile fiber ropes supported on wooden poles, on which were drawn, frames or baskets with materials, the traction being ensured at the ends of the ropes, using the horses.

Rail track with linear electric motor

In 1827, the textile ropes were replaced with steel wires and in 1833 the endless cable car was invented. Later on, wagon trains were introduced and more efficient traction cable pulling systems, especially in coal and salt mines. A central cable and cable car was built in Italy at the end of the nineteenth century to introduce cable traction using steam engines in England, using electric motors in Switzerland and France and water counterweight motors in Switzerland in Friborg, France, Germany and Italy. [10,13,15]

MATERIAL AND METHOD

In this scientific approach I have analyzed the main unconventional means of transport in order to propose and promote new tourist circuits in areas with tourism potential and unconventional means of transport, which are also real tourist attractions by their ingenuity.

RESEARCH RESULTS

Railway with rack. The system was then generalized in Switzerland, where railroad tracks were built at the highest altitude from Europe on Mount Jungfrau at 3,457 meters. Between the 14 railways with rack from Switzerland, the record of the sloping line holds the line on Mount Pilatus, near Lucerne with 480 mm/m. Railways with rack have been generalized on mountainous routes with large declines in the central and western European countries but also in the two America.

Train and railway with rack

If there are high-speed Express trains running more than 500 km per hour, you can travel comfortably with the world's slowest Express - Glacier Express in Switzerland - which, on a narrow rack line, advances through the tall steps of Alps near the glaciers at a speed of 35 km/h. Leave either from St. Moritz or Davos and crosses 291 bridges, 91 tunnels, 7 valleys, viaducts, narrow and deep gorges covering the 300 km distance in 7 hours to Zermatt, being considered the jeweler of the Swiss Railways, equipped with wagons with panoramic views, air conditioned, convenient places of any class, multilingual information systems, restaurant. Near Fusilir, the train when leaving from the tunnel seems to float in the air when it passes over the high viaduct on its way to the medieval city of Chur. The railway gets on steeply up the Oberalp steep (2033 m) from where it descends to the valley of the Rhone near the Aletsch Glacier to Brig. The train starts climbing again, by passing the Visp village on its way to Zermatt, and tourists can admire the Matterhorn with its rocky and jagged peaks reaching the 4478-meter high, considered the Swiss paradise due to its pyramidal peak that tends to reach the sky like the gothic cathedral turrets. Passers found at altitudes greater than 2000 meters are usually closed in the winter for 4-6 months for car transport to avoid snow and avalanches, railways can be used to climb cars on ramps in Oberwald-Realp for the Furka tunnel or Andermatt for the Oberalp step. On the way you can admire the famous village of Wallis from the Zermatt and Matterhorn area, which has a population of 3000 inhabitants and has earned its fame thanks to the Matterhorn peak, the old houses, the Alpine Museum, or the Rosa Hotel, over 150 years old. Only electric cars circulate in Zermatt, the city being closed to traffic, the world moves on foot or by taxi, electric bus or horse-drawn carriage. The Zermatt ski area includes an area of nearly 300 km of slopes in the area: Rothorn, Stockhorn and Klein Materhorn where the funicular climbs to 3820 meters.

The Brig is another attraction for mountain tourists, being once an important commercial point for goods passing through the Simplon, Furka and Grimsel passes, remarking through Renaissance Castle Stockalper Castle with golden tower onions.

The next point reached by Glacier Express is Andermatt considered to be the most interesting and preferred area by the mountain lovers. It is a well-known tourist center for winter sports and a starting point for the Three Passengers, Furka, Grimsel and Sustem, being considered one of the most spectacular Swiss alpine roads. Rathaus, the Church Peter and Paul Church, or St. Columban Church in Roman style on the way to Altdorf can be admired.

Disentis is found in a wonderful landscape, being a pleasant summer holiday center but also for white sports, a starting point for hiking or bikes. It owes its name to the Benedictine worship center founded in the 8th century, which is still the spiritual center of the valley. The church has two towers and a single ship, it was rebuilt in Baroque style and has an incunabula museum about abbey history, sacred art and a collection of minerals and crystals.

Chur is the oldest known Swiss city of the Roman period, is the capital of the Graubunden canton (Grisons), surrounded by the wonderful Alpine amphitheater. In the old town can be admired the 15th century Saint Martin church, with special altars and stained glasses by Augusto Giacometti or Villa Planta where the art museum is. In Hofplatz you can contemplate the Episcopal Palace and the Cathedral of the Ascension in a Romantic and Gothic architectural style that houses treasures of inestimable value, the stained glasses that make the main altar stand out through the wooden triptych carved and painted by master Jacob Russ.

