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EDITORIAL STAFF OF A JOURNAL

Managing editor
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Основная тематическая направленность журнала: материалы о научно-технических, организационных, экономических, экологических, правовых проблемах, истории, состоянии и перспективах развития транспортного комплекса стран БРИКС; о взаимодействии стран БРИКС по вопросам транспортного обеспечения и сотрудничества с другими государствами, мировыми транспортными системами, а также о подготовке персонала всех уровней для транспортной отрасли и развитии в данной сфере сотрудничества образовательных учреждений и транспортных предприятий разных стран.

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III conference of the Association of rectors of transport universities of BRICS+

Egor Komarov
Independent researcher; St. Petersburg, Russian Federation; komar77@internet.ru

ABSTRACT On June 10–11, 2024, the Emperor Alexander I St. Petersburg Transport University (PGUPS) in St. Petersburg hosted the III Conference of the Association of Rectors of Transport Universities of BRICS+.

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Информация

III Конференция Ассоциации транспортных вузов БРИКС+

Егор Комаров
Независимый исследователь; г. Санкт-Петербург, Россия; komar77@internet.ru

АННОТАЦИЯ 10–11 июня 2024 г. в Санкт-Петербурге на базе Петербургского государственного университета путей сообщения Императора Александра I (ПГУПС) состоялась III Конференция Ассоциации ректоров транспортных вузов БРИКС.

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In the light of the expansion of international contacts and growth of global trade, over the last decades, the requirements for training of professionals for the transport sector in various countries have been increasingly converging. Certainly, a degree of alignment varies depending on a particular mode of transport. It is most of all manifested in training of specialists for water and air transport who are to be involved in international traffic with a high level of alignment of safety requirements, but every year it applies more and more to road and railway transport, too.

With regard to aspects of transport management, such as logistics, environment protection, energy saving, managing the transportation of highly hazardous goods, and international passenger traffic, requirements for transport personnel in different countries obviously become increasingly similar.

This makes academic, scholarly and engineering activities of educational institutions involved in training of manpower for the transport industry across the world similar in terms of the scope, challenges, and prospects. The goals and objectives for the development of contacts in these areas have formed the basis for the idea to establish the Association of Rectors of Transport Universities of the BRICS Countries put forward by the management of PGUPS in 2016–2018. It was presented at international conferences, symposiums, and workshops at a number of universities in China, India, Brazil, and South Africa and was received with interest and approval.

St. Petersburg. The Yusupov Palace on the embankment of the Fontanka River[1] is the cradle of Russian transport education and science. It is the first building of the Institute of the Corps of Railway Engineers. Currently, the building houses classrooms and the historical and cultural centre of Emperor Alexander I St. Petersburg Transport University (PGUPS). The III Conference of the Association of Rectors of Transport Universities of BRICS+ took place here on June 10–11, 2024. Photo by V. Korovyakovsky

Participants of the conference at the Yusupov Palace. June 10, 2024. Photo by V. Korovyakovsky

[1] Architect Giacomo Quarenghi, an architectural monument of the 18th century.

Conference room of the Constituent Conference of the Association of Rectors of Transport Universities of BRICS+. St. Petersburg, PGUPS. November 13, 2018. Photo by E. Komarov

The preparation work took several years, when representatives of various educational institutions exchanged their opinions, entered into bilateral agreements, held conference, exchange visits, consulted with major transport companies as the leading employers for graduates from transport educational institutions in the member countries, and with public authorities. In Russia, the idea to establish the Association was supported by the Ministry of Transport of Russia, the Federal Agency for Railway Transport (Roszheldor), and one of the world's largest transport companies JSC Russian Railways.

