

UDC. 656.072:338.5

T. YU. CHARKINA^{1*}

^{1*}Department «Economics and Management», Dnepropetrovsk National University of Railway Transport named after Academician V. Lazaryan, Lazaryana str., 2, Dnepropetrovsk, Ukraine, 49010, tel. +38 05 62 33 58 13, e-mail: ubarash@mail.ru¹

IMPROVED CLASSIFICATION OF PASSENGER TRAINS IN UKRAINE

Purpose. To develop the new classification of passenger trains in Ukraine taking into account the working period, the territory of service, the maximum distance of movement, average journey speed, time of a trip, a type of a rolling stock and sources of financing. **Method.** It is proposed to divide the passenger trains on day train, night train and all day train, then to determine the optimal areas for the movement of trains with cost minimization of their operation. **Results.** The passenger trains are divided into urban, suburban, regional, interregional and long-distance. In turn, each train is divided into slow and fast, on-site service: on the suburban, within the region, within 2-3 regions and long-distance. **Academic novelty.** The classification of passenger trains in Ukraine is improved which considers the additional features of economic factors of movement, working period, service territory, maximum range of passengers transportation, average speed, and trip time, type of a rolling stock and transportations sources of financing. **Practical importance.** The accounting of the specified factors increases validity of administrative decisions that will allow providing efficiency of functioning of passenger trains and their competitiveness in the market of transport services.

Key words: train passenger, working period of the train, distance of train movement, middle average speed, type of a rolling stock.

Introduction

In today's market and the reform of the railway industry will be significant changes in the organization of passenger transportation:

- changing the organizational structure for passenger management;
- disappears concept of local passenger trains as the railway lose legal status;
- there is a need in creation of passenger transportation directorates in suburban and distant traffic;
- it is allocated a separate company to service high-speed passenger trains;
- the regions receive financial independence and self-will decide the most rational way traffic.

The above requires the development of a new classification based on passenger trains plying their period during the day, service area, speed, travel time and the type of rolling stock, financing sources for optimization of revenues and costs and increase the competitiveness of passenger trains in the transport market.

It is analysis of recent researches and publications, on which the author relies with reference to the sources

The rational organization of passenger trains was investigated in scientific studies of Yu. S. Barash [1, 10], O. B. Bednikova [2], D. V. Glazkova [3], V. P. Gudkovo [11], O. M. Gudkova [9, 11], O. O. Karas' [4, 6-8], O. M. Kryvopishina [5], L. M. Loboiko [6-8], V. M. Samsonkina [9], V. V. Skalozub [10], P. O. Yanovskogo [11]. Also the listed issues involved experts of Ukrzaliznytsya and industrial research laboratories DNURT, UkrDAZT and DETUT. But by the development of scientifically grounded classification of passenger trains almost nobody has done since the Soviet times.

It is the selection of the unsolved parts of the common problems, which this article are devoted

In the conditions of the act of acquiring shares of the rail industry will be significant changes in the organization of passenger transportation, changing the organizational structure of the public sector, removes the notion of local passenger trains, because the railways lose the status of a legal person, there is

a need to create directories for passenger traffics in suburban and long-distance communication and the selection into a separate group of high-speed passenger trains.

Purpose

To develop a new classification of passenger trains in Ukraine considering working period, service area, the maximum distance, average route speed, travel time and the type of rolling stock and financing.

Method

The author proposed initially to divide passenger trains of working period during the twenty-four hours, day trains, night trains and all day trains.

Daytime trains are intended for transportation of passengers from the 6th to 24th hour with stay period on the road to 7 hours. The period selected within an interval of 6 hours, which is used in Ukraine, and 8 hours, which exists in Europe. The author believes that time travel in the daytime train more than 6 hours is very tiring passenger and therefore these trains is uncompetitive compared with trains that have cars with shelves for rest.

