SaaS in digital ecosystem of smart priorities for transport and logistics

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Abstract. The objective of the article is to provide an analytical overview of the various aspects of the development and implementation of Saas services in the development of a digital ecosystem of smart priorities for transport and logistics as of March 2023, including an analysis of the industry needs for their further development and effectiveness of their use in the context of new geopolitical challenges. Methods: The work applies the method of analytical review of the state of the Russian market of SaaS technologies, the peculiarities of the development of national digital services in the field of logistics, and ways to improve the efficiency of their application. **Key words:** SaaS, Logistics, Digital Ecosystems, Transport, Digitalisation, International Logistics Regulation.

1 Introduction

In the modern global context, when virtually all the risks to the development of the transport and logistics ecosystem of Russia and the world have simultaneously materialised, such as economic volatility and its slowdown, the growth of global debt, transportation and insurance tariffs, the absence of clear legal international regulation, the breakdown of international routes not only for freight but also for air travel, in particular passenger air travel, sanctions pressure, creating a new strategy for the formation of Russian transport and logistics sovereignty has become a high-priority task The accelerating pace of digitalisation of the Russian economy and that of the countries-strategic partners, and the need to overcome dependence on foreign software, bring up to date the problem of increasing the level of implementation of new information services in transport and logistics, in particular in rail freight transport.

2 Materials and Methods

The research was guided by the Russian regulatory framework that sets strategic directions, conceptual approaches and regulations, as well as expert models and opinions of

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representatives of the scientific and business communities on the digital transformation of transport and logistics ecosystems.

The development of digitalisation and implementation of innovations in the Russian logistics ecosystem have been discussed in the works of A.Y. Panychev. Pokrovskaya O.D., Satsuk T.P. and others [1-5, 11-16].

Theoretical development and practical approbation of methods to respond to the imposed sanctions, new strategies for the development of the logistics industry, and improving the quality of human capital were covered in the studies of scientists, teachers of the St. Petersburg State University of Railway Transport of Emperor Alexander I [6-10].

The Ministry of Transport presented the Strategy for Digital Transformation of the Transport Industry to 2030 in 2021. The digitalisation of the transport and logistics ecosystem of the Russian Federation will be implemented by means of the following key projects:

- Drones for passengers and cargo
- Green Digital Passenger Corridor
- Seamless freight logistics
- Digital management of the Russian Federation transport system
- Digitalisation for transport security
- Digital twins of transport infrastructure facilities

Fig. 1. Digitalisation tracks of the transport and logistics system in the Russian Federation.

In 2021, the priority use of Russian software was indicated as a significant requirement for the implementation of projects. Currently, within the framework of the current sanctions agenda, the task of import substitution in the sphere of Russia's digital sovereignty, including in transport, appears to be of paramount importance.

As part of the implementation of Strategy projects, the State Information System for Electronic Transport Documents (GIS ETPD) was launched on 1 September 2022, enabling the transition to seamless document management in multimodal transport.

Another significant step towards the digital transformation of the transport and logistics industry was the conclusion of a strategic partnership agreement between the Digital Transport and Logistics Association and one of Russia's largest fintechs, Sberbank, during SPIEF. The purpose of the cooperation will be to accelerate the digitalisation of the transport industry and to apply Sber's experience in creating and implementing new digital services, taking into account the need to import substitution of foreign software.

Therefore, at present, the central vector of innovation in the transport and logistics sector is its digitalisation with the aim of creating a single seamless ecosystem that meets the task of creating the sovereignty of the transport of the Russian Federation.

3 Results and Discussion

3.1 SaaS characteristic

One of the fastest growing areas of digitalisation in transport and logistics has been the introduction of cloud computing, which is a technology that gives users network access to various data, services or applications.

SaaS (Software-as-a-Service) is an internet-based application that other users can use via the internet. SaaS is a software application which stores users' files or is hosted on the World

Wide Web. The distinguishing feature is the provider's ability to fully administer (and, in fact, control) the use of SaaS.

Fig. 2. Diagram of a SaaS service. https://www.tadviser.ru/index.php/Article:SaaS_(world_market).

Saas services are provided to users on the basis of a licence agreement, and the costs of technical support, maintenance and upgrades are included in the subscription fee. Saas services are used in the B2B and B2C segments. These types of applications can replace software, solving the problem of using foreign software. The bright and commercially successful examples of Saas services from Russian developers are 1C and Moye Delo.

An important advantage of Saas is the ability to scale business without the need to create data centres, as well as the ease of upgrading the service to the specifics of specific business processes.