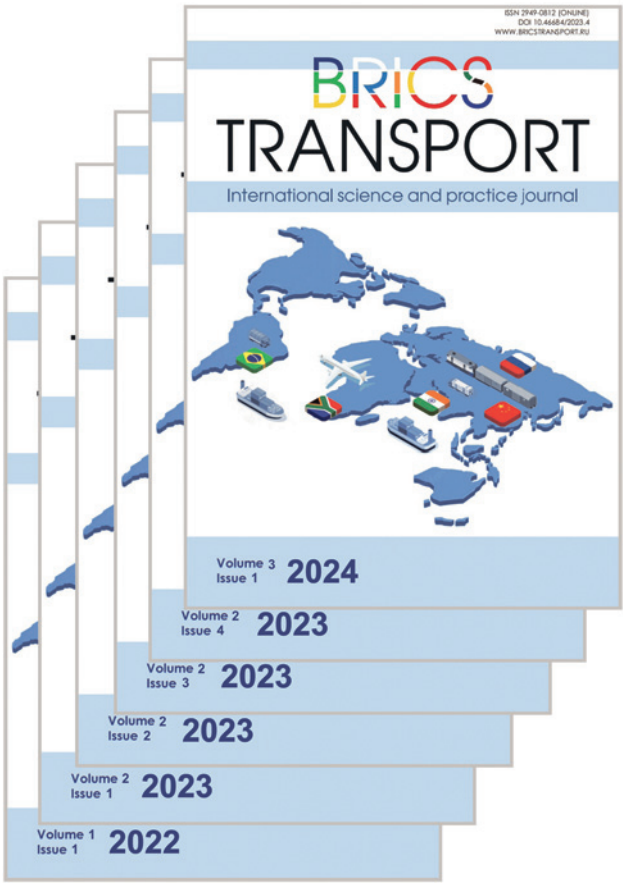
The constituent conference took place in St. Petersburg in 2018, where representatives of technical and transport universities from Brazil, Russia, India, China and the Republic of South Africa established the Association of Rectors of Transport Universities of BRICS+.

The purpose of the establishment of the Association is to provide an environment for transport-related educational institutions in the BRICS countries to share their experience in training of highly skilled personnel, implementation of state-of-the-art technology innovations in the transport sector, combining their efforts for the integration of universities into a global academic and scholarly community, improving their ratings on the international market of education, and supporting export of educational services.

The Association is designed to contribute to combining efforts for the preservation, strengthening and development of the existing ties between universities; facilitate international academic exchanges of teachers and students; organize conferences and workshops to share experience in the development of educational programs in transport; implement joint educational, scientific, and cultural projects, in particular in the network format; coordinate its efforts with national and international educational agencies; contribute to the organization of joint research work in priority focus areas of the transport industry; promote the publication of collections of research papers, monographs, learning and teaching materials, dictionaries, glossaries, etc.

In 2019, the II Conference of the Association held in Johannesburg, South Africa, adopted specific decisions on planning its activities for the years to come.

A group of participants of the II Conference of the Association of Rectors of Transport Universities of BRICS+ during the meeting with Mr. J. Mamabolo, the Minister of Transport of Gauteng Province, South Africa (fifth from left). Johannesburg, South Africa. October 23, 2019. Photo by E. Komarov



Covers of the BRICS Transport journal issues published in 2022–2024. https://www.bricstransport.ru/jour

The coronavirus pandemic mixed up the plans of the Association; however, it was able to hold a number of scientific and educational events online. 2022 saw the establishment of the *BRICS Transport* journal, an information organ of the Association in pursuance of the decisions of the 2019 Conference. The founders of the journal are Emperor I St. Petersburg State Transport University and the Training and Methodology Centre for Railway Transport Education. The journal has been registered as a mass media outlet in accordance with the established procedure in the Russian Federation and is issued in English on a regular quarterly basis. To date, six issues have been published.

The five years that have lapsed after the establishment of the Association were quite difficult. The global political landscape has changed drastically. In the recent years, the countries of Global South and the Russian Federation have encountered manifestations of neo-colonialism on the part of the United States and a number of EU countries. This, however, has promoted the search for new ways of interaction between Russia and its friendly countries and had positive effects on the enhancement and expansion of partnerships within the BRICS countries in economic, scientific, academic and other spheres.

The expansion of BRICS to 10 members in 2024 with the accession of the Arab Republic of Egypt, the Islamic Republic of Iran, the Kingdom of Saudi Arabia, the United Arab Emirates, and the Federal Democratic Republic of Ethiopia has strengthened the collective positions of the countries.

Transport is one of the most important areas in the activities of the BRICS countries. This was particularly highlighted in the speech of President of the Russian Federation Vladimir Putin during the expanded meeting of leaders at the 15th BRICS Summit on August 23, 2023. The President, in particular, said, *"The creation of new sustainable and safe transportation routes is an important priority in the interactions in the BRICS space. Speaking to the participants of the BRICS Business Forum, I already mentioned the relevance of the accelerated development of transcontinental routes, such as the North–South corridor, which will connect Russian ports in the northern seas and the Baltic Sea with sea terminals on the coast of the Persian Gulf and the Indian Ocean and will be able to provide annual transit of up to 30 million tonnes of cargo in the future.*

"We believe that the time is ripe for establishing a standing committee within the BRICS to deal not only with the North–South project, but also, more generally, with the development of logistics and transport corridors, both interregional and global. With the consent of our partners, Russia could work on this idea while chairing BRICS in 2024."[2]

Based on the tasks set, the management of PGUPS initiated the convocation of the III Conference of the Association of Rectors of Transport Universities of BRICS+ in early 2024. The initiative was supported by the Ministry of Transport of the Russian Federation, Roszheldor, and JSC Russian Railways.