Night trains intended for the carriage of passengers from 10 pm to 8 am with stay period on the road from 8 to 10 hours. The term of rational trip selected to account for 7-8 hours of sleep and one hour to prepare for the rest and one hour on the dress, coffee or tea and preparing to exit. These trains are very convenient for passengers who are traveling on a business trip, on vacation, continue the journey by plane and want during the day to do all their tasks and go back by day or by night train. For these trains must be set higher tariffs for transportation service, as they require extra comfort: outfit, bedroom linen, mattress, pillow, blankets and other soft toys, as well as service conductors while on day trains will operate only stewards.

The all-day trains are intended for transportation of passengers as in the day, and at night with the stay period on the road at least 10 hours. The period of a trip depends on distance. These trains are convenient for a trip of passengers both across Ukraine, and out of its borders.

Outside the service or distance running of passenger trains shall be allocated to the following types:

Suburban trains – designed to carry passengers in a suburban area of medium and large cities at a distance of 70-80 km. Now the maximum distance to the running of the Ukrainian railways is 300 miles, resulting in significant loss commuter traffic as outside the 80 km it is a small number of passengers. In these circumstances, it is advisable to use regional trains. For transportation of passengers in the commuter rail it is necessary to apply the electric multiple-unit train and diesel-powered coach train and regular buses. Term trip passengers in commuter rail cannot be greater than 1 hour and 40 minutes.

Regional trains have to run within the region if the distance of travel to the borders area exceeds the optimal running of suburban trains. These trains have a higher speed and a small number of stops due to which the rates are higher than the suburban transportation. The necessity of staying period on the road and financing such trains will be decided by the regional authorities.

Interregional trains – designed to carry passengers between medium and large cities in Ukraine, located in adjacent regions 2-3 (region), a distance of 500 km. In turn, inter-regional trains are divided according to the time zone and running of the following:

- the interregional trains normally dedicated to the carriage of passengers in a suburban area of medium and large cities at a distance of 300 miles with few stops and increased speed to 80 km/h. These trains are served by multiple units rolling stock of the old generation;

- the trans regional speeding trains – designed to carry passengers between medium and large cities at a distance of 500 km with a small number of stops, average route speed of 140 km/h. These trains should be used for passengers' transportation within two or more adjacent regions of multiple unit trains of the new generation.

Passenger trains of long-distance – designed to carry passengers over a distance of more than 500 km within Ukraine and abroad, they are in turn divided into the following:

- intercity day trains – designed to carry passengers between middle and large cities at a distance of 600 miles with few stops, average route speed to 90 km/h and stay period on the road no more than 10 hours. For their formation is proposed wagons locomotive traction of older generation;

– Intercity Express day trains – designed to carry passengers between middle and large cities at a distance to 900 km with few stops, average route high-speed operation of 140 km/h and stay period on the road no more than 7 hours. These trains should be used for passengers' transportation from the regional centers and major cities to Kyiv and between these cities. The use of daily speeding trains with seating limited term trip passengers to 7 hours, get tide of them, and the number of directions in which to provide maximum movement speed to 160 km/h;

– Intercity night train – designed to carry passengers between medium and large cities in Ukraine with a small number of stops, average route speed to 90 km/h and time spent in transit from 8 to 10 hours of rolling stock of the old generation locomotive traction. A detailed assignment of these trains are given above;

– Intercity Express night trains – designed to carry passengers between medium and large cities at a distance of 900-1 300 miles with few stops, average route speed to 110-140 km/h and stay period on the road from 8 to 10 hours of high-speed rolling stock locomotive traction of new generation or MVRS;

– Intercity trains which is running as in the night and in the day without limiting distance of the old generation cars with shelves for rest and places for seating, with route speed of 70-90 km/h intended for the carriage of passengers within Ukraine in areas where no high-speed movement, or in parallel with it;

– Intercity Express trains which are running both night and day without limiting distance running of the cars of new generation with shelves for rest and places for seating, with route speed of 110-140 km/h, designed for passengers' transportation within Ukraine for directions where there is high-speed operation.