SaaS development tracks. According to research by Gartner in 2021 the sphere of development and implementation of SaaS in the world grew by a quarter compared to the previous year and its total revenue is projected at $397.5 billion. According to J'son & Partners Consulting research, the Russian Saas market in 2020 was 11.5 billion and showed a 28% growth compared to the previous year.

Currently, the implementation of Saas technology in the transport and logistics sector has great potential. Russian IT companies, such as, have considerable experience in developing Saas for supply chain management and optimisation. For example, Generix Supply Chain Hub SaaS platform developed by the company is used in more than 6000 companies, uniting manufacturers, retail, e-commerce, 3PL/4PL. The platform provides tools to automate information flows, digitise company collaboration processes and track supply chains in real time. Customers are offered 150 standardised industrial logistics business processes. Smart Logistics is also successfully developing Saas services for logistics.

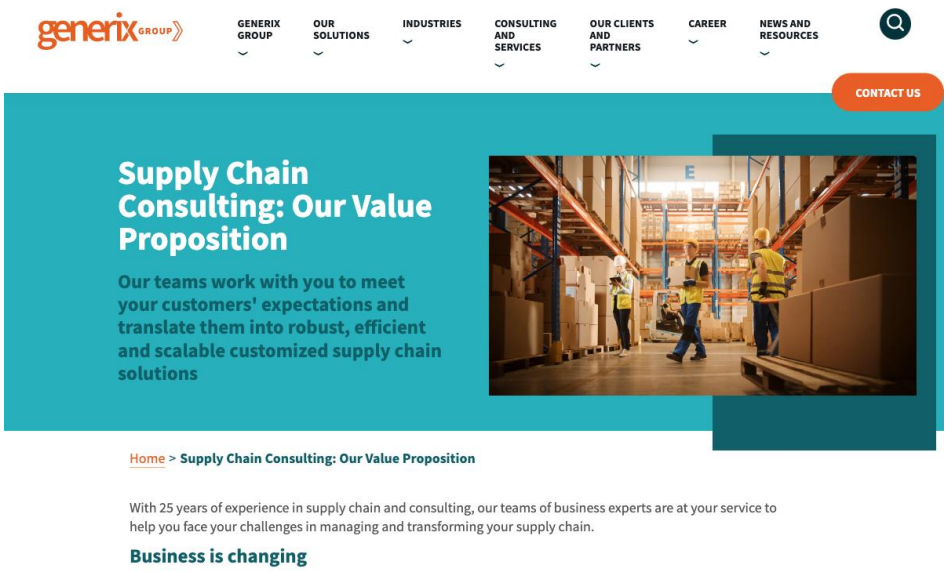

Fig. 3. Generix Group digital portal. Screenshot from Generix Group official website: https://www.generixgroup.com/ru/blog/rost-interesa-k-saas-v-logistike.

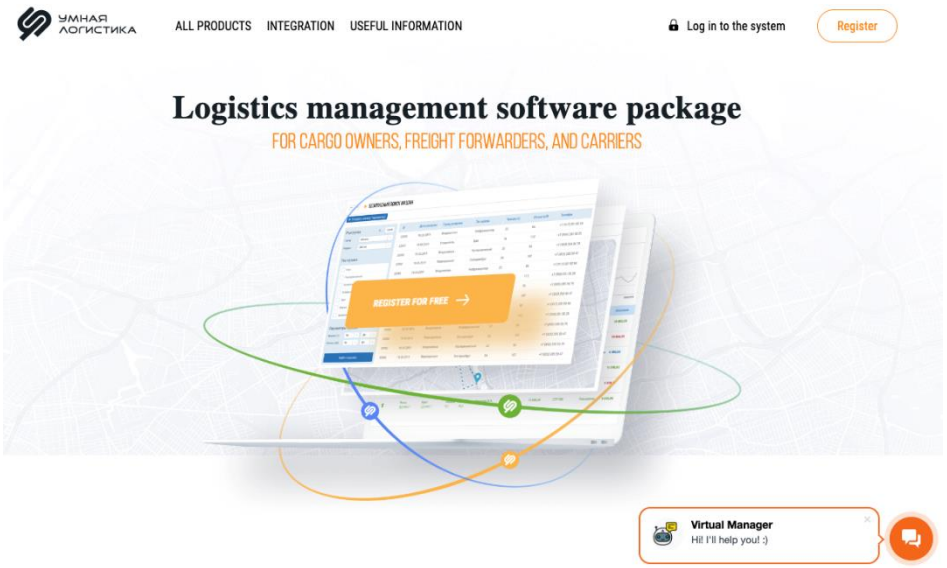

Fig. 4. Smart Logistics digital portal. Screenshot from the official Smart Logistics website: https://ul.su/?ysclid=l834kur8u822511976.