The idea to promote the activity of the Association of Rectors of Transport Universities of BRICS+ by holding a conference was in line with the activities of the BRICS Business Council established further to the 5th BRICS Summit held in Durban, South Africa, in 2013. The Council is designed as a platform for discussing issues of strengthening and promoting economic, trade, business and investment ties between the business communities in the BRICS countries, and for supporting a dialogue between the business community and government agencies.

In 2024, the Subgroup on Transport and Logistics of the BRICS Business Council was established at the behest of JSC Russian Railways to provide a platform for

[2] BRICS+ meeting of leaders. URL: http://kremlin.ru/events/president/news/72089

Conference room of the III Conference of the Association of Rectors of Transport Universities of BRICS+. Yusupov Palace on Fontanka Embankment. PGUPS. St. Petersburg June 10, 2024. Photo by D. Firsov

interested players in the transport sector to discuss important issues related to the development of transport and logistics for the improvement of logistics connectivity between the countries of the association. To date, about 100 organizations have taken part in the meetings of the Subgroup. These include not only transport and logistics companies, but also educational institutions, research organizations in the field of transport and logistics, and sector-specific universities. The Subgroup on Transport and Logistics of the BRICS Business Council supported holding the III Conference of the Association of Rectors of Transport Universities of BRICS+ as one of its formal events.

The Conference of the Association of Rectors of Transport Universities of BRICS+ took place on June 10–11, 2024 bringing together about 100 participants, including representatives of transport and technical universities, transport companies, research and design organizations in the field of transport. In addition, about 50 representatives of these organizations attended remotely through video conferencing. All of the countries that are currently members of BRICS were represented at the Conference.

The Conference was opened by the Rector of the hosting university, Emperor Alexander I St. Petersburg State Transport University, Oleg S. Valinsky who declared it open and welcomed the participants:

“Dear participants of the conference, colleagues, dear guests,

I cordially welcome you in the beautiful St. Petersburg and in the first transport engineering university, in the historical hall of the Yusupov Palace on Fontanka.

The founder of our educational institution, Emperor Alexander I, gathered the best professors and teachers from Russia and European countries, headed by Augustine Betancourt, the famous engineer and expert in engineering training at the best European universities, to teach at the Institute of the Corps of Railway Engineers.

On the instructions of the emperor, the treasury bought this beautiful palace with a park for the institute. Here Betancourt created a unique higher engineering educational institution, where future engineering talents studied and were educated. This year our University celebrates 215 years since its foundation.

The brilliant architectural and construction appearance of St. Petersburg of the XIX century, with its bridges, embankments and palace ensembles, was created by architects and builders, guided by graduates of the first engineering university of Russia. In memory of visiting the Great City, we ask you to accept the album “St. Petersburg and the Suburbs” as a gift. I also want to draw attention to the souvenir that we are presenting. The frog is a symbol of the students of our University, since initially the university trained railway engineers for both land and water transport. We hope that the souvenir will also become your good talisman.

Presidium of the III Conference of the Association of Rectors of Transport Universities of BRICS+. From left to right: Tamila S. Titova, First Vice-Rector – Vice-Rector for Research, PGUPS; Oleg S. Valinsky, Chairman of the Conference, Rector of PGUPS; Feng Yaou, President of the Eurasia International Corporation, China. Photo by D. Firsov

Dear colleagues! Representatives of higher education institutions from all 10 BRICS countries take part in our conference in both face-to-face and distance format. We have a wide representation of transport educational institutions in Russia, and our industrial partners are with us in this hall. I thank all the participants of the conference for their interest and attention to our event.

I declare the conference open, I wish you fruitful work and great success".

The greeting letters to the conference participants were presented by the Minister of Transport of the Russian Federation Roman V. Starovoit, the Governor of St. Petersburg Alexander D. Beglov, and General Director – Chairman of the Board of JSC Russian Railways Oleg V. Belozyorov.

Министр транспорта Российской Федерации

Minister of Transport of the Russian Federation

To the Participants of the III Conference of the Association of Rectors of Transport Universities of BRICS

Dear Colleagues,

On behalf of the Ministry of Transport of the Russian Federation, I would like to welcome you at the Third Conference of the Association of Rectors of Transport Universities of BRICS.

