Digital platform solutions of Russian Railways as a tool for the development of the concept of MaaS (Mobility as a Service)

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Abstract. The purpose of the study: to substantiate the advantages of the MaaS (Mobility as a Service) concept as a universal digital Smart aggregator, a platform integrating all participants in passenger transportation. Methods: content analysis, analysis of digital platform technologies, monitoring of digital processes and solutions at the level of a separate transport company. Results: the main advantages of digital transport multimodality as a concept of integrated digital platforms of the future transport are substantiated. The hypothesis is put forward that electronic digitalized communication technologies of market participants will become the main factor of economic growth. And the ideal MaaS-economic model will be a comprehensive integration of all existing digital platforms in the world and on national markets. The functionality and advantages for users of the development of MaaS solutions of the Russian railway carrier - the Russian Railways company – the Travel.RZD application and a pilot project within the framework of Innovative mobility implemented in the Samara region are presented. Keywords: digital transport multimodality, seamless, Travel.RZD, MaaS solution, Smart MaaS, Russian Railways.

1 Introduction

The trend of the last few years has been a significant change in the concept of public transport development in Russia and in the world. The approach to the management of complex transportation and related services «Mobility as a Service» (Mobility-as-a-Service, MaaS) is gaining popularity and practical application - the development of digitalized flexible systems for integrating supply and demand for transport services, also ensuring the achievement of the goals of reducing the burden on the environment, the choice of environmentally friendly services [3-7]. The concept assumes the possibility of providing and receiving complex services on a digital basis, the possibility of electronic preliminary planning and registration, connecting consumers and suppliers to any services accompanying the provision of transport services. MaaS assumes a comprehensive digital transport multimodality.

Digital transport multimodality provides planning, monitoring, cost optimization, cost minimization, multiple choice, quick search within the organization of passenger travel, cargo transportation. The economic efficiency of digital multimodal is ensured by well-
established rapid electronic interface and communication between various counterparties – participants in the supply chain system, between different modes of transport and transport companies, operators. This leads to an increase in speed, time savings, an increase in the physical volume and scale of transportation and the volume of related types of services and, as a result, a significant increase in the added value of the transport and service industries [1, 4-5, 10].

The purpose of the study: substantiation of the advantages of the Maas (Mobility as a service) concept as a universal digital aggregator – service, digital payment forms integrating all participants of passenger transportation.

Object of research: MaaS solutions developed by the largest railway carrier in the world - Russian Railways Holding.

2 Research Methodology

The research methodology is based on the use of specific statistical indicators included in the databases of international and Russian statistics. At the level of the Federal State Statistics Service of Russia (Rosstat) these indicators are included in the databases of the federal statistical observation in the forms: No. 3-inform «Information on the use of information and communication technologies and the production of computer equipment, software and services in these areas» [9]. At the same time, in our research we used the following methods: content analysis, analysis of digital platform technologies, monitoring of digital processes and solutions that are being implemented by the largest railway company in the world, Russian Railways [8].

3 Discussion

The core of the future development of transport systems in the global world, including rail transport, we define special attention, efforts, priority investments in multimodal digital platforms integrating all modes of transport, all participants in transportation, consumers, operators of related industries-suppliers, and developments along with partner modes of transport. Indeed, railway and all other modes of transport modes should work together to create a comprehensive transport product (service) with high added value for the supplier and maximum benefit for the consumer. In addition, the introduction of the MaaS concept into the business stimulates the development of a customer-oriented approach to the provision of services, including package services and personalized offers.

MaaS digital integration of all participants in the transportation market will allow: significantly improve the planning and optimization of operational and investment resources of companies, reduce the cost of transportation, consumer costs for delivery, significantly reducing the time of goods movement and travel time by passengers.

4 The economic importance of digital aggregator platforms in the implementation of the concept of transportation «Mobility as a service»

The widespread introduction of digital integrator platforms for suppliers and consumers of transport services and related additional services leads to a significant development of integration processes in the transport services market, the emergence and growth of digital multimodal transport, updating and expanding the list of transportation services and activities.
MaaS (Mobility as a Service – «Mobility as a service» or «Vehicles as a service») is a set of digital services, platforms that allow users and developer companies, operators, suppliers to integrate everywhere in the world, in realizing the ability of all service participants, platforms to provide search, exchange, transfer, use of data, the possibility of online access to certain content, as well as sharing various modes of transport, refusing to travel by private transport [2].

It is expected that by 2050, in passenger transportation, the business philosophy and technological solutions within the framework of «Mobility-As-a-Service» (MaaS) will become market dominants and determinants, and electronic digitalized communication technologies of market participants will become the main factor of economic growth. A similar approach will be implemented in cargo transportation – integrated seamless cargo transportation «door to door». The digital integration of the elements of the market system will become total, large-scale, universal. And developers and owners of digital platforms will get a great advantage, benefit and monopoly power in the market.

Digital business models will become the basis for the entrepreneurial success of all companies participating in the transport services market without exception. It is assumed that the ideal MaaS-economic model will be a comprehensive integration of all digital forms existing in the world and on national markets. The market will take the form of a universal digital association and a digital market space [4].

Each participant of the transportation market, the transport services market will be interested in the growth of its marginality by creating a unique offer and the ability to quickly provide almost any consumer request through electronic cooperation with other participants - suppliers, payment systems, financial organizations, transport operators, travel operators, hotel holdings, aggregator-mi et al. (the so-called Smart MaaS platform).