– Similarly to the above, the last two trains proposed international trains that run outside of Ukraine and cars formed from the old generation, and international express trains that run outside Ukraine in high-speed rolling stock, formed with the new generation of cars (see Table).

Based on the research we can conclude that the use of the new classification of passenger trains in Ukraine based on working period, transportation service, the maximum distance, average route

speed, travel time and the type of rolling stock will increase the efficiency of passenger trains and their competitiveness in the market of transport services.

Conclusions

To increase the competitiveness of passenger trains on the transport market should primarily introduce a new classification that takes into account the organization of movement depending on the running of the period during the day, distance and speed, duration and comfort of travel, type of rolling stock and source funding for their activities. This will continue to determine the optimal distance and travel dates' different rolling stock for suburban, regional, passenger and high-speed trains and significantly reduce their losses.

REFERENCES

1. Barash, Yu. S., Skalozub, V. V., *Metodyka skladannia optymalnoho planu formuvannia pasazhyrskykh poizdiv* [Method of forming an optimal plan for passenger trains]. *Ekonomika: problemy teorii ta praktyky. Dnipropetrovsk*, DNU Publ., 2005, issue 205, volume 4, pp. 1186-1198.
2. Barash, Yu. S., Skalozub, V. V., *Metodyka skladannia optymalnoho planu formuvannia pasazhyrskykh poizdiv* [More efficient use of rail transport to serve the population of large cities and suburban areas]. Dis. Candidate. Ekon. Sciences. *Ekonomika: problemy teorii ta praktyky. Dnipropetrovsk*, DNU Publ., 2005, issue 205, vol., 4, pp. 1186-1198.
3. Hlazzkov, D. V., *Raschet chysla y naznachenyi poezdov v dalnem y mestnom soobshchenyy v zavysymosty ot struktury passazhyropotoka* [Calculation of the number of trains and destinations in distant and local traffic, depending on the structure of the passenger traffic].
4. *Dys. kand. tekhn. nauk*. Moscow, Rossyiskyi gosudarstvennyi otkrytyi tekhnicheskyy unyversytet putei soobshchenyia, 2005.
5. Karas O. O., *Formuvannia suchasnoho mekhanizmu upravlinnia pidpriemstvamy v rynkovykh umovakh (na prykladi pasazhyrskoho hospodarstva zaliznychnoho transportu. [Formuvannya Suchasni mehanizmu upravlinnya pidpriemstvami in rinkovih of minds (on prykladi pasazhyrskogo hospodarstva Zaliznicново transport)]* Avtoreferat dys. kand. ekon. nauk. Dnipropetrovsk, DNURT Publ., 2009, p. 23.
6. Kryvopishyn O. M., *Problemy orhanizatsii pasazhyrskykh perevezhen zaliznychnym transportom*