The global transport system is facing monumental challenges that urge us to place our focus on meeting the increasing needs of passenger and freight transportation, making them more efficient, safe and fast, while providing the comfort of passenger movements and convenient working environments for consignors and consignees.

Many transport solutions are indispensible from the global development of humanity on planetary scales. Modern transport requires that we improve processes in science and education and share international experience. This will contribute to the progress of both the BRICS countries and the world as a whole.

Joint efforts have a great positive influence on the growing partnership between the countries concerned. Scientific, cultural and humanitarian programs and projects implemented by the Association are making a brilliant contribution to the future.

I would like to wish the conference participants success in their endeavors, constructive scientific discussions, expanding the existing and building new business and social contacts.

Roman V. Starovoit

Greetings to the participants of the Conference from the Minister of Transport of the Russian Federation Roman V. Starovoit. English translation

GOVERNOR OF ST. PETERSBURG

To the Participants of the III Conference
of the Association of Transport
Universities of BRICS

Dear Friends,

On behalf of the Government of St. Petersburg, I welcome you at the III Conference of the Association of Transport Universities of BRICS.

Today, the BRICS association is playing a pivotal role in the global space. Its member states are steadfast to their positions on the international arena and present a united front in making important economic and political decisions.

A modern transport logistics system is being built up before our eyes, involving representatives of one of the world's largest economic blocks.

The fact that St. Petersburg is hosting the Third Conference of the Association of Rectors of Transport Universities of the BRICS Countries once again confirms its special status and potential as a major hub of education, science and culture.

Emperor Alexander I St. Petersburg State Transport University is one of the leading universities of the Northern capital. Its facilities provide a reputable international platform that sets an intellectual agenda for the development of transport universities in the BRICS countries, including the exchange of experience, state-of-the-art technology and innovation.

Collaborative programs in science and education that are designed to deliver forward-looking training of a new generation of talents will contribute to the strengthening of the technological sovereignty of our countries.

I am convinced that the Conference will provide a forum for effective discussion of pressing challenges in the transport sector, search for innovative solutions, and expansion of partnerships. I wish you all successful and productive work.

Governor of St. Petersburg Alexander D. Beglov

Greetings to the participants of the Conference from the Governor of St. Petersburg Alexander D. Beglov. English translation

To the Participants of the III Conference of the
Association of Rectors of Transport
Universities of BRICS

Dear Participants of the Conference, dear Friends,

I warmly welcome you on behalf of Russian Railway OJSC!

As a major transport and logistics company in Russia taking the lead in a number of aspects, RZhD Holding has been actively strengthening its international ties, implementing important projects in the railway industry in foreign countries, and offering its foreign customers the most advanced solutions in technology and infrastructure. Cooperation in the field of personnel training and development is becoming an increasingly important area in our international activities. After all, RZhD OJSC is the founder of almost one hundred educational institutions, it supports 71 centers of excellence, and our Corporate University was recognized as one of the best in the world.

Given the growing significance of the integration within the BRICS for the global economy, it appears to be extremely important to jointly generate and implement professional, educational, cultural and humanitarian projects at high education institutions in the partnering countries. In this process, the role of the Association of Rectors of Transport Universities in the BRICS countries can hardly be overestimated, as it offers an environment for extending contacts between university leaders, enabling them to subsequently proceed with consistent work based on long-term programs involving professors, teachers and students. RZhD OJSC is closely cooperating with Russian industry-specific universities and is willing to contribute to professional training and support promising educational and scientific projects.

I am convinced that our meeting will be an important milestone in the development of cooperation between transport universities of the BRICS countries. I wish all the participants fruitful work and success in the pursuit of their goals for the benefit of our countries!

General Director – Chairman of the Board of RZhD OJSC,
Representative of the Russian Federation
at the BRICS Business Council Oleg V. Belozyorov

Greetings to the participants of the Conference from General Director and Chairman of the Board of JSC Russian Railways Oleg V. Belozyorov. English translation

The conference participants were greeted by Head of the Federal Agency for Railway Transport (Roszheldor) Aleksey A. Druzhinin (via video link), Head of the Administrative and Personnel Department of the Federal Agency for Railway Transport Andrey M. Bespalov, President of the Eurasia International Corporation, China, Feng Yaou, Minister of Transport of the Republic of Cuba Eduardo Rodríguez Dávila, Director of the Institute for Transport and Logistics Studies at University of Johannesburg, South Africa, Prof. Noleen Pisa, and others.