Table 1 and Figure 1 summarize the stages of transition to the universal Smart MaaS platform.

<table>
<thead>
<tr>
<th>Type of service</th>
<th>Example</th>
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<tbody>
<tr>
<td>Software-as-a-Service</td>
<td>Software for joint supply chain management with other companies (Flexport, USA). Allows you to reduce penalties for penalties by 90%.</td>
</tr>
<tr>
<td>Platform-as-a-Service</td>
<td>Secure Digital Twins (Microsoft, USA) is a platform that allows you to create knowledge bases based on digital models of entire environments</td>
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<td>(knowledge, factories, power systems, railways, etc.). The platform has reduced the time for scheduling trains on the West Coast Mainline line in</td>
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<td></td>
<td>the UK from 30 minutes to 19 seconds.</td>
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<tr>
<td>Trains-as-a-Service</td>
<td>Hitachi (ABB, Switzerland) - provides 122 trains on lease to the railways of Great Britain. The company receives a fee for maintenance and trouble-free operation of trains. The trains remain owned by the company. The model reduces energy consumption by 18% and track repair costs by 43%.</td>
</tr>
<tr>
<td>Product-as-a-Service</td>
<td>Hilti Company (Liechtenstein) – provide their construction tools with a monthly payment. This increased the company's growth by 5-10% per year.</td>
</tr>
<tr>
<td>Tunnel-Drilling-</td>
<td>An experiment by EPOS, Portugal and Atlas Copco production company, Sweden on the presentation of equipment for tunneling at a fixed price per 1 sq. meter. This solution allows the contractor to gain full control over costs.</td>
</tr>
<tr>
<td>Machinery-as-a-Service</td>
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5 Experience in implementing Saas solutions in passenger transportation (initiative of Russian Railways)

The Russian railway carrier is working on digitalization of services, multimodal opportunities for passengers, as well as developing additional services and ticket solutions for the regions.

The MaaS solution in the field of passenger transportation for the regions was the MaaS platform developed by Russian Railways, which allows you to purchase tickets for all types of transport.

MaaS-a solution in the field of passenger transportation will allow the consumer:
- select routes for any transport in one place;
- pay for tickets for all transport on the selected route with one click;
- receive information about the exact schedule, do not miss event events;
- store tickets in the "Order History" - automatically, and favorite routes in the selected;
- take out insurance;
- Save your favorite routes to favorites.

The MaaS solution integrates buses, ships and ferries, planes and trains in one digital space (platform, application), allows you to select a route and buy tickets in one order and pay once.

Figure 2 visually shows the interface of a mobile application – a pilot project of a Russian Railways Maas solution within the framework of innovative mobility.
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Figure 2 visually shows the interface of a mobile application — a pilot project of a Russian Railways MaaS solution within the framework of Innovative mobility.

The Russian Railway Holding has also developed another pilot solution in the field of MaaS technologies - Travel.RZD. The passenger has the opportunity to plan and purchase everything necessary for a tourist trip: book excursions, purchase tickets for trips, book hotels, find and buy tickets for entertainment and cultural events. Within the framework of the Travel.RZD service, many previously separate and separate services are integrated, thereby this is an advance in comfort and convenience technologies for tourists, tourists, passengers who prefer a comprehensive product in the framework of their journey. The Travel.RZD digital platform allows you to plan your trip and travel program, order and pay for basic services: trips, transfers, sightseeing services, museums, comprehensive tour programs. There are search filters, a calendar with the construction of a compact travel schedule, viewing the location of hotels on the map, issuing a list of hotels, etc.

The main features of the Travel.RZD service:

- search for hotels in Russian regions, electronic booking;
- selection and booking of excursions;
- buying tickets to visit museums;
- ordering and booking of a comprehensive tourist program developed by Russian tour operators and tourist bureaus.

Currently, the number of contractors-service providers connected to the digital service is about 75,000 hotels, 1,700 exclusions in 100 Russian cities, 400 companies-developers of tourist experiences, about 100 developed tours, routes, programs.
6 Conclusion

The performed research allows us to conclude that digital transport multimodality as a concept of the future transport integrated by digital platforms contributes to fast and efficient planning, monitoring, cost optimization, minimizing time costs, multiple choice, quick search within the framework of the organization of passenger travel, cargo transportation. Electronic digitalized technologies of communication of market participants will become the main factor of economic growth. The ideal MaaS-economic model will be the integrated integration of all existing digital platforms in the world and on national markets. The market will take the form of a universal digital association and a digital market space. The economic efficiency of digital multimodality will be ensured by well–established rapid electronic interfacing and communication between various counterparties - participants in the supply chain system, between different modes of transport and transport companies, operators. This will lead to an increase in speed, time savings, an increase in the physical volume and scale of transportation and related types of services and, as a result, a significant increase in the added value of the transport and service industries.

Russian Railways has some experience and groundwork in the implementation of MaaS solutions in the organization of passenger transportation. The Russian Railways MaaS solution integrates buses, ships and ferries, planes and trains in one digital space (platform, application), allows you to select a route and buy tickets in one order and pay once. We have also developed a MaaS solution in the field of tourist trips - Travel.RZD, which allows you to plan a trip and a tourist program, order and pay for basic services: trips, transfers, sightseeing services, museums, comprehensive tourist programs.

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