DOI: https://doi.org/10.30932/1992-3252-2020-18-6-208-219

Models of Organisation of Combined (Mixed-Mode) Passenger Transportation

Guts, Alexey V., *JSC Russian Railways, Moscow, Russia*.*

Alexey V. GUTS

ABSTRACT

The article examines business models for mixed-mode (combined) passenger transportation and development of combined passenger transportation as a factor in the growth of capacity of the railway passenger transportation market. The crisis in the transport services market, caused by non-economic factors (COVID-19 pandemic), is characterized by a classic combination of supply shocks and demand shocks for passenger transportation, which increases relevance of the problem of searching ways to rise the volume of passenger traffic, in particular, by rail, demand for services provided to the public using railway assets.

The current approach to increasing the demand for railway passenger transportation by developing the railway route network, improving the equipment of railway stations and the quality of service, expanding the range of services offered, promoting everything that encourages the consumption of services by a larger number of customers, will remain important. Nevertheless, this approach should be critically considered and supplemented in the light of new economic trends motivated by digital technology. That is especially important today, when, in conditions of resource constraints, a strategic organisational solution is needed aimed at scaling a business, achieving an optimal «balance» of costs, quality, competencies, flexibility and customer focus.

The organisation of combined passenger transportation involves active «horizontal» interaction of various transport organisations, both among themselves and with different cohorts of passengers with their own consumer preferences and income restrictions. Therefore, the transition from linear business processes built «vertically» to horizontal business processes that offer specialised packages of services through a «single window» system according to uniform standards based on digital technologies is relevant.

The article proposes models for organising network interaction of participants in the passenger transportation market based on digital technologies to ensure «seamless» mobility of the population with the consolidating role of railway transport. Specific models for organising combined railway transportation should be based on a specific business model, the choice of which is determined by a strategic decision of the company.

Keywords: railways, passenger transportation market, multimodal transportation, networking, business model, seamless mobility.

---

*Information about the author:
Guts, Alexey V. – Head of the Marketing unit of the High-Speed Transportation Directorate, a branch of JSC Russian Railways, Moscow, Russia, aleksey_guts@bk.ru.

Article received 02.11.2020, accepted 21.12.2020.

For the original Russian text of the article please see p. 208.

The organisation of combined passenger transportation[1] is an adequate and necessary response to the growing mobility of the population, which is a function of such variables as the price of the service (P), the speed of movement (V), the total travel time, which acts as a factor of space compression due to the developed route network (RN), connectivity of transport infrastructure (C):

$$M = f(P, V, RN, C). \quad (1)$$

The dependent variable, «population mobility», in the system of socio-economic priorities is a «merit good», the consumption of which should be encouraged. The organisation of combined passenger transportation serves as a tool for increasing the mobility of the population, primarily in large cities and agglomerations, where the need for speed of movement, requirements for the quality of transport services, the creation of «seamless» transportation, on routes using different modes of transport and for using different modes of transport with a single ticket, is manifested with all the acuteness [1].

The development of an offer which has a value for the passenger regarding «barrier-free» («seamless») mobility as a service, acts to a certain extent as a challenge for the companies of the passenger transportation, since it is not limited to improving the convenience of the railway route network, the equipment of railway stations, the quality of services, extended line of services offered. Organisation of combined passenger transportation is associated with a cardinal shift/transformation of the business process of a transport company towards a network business model, which requires the company to develop a strategic decision on the transition to a new business model, that is, a new logic of creating value for the client and monetising the results of its implementation for the company.

«Seamless» mobility as a service is provided by modern technology of transportation which, based on:

1) combinations of different modes of transport;

2) integrated and coupled development of transport infrastructure (route network, transport interchange hubs, agreed timetables for various modes of transport);

3) the pool of competencies of the participants in the transportation process, allows to create a combined transportation service according to the «door-to-door» («from home to home») scheme and with a single transportation document and creates the value offer for customers/passengers: *mobility, accessibility, and safety of transportation*.

The organisation of combined passenger transportation involves the interaction of different modes of transport/different transport organisations, both among themselves and with different cohorts of passengers with different consumer profiles. Thus, not only modern technology of transportation work is required, but also a special technology to ensure connectivity between them, namely, network interaction, based on the built architecture of horizontal links between transport organisations who are participants in combined transportation [2].