St. Moritz, a charming spa town, is located in the Upper Engadine region, a hibernating resort, situated at the foot of access to a lake landscape, Lake St. Moritz, Lake Silvaplana and Sils, offer a range of outdoor sports options throughout the year. The main

core of the small town concentrates on the large hotel chains and life in St.Moritz-Dorf, crossed by Via Maistra where they can be admired: the Mauritiusbrunnen, the fountain, the Rathaus, the Church with a horn-shaped tower, the Segantini Museum. The following activities can be practiced: walks, rafting, sailing, canoeing, paragliding, golf, moutain-bike, the water path that crosses 6 alpine beaches and the ecologic Energy Tour.

Davos is located in a green valley, inspired by writer Tomas Mann in the famous Roman Magic Mountain and is the starting point for Glacier Express to the beautiful alpine areas of Switzerland. From this tourist point, the railway with rack train goes along the Landwasser River, crossing the Zügen Gorge, to the Wiesner Viaduct to the village of Filisur.

Also in Switzerland, you can make a trip with rack train to Jungfrau can be admired by impressive mountain ranges, starting from the Kleine Scheidegg Pass through Egerwang and Mönch to the highest elevation in Europe, Jungfraujoch at 3454 meters altitude. To this destination departure is made from Interlaken, a town located between the lakes of Thun and Brienz, the starting point for trips to Jungfrau. With a 20-km detour you can reach Grindelwald near the Jungfrau region, a UNESCO-listed landscape since 2001, it can cross the glacier trail to Jungfraujoch, where is the weather station, the ice castle, and the panorama of the entire valley, Kleine Scheidegg as a starting point to the foothills of the mountain is a very popular ski resort, but also a starting point for mountain hiking.

Bernina Express, a rack train in Switzerland, runs on the Chur-Tirano round-trip, the movement lasting 4 hours and 35 minutes on the distance of 145 km away, through the highest crossing point of the Alps with a 7% inclination. During the route the train first climbs to Albula Line at 585 m in the Chur area to reach 1774 m at Pontresina before heading for Bernina to 2253 m and descending to Tirano up to 429 m. On this route tourists have the opportunity to contemplate a complex range of Alpine landscapes with special endemic vegetation, the Piz Bernina Glacier, or Mediterranean palm trees and flora in the area of Tirano.

Golden Pass crosses the Luzern-Interlaken-Zweisemmen-Montreux route in Switzerland in 5 hours and 6 minutes. It is considered to be a classic trip to the canton country, enjoying great views on the banks of Lake Lucerne.

The Lötschberg-Centovalli Express travels through a romantic trail through Centovalli, linking the two major railways across Europe over Gotthard and Simplon. The train passes over bridges and slopes of 6%, round-trip travel that can be done in one day on the romantic route Zürich-Gotthard-Centovalli-Simplon-Lötschberg-Brig-Zürich.

Wilhelm Tell Express runs round-trip, only between May and October, and the 6-hour trip can also be done with vintage trains, with Belle Epoque wagons, towed by steam locomotives along the route linking the Ticino canton from Italy, from Luzern to Lugano.

Palm Express travels in 4 hours and 10 minutes to St. Moritz only during the spring/summer period until the beginning of autumn, being a connection between the bus and the railway crossing glacier and Mediterranean areas in southern Switzerland at the border with Italy. This Expres unites Engadine and Upper Valais with Ticino, St. Moritz, Zermatt with Ascona, Lucarno and Lugano.

Allalin Express returns round trip on the Berna - Interlaken - Lötschberg - Brig - Saas Fee route in about 3 hours.

Voralpen Express, crosses the foothills of the Alps and the banks of the Swiss lakes on the round trip, Luzern - Goldau - Arth - Rapperswil - St. Gall - Romanshorn, the duration of the trip being 2 hours and 39 minutes, a route where natural and anthropic resources can be admired from the stations of the train station.

In France, starting with 1908, once at half an hour leaves from Chamonix railway station (Upper Savoie and Mont Blanc), the rack train which in 20 minutes reaches to 1913 meters at Montenvers near Mer de Glace. The actual appearance of the two wood wagon gasket has not changed, he excites, as is the largest glacier in France with a surface of 40 square kilometers.

For a climb on Zugspitze (2962 meters) in Germany, are necessary 70 minutes for that the rack trains to reach on the highest mountain. The train climbing inaugurated in 1928-1930 is very spectacular because: it passes by Eibsee through a 4.4 km tunnel where the slope has an inclination of 25%, going to Schneefernerhaus, 2650 meters wide panorama from where the cableway goes to the higher peak.

The rack transport system was first implemented in the US in 1847. The most famous railway with rack track is in the state of Colorado: the 14 km long line leaves at an altitude of 2,000 m (Manitou) and rises to 4,301 m (Pike's Peak Observatory).