- u m. Kyievi ta shliakhy yikh vyrishennia [The problems of passenger transport by rail in the city. Kiev and Solutions]. *Zaliznychnyi transp. Ukrainy*, 2006, issue 5, pp. 27-29.
7. Loboiko L. M., Barash, Yu. S., Karas O. O., Optymizatsiia rukhu pasazhyrskykh poizdiv vahoniv [Optimization of passenger train cars]. *Visnyk Dnipropetrovs'koho nacional'noho universytetu zaliznychnoho transportu imeni akademika V. Lazarjana* [Bulletin of Dnepropetrovsk National University of Railway Transport named after Academician Lazaryan], 2008, issue 21, pp. 46-52.
 8. Loboiko L. M., Barash, Yu. S., Karas O. O., Vydyltsiuvannia pasazhyrskoho rukhomoho skladu vahoniv [Types ringing passenger rolling stock cars]. Tezy dopovydy 7-yi mizhnarodnoy naukovo konferentsii «Problemy ekonomiky transportu» [Proc. of the 7th Int. Scientific Conf. "Problems of Transport Economics"]. Dnepropetrovsk, 2008, pp. 35-36.
 9. Loboiko L. M., Barash, Yu. S., Karas O. O., Ekonomichna dotsilnist vprovadzhennia dennichnykh poizdiv vahoniv [The economic feasibility of implementing a day-night trains cars] Tezy dopovydy 7-yi mizhnarodnoy naukovo konferentsii «Problemy ekonomiky transportu» [Proc. of the 7th Int. Scientific Conf. "Problems of Transport Economics"]. Dnepropetrovsk, 2008, pp. 37.
 10. Samsonkyn V.M., Hudkov A.M., Puty povesheniya efektyvnosti passazhyrskykh perezozok na zheleznodorozhnom transporte [Improving Ways of the effectiveness passenger traffic by railroad Transport]. Kiev, KUETT Publ., 2003, issue 4, pp. 135-142.
 11. Skalozub V. V., Barash Yu. S., Vyshniakova I. M. Udoskonalennia metodu optymizatsii planu formuvannia pasazhyrskykh poizdiv z urakhuvanniam obsiahiv investytsii [Improvement of the method optimization plan formation passenger trains considering the amount of investment]. *Visnyk Dnipropetrovs'koho nacional'noho universytetu zaliznychnoho transportu imeni akademika V. Lazarjana* [Bulletin of Dnepropetrovsk National University of Railway Transport named after Academician Lazaryan], 2006, issue 12, pp. 249-255.
 12. Yanovskyi P. O., Hudkov O. M., Hudkova V. P. Faktory rozvytku prymiskykh perevezen na zaliznychnomu transporti [Factors of commuter traffic on the railways]. *Zbirnyk naukovykh prats Kyivskoho universytetu ekonomiky i tekhnolohii transportu. Ser. Problemy pidvyshchennia efektyvnosti infrastruktury*. Kiev., KUETT Publ., 2006, issue 12, pp. 173-177.
 13. Charkina T. Yu., *Upravlinnia konkurentospromozhnistiu zaliznychnykh pasazhyrskykh perevezen na rynku transportnykh posluh*. [Management competitiveness of rail passenger services in the transport market. Dis. for the degree of Cand. of Econ. Sciences.]. Dnipropetrovsk. DNUZT, 2013.

Table

Classification of passenger trains in Ukraine behind the following period, the service territory, motion speed, a financing source in the conditions of the modern market and implementation of high-speed movement. Source: Development of the author

Train's name of working period during the day and night	Day trains			Night trains			All-day trains			
	Commuter rail	Within one region	Trans regional within 2-3 regions	Commuter rail	Night Intercity	Night Intercity Express	Intercity	Intercity Express	International train	International Express
Train's name of service territory	Commuter rail	Within one region	Trans regional within 2-3 regions	Commuter rail	Night Intercity	Night Intercity Express	Intercity	Intercity Express	International train	International Express
Final name of the train	Commuter rail	Regional trains	Trans regional speeding train	Commuter rail	500-800	900-1300	Within Ukraine	Within Ukraine	Outside of Ukraine	Outside of Ukraine
Maximum distance, km	to 70-80	to 180	to 500	to 900	70-90	110-140	70-90	110-140	70-90	110-140
Intermediate average speed, km/h	to 50	to 80	110-140	110-140	8-10	8-10	to 24	to 16	Depend on distance	Depend on distance
Way time	1 hour 40 minutes	to 2,25	to 4	to 7	8-10	8-10	to 24	to 16	Depend on distance	Depend on distance
Financing source	City authorities and private investments	Regional authorities and private investments	Regional authorities and private investments	Regional authorities and private investments	City authorities and private investments	City authorities and private investments	City authorities and private investments	City authorities and private investments	JSC "Ukrzaliznytsya" and private investments	JSC "Ukrzaliznytsya" and private investments
Type of rolling stock	MVRS and rail bus	MVRS	MVRS speeding and cars of locomotive traction	MVRS speeding and cars of locomotive traction	Cars of locomotive traction of old generation	MVRS speeding and cars of locomotive traction	Cars of locomotive traction of old generation	MVRS speeding and cars of locomotive traction	Cars of locomotive traction of old generation	MVRS speeding and cars of locomotive traction

