

DEFINITION OF PRINCIPLES OF TOURIST TRAFFIC ORGANIZATION ON NARROW-GAUGE RAILWAYS

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Предложена классификация узкоколейных трансферов и туристических путешествий в зависимости от цели поездки, вида подвижного состава, времени путешествия и регионов обслуживания, которая позволит заранее планировать необходимое количество подвижного состава. Определены принципы и ключевые факторы, которые влияют на развитие туристических перевозок по узкоколейным железным дорогам. Рассчитаны прогнозные показатели туристического потока в Закарпатской области и ожидаемый годовой доход от туристических перевозок, которые будут организованы по узкоколейной железной дороге.

Ключевые слова: узкоколейная железная дорога; трансферные перевозки; туристические перевозки; туристические путешествия; железнодорожный транспорт; туристический маршрут

1. Introduction

The railway excursions on the narrow gauges are very popular in the world [10]. Among the successful railway tourist transportations are the following examples.

For example, in *India* operates a narrow gauge mountain railway Nilgiri with a length 46 kilometers, connecting Mettupalayam and Udahanadalam. The travel takes 5 hours when going up and 3 hours when going down. Almost 46 kilometers of the railway pass through 208 turns, 16 tunnels and 250 bridges.

Another famous narrow-gauge railway in the world is the one, on which passes the tourist train «Bernina Express», the route Chur (*Switzerland*) – Tirano (*Italy*). Four-hour journey will bring great pleasure to the passengers, because at the distance of 127 km they face a big height difference.

The railway between *Thailand* and Burma or "Death Railway", which was built during the Second World War is very popular with tourists. More than 100 000 people died during construction of this railway. The length of the route is 415 km. The train when driving is almost pressed against the cliffs and crosses a few shaky wooden bridges. Tourists will get an unforgettable experience during the passage across the bridge over the river Kwai.

In *Serbia* one offers for tourists twice a day train travel "Nostalgia" at the 13-kilometer narrow-gauge railway between the stations Mokra Gora and Sharhan Vitas. During a 30-minute trip tourists will pass through 20 tunnels.

In the *USA* operates the Georgetown railway, narrow gauge line only 7.2 km long ascends an elevation of 200 meters above the sea level. More than a century it is a very popular tourist attraction. Classic train with old-fashioned cars powered by steam locomotive traction carries passengers, gradually climbing the bridge of 30 meters height.

In *Hungary* there are narrow-gauge railways in cities Palhaza, Miskolc, Nyiregyhaza. Narrow-gauge network in Hungary is 380 kilometers. They pass through the mountains and valleys opening to tourists picturesque landscapes.

The biggest narrow-gauge railway network is in *Japan*. Actually, it is a narrow gauge (1067 mm, the so-called Cape gauge) is the standard here. Thus, it does not work one of the main disadvantages of the narrow-gauge railways. However, the narrow gauge still restricts the speed of trains that is why the high-speed lines Shinkansen have the standard gauge (1435 mm).

In *Argentina* the most famous among the tourists is the so-called "Train to the Clouds," which overcomes the 940 kilometers across the Andes, connecting Chile with Argentina. During the travel the train passes 29 bridges, 21 tunnels and 13 viaducts. At this the train climbs high in the mountains to a height of 4220 meters above sea level.

2. The object of research and its technological audit

In Ukraine operate only four narrow-gauge railways, located in Transcarpathia region. Restoration of the narrow-gauge railways in Ukraine can be a momentum for attracting investments into potentially attractive type of business, because in the developed world countries the railway tourist transportations bring stable income to the owners of railways. Attracting additional funds will help to renew rolling stock and railway infrastructure, since today, in terms of services provided to passengers, railway transport does not meet the European requirements.

3. The aim and objectives of research

The objective of the research: to determine the principles of the tourist routes organization on narrow gauges.

To achieve the goal, the authors have determined the following tasks:

1. To determine the factors that plays the main role for the development of tourist traffic on the narrow gauges.
2. To develop a methodological approach that is based on the principle of determining the actual number of passengers and revenues from tourist transportations on the certain routes.

4. Research of existing solutions of the problem

A lot of scientists deal with the problems and prospects of development of railway transport and tourism in Ukraine, but only a limited number of publications is dedicated to the topic of railway tourism in Ukraine. As for the publications related to the passenger transportations by narrow-gauge railways of Ukraine, they hardly exist. Therefore, investigations in this area are very important, because transportation is an integral part of tourist travel, and it is the railway transport that is the most convenient in terms of service and affordable in terms of the ticket price.