In contrast to the horizontal cooperation of participants in the transportation process, network interaction is based on the principles of shared values, trust, generally accepted standards, connection tools, common protocols, systems to support organisation and control.

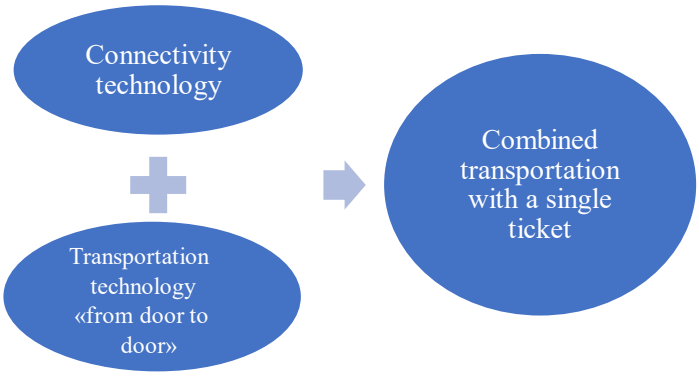
Modern digital technologies create technical opportunities for network interaction of a qualitatively new level, allowing to integrate a multi-layer «real» network consisting of transport assets, route network, transport services and various kinds of services focused on creating value for people, businesses, and territories [3–5].

The current stage of development and widespread distribution of networks, called «uberization of the economy», is based on the use of platform solutions.

Thus, the model of organising combined passenger transportation is based on the transportation technology focused on door-to-door travel interfacing modes of transport with modes of transportation with the aid of the integrated and coupled development of transport infrastructure.

The multimodal transportation technology is implemented through the mechanisms of interconnection of transport companies with each other (horizontal and vertical integration, network interaction) to create a joint product –

[1] The terms «combined transportation», «mixed-mode transportation» are suggested as they literally reproduce the original terms in Russian used by the author. This does not refer in the context of the article to the discussions on the terminology regarding combined, multimodal, intermodal, mixed transportation, transit, commuting, etc. - *ed. note.*



Pic 1. Model of organisation of combined transportation (compiled by the author).

combined passenger transportation with a single ticket – based on a joint business process.

The use of digital technologies and the creation of a digital zone of interaction between companies and passengers: a «network space» that includes transport organisations; as well as companies that create related services, forms a common business platform as a «single window» for obtaining a «single ticket».

In its most general form, the model of organising combined passenger transportation can be represented as the interaction of technologies for creating combined passenger transportation (Pic. 1).

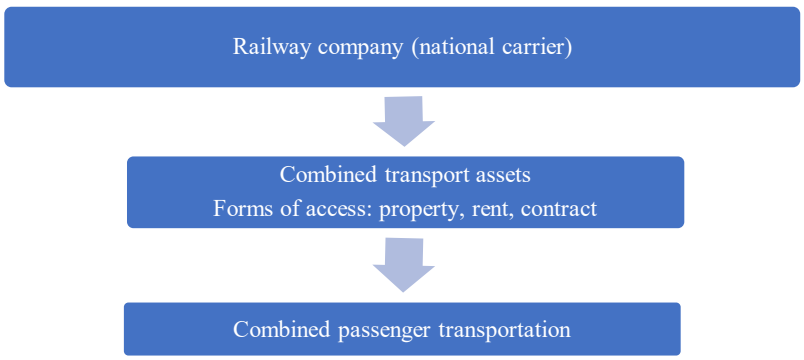
Specific models for organising combined railway transportation will be based on a specific business model, the choice of which is based on a strategic decision of the company.

Let us single out the models for organising combined transportation by such a criterion as the business model used by the company.

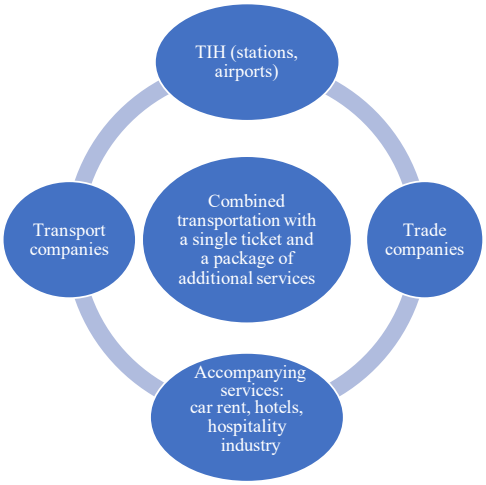
1) Product oriented business model (Pic. 2).

