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	JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

SOI: 1.1/TAS DOI: 10.15863/TAS

International Scientific Journal

Theoretical & Applied Science

p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)

Year: 2024 **Issue:** 12 **Volume:** 140

Published: 03.12.2024 **http://T-Science.org**

Issue Article

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DEVELOPMENT OF RAILWAY TRANSPORT IN UZBEKISTAN

Abstract: *Uzbekistan Temir Yullari JSC is an autonomous railway company. To date, he is responsible for about 7,000 kilometers of railways on the territory of Uzbekistan. Railway transport has a number of advantages, for example, environmental friendliness, time savings in transportation processes, human and time resources, the ability to transport bulky and massive loads. The development of rail transport is driven not only by the speed and quality of innovation in this industry, but also by the formation of global supply chains – from the transportation of raw materials to the delivery of the final product to its destination.*

Digitalization of the country's railway will be able to radically change the efficiency of the transport industry by increasing capacity and increasing the stability of its operation. The article examines the development of railway transport in Uzbekistan in connection with its modernization, re-equipment and automation.

Key words: *Railway transport, railways, non-connecting tracks, innovation, digital railway.*

Language: *English*

Citation: Sadullayeva, Sh.A., Shermukhamedov, A.T., & Abdunazarova, Sh. (2024). Development of railway transport in Uzbekistan. *ISJ Theoretical & Applied Science, 12 (140),* 18-21.

Soi: http://s-o-i.org/1.1/TAS-12-140-3 ***Doi***: crossref https://dx.doi.org/10.15863/TAS.2024.12.140.3

Scopus ASCC: *2000.*

Introduction

Railway transport is a complex industrial, economic and social system with its own internal, inherent territorial, industrial and functional structure. To improve the quality of transport services, scientifically based general transport standards for basic types of services have been developed and introduced, as well as methods of quality control of transport services are being improved. The introduction of standardization provides an effective way to regulate the quality of railway operations. Currently, the railway in Uzbekistan is actively developing. Uzbekistan ranks 5th in the CIS in terms of the total length of railways. Uzbekistan's train fleet is periodically upgraded and updated. High-speed trains are now operating, as the country's territorial location allows it to further develop railways.

Research methodology

When writing the article, we applied methods of analysis and synthesis on this topic, as well as our research on the modernization of the Uzbek railway. The methodological basis of the research is the institutional approach to digitalization of transport.

Analysis of the results. In the development of railway transport, modern innovative solutions are primarily aimed at improving the technical equipment of trains and trains. Railway transport is considered one of the most environmentally friendly modes of transport. Modern trains can deliver goods and passengers in record time, and passengers with the