The work [1] proposes a methodical approach to determining the feasibility and competitiveness of railway travels in different directions. It is based on the definition and use of saturation coefficients of the direction, the tour attractiveness and efficient tourist cost and makes possible the organization of more competitive railway travels, as compared to the others. In addition, the work determines the factors of competitiveness of the tourist travels, which take into account the peculiarities of railway tourism organization influencing the needs satisfaction of potential customers through emphasizing the most important factors.

The work [2] proposes to introduce the development of railway tourism on the basis of clustering. The authors believe that the development of railway tourism in Ukraine is impossible without diversification of railway transport into adjacent industry – tourism. The authors propose to conduct diversification by creating the transport and tourism cluster, which will be headed by the Ministry of Infrastructure. At the same time, it is proposed to conduct the passenger diversification of the economy in the three stages:

at first to determine the cluster members, then to combine associative partnerships into the joint stock companies and at the final stage to make the organization of holding companies.

The author of the work [3] also insists on the diversification of railway transport. Particularly, in the field of passenger transportations he proposes to expand the range of services at the stations in order to make profit. He draws attention to the fact that Ukraine still does not have sufficient theoretical and practical experience for successful diversification of railway transport enterprises. The author emphasizes the fact that firstly it is necessary to determine the strategic goal of railway transport operation, and then to develop the criteria for diversification, based on the positive experience of foreign companies.

The work [4] determines the prospects of railway tourism development in Ukraine on the Transcarpathian narrow-gauge lines. It was found that the facilities of track infrastructure, passenger infrastructure, rolling stock, and auxiliary units involved in the functioning of narrow gauge railway are in disrepair and need significant upgrades and capital repair.

The transport component of the Ukrainian tourist potential in modern conditions helps to strengthen it only in the sense that the system of transport networks has a distinct transit character. Consequently, a large number of areas provided with diverse recreational resources has transport accessibility for tourists and excursionists. Regarding the state of the transport infrastructure, in order to make it contribute to the efficient use and increase of the tourism potential, it is necessary to improve all its components both in quantitative and especially in qualitative plan. Moreover, the active involvement of different transport modes to the tourist services will make it possible to effectively develop different areas and types of tourism business and diversify the range of provided tourism services [5].

For the time being tourist objects are still unclaimed because of underdevelopment of infrastructure of tourist services and the infrastructure is not restored because of the lack of investors' interest, since the state does not stimulate them. Among the directions of the situation improvement in the Ukrainian market of tourist services the authors propose the following steps: infrastructure renewal, development of social tourism programs, improving the information policy, reconstruction of tourist objects and others [6].

Unlike the traditional interpretation and understanding of tourism only as a temporary departure of person from the permanent residence, all the visitors, who use the complex tourist product (tour) or individual recreational and tourist services should be subject to statistical accounting and economic analysis. It is proposed to regard the tourism as a branch of modern national and regional economy; the sphere of socio-economic policy of the state and its regions; the implementation technology of recreational needs and demands; the realization sphere of the rights and needs of the citizens for recreation, travels, and health improvement [7].

The main components influencing the choice of potential tourist to travel on a specific route are the places of interest or, as they are called by the authors, the "attraction factors" (sea, waterfall, museum, etc.) that attract tourists to the destination, as well as entertainments and convenience [8].

Information flows that receive potential tourists from the Internet are the basic impulses to travel in a particular area. They analyze the information about the eight most popular European places to visit: London, Madrid, Athens, Barcelona, Berlin, Rome, Paris and Rotterdam. They find thousands of photos from these places in social networks. Information in the form of photos and complete description of the location of historical and cultural monuments, photos of hotels, restaurants, casinos, parks and other places of recreation is very useful. Certainly, knowing complete information on a specific area, the tourist can plan his route in advance, book a hotel, and even buy the tickets for travel by local transport. It is interesting that, according to statistics, the locals have placed three times more photos of their town than the tourists who visited it. [9]

4.1 Unresolved aspects of the problem

Each of the above mentioned scientists made a significant contribution to solving the problems of transport, tourism and sustainable development of the country. But factors influencing the development of tourist traffic on the narrow gauges are still not exactly defined. There are no clear recommendations concerning the classification of narrow-gauge transfers and tourist travels depending on the travel purpose, type of rolling stock, travel term, and the service areas., as well as there is no single methodological approach that is based on the principle of determining the actual number of passengers and revenues from tourist transportations on the certain routes.