According to Gartner estimates, SaaS cloud services occupy leading positions in the market of digital solutions, the profitability of the SaaS market exceeds the success of other types of cloud services, such as PaaS - "Platform as a Service" and IaaS - "Infrastructure as a Service".

For large transport companies such as JSC "Russian Railways", JSC "Russian Railways Logistics", LLC "Transoil" SaaS services have great potential in the field of communications (conferences), mail, document processing in the cloud. Saas means solutions of domestic developers can solve the problem of urgent import substitution of foreign software after the

introduction of international sanctions against Russia. At present, the Russian Federation is taking measures to support the IT industry in order to improve competitiveness.

One of the ways to increase the level of implementation of cloud digital services in the transport and logistics sector could be the creation of joint ventures and the use of Saas solutions from Indian companies. In recent years, India, a long-standing strategic partner of Russia, has become one of the fastest-growing markets for Saas development. For example, the Indian company Blackbuck is one of the largest Saas service providers in the world and the world's largest digital freight forwarder.

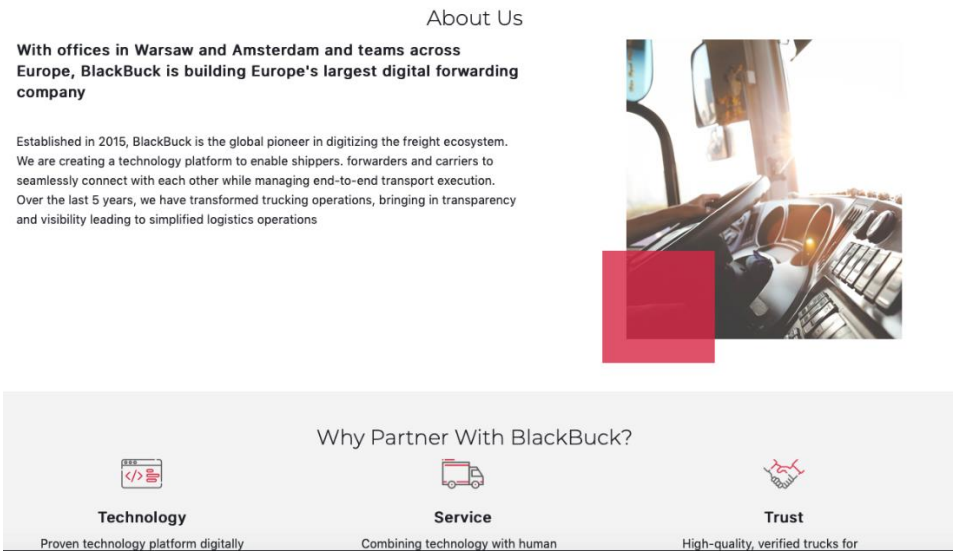

Fig. 5. Blackbuck Digital Portal. Screenshot from the official Blackbuck website: https://www.blackbuck.com/company.php?lang=en.

Establishment of joint Russian-Indian enterprises, training, involvement of specialists and experience transfer could contribute to the development of the Russian SaaS development market in the transport and logistics sector.

Another significant way of developing digital solutions for the industry could be the creation of scientific clusters on the basis of industry-specific transport universities that have experience in implementing projects to automate processes in transport, such as PGUPS.

The School of Engineering Entrepreneurship and Priority 2030 projects being implemented within its framework help to improve the quality of training human capital for the transport and logistics industry and project teams capable of participating in the development of IT solutions for modern digital transport ecosystems. The development of a grant system for transport and logistics companies for the development of digital solutions for specific business tasks by researchers at industry-specific universities will on the one hand stimulate the development of new cloud services and, on the other, the participation of future industry professionals while still studying in such projects. will increase their digital competencies and prepare them for work in production.

At present, the main problems that hinder the implementation of digital services in transport and logistics are the digital inequality of regions and the lack of access to the Internet in certain areas. For example, according to Rosstat, 28% of Russian households did not have internet access in 2021. This problem should be solved within 3 years as part of the implementation of the national programme "Digital Economy".

Another significant problem that hinders the implementation of electronic document management, particularly at the international level, is the difference in its regulation in

different countries and the actual lack of clear regulation within regional international organisations such as the EAEU. In such circumstances, the introduction of SaaS services and automated information systems for the exchange of electronic documents in international transport and logistics has its limitations.