Andrey M. Bespalov, Head of the Administrative and Personnel Department of the Federal Agency for Railway Transport is greeting the Conference participants. In the photo are Nikita V. Kamenir, Head of the North-West Regional Department of the Federal Agency for Railway Transport (on the left). Photo by D. Firsov

Alexander M. Zbarsky, Deputy Head of the Personnel Management Department of JSC Russian Railways is greeting the Conference participants, Peter K. Rybin, the first Vice–rector, Vice-rector for Academic Work of PGUPS (on the left). Photo by D. Firsov

Irina Yu. Ganus, acting Chairperson of the Committee for Science and Higher Education of the Government of St. Petersburg, is greeting the Conference participants. Photo by V. Korovyakovsky

Feng Yaou, President of the Eurasia International Corporation, China, is greeting the Conference participants. Photo by V. Korovyakovsky

Prof Noleen Pisa, Head of Department and Associate Professor & Director: Institute for Transport and Logistics Studies (ITLS) at University of Johannesburg, South Africa, is greeting the Conference participants via video link

Eduardo Rodríguez Dávila, Minister of Transport of the Republic of Cuba, is greeting the Conference participants via video link

Kumar Gaurav, Consul General of India in St. Petersburg, is greeting the Conference participants. Photo by V. Korovyakovsky

Esraa Daoud — assistant professor, the Head of the Grants and International Cooperation Office, Helwan University, Egypt is greeting the Conference participants via video link

Andrea Santos, Professor, Dean of the Faculty of Transport of the Federal University of Rio de Janeiro, Federal Republic of Brazil is greeting the Conference participants via video link

Chaired by PGUPS Rector Oleg S. Valinsky, the plenary session of the Conference "Development of the BRICS Transport System: Role of Transport Universities" included about 20 presentations by experts from transport organizations, higher education institutions, research and design organizations in Russia, India, China, South Africa, Ethiopia, Brazil, and Egypt. The speakers talked about their understanding of and proposals on the goals and objectives of the Association and the ways for the improvement of manpower training and transport operations.

The presentations were delivered by **Oleg S. Valinsky**, Rector of PGUPS: "Responsibilities of a transport university for the development and dissemination of advanced competencies in the fields of transport and transport education in the context of the expanding BRICS space"; **Kirill L. Muzalevsky**, First Deputy Head of the Department of Foreign Projects and International Cooperation, JSC Russian Railways, and acting Head of the Subgroup on Transport and Logistics of the BRICS Business Council: "Topical issues of business cooperation in the fields of transport and logistics in the framework of BRICS"; **Vitaly V. Stepanishchev**, General Director of the Business Centre for the Development of Cooperation with Latin American Countries: "The status and development of transport and logistics integration of South American countries"; **Sergei O. Baryshnikov**, Rector of the Admiral Makarov State University of Maritime and Inland Shipping: "The research and academic potential of the State University of Maritime and Inland Shipping in the framework of the BRICS Association"; **Valery F. Tanaev**, Head of the Moscow Railway, a branch of JSC Russian Railways: "Transport support and prospects for the development of the freight frame on the Moscow Railway"; **Shan Zhiwei**, Vice President of Xi'an Jiaotong Transport University, China (via video link); **Artem I. Azhgirevich**, Rector of the Moscow Automobile and Road Construction State Technical University: "Forward-looking training of human resources for the transport sector"; **Tribhuvan Darbari**, Chairman of the SCO Secretariat, India: "The proposed strategy for the development of PGUPS among the SCO and BRICS countries"; **Natalia N. Shishlakova**, Deputy General Director for Corporate Development and Project Activities, Member of the Management Board of JSC Transmashholding, Director of Transmashholding Corporate University: "Training and Industry"; **Andrey A. Tikhomirov**, Head of the Centre for Macroeconomics and Forecasting Methodology, Institute of Economics and Transport Development: "Prospects for the development of transport and logistics routes connecting the BRICS countries"; **Vladimir V. Burovtsev**, Rector of the Far Eastern State Transport University: "Far Eastern State Transport University as the eastern academic outpost for the transport system in the Asia-Pacific region"; **Moges Aregay Gebremariam**, Head of Marketing and Investment Department, Ethiopian Railways: "The strategic plan for the development of Ethiopian Railway Corporation and its role in transport and logistics of the BRICS countries"; **Mikhail N. Cheptsov**, Rector of the Donetsk Railway Institute: "The Donetsk Railway Institute: Yesterday, Today, Tomorrow"[3].