5. Methods of research

Theoretical and methodological basis of the research is the provision of economic theory, management theory, corporate governance. The paper used systems, diagnostic and optimization approaches that laid the foundations for a comprehensive study of railway tourism development strategy. To achieve this goal and solve certain tasks used: observation of detail, grouping and summarizing – to define and systematize the main factors affecting the efficiency of rail tourism; method of assessing the efficiency of real investment – to determine the amount of investment in the development of railway tourism organizational; calculation method – to calculate the cost of rail transport and tourist services.

6. Research results

Factors determining the demand for tourist traffic by narrow gauge railways

In the work [1] were presented the studies that according to a survey of 3000 respondents it was found that 74% of respondents or 2.210 people have a positive attitude towards the railway tourism; 6% of respondents have a negative attitude towards the railway tourism; 20% of respondents did not give the priority or confirmed their negative attitude towards the railway tourism. But at the same time, the supporters of railway tourism prefer the following types of tourist services: 9% of respondents are interested in adventure tourism, 12% of respondents want to vacate during the travel, 18% of respondents want to travel with informative purpose, 10% of respondents are interested in visiting the religious institutions, 9% travel with therapeutic purpose and 18% are interested in beach tourism.

As for the period of travel on the railway track, 25% of respondents prefer one-day tourist travels, 37% of respondents are interested in short journeys 2, 3 days, and 19% of respondents are interested in multi-day travels by tourist trains. At this, 19% of respondents could not positively answer this question.

In the Transcarpathian region tourists can find almost all of the above mentioned types of railway travels on the narrow gauges, such as: active recreation in the mountains in winter and summer; adventure tourism to explore beautiful nature of the region throughout the year; therapeutic tourism in thermal waters in the town Berehove, Transcarpathia resorts and bathing in hot tanks and rivers; travels with informative purpose throughout Transcarpathia; viewing the reserved lakes and rivers; visiting the historical castles, monasteries and others.

The question arises: "Who are the potential clients of railway tourism on the narrow gauges?" We can expect a considerable demand for one-day tourist traffic on the part of the guests of local Transcarpathian hotels, among them are the domestic and foreign residents.

The demand for short journeys (up to 5 days) by narrow-gauge railways can be expected not only from the guests of Transcarpathian hotels, but also from the residents of all regions of Ukraine and European countries.

At the moment one cannot confirm the existence of demand for railway tourist travels with the term up to 14 days, because on the territory of the narrow-gauge railway one cannot find the required number of excursion sites for domestic and foreign tourists. It can be possible only when the tourist base of Transcarpathia will be more developed, and the tour operator will organize additional travels on the narrow-gauge railways along the territories of the neighboring countries. But in the presence of the first class trains, which will contain the compartment cars, dining cars, buffet car, salon car, and in prospect casino-car (game car during the day) there would be a lot of tourists who want to travel for the period up to 7, 8 days.

According to the experts of the World Tourism Organization, the proportion, in which one foreign tourist coming from abroad and four people traveling along the territory of the country are accounted for by one tourist traveling abroad, is considered optimal. For implementation of this proportion the possibilities of railway transport can be fully used almost in all types of tourism.

Taking into account the recent events that took place in Ukraine during 2014-2016 years, namely the hybrid warfare, the deterioration of relations with Russia, the cancellation of visa regime for travels in some European countries, and substantial income reduction of population, the above mentioned ratio is almost unchanged, but the volumes of tourist traffic have significantly reduced.

In addition, after the annexation of Crimea the tourist traffic flows have been changed. Most of people in the country recreate in western Ukraine, which leads to the increase in demand for tourist travels by narrow gauges of Transcarpathia. In addition, it should be accounted some interest of domestic and foreign businessmen in the tourism infrastructure development of the Transcarpathian region.

The demand for tourist traffic by narrow-gauge railways will be significantly increased in the presence of comfortable modern rolling stock, since now we have a narrow-gauge rolling stock for passenger transportations, but it is in neglected state and hardly suitable for tourist travels. The Transcarpathia has a positive attempt to use the old rolling stock for organization of excursion tourist travels, but it does not have any comfortable conditions and can make only short journeys. There is a demand for such transportations, but it is insignificant and irregular.