presented comfortable conditions will get to their destination in a very short time. The Uzbek railway is officially a joint-stock company "Uzbekistan Temir Yullari", actually owned by the state and the length of the lines is 7000 kilometers, of which about 2,700 kilometers are electrified sections. The development of railway transport is becoming not material, but intellectual capital. The pace of socio-economic development of the country largely depends on the development of the railway, namely the economy of high speeds, i.e. an economy requiring rapid movement of raw materials, materials, products, within which not only material, but also intellectual capital becomes the main value. In the field of railway automation, telemechanics and communications, the creation of an automated train control system, which is part of the general automated transportation management system of the country.The widespread use of computing and microprocessor technology to ensure traffic safety will significantly increase their functionality and reliability, reduce maintenance costs, as well as; the creation of technological communication systems using fiber-optic communication lines, digital transmission systems; the use of satellite communication systems. Domestic passenger traffic connects Tashkent and Samarkand with Andijan, Khojikent, Bukhara, Karshi, Urgench, Kungrad, Termez, Shavat, Alat and other settlements. Uzbekistan Airways has a fairly good fleet of passenger trains at its disposal, making dozens of flights daily. High-speed express trains "Afrosiab", branded express trains "Shark"; electric trains "Nasaf"; branded night trains, i.e. wagons equipped with sleeping places, tourist trains "Afson" run to their destination. During the years of independence, Uzbekistan has done a lot of work on the formation of new steel highways. The Navoi– Uchkuduk– Sultanuizdag– Nukus railway was laid in the sands of Kyzylkum, a combined railway and automobile bridge over the Amu Darya River was built, and the Tashguzar -Boysun–Kumkurgan railway was built in the most difficult mountainous conditions. The operation of the new Tashguzar – Boysun-Kumkurgan railway provides favorable conditions for the development of various industries, transport services in Kashkadarya and Surkhandarya regions, and also significantly changes the entire scheme of transport and economic relations in the region. The reconstruction of the track on the Tashkent – Samarkand – Bukhara section was carried out, work on the electrification of the Tukimachi – Angren, Marokand – Karshi, Karshi – Termez railway lines was carried out, new railway lines Yangier – Jizzakh and Yangier-Farhad, Angren – Pape were opened. This railway section of Uzbekistan is part of the Trans-Afghan corridor connecting Shibergan, Ankhoy, Meimene and Herat, opening through railway traffic to Afghanistan and Uzbekistan to the ports of Bandar Abbas and Chahbehar (Iran), Karachi (Pakistan) and allowing cargo arriving from Southeast Asia to Europe by a shorter route than through the Far Eastern railway corridors. The transportation carried out along this transport corridor additionally provides Uzbekistan with the opportunity to establish foreign trade relations with the Eastern states of the Pacific region, Western Turkey and a number of European countries. International passenger traffic connects Uzbekistan with Kazakhstan, Turkmenistan, Kyrgyzstan, Tajikistan, Russia and Ukraine. Most trains run to the Russian Federation to the cities of Chelyabinsk, Ufa, Yekaterinburg, Novosibirsk, Saratov, Volgograd and, of course, Moscow. Currently, the railway connection is actively developing, and the train fleet is being modernized and updated, thanks to which Uzbekistan has launched high-speed passenger trains. The modern high-speed train "Afrosiab" connecting Bukhara, Karshi, Samarkand and Tashkent runs at a speed of 210 km/h and has VIP, Business and Economy class carriages. The train was designed and assembled in Spain and is currently one of the most modern.In 2024, the volume of traffic along the international transport corridor increased several times [1]. The creation and development of national and international information systems that provide the necessary information to cargo owners, paperless technology when escorting goods, and the provision of technological information for managing the transportation process is important. Information systems are becoming a means of fully involving railways in the system of commercial activities of the company. Wider use of the joint-less track design with thermally reinforced rails [2]. Ensuring the advanced reduction of the upper structure of the track, the roadbed and the creation of artificial structures in accordance with the changing conditions of operational work, while making extensive use of mechanization and automation of track repair work, has had a great effect in the railway transport system. A more complete use of profile grinding of rails to extend their service life and improve the condition of the track, as well as lubrication of the side surfaces of rails and wheels, has given a great economic effect for the stable operation of railway transport. Today, the radical reform of the railway transport sector is gaining momentum in Uzbekistan, which started on October 10, 2023, according to the instruction of the President of the Republic of Uzbekistan. The document approved a number of measures related to the reorganization of the structure of the railway industry. Now the responsibility for ensuring the functioning and development of infrastructure facilities and the locomotive fleet is assigned to the established JSC "Infrastructure of Railway Transport". Another organization that was separated into a separate company was Cargo Railways . This JSC is an international multimodal transportation operator and will provide services for the operation and