Oleg S. Valinsky, Rector of Emperor Alexander I St. Petersburg State Transport University is speaking.
Photo by D. Firsov

Kirill L. Muzalevsky, First Deputy Head of the Department of Foreign Projects and International Cooperation, JSC Russian Railways, is speaking.
Photo by D. Firsov

Vitaly V. Stepanishchev, General Director of the Business Centre for the Development of Cooperation with Latin American Countries, is speaking.
Photo by V. Belikov

[3] The Editorial Board is planning to publish presentations of the Conference participants in the coming issues.

Sergei O. Baryshnikov, Rector of the Admiral Makarov State University of Maritime and Inland Shipping, is speaking. Photo by D. Belikov

Valery F. Tanaev, Head of the Moscow Railway, a branch of JSC Russian Railways, is speaking. Photo by D. Firsov

Shan Zhiwei, Vice President of Xi'an Jiaotong Transport University, China, is speaking via video link

Artem I. Azhgirevich, Rector of the Moscow Automobile and Road Construction State Technical University, is speaking. Photo by V. Belikov

Tribhuvan Darbari, Chairman of the Indian Secretariat of the SCO Business Council, is speaking. Photo by V. Korovyakovsky

Natalia N. Shishlakova, Deputy General Director for Corporate Development and Project Activities, Member of the Management Board of JSC Transmashholding, Director of Transmashholding Corporate University, is speaking. Photo by V. Belikov

The Conference included a roundtable which discussed the objectives of the Association of Rectors of Transport Universities of the BRICS Countries, with **Denis L. Kravchenko**, Editor-in-Chief of the *Gudok* newspaper, acting as the facilitator.

The discussion at the round table was attended by: **Pyotr K. Rybin**, First Vice–Rector, Vice-Rector for Academic Affairs of the PGUPS; **Dmitry V. Orlov**, Deputy Chief Engineer of the Gorky Railway branch of JSC Russian Railways, Russia; **Igor P. Kiselev**, Chief Scientific

Andrey A. Tikhomirov, Head of the Centre for Macroeconomics and Forecasting Methodology, Institute of Economics and Transport Development, is speaking. (Photo by V. Belikov)

Vladimir V. Burovtsev, Rector of the Far Eastern State Transport University, is speaking. Photo by V. Belikov

Moges Aregay Gebremariam, Head of Marketing and Investment Department, Ethiopian Railways, is speaking. Photo by V. Belikov

Editor of the BRICS Transport Journal, Emeritus Professor of the PGUPS, Russia; **Han Xiaowei**, Rector of the Shaanxi Railway Vocational Institute, People's Republic of China; **Ali Ziaii**, Secretary for Transit and Transport of the Center for Development and Progress under the President of the Islamic Republic of Iran; **Alexander P. Zhigadlo**, Rector of the Siberian State Automobile and Highway University, Russia; **Peter G. Yakovlev**, Deputy Editor-in-Chief of Railways Journal Zheleznye Dorogi Mira, Russia; **Andrea Santos**, Professor, Dean of the Faculty of Transport of the Federal University of Rio de Janeiro, Federal Republic of Brazil; **Alexander N. Guda**, Vice-Rector for Research at Rostov State Transport University, Russia; **Karina A. Garmash**, Deputy

Mikhail N. Cheptsov, Rector of the Donetsk Railway Institute, is speaking. Photo by V. Belikov

Denis L. Kravchenko, Editor-in-Chief of the Gudok newspaper, is facilitating the roundtable discussion at the Conference. Photo by V. Korovyakovsky

The final meeting of the conference in the hall of the Museum of Railways of Russia. In the presidium — from left to right: Igor P. Kiselev, chief scientific editor of the BRICS Transport Journal, Tamila S. Titova, First Vice-rector, Vice-Rector for Research, PGUPS, Oleg S. Valinsky, Rector of the PGUPS; Vladimir A. Odintsov, Director of the Museum of Railways of Russia. Photo by Svetlana Minina

Head of the St. Petersburg Metro, Head of the Personnel Management Service, Russia; **Sant Kumar Chaudhary**, Chairman of the Shankar Institute Group, Republic of India; **Vladimir V. Burovtsev**, Rector of the Far Eastern State Transport University, Russia; **Mikhail M. Mehedov**, Deputy Director General for Development of JSC VNIIZHT; **Yuri A. Trofimov**, Rector of Irkutsk State Transport University, Russia; **Maxim A. Garanin**, Rector of Samara State Transport University, Russia; **Irina S. Skovorodina**, Editor-in-Chief of the BRICS Transport Journal, Russia; **Alexander G. Galkin**, Rector of the Ural State Transport University, Russia; **Natalia Yu. Anashkina**, Vice-Rector for International Relations of the Ural State Transport University, Russia; **Vlaimir I. Metilenko**, Director of the Central Museum of Railway Transport of the Russian Federation, Russia; **Yakov M. Dalinger**, Vice-Rector of the Russian University of Transport, Russia; **Lyubov V. Luchinina**, Head of the Department of International Cooperation of the Russian University of Transport, Russia; **Aman Abdulkerim Mohammed**, Project Manager of Awash Kombolcha Haragebeya Railway Projec, Federal Republic of Ethiopia; and others.