On the basis of above mentioned one can conclude that the main role for the development of tourist traffic on the narrow gauges play the following factors:

1. The presence of existing infrastructure of railway tracks that is reconstructed or rebuilt and corresponds to the established standards of safety, motion speed, travel comfort and is properly maintained.
2. The presence of the developed tourist infrastructure (hotels, apartments, restaurants, cafes, tourist agencies, recreation camps and etc.) around the narrow-gauge railway.
3. The presence of beautiful nature, places for active recreation (ski resorts, routes for bicycle travels, etc.), places for quiet rest (lakes and rivers), thermal waters for therapeutic tourism, resorts, local national characteristics (bathing in tanks, wine festivals, fishing, etc.) and nature reserves.
4. The presence of tourists in local hotels that are potential clients of travel company.
5. The presence of demand for these types of railway services from domestic and foreign tourists.
6. The availability of modern comfortable narrow-gauge rolling stock for different kinds of travel services depending on the travel period.
7. Conducting efficient promotional campaign to attract the tourists to railway transportations.
8. High level of tourist services during the train travel, accommodation in hotels and apartments, meals in restaurants and cafes, transfer and excursion services, high level of camps for active and quiet recreation, etc.
9. The attractiveness of tourist routes to suit any taste, which make it possible to attract the maximum number of customers.
10. Pricing and tariff policy of tourism companies and their contractors, which should take into account the cost of tourist services of the companies that use automobile transport for tourist transportations.

Let us consider in full detail the influence of configuration of the existing infrastructure of railway tracks on the demand of population for tourist travels. In Ukraine there are four areas, where the narrow-gauge railways still remained. They are in disrepair and now almost useless for transportations. Historically, these railways were used for transportations of timber and building freights. They operate only partially, sometimes they are used for one-time tourist travels (for example, the Carpathian tram, which belongs to a private company). The track structure is absent almost everywhere, but there is the roadbed, which can be reconstructed and restored for laying the sleepers.

The routes of the narrow-gauge railways should run close to the existing tourism infrastructure that is now serviced by the automobile transport. For this purpose one should optimally use the configuration of existing railways, where the new route should be laid, other places should be reconstructed.

There is a real question: "Will the tourists move from the automobile transport to the railway one?" This will be facilitated by several factors: narrow-gauge railway transportations in new rolling stock with full comfort attract tourists by its exoticism; such transportations are much safer than the automobile ones, especially in winter; railway transportations in terms of the travel comfort are considerably superior to the automobile transportations, as the rolling stock has everything you need for the rest, hygiene, convenience of travel, food, etc.; the railway transportations will facilitate the new job creation, infrastructure development of individual areas and building of new hotels, restaurants, recreation centers, etc.

The new line of narrow-gauge railways can run in the cities without existing tourist infrastructure facilities, but with historical sites that can generate additional travel demand. For example, in the Transcarpathian regions there are waterfalls, deer and ostrich farms, castles, flower valleys, skiing pistes, mountain rivers and others.

The best configuration for reconstruction of the old railway line and construction of the new one is a form of the adjacent rings. This form makes it possible to organize several different tourist routes at once, which cover a large number of active and quiet recreation centers, historical sites, health resorts, towns with picturesque views, and others.

The above mentioned configuration of the railway route makes it possible to build a separate railway line to the tourist city or the tourist attractions that are in great demand (for example, the existing routes of the narrow-gauge railways of Irshava - Berehove

and Irshava - Vynohradiv).

The availability of railway track 1520 mm in the area of attraction significantly contributes to the demand for railway tourist transportations, which encourages the potential tourists to change to the narrow-gauge railway without significant expenditures and efforts.

The principles of the tourist routes organization on narrow gauges

One can propose several variants for tourist traffic organization on the narrow gauges depending on the flow of tourists, term of travel and the destination of tourist travel:

- *Small transfer*. Transportation of small number of tourists by the special railcar from the broad gauge station to the wellness center, hotel or any tourist facility;

- *Small tourist transfer*. Transportation of small number of tourists by the special railcar from the hotel to any tourist facility and between them;

- *Large transfer by railway rolling stock*. Transportation of large number of passengers by the narrow-gauge train from the broad gauge station to the wellness center, hotel or any tourist facility;

- *Large tourist transfer by railway rolling stock*. Transportation of large number of individual tourists by the narrow-gauge train from the hotel to any tourist facility and between them with open-date railway ticket;

- *Tourist travel with small transfer*. Transportation of small number of unorganized tourists by the special railcar on certain tourist routes for no more than one day;

- *One-day tourist travel by railway rolling stock*. Transportation of certain number of organized tourists by the narrow-gauge train on the certain tourist routes with the term up to five days;

- *Long-term tourist travel by railway rolling stock*. Transportation of organized tourists by the narrow-gauge train on the certain tourist routes of Ukraine and the tourist routes of the neighboring countries for a period up to fourteen days.