South America has rack lines that reach the highest heights. The Ferrocarril Arica-La Paz line, between Bolivia and Chile, reaches an altitude of 4,257 meters.

For an unforgettable experience in Brazil, at Rio de Janeiro it can be taken the rack train that climbs Mount Corcovado (917 meters) through the Tijuaca National Forest, for twenty minutes, up to the Statue of Christ the Redeemer, the same racked rack that also transported the materials needed to build the statue. The 38 meter statue is part of the 7 Wonders of the Modern World, it is built in Art Deco style of reinforced concrete and weighs 635 tons and the face of the Savior was modeled by the Romanian artist Gh.Leonida while working in Paris.

In Romania, between 1905 and 1908, the Bistra Valley Depression to Hateg was built, a railway line with rack on a portion of the Caransebes - Sub-Cetate (76 km), between Boutari (425 m altitude) and Zaicani 569 m altitude) - 50 mm/m downhill, through the Iron Gates of Transylvania (692 m altitude). The freight train speed was 12 km/h, and that of the passenger trains was 8 km/h. Unfortunately, since 1978, on this special infrastructure has left no trains, although the route could have been a special tourist route for those who want special tourist landscapes and contribute to the economic development of the area.

Railroad with vehicle on air cushion. Cushion air suspension consists in suspending the rolling stock over a thin layer of air above a tread that eliminates friction between wheels and rails while traveling (Figure 3). The principle of operation is based on four types of technology: adaptive electromagnets, permanent magnets, superconducting magnets and magnetodynamic suspension. In this way, it reaches speeds of up to 550 km/h on railway lines that exist in China, Germany and Japan.

Railroad with vehicle on air cushion

Like any transport system, also the transport by rail with the vehicle on the cushion has advantages and disadvantages.

The advantages of using such a means of transport and for tourism purposes are:

- the risk of derailment and passenger safety;
- better accelerations;
- ability to climb steeper slopes;
- higher energy efficiency
- reduction of noise pollution;
- higher travel speeds and shorter arrival times.

The disadvantages of using this system are:

- inadequacy of freight transport;
- incompatibility with traditional tourist transport networks where there is infrastructure for rack trains and beyond;
- high infrastructure cost.

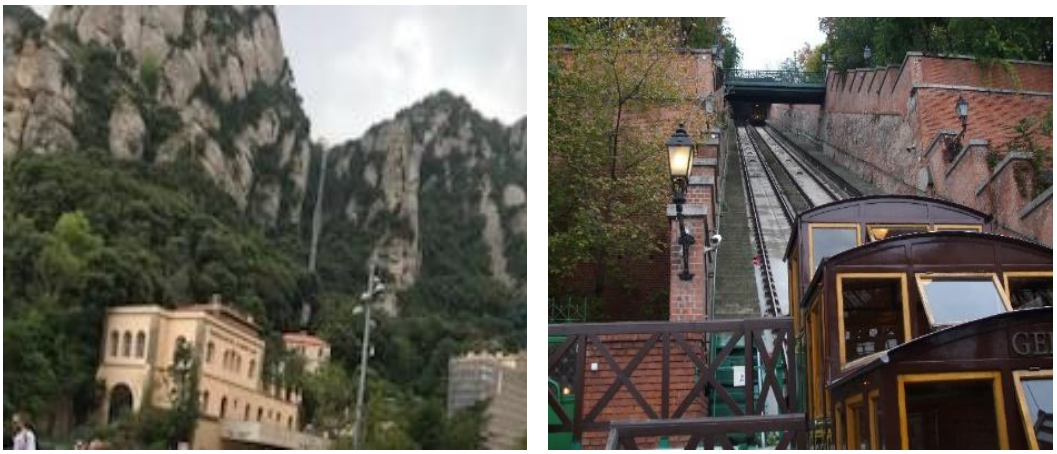
Suspended railroad is an elevated monorail form in which vehicles used for passenger transport are suspended by a fixed rail above a street, river or canal, or even railroad.

This type of transport is a modern form of transport in the big urban agglomerations, where tourists can admire the anthropic resources existing in historical centers or modern glass and steel constructions, being an efficient way to contemplate large metropolises.

The transportable railway. In the case of this system, railways and rolling stock can be moved to needs and temporarily mounted in mining and forestry, in hydraulic works, in construction sites, which through implemented projects can be real tourist attractions. The most known system of this type is Decauville. In Europe, such a Decauville system is found on two beaches in Portugal, Barril and Caparica, where 10 km of seasonal tourist trains are installed (Figure 4), for the transportation of beach tourists is also used for recreation, admire the wonderful landscapes of the area in this part of the world. At the end of the summer season, this type of railway is dismantled and preserved until the following year.

The Funicular as a means of transport has appeared in China, India and Japan for 3,000 years ago, due to the need to cross areas with water courses, abysses, deep valleys, canyons.