During the general discussion, the participants made specific proposals for the development of academic, research, humanitarian, cultural and other activities of the Association.

Some of the most important proposals include managing remote network training in various areas of transport and engineering policies for students of BRICS transport universities; advanced training of transport industry specialists; international summer schools for students; joint scientific research by scholars from universities and research institutions of the BRICS countries, in particular, regarding the development of international transport corridors; establishing a fund for encouraging start-ups and research by students of transport universities; participation in work of international research platforms, in particular, the Subgroup on Transport and Logistics of the BRICS Business Council to prepare recommendations for the next BRICS summit (2024, Kazan, Russia).

It was proposed to rename the Association into the Association of BRICS Transport Universities to expand its ability to involve transport research institutions and transport companies in its activities.

The conference participants voted on the proposed amendments to the Charter of the Association, which is now called the “Association of Transport Universities of BRICS+”. Rector of PGUPS Oleg S. Valinsky was elected as Chairman of the Association. All amendments to the Charter will be coordinated by the participants and implemented by the end of 2024.

General view of the Museum of Railways of Russia. Photo of the Museum of Railways of Russia

On July 11, the final meeting of the Conference was held at the Museum of Railways of Russia. The meeting discussed proposals on the work plan for the coming year and in the future. Proposals on the time and venue of the next IV conference of the Association of BRICS Transport Universities were considered. It was decided to discuss the received proposals and make a decision in a remote online format by the end of 2024. The conference participants got acquainted with the exposition of the Museum, one of the largest collections of historical exhibits of railway equipment in the world.

Bionotes

Egor Komarov — Independent researcher; Saint Petersburg, Russian Federation; komar77@internet.ru.

Об авторах

Егор Комаров — независимый исследователь; г. Санкт-Петербург, Россия; komar77@internet.ru

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Conference report
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Responsibilities of a transport university for the development and dissemination of advanced competencies in the fields of transport and transport education in the context of the expanding BRICS space

Oleg S. Valinsky
Emperor Alexander I St. Petersburg State Transport University (PGUPS); St. Petersburg, Russia; rector@pgups.ru

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Доклад

Задачи транспортного вуза по развитию и распространению передовых компетенций в области транспорта и транспортного образования в условиях расширения БРИКС

О.С. Валинский
Петербургский государственный университет путей сообщения Императора Александр I (ПГУПС); г. Санкт-Петербург, Россия; rector@pgups.ru

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I am happy to greet you once again on behalf of the staff of Russia's first transport university and on my own behalf. I wish you successful collaboration and productive work at the conference.

We, who have come together here, have a few very important things in common.

We are engaged in the transport sector or closely related to it. Someone more, someone less, we are all involved in training and certification of competencies of the workforce for the transport sector. Even if you are not directly involved in the educational process, you are still well aware of its importance and can assess its outcomes in the field, which means the attainment level among specialists in educational institutions.

We understand that the world is rapidly changing and this change inevitably affects the relationships between governments in all areas, and transport is no exception. Managing the transportation system in every country — not only international, but also domestic arteries — is increasingly reliant on the legal framework, engineering solutions, standards, regulations, and technologies adopted internationally. This means that personal training requirements and management principles for survey and research activities

in the modern transport industry in various countries become more and more converged.

All this makes academic, engineering and scholarly activities of educational institutions involved in training of workforce for the transport industry throughout the world similar in terms of the scope, challenges, and prospects.

The goals and objectives in creating conditions for the development of contacts in these areas formed the basis of the idea to establish the Association of Transport Universities of the BRICS Countries that the management of Emperor I St. Petersburg State Transport University (PGUPS) put forward six years ago.

The first, constituent conference took place at this very venue in St. Petersburg five years ago, in 2018, where representatives of technical and transport universities from Brazil, Russia, India, China and the Republic of South Africa established the Association of Rectors of Transport Universities of BRICS.

In 2019, the II Conference of the Association was held in Johannesburg, South Africa, where we adopted an action plan for the next three years and planned joint activities. In cooperation with our partners from India and China, we began to prepare activities for academic work within the Association.