Small transfer can be used for transportation of all the passengers who arrived by railway transport for recreation in sanatoria, rest houses, mountain resorts and other tourist facilities, if their number does not exceed the capacity of the special railcar, and the above mentioned facilities are located in the district served by the narrow-gauge railway. These transfer transportations by the railcar are much more comfortable than the transportations by usual route taxis (minibuses) and safe, as the railway operates properly throughout the year.

Small tourist transfer. At the same time, the railcars can be used for transportations of unorganized tourists and small tourist groups on the certain routes of the narrow-gauge line with bringing the passengers directly to any tourist facility, because this transport mode can travel both by railway and by road. The cost of the railcar travel is lower than that in the usual buses, as the railway line always has smaller vertical slopes and curves in plan, which requires less fuel.

Large transfer by railway rolling stock can be used for transportations of all the passengers, who arrived by railway transport with wide track 1520 mm for recreation in sanatoria, rest houses, mountain resorts and other tourist facilities, if their number exceeds the capacity of special railcar, and the above mentioned facilities are located in the district served by the narrow-gauge railway. But in this case, the usual buses for passenger transportation from the narrow-gauge train to the recreation facilities should be used. Such transfer transportations are much more comfortable than the transportations by small and big buses and they are safe, as the railway operates properly throughout the year.

Large tourist transfer by railway rolling stock. Such railway transportations can be used for transportation of unorganized tourists and small tourist groups on the certain directions of the narrow-gauge line with bringing the passengers to any tourist facility by railway with open-date railway ticket. Such form of transfer transportations makes it possible for tourists to visit several tourist attractions independently for a particular period of time without a schedule. In addition, these trains may be used by the residents of the region and the staff working in these tourist attractions. The travel cost in these trains will be lower than in usual buses.

Tourist travel by small transfer. This type of tourist traffic by the special railcar on the certain tourist routes with the term up to one day can be proposed to unorganized tourists, who want to visit certain places at their will. This type of tourist transportations is cheaper than the transportations by the narrow-gauge train.

One-day or two-day tourist travel by the narrow-gauge rolling stock occurs only according to the predetermined route in the presence of certain number of organized tourists with the term no more than one or two days. The structure of the narrow-gauge train is determined by the number of tourists who want to travel on a specific route, including certain tourist sites. As a rule, such travel involves several stops to view the local sights, tourist attractions, stay in the hotel (in case of two-day travel) and meals at the restaurant or local cafes.

Short-term tourist travel by the railway rolling stock occurs only according to the predetermined route in the presence of certain number of organized tourists with the term no more than five days. The structure of the narrow-gauge train is determined by the number of tourists, who want to travel on a specific route, including certain tourist sites. As a rule, such travel involves every day several stops to view the local sights, tourist attractions, rest and meals at the restaurant or local cafes. In addition, at night it is provided the rest in local hotels or apartments, which determines the price of travel.

Long-term tourist travel by the railway rolling stock occurs only according to the predetermined route in the presence of certain number of organized tourists with the term no more than fourteen days. The structure of the narrow-gauge train is determined by the number of tourists, who want to travel on a specific route, including certain tourist sites. One Transcarpathian region is not enough for travel and therefore for these routes it is provided the visiting of other regions of Ukraine and neighboring European countries. Such travels can be performed by two modes of transport: the railway (on the narrow, European and broad gauge) and automobile one. Sometimes tourists can travel in the other regions by sea and rivers. As a rule, such travel involves every day several stops to view the local sights, tourist attractions, rest and meals at the restaurant or local cafes. In addition, at night it is provided the rest in local hotels or apartments, which determines the price of travel.

For economic justification of building new or reconstructing the existing narrow-gauge railways in order to transport tourists one should determine the amount of future tourist routes, their duration, the number of journeys and the structure of rolling stock during the year and the presence of tourist infrastructure and historical monuments in the district served by the narrow-gauge railway.

The article proposes a methodological approach that is based on the principle of determining the actual number of passengers and revenues from tourist transportations on the certain routes. It was taken into account the attractiveness of the route, price for tourist vouchers or travel tickets, minimization of the rolling stock number and the cost of construction and income of the company.

The Table 1 represents the real data concerning the development of tourism and recreation in Transcarpathian region for 2015. It should be said that they are greatly underestimated because they do not take into account a significant share of tourists staying in the apartments.

Table 1.