The largest line of funiculars in the world (880 mm/m) is found in Chile, followed by the 830 mm/m intersection line from France.



Funicular climbing Montserat and Budapest fortress

One of the longest cable routes in the world is in Switzerland and connects Grindelwald-Grund (943 meters) to Männlichen (2230 meters) in the Swiss Alps.

Peak Tram, Hong Kong, China, is a funicular that rises sharply to the tip of Victoria at a 4-27 degree level, giving the impression that the blocks tilt as they pass by them.

With the funicular on the Powell-Hyde Line in San Francisco, California, you can admire the city, with Golden Gate, the famous bridge known all over the world for its grandeur from the past.

Monorail. The single-track rail or monorail line appeared in 1821 in England, in the alternative line of the pre-erected wooden escarpments. In 1868, in France, the monorail appears with a wheel on the track and two other sidewalk wheels on the road. In 1892, in the US, appears the system with a rail-mounted at the ground for the locomotive and wagons and a T-shaped upper rail appears for stability. In the Swedish Alweg system, is used sedan-type vehicles equipped with electric motors and bearers and with guide wheels running on tires on pre-stressed concrete treads. Axial to the track is a guide rail. Passengers are transported to this system in Germany, Japan, the U.S. but also tourists whose destination is these areas.

Funicular. In the twentieth century, special funiculars were built for the transport of mountain travelers and not only called funicular (Figure 5), which are used as cable cars and lifts. For crossing the highest mountain in Europe, Mont Blanc, from Courmayeur to Chamonix, the cable car has been used since 1960. The funicular was made with unique technical solutions that can work all year round, except for bad weather with strong winds and blizzards. The funicular on this route is divided into six sections:

Funicular

- the first section leads to the Pavillion du Mont Fréty (2173 meters) to admire the Alpine Botanical Garden (Saussurea alpina);
- the second section leads to the Turin refuge (3375 meters);
- the third section reaches the Helbronner mountain peak (3462 meters) where glacial terraces can contemplate peaks of over 4,000 meters including Mont Blanc, Matterhorn, Grand Paradis etc.;
- the fourth section leads us to 3842 meters being considered the paradise of the skiers without slopes;
- the fifth section of the L'Aiguille Plan at 2317 meters;
- the sixth section leads to Chamonix at an altitude of 1037 meters.

From the fourth section, experienced Alpine tourists can cross La Vallée Blanche from Aiguille Peak to Chamonix 20 km on ski slopes or Montenvers rack, but also on the five and six sections.

The longest and tallest funicular from the world takes an hour to climb from a plateau of Anzi (Venezuela) 3,125 meters to the Pico Espejo Peak with four stops on the way.

An entry point in the Picos of Europa National Park, Spain, can be the cable car that leads over the Picos forested valley at 1,840 meters and the hills of the northern Spain can be hiked to explore the area.

In Romania, funiculars were built between Anina and Oravita (1853-1863) in Comadau, Jud. Covasna (1883), in Malini, Jud. Suceava (1892). After World War II, cableways were built in mountainous tourist areas in Balea, Brasov, Busteni, Crivaia, Paltinis, Predeal, Sinaia, etc. Today, amateurs of mountain and white sport tourists can use the gondola lift, chair lift or ski lift as a means of transport (Figure 6).

Gondola lift

Ski lift

Chairlift

The beautiful valley of Gulmarg, Jammu and Kashmir from India is situated at 2730 meters altitude in the northwest of the Himalayan Mountains, called the flower field. To get here and contemplate the floral variety, it is use the gondola that climbs in two vertical steps up to 3980 meters from where it can be admired the K2 peak.

Train ferry. A train ferry is a craft designed to carry vehicles normally circulating on rail tracks. Typically a craft level has rails and the boat has a front and/or rear door to allow access to the docks (Figure 6). The first train ferry line was established at Deutz (1893) but quickly expanded into England, Egypt, Greece, Japan, Spain and the United States.

It is interesting for tourists who are destined to use one of the countries listed above to use the combined tourist transport: railway - the river.

CONCLUSIONS

In order to value areas with natural and anthropogenic tourism potential where other conventional means of transport cannot reach due to high mountainous declivity, unconventional transports can become through their ingenuity means of access and promotion.

The most common types of unconventional tourist transports known worldwide and in Romania are the railway with rack with vehicle on air cushion, but also the transportable and suspended railway, the funicular, the monorail and the special means of transport for

winter sports. In these areas, the use of these types of transport contributes to the sustainable development of difficult to reach areas and the creation of tourist brands.

All these types of unconventional transport represent a modern form of transportation also in the big urban agglomerations not only in mountain areas because tourists can admire the natural and anthropogenic resources existing in the areas with tourist vocation.

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