Т. Ю. ЧАРКІНА

Каф. «Економіка та менеджмент», Дніпропетровський національний університет залізничного транспорту імені академіка В. Лазаряна, вул. Лазаряна, 2, Дніпропетровськ, Україна, 49010, тел. +38(0562) 33 58 13, ел. пошта ubarash@mail.ru

УДОСКОНАЛЕНА КЛАСИФІКАЦІЯ ПАСАЖИРСЬКИХ ПОЇЗДІВ В УКРАЇНІ

Мета. Розробити нову класифікацію пасажирських поїздів в Україні з урахуванням періоду курсування, території обслуговування, максимальної відстані, середньої маршрутною швидкості, часу поїздки, виду рухомого складу та джерел фінансування. **Методика.** Запропоновано поділити пасажирські поїзди на денні, нічні та цілодобові, потім визначити оптимальні зони курсування поїздів за умови мінімізації витрат на їх діяльність. **Результати.** Пасажирські поїзди поділені на приміські, регіональні, міжрегіональні та дальнього сполучення. В свою чергу кожен поїзд поділений на звичайні та швидкісні, за територією обслуговування: на приміські у межах області, у межах 2-3 областей та дальнього сполучення. **Наукова новизна.** Удосконалено класифікацію пасажирських поїздів в Україні, яка доповнена ознаками, що враховують основні економічні фактори руху: період курсування, територію обслуговування, максимальну відстань перевезень пасажирів, середню маршрутною швидкість, час поїздки, вид рухомого складу та джерело фінансування їх діяльності. **Практична значимість.** Врахування вищенаведених ознак підвищує обґрунтованість управлінських рішень щодо забезпечення ефективності функціонування пасажирських поїздів та їх конкурентоспроможності на ринку транспортних послуг.

Ключеві слова: пасажирський поїзд, період курсування, відстань курсування, середня маршрутною швидкість, вид рухомого складу.

Т. Ю. ЧАРКИНА

Каф. «Экономика и менеджмент», Днепропетровский национальный университет железнодорожного транспорта имени В. Лазаряна, ул. Лазаряна, 2, Днепропетровск, Украина, 49010, тел. +38(0562) 33 58 13, ел. почта ubarash@mail.ru

УСОВЕРШЕНСТВОВАНАЯ КЛАССИФИКАЦИЯ ПАСАЖИРСКИХ ПОЕЗДОВ В УКРАИНЕ

Цель. Разработать новую классификацию пассажирских поездов в Украине с учетом периодом движения, территории обслуживания, максимального расстояния движения, средней маршрутной скорости, времени поездки, вида подвижного состава и источников финансирования. **Методика.** Предложено поделить пассажирские поезда на дневные ночные и круглосуточные, потом определить оптимальные зоны движения поездов с учетом минимизации затрат на их эксплуатацию. **Результаты.** Пассажирские поезда поделены на пригородные, региональные, межрегиональные и дальнего сообщения. В свою очередь каждый вид поезда поделен на обычные и скоростные, по территории обслуживания: на пригородные, в пределах области, в пределах 2-3 областей и дальнего следования. **Научная новизна.** Усовершенствована классификация пассажирских поездов в Украине, которая учитывает экономические факторы движения: период движения, территория обслуживания, максимальная дальность перевозки пассажиров, среднюю маршрутную скорость, время поездки, вид подвижного состава и источники финансирования перевозок. **Практическое значение.** Учет указанных факторов повышает обоснованность управленческих решений, что позволит обеспечить эффективность функционирования пассажирских поездов и их конкурентоспособность на рынке транспортных услуг.

Ключевые слова: пассажирский поезд, период движения поездов, дальность движения поездов, средняя маршрутная скорость, вид подвижного состава.