The basic indicators of tourist and recreational activities in Transcarpathian region

No.	Name of the district or town	The number of tourists and vacationers, thous.	The number of travel days, thous.	The volume of provided tourist and recreational services, thous. UAH
1	Berehove district	85 293	203 835	3 527.6
2	Velykobereznianskyi district	no data available		
3	Vynohradiv district	2 268	3 491	1 004.1
4	Volovets district	3 327	7 544	793.7
5	Irshava district	2 118	16 627	641.7
6	Mizhhirya district	13 771	57 041	9 567.6
7	Mukachevo district	26 677	291 118	96 586.7
8	Perechyn district	4 739	76 474	7 001.6
9	Rakhiv district	26 550	73 122	13 571.7
10	Svalyava district	25 229	317 696	140 348.7
11	Tyachiv district	32 595	66 567	7 490.0
12	Uzhhorod district	9 955	26 416	6 287.7
13	Khust district	63 478	172 089	36 989.7
14	Uzhhorod	22 532	36 867	14 659.7
15	Mukachevo	8 753	10 351	1 684.4
16	Khust	5 433	19 506	2 748.3
17	Berehove	5 817	12 518	1 527.9
	Total	338 535	1 391 262	344 431.1

If we analyze the initial data from the Table 1, we can conclude that at the first stage of construction the tourist narrow-gauge railway line (launch area no. 1) should be laid on the route: Berehove-Khmelnik-Vynohradiv-Khust-Mizhhirya-Lysychovo-Svalyava. At the second launch area of construction one should extend the narrow-gauge line on the route Svalyava-Mukachevo-Irshava and therefore to make the ring railway line. One can also complete the construction of the narrow-gauge line in the area Irshava-Lysychovo that will enable the development of this region.

It should be said that tourism and recreational activities in the Transcarpathian region for the previous reporting years several times exceeded the volumes presented in the Table 1. Therefore, further research will take into account all the tourists, living in private hotels and apartments, as well as the additional flow of potential passengers, who will come to Transcarpathia to travel the new railway. The number of these potential tourists can be up to 2 million people.

Some demand for the railway transportation already exists, but one should conduct the basic marketing research to identify this demand. The Table 2 presents the estimated indicators of demand for transfer and tourist transportations by the narrow-gauge lines.

Table 2.

Estimated indicators of the tourism and recreational activities in the Transcarpathian region at the 1st stage of construction

No.	Name of the district or town	The number of tourists and vacationers, thous.
	Estimated number of tourists and vacationers who are the potential customers of narrow-gauge railway	
1	Berehove district	255
2	Velykobereznianskyi district	20
3	Vynohradiv district	7
4	Volovets district	11
5	Irshava district	7
6	Mizhhirya district	45
7	Mukachevo district	78
8	Perechyn district	15
9	Rakhiv district	79
10	Svalyava district	90
11	Tyachiv district	99
12	Uzhhorod district	35
13	Khust district	170
14	Uzhhorod	69
15	Mukachevo	32
16	Khust	17
17	Berehove	21
	Total number of tourists and vacationers	1 050
	The estimated number of tourists who will use the narrow-gauge railway	63
	The tourists who will use the narrow-gauge railway	
1	Pupils of Ukrainian schools	3
2	Students	4
3	Residents of Ukraine	20
4	Representatives of neighboring European countries	6
	Total estimated number of tourists who will use the narrow-gauge railway	96

The Table 2 presents the estimated number of tourists who have the opportunity to travel by narrow-gauge lines. But if one calculates the rolling stock for this number of potential customers, it will need large investments. Therefore, for the first stage of construction it is proposed to purchase only 6 railcars and 5 tourist trains, which will consist of 2 cars of the second class, 1 car of the first class, dining car, maintenance car and the train locomotive. It is proposed to determine the possible number of transported tourists on the basis of the total capacity of these cars, their travel term, the number of journeys per year and average annual train occupancy (Table. 3).

Table 3.