We proceed from the assumption that a railway company, a national carrier as a rule, takes on the function of an integrator of the passenger transportation market by diversifying its assets (for example, acquiring a bus fleet) to organise combined transportation. Joint asset management enables the railway passenger market to grow, increase efficiency, create new profit centres, and maximize total revenue.

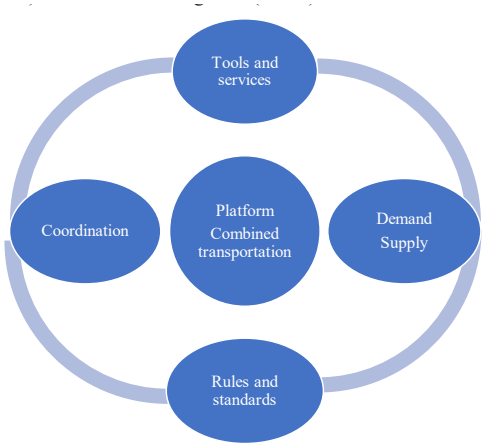
The model is based on a supply chain, a horizontal end-to-end process, a stream of additional value/value creation of a product/service aimed at forming a value offer for combined passenger transportation. Companies implementing a product business model keep the supply chain/value creation in focus as their main competitive advantage. Companies of this type compete not with products, but with supply chains, and that determines the success of their business. The competitive advantages of the supply chain are achieved through technological breakthroughs, cost reduction, scale effects and marketing [6]; the company's efficiency increases after each doubling of the output, which is accompanied by an increase



Pic. 2. Product oriented business model (compiled by the author).



Pic. 3. Business model, built on joint/integrated business processes (compiled by the author).



Pic. 4. Business model oriented on platform solutions (compiled by the author).

in market share and an increase in the company's competitiveness in terms of price [7]. Digital technologies make an invaluable contribution to increasing the efficiency of the product business model due to traceability and greater coverage of transactions, and customisation of the offer. However, since the business model itself very limitedly presupposes «going out» outside the traditional product market, either its transformation, it cannot fully use the potential inherent in digitalisation of transport and logistics.

2) A business model which is built on joint/integrated business processes that combine interrelated and complementary production, main and related activities, to obtain a joint product/result (Pic. 3).

In such a model, companies that initially have a product business model receive signals from the market about the possibilities of scaling their own business through «horizontal» network interactions, exchange of information and data between various transport organisations, both among themselves and with companies producing complementary and related products, creating thus new mechanisms for monetising value. The organisation of combined passenger transportation based on network interactions implies development of common standards for cooperation, trust, systems to support organisation and control. As a rule, such a model develops in the presence of institutional conditions (coordinating bodies in the form of associations, self-organising organisations, supported by systems of government regulation and judicial protection of contracts). The digital transformation of transport and logistics creates the technical capabilities for organising networking through the sharing of assets, complementary resources on the principle of a «single window», cost optimisation and quality growth, on the one hand, and «mass customisation» of the offer for customers based on digital technologies, on the other.