maintenance of freight wagons and containers, for door-to-door transportation, for the formation of logistics centers and terminals, for the formation of logistics supply chains of goods by providing services for the operation of multimodal logistics terminals on the territory of other states and other logistics services. The scope of the new organization also includes cargo insurance and terminal services. The functioning of Cargo Railways JSC will make it possible to abandon the practice of state regulation and switch to a market mechanism for the formation of tariffs for the provision of freight wagons and containers. In addition, the reform will accelerate the development of the market for private operators of the carriage fleet, and will ensure equal access to the railway infrastructure. Prior to the start of industry reform, representatives of the railway industry of Uzbekistan held a number of meetings with foreign colleagues, where one of the topics was the experience of reforming the railway industry [3,4]. Now, according to previously concluded agreements with international consultants for the provision of services for coordinating the transformation of the industry, we expect to receive conclusions on the most optimal schemes for the interaction of structural enterprises with each other, as well as with the management apparatus. Currently, a large number of engineering companies supply the roofs of electric vehicles with solar panels, thereby maximizing the product range [2]. This issue is also being resolved for the Uzbek Railway's carriage fleet. Seamless and, in general, comprehensive service are the main trends in the development of modern transport, both in terms of interaction with passengers and in terms of interaction with shippers. Therefore, multimodality is a feature that we are developing massively in our digital sales channels. For passengers, it is a trip by several modes of transport, receiving additional services, including tourism. There are already more than a thousand tourist sites on the tourist portal [5]. These are hotels, excursions, tours, tickets to cultural events, vouchers to sanatoriums – the whole set of impressions for passengers. Many well-known companies, Siemens, Tails and others, are developing sensors that will help in train maintenance and will be able to provide additional passenger safety, for example, due to the timely detection of damage to railway tracks using GPS designations.The development of intelligent sensors for railway tracks has been started automatically in Uzbekistan.. An important point for the automated operation of railway tracks is the identification and processing of a huge amount of information that comes from the railway, vehicles, passengers. The use of drones is an additional way to guarantee the safety of passenger transportation.Many well-known companies, Siemens, Tails and others, are developing sensors that will help in train maintenance and will be able to provide additional passenger safety, for example, due to the timely detection of damage to railway tracks using GPS designations.The development of intelligent sensors for railway tracks has been started automatically in Uzbekistan. An important point for the automated operation of railway tracks is the identification and processing of a huge amount of information that comes from the railway, vehicles, passengers [6]. The use of drones is an additional way to guarantee the safety of passenger transportation.Unmanned devices can also be used to guarantee the safe movement of railway transport. They are equipped with automated territory sensing systems and have the ability to inspect the road in front of moving trains for any obstacles that arise, and are also suitable for ensuring safe autonomous movement of the vehicle. The method of energy transmission can be used in the train of the future: a "beam" of ultrahigh frequency (microwave) energy is located above the railway in the place where the pantograph of the locomotive will pass. The greater the distance the beam travels, the more it is scattered and it is necessary to place microwave radiation sources at relatively short intervals of length so that the beam does not scatter and is located in the necessary area of space above the railway.This will solve the problems of resource conservation and energy losses in conductors, as well as remove the maximum speed limit on high-speed railway lines [7]. A rational combination of various energy and resource saving methods in future trains will improve technical, economic, environmental and other indicators. It is also necessary to touch upon technologies that make it possible to improve one of the most important indicators of railway transport, namely, the speed of the train. Transportation companies try to minimize their transportation costs, thereby increasing potential profits. There are many cost-cutting tools, but the most effective among them are the absence of disruptions to train schedules and automation of their movement control, taking into account all parameters affecting speed and safety. These two fundamental factors are completely dependent on the capabilities of the locomotives used by the shipping companies. Moreover, there are opportunities not only for traditional ones. To meet such IT requests from railway customers, GE Transportation (a subsidiary of General Electric), specializing in the development and production of technological installations and vehicles, produces "smart" locomotives equipped with artificial intelligence systems with elements of computer self-learning. Since 2017, there has already been a variant of a rolling stock in Australia that uses solar energy for transportation. The solar and hydrogen energy industries are just such, they will be able to provide a more sustainable demand for train travel compared to other existing types of vehicles [7]. Already one of the first examples of the operation of "smart" GE Transportation locomotives on German railways showed a record result for the transport industry — Deutsche Bahn was able to increase the efficiency of

transportation by 1.25 times.An intelligent control system in railway transport is extremely important [8]. Computer vision will also be widely used by the company to record the duration and correctness of the actions performed by employees. Artificial intelligence also includes intelligent software robots and speech services. For example, in Russia, about 50% of customer requests, as well as employee users of the systems, are processed not by a human, but by a robot and speech services, which have reduced the processing time of requests by 3 to 5 times. The service for rationing work operations allows you to monitor the economy and the cost of employees' labor. In addition, AI algorithms, receiving data from cameras and sensors, help to control the reliability of securing cargo and, as a result, increases the safety of cargo transportation. The direction of AI implementation in railway transport operations can be called new decision-making tools. When building predictive models, AI "predicts" the future state of infrastructure and rolling stock. This allows you to optimize the maintenance schedule, as well as increase the service life of the equipment.

Conclusions

For further development, the Blockchain allows you to monitor the lifecycle of the process at any stage, which strengthens the trust factor. it is necessary to cooperate with Russian specialists in the field of operation and development of new systems. It is necessary to use blockchain technology with them. Blockchain allows you to monitor the production cycle of the process in railway transport at any stage, as in the field of using smart contracts - whether it is a wagon farm, infrastructure, logistics, locomotive complex, as this technology is indispensable. There is a huge infrastructure in the railway transport system of Uzbekistan, and how effectively information is collected on the operation of railway stations without human intervention, on time, with proper quality, depends largely on the effect of digitalization.

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