Calculation of the estimated number of tourists who will have the opportunity to travel by the narrow-gauge lines upon the condition of using the capacity of the available rolling stock, provided certain traffic management

Name of the route	Number of seats in rolling stock	The type of rolling stock	The number of journeys per day, units	The number of journeys per year, units	Fill factor of the rolling stock	Total number of tourists, units
Svaliava-Lysychovo-Mizhhirya	24	Railcar	3	175	1	12 600
Transfer transportations of passengers between stations and hotels including the workers and local population	24	Railcar	6	300	0,7	30 240
Svalyava-Mukachevo-Irshava-Berehove	64	Train with 2 cars of the second class and 1 car of the first class	1	300	0,8	15 360
Berehove-Khmelnyk-Vynohradiv-Khust-Mizhhirya-Lysychovo-Svalyava	64	Train with 2 cars of the second class and 1 car of the first class	1	450	0,8	23 040
Total						81 240

At this it is proposed the following movement organization of rolling stock on the narrow gauges:

On the route Svaliava- Lysychovo-Mizhhirya will be organized three journeys of the railcars per day with capacity 24 seats in each. It is expected 525 such excursions per year. The railcars are also supposed to be used for transfer transportations of the tourists who came by the broad gauge from the stations Svaliava and Mukachevo to tourist sites and, in addition, for transportation of tourists, residents of cities and villages, and of hotels and restaurant employees that have access to the narrow-gauge railway.

For the two-day route Svaliava-Mukachevo-Irshava-Khmelnyk-Berehove and backwards it is supposed to use the narrow-gauge train with five cars (2 cars of the second class, 1 car of the first class, dining car and the special car) having 64 seats. For this route there will be involved two rolling stocks running every other day.

The route Berehove-Khmelnyk-Vynohradiv-Khust-Mizhhirya-Lysychovo-Svaliava is intended for 3 days. This direction also provides the use of the narrow-gauge train of five cars (2 cars of the second class, 1 car of the first class, dining car and the special car) having 64 seats.

But firstly one should determine the most attractive routes for tourist travels by railway. On the basis of the above mentioned at the first stage of construction of the narrow-gauge railway the following routes can be proposed: Svaliava, Lysychovo (length 30 km), Lysychovo-Mizhhirya (24 km), Mizhhirya-Khust (60 km), Khust-Vynohradiv (25 km), Vynohradiv-Khmilnyk (19.6 km), Khmilnyk-Berehove (25 km), Khmilnyk-Irshava (15 km), Irshava-Mukachevo (33 km), Mukachevo-Svalyava (26 km). In these towns the stop of tourist trains or railcars is provided.

Tourist train stops at the stations for landing the tourists who transfer to the minibuses or the ordinary buses, the capacity of which corresponds to the number of tourists who want to continue the tour. After each tour, a group of tourists boards the bus and goes to the restaurant or to the railway station and then travels by train. At the end of the day the train brings tourists to the hotel (apartments) for the rest and meals. The price includes accommodation in a hotel and morning breakfast. After that tourists go to the city excursions, and then buses bring them to the railway station.

For tourist meals during the travel the train additionally includes a dining car, or the buffet car depending on the length of the route and class of the train. After the tour buses bring the tourists from the terminal station to the hotel. Thus, throughout the tour buses carry out the transfer transportations of tourists from the trains to tourist sites, restaurant, hotel and backward.

On the route Svaliava-Lysychovo-Mizhhirya the railcars can perform the tourist transportations by small groups of 16 or 24 people. They transport tourists by both the railway and the road that is very convenient because there is no need to change the train for minibuses. If the number of tourists will increase, on the given route can be introduced the running of tourist trains of three cars (including two cars of the second class).

Taking into account the mentioned estimated flow of tourists the revenue of the railway company from tourist and transfer transportations can be calculated.

7. SWOT-analysis of research results

Strengths. As a result of the proposed measures one can expect increase of passenger traffic on the railroad, image improvement of the Ukrainian railways within the country and abroad, attraction of additional funds to renew the outdated infrastructure and rolling stock, restoration of the objects of cultural and historical significance, creation of new jobs, and restraining of migration processes in western Ukraine.

Weaknesses. The main railway company of Ukraine – Open Joint Stock Company "Ukrainian Railway" – does not have the funds to purchase rolling stock and infrastructure upgrades.

Opportunities. The following factors can be attributed to the possibility of the development of railway tourism: 1. With the help of the private investor Ukrzaliznytsia will update the rolling stock, as well as tourism and transport infrastructure. 2. Residents of Ukraine will receive affordable form of recreation, because train travel is cheaper than a car overnight in a hotel. 3. Private investors will be able to profit from a new kind of business, on public-private partnership, because until now to private investors in railway transport business was closed.

Threats. Unstable political and economic situation in the country, the imperfection of the legislative framework in the sphere of railway transport and tourism can be restrain the desire of the private investor to invest in the development of railway tourism. In addition, given the low solvency of the population, there is a chance that for the ordinary citizen traveling on a tourist train will be too expensive. As a result, the private investor's income will fall sharply, and the payback period of the project will increase dramatically.