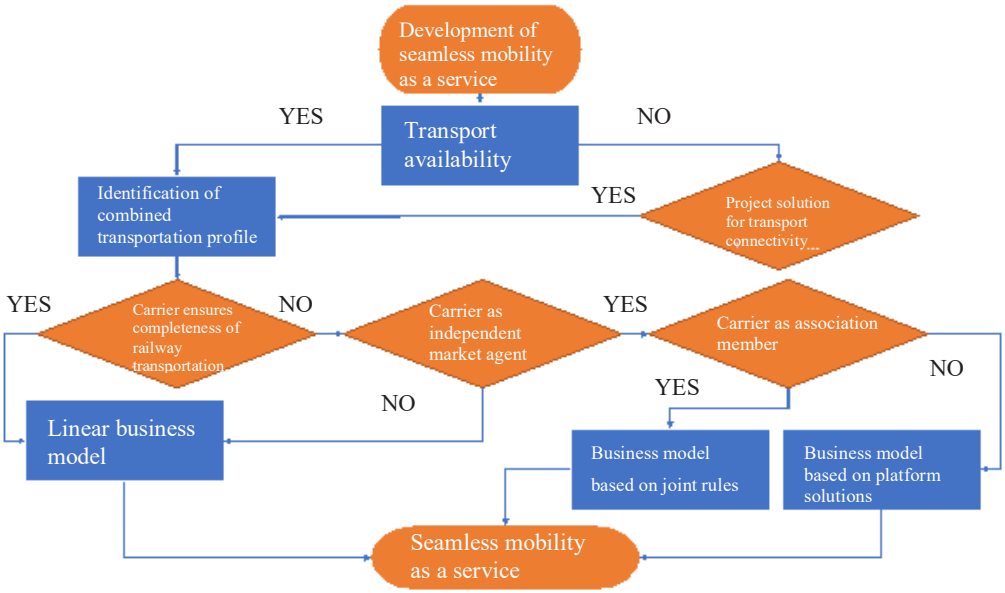
3) A business model that is focused on platform solutions: systems of services for aggregation of independent market agents, coordination and optimisation of interaction between them, both of a sectoral and cross-sectoral nature (B2B) and in the B2C segment (Pic. 4).

In its most general form, a platform is a common foundation linking suppliers to consumers. It would seem that the platform does not introduce any new value into the interaction between the supplier and the customer (in comparison with the linear organisation); however, here a «network space» arises on the part of service providers and their consumers, offering additional value for its participants in terms of saving selection costs and mobility. The platform appears as:

1) the basis on which the complete set of products and services is integrated;

b) supply chain/chains of value creation and of support to transactions;

c) a set of rules, protocols, and conditions for interaction between platform participants [5].



Pic. 5. Block diagram of network interaction for organisation of combine passenger transportation (compiled by the author).

Platform solutions allow the company to:

Firstly, to have several streams/sources of income due to a coalition with different economic agents, to work simultaneously with different data, the speed of communication and information exchange.

Secondly, an equally important source of income and capitalisation growth is the transition to a different coordination mechanism: network cooperation, which becomes an independent market asset [8; 10; 11]. The more participants are there in network interaction, the more meaningful and diverse it becomes, the higher are the network effects, both for individual network participants and for the system as a whole. Participation in the network allows working with different companies/clients/data, and that increases the density of the economic space, allows getting economies of scale; asset consolidation and resource sharing ensure service quality at competitive costs; shared values, trust, and communication standards reduce coordination costs. Since there are positive network effects [9], it is profitable to join the network, to be a member of it, which increases the market value of the company's assets. The costs of those who are not online will inevitably increase [8].

The platform thus creates value for all its participants:

• On the supply side, these are transport organisations, as well as companies that create related services (car rental, hotel reservations, etc.).

• On the demand side, these are passengers with different preference profiles.

• The product traded on the platform is information about the timetable, the availability of carrying capacity and tickets, related services.

• The value produced by the platform is speed with which platform participants can interact, or, in other words, a new level of mobility, savings in transaction costs, feedback and production of new offers (products/services).

• Benefits on the side of the consumer/passenger will be: minimisation of time for organising a trip, optimal travel speed, the single standard of service quality along the entire route, optimal service price.

• Benefits on the side of the manufacturer are appropriation of network effects, saving transaction costs, customising the offer and customer loyalty, producing new products/services, and increasing profits, increasing the market value of assets.

A block diagram of organisation of network interaction of Russian market participants and the choice of a priority business model to ensure «seamless» mobility

of the population based on digital technologies with the consolidating role of railway transport is shown in Pic. 5.

In the Russian passenger transportation market, JSC Russian Railways may become the initiator of networking to expand the route network, consolidate assets, optimise costs, and increase the quality of transportation services due to its technological and economic situation. Networking with the participation of JSC Russian Railways based on modern information technologies will launch the process of diffusion of services provided by railways into adjacent markets, attract service infrastructure to facilitate and provide new sales channels and promote services to end consumers.

Conclusions.

1. Organisation of combined passenger transportation serves to consolidate resources and reserves for optimising the costs of transport organisations, increasing the efficiency of using transport assets. Organisation of combined passenger transportation involves active *«horizontal»* interaction of various transport organisations, both among themselves and with different cohorts of passengers with their own consumer preferences and income restrictions. Therefore, the transition from linear business processes built «vertically» to horizontal business processes that offer specialized packages of services through a «single window» system according to uniform standards based on digital technologies is relevant.