However, due to the force majeure circumstances, the pandemic of a novel coronavirus, we were unable to come together in person, to hold conferences, exchange students and staff. Nevertheless, even under these circumstances, we were able to carry out remote online activities.

In 2002, our University together with the Training and Methodology Centre for Railway Transport has carried out necessary preparations and obtained a formal registration as a mass media outlet for the international journal BRICS Transport.

For the first consecutive year, the journal has been published in English on a quarterly basis. To date, we have published six issues and these have been distributed on memory sticks to all of the Conference participants. In fact, the journal becomes the mass media outlet of our Association. We look forward to attract new authors and intend to make a special issue dedicated to this Conference with presentations and speeches of its speakers.

The five years that have lapsed after the establishment of the Association were not easy. The global political landscape has changed drastically. In the recent years, the countries of global South and the Russian Federation have encountered manifestations of neo-colonialism on the part of the United States and a number of EU countries. This has opened new opportunities to us all and had positive effects on the enhancement and expansion of partnerships within the BRICS countries in economic, scientific, academic and other spheres.

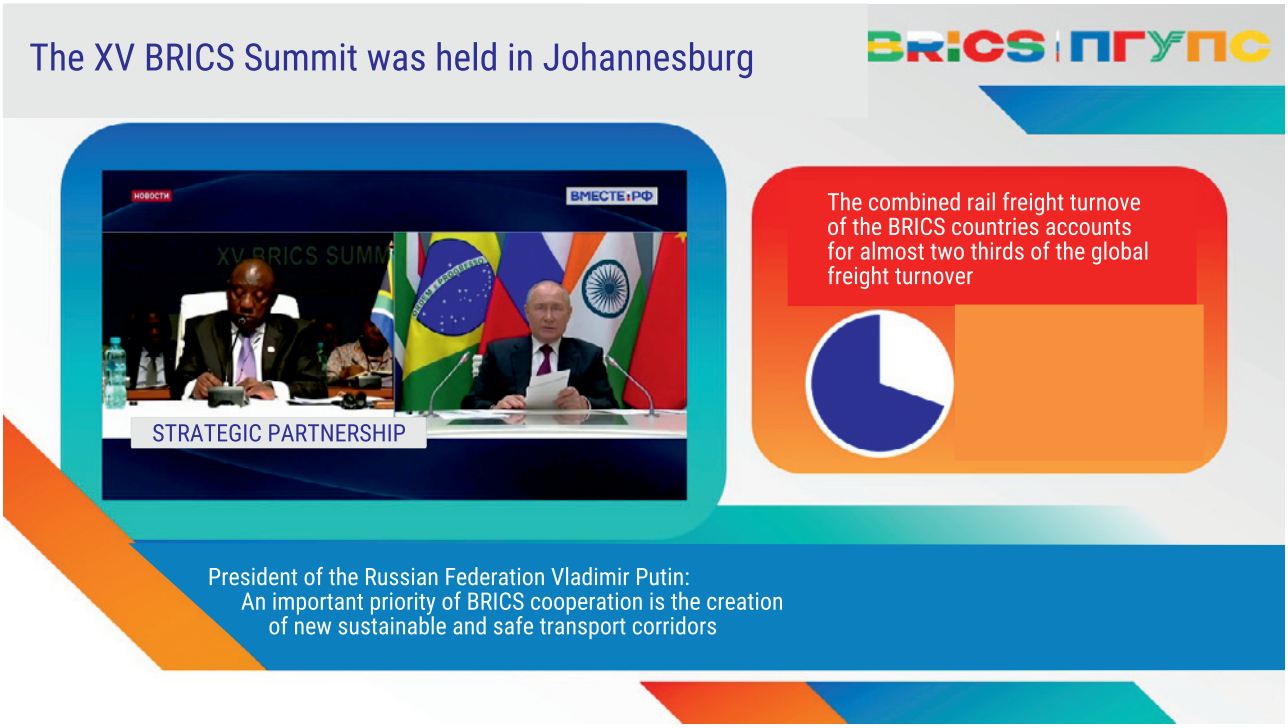
The expansion of BRICS to 10 members with the accession of the Arab Republic of Egypt, the Islamic Republic of Iran, the Kingdom of Saudi Arabia, the United Arab Emirates, and the Federal Democratic Republic of Ethiopia has significantly strengthened the collective positions of the countries opposing unfriendly powers.

In the BRICS countries, the activities in the area of transport, to which we are directly related, are among of the most important and relevant endeavours. This was particularly emphasized by the President of the

Russian Federation Vladimir Putin at the 15th BRICS summit in Johannesburg. He noted that the creation of new sustainable and safe transportation routes was an important priority