8. Conclusions

On the basis of conducted research it can be concluded that:

For the first time in Ukraine it was proposed the classification of narrow-gauge transfers and tourist travels depending on the travel purpose, type of rolling stock, travel term, and the service areas. This makes it possible to plan in advance the required number of the railcars and tourist trains for transportations of passengers, tourists, residents of the region, and service personnel depending on their number.

At present the railway transport activity is declined, because there are not enough investments for its activity. But the oligarchs and sponsors of our country accumulated lot of money that can be invested in the development of passenger transportations. They do not wish to invest in old technologies that do not allow them to profit, but they will be pleased to invest in new activities – high-speed traffic, tourist traffic and other activities.

The principles of the tourist routes organization on narrow gauges: *small transfer* (transportation of small number of tourists by the special railcar from the broad gauge station to the wellness center, hotel or any tourist facility); *small tourist transfer* (transportation of small number of tourists by the special railcar from the hotel to any tourist facility and between them); *large transfer by railway rolling stock* (transportation of large number of passengers by the narrow-gauge train from the broad gauge station to the wellness center, hotel or any tourist facility); *large tourist transfer by railway rolling stock* (transportation of large number of individual tourists by the narrow-gauge train from the hotel to any tourist facility and between them with open-date railway ticket); *tourist travel with small transfer* (transportation of small number of unorganized tourists by the special railcar on certain tourist routes for no more than one day); *one-day tourist travel by railway rolling stock* (transportation of certain number of organized tourists by the narrow-gauge train on the certain tourist routes with the term up to five days); *long-term tourist travel by railway rolling stock* (transportation of organized tourists by the narrow-gauge train on the certain tourist routes of Ukraine and the tourist routes of the neighboring countries for a period up to fourteen days).

On the basis of above mentioned one can conclude that the main role for the development of tourist traffic on the narrow gauges play the following factors:

- The presence of existing infrastructure of railway tracks that is reconstructed or rebuilt and corresponds to the established standards of safety, motion speed, travel comfort and is properly maintained.
- The presence of the developed tourist infrastructure around the narrow-gauge railway.
- The presence of beautiful nature, places for active recreation, places for quiet rest, thermal waters for therapeutic tourism, resorts, local national characteristics and nature reserves.
- The presence of tourists in local hotels that are potential clients of travel company.
- The presence of demand for these types of railway services from domestic and foreign tourists.
- The availability of modern comfortable narrow-gauge rolling stock for different kinds of travel services depending on the travel period.
- Conducting efficient promotional campaign to attract the tourists to railway transportations.
- High level of tourist services during the train travel, accommodation in hotels and apartments, meals in restaurants and cafes, transfer and excursion services, high level of camps for active and quiet recreation, etc.
- The attractiveness of tourist routes to suit any taste, which make it possible to attract the maximum number of customers.
- Pricing and tariff policy of tourism companies and their contractors, which should take into account the cost of tourist services of the companies that use automobile transport for tourist transportations.

The final choice of tourist traffic should be justified by a methodological approach that is based on the principle of determining the actual number of passengers and revenues from tourist transportations on the certain routes and economic calculations.

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To increase the competitiveness of railway transport the authors propose to develop of railway tourism in Ukraine.

The article aims are: to design an optimal the classification of narrow-gauge transfers and tourist travels depending on the travel purpose, type of rolling stock, travel term, and the service areas; to determine factors that play main role for the development of tourist traffic on the narrow gauges; to develop a methodological approach that is based on the principle of determining the actual number of passengers and revenues from tourist transportations on the certain routes.

The methodical approach to determining the cost of tourist traffic by railway and road transport was further developed. This approach is based on the principle of determining the actual number of passengers and revenues from tourist transportations on the certain routes. It was taken into account the attractiveness of the route, price for tourist vouchers or travel tickets, minimization of the rolling stock number and the cost of construction and income of the company. Moreover, the authors set a goal to develop a methodical approach to determine the costs of the company that will organize transportations on the specific tourist route.

As a result of the proposed measures one can expect increase of passenger traffic on the railroad, image improvement of the Ukrainian railways within the country and abroad, attraction of additional funds to renew the outdated infrastructure and rolling stock, restoration of the objects of cultural and historical significance, creation of new jobs, and restraining of migration processes in western Ukraine.

Keywords: narrow gauges; transfer; tourist traffic; tourist travel; railway transport; tourist route

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