2. The increasing complexity of technologies, digital transformation of production processes increases the value of cooperation: the ability to coordinate their actions with the actions of other economic agents when competition becomes economically unprofitable. Modern IT technologies, platform solutions create technical opportunities for integration of business processes of different modes of transport to consolidate efforts and network interaction towards shared assets, complementary competencies, optimizing costs and increasing quality.

3. Modern trends in development of the global and Russian passenger transportation market indicate the need to develop new business models for creating value for the client and to compensate for the diminishing demand, where a new format of using the railway infrastructure will appear, focused on creating value for people, business, and territory. Models for organising combined railway transportation should be based on business models, the choice of which should be predetermined by the company's strategic decision.

REFERENCES

1. Dunaev, O. N., Guts, A. V. Market of passenger transportation: ways of organising multimodal transportation [*Rynok passazhirskikh perevozok: puti organizatsii multimodalnykh perevozok*]. *Transport Rossiiskoi Federatsii*, 2019, Iss. 1 (80), pp. 23–26. [Electronic resource]: https://cyberleninka.ru/article/n/rynok-passazhirskih-perevozok-puti-organizatsii-multimodalnyh-perevozok/pdf. Last accessed 21.12.2020.

2. Report of the International Public Transport Association: Mobility as a Service. April 2019 [*Otchet mezhdunarodnoi assotsiatsii publichnogo transporta: mobilnost' kak servis. Aprel 2019*]. [Electronic resource]: https://www.metropolis.org/sites/default/files/resources/Report_MaaS_final.pdf. Last accessed 21.12.2020.

3. JR East Group Management Vision «Move Up» 2027. Report of Japanese railway company. 2017. [Electronic resource]: https://www.jreast.co.jp/e/investor/moveup/. Last accessed 21.12.2020.

4. Linz, K., Mueller-Stievens, G., Zimmerman, A. Radical change in the business model: adaptation and survival in a competitive environment [*Radikalnoe izmenenie biznes-modeli: adaptatsiya i vyzhivanie v konkurentnoi srede. Transl. from English*]. Moscow, Alpina Publisher, 2019, 311 p.

5. Business models for MaaS [*Biznes-modeli dlya MaaS*]. [Electronic resource]: https://www.researchgate.net/publication/321623880_Business_models_for_MaaS. Last accessed 21.12.2020.

6. Dunaev, O. N. Management of changes in business models of companies [*Upravlenie izmeneniyami biznes-modelei kompanii*]. *Logistika*, 2020, Iss. 8 (165), pp. 29–31. [Electronic resource]: https://www.elibrary.ru/item.asp?id=44043248/. Last accessed 21.12.2020.

7. Lamanova, V. A. Scale economics at the railway enterprise [*Effekt masshtaba na zheleznodorozhnom predpriyatii*]. *Economics*, 2020, Iss. 2 (45), pp. 77–82. [Electronic resource]: https://cyberleninka.ru/article/n/effekt-masshtaba-na-zheleznodorozhnom-predpriyatii/pdf. Last accessed 21.12.2020.

8. Capitalism of platforms [*Kapitalizm platform*]. Transl. from English and scientific ed. M. Dobryakova. National Research University Higher School of Economics. Moscow, Publishing house of Higher School of Economics, 2019, 128 p.

9. Joshua Cooper Ramo. Seventh Sense. Under the sign of unpredictability [*Sedmoe chuvstvo. Pod znakom nepredskazuemosti*]. Moscow, Eksmo, 2017, 247 p.

10. Moazed, A., Johnson, N. Platform: Practical application of the revolutionary business model [*Platforma: prakticheskoe primenenie revolyutsionnoi biznes-modeli*]. Transl. from English. Moscow, Alpina Publisher, 2019, 288 p. [Electronic resource]: https://znanium.com/read?id=352338. Last accessed 21.12.2020.

11. Wile, P., Warner, S. Digital transformation of business: Changing the business model for a new generation organization [*Tsifrovaya transformatsiya biznesa: Izmenenie biznes-modeli dlya organizatsii novogo pokoleniya*]. Transl. from English. Moscow, Alpina Publisher, 2019, 257 p.