Thus, in the regulation of electronic document flow and electronic signatures, the US legislation is the most and the most dispositive. American legal entities and individuals are given the right to independently regulate internal processes in the field of electronic document flow. Based on the concepts of "business choice", freedom of contract and choice of digital technology, the latter is left to the discretion of the parties, who are free to choose an independent third party to certify the electronic signature key certificate.

The EU's legal framework for electronic document management is based on Directive 1999/93/EU. According to this document, each EU member state is entitled at the national level to set up structures dealing with the licencing of organisations providing services of electronic signatures. The government is vested with a supervisory function over the providers of certification services and issuance of electronic signature qualification certificates. Note, however, that this legal regime of licensing services preserves conditions for developing competition in the market for digital signature services.

The most rigid model of legal regulation of electronic document flow, digital signature origination and use exists in Russia and India. For instance, in Russia there is a federal law "On electronic signature" dated 06.04.2011 No. 63-FZ. The Russian legislation provides for strict regulation of the activity on the provision of services in the field of electronic document management, licencing of these activities, and the mandatory use of standardised algorithms of electronic digital signatures. At the same time, within the framework of corporate use of internal electronic document flow, it is planned to sign preliminary agreements on the regulations for the use of electronic documents. Electronic document flow operators that provide services for the exchange of electronic documents using qualified electronic signature key certificates as part of the receipt of invoices are entered into the Federal Level Register of Electronic Document Flow. Their list can be found on the website of the Federal Tax Service. In addition, the system for providing data to SaaS services must ensure that such an information system complies with Federal Act No. 152-FZ of 27 July 2006 "On personal data".

Therefore, the lack of a possibility to choose a means of creating and verifying electronic documents, which is inherent in the Russian legal system, serves as a significant obstacle to the creation of an international electronic document flow system with foreign companies. It seems that mutual recognition by the states of national electronic digital signature verification systems or the creation of a unified regional body for digital signature issuance significantly contributed to the development of digital document flow services.

In order to create an effective seamless system of international document flow it is necessary to either create a supranational EDI operator issuing qualified electronic signature verification key certificates for the parties of transport and logistics relations or reach an agreement on recognition of national electronic document flow operator certificates between the countries - strategic partners.

The intensification of digitalisation, including the operation of digital platforms for the logistics industry, including applications of AI systems, as well as accessing customer data, including in international transport, needs the rapid development of its legal and regulatory framework in order to ensure the necessary level of information security, on the one hand, and to promote digital services in logistics, on the other.

4 Conclusion

To summarise this study, the current complex geopolitical situation, such as the covid-19 pandemic, should be a driver for the digitalisation of the transport and logistics industry. The importance of the development of the domestic sphere of IT technologies has been discussed for quite some time. In recent years, numerous strategies, projects, and initiatives have been launched for the digitalisation of the transport and logistics ecosystem. However, the new geopolitical agenda and sanctions pressure, which have effectively closed off access to foreign software and equipment, have created an environment in which there is an urgent need to raise the level of new software development and digital technology creation. And it is now that the Russian Federation and those Russian companies that can take a leading position in this area and ensure the full-scale creation and implementation of domestic technology can not only ensure the transport and logistics sovereignty of the state, but also find themselves in a winning position in the changing transport and logistics services market, in particular in the newly emerging field of international transport. SaaS solutions enable digital transport connectivity of regions and information cybersecurity of transport and logistics. The development of the SaaS services market in logistics can significantly accelerate the implementation of the objectives set out in the Strategy for Digital Transformation of the Transport Industry until 2030, in terms of the implementation of the project "Seamless Freight Logistics". Cloud-based SaaS services can become one of the options for implementing an end-to-end system for the exchange of electronic transport documents both at the national and international level.

The creation of conditions for the development of a digital ecosystem of intelligent priorities for transport and logistics should include stimulating the development and implementation of SaaS services by:

1. providing state support measures to developer companies;
2. recognition of electronic document management certification systems in Russia's strategic partner countries;
3. creating joint ventures with foreign companies from friendly countries to develop SaaS services for the logistics sector;
4. creating federal educational standards for higher education programmes to improve the quality of human capital employed in the transport sector.

The introduction of SaaS services will make it possible to solve the problem of import substitution of foreign software faster and cheaper, including in the transport and logistics industry.

Will regional cooperation become a key trend in the construction of a new freight routing system? Will the Russian transport industry reach a level of digitalisation in Russia comparable to that of the banking sector? Only time and experience in building a digital ecosystem of intelligent priorities for transport and logistics will answer these questions. It is clear that the full digital transformation of logistics transport systems is becoming one of the urgent tasks of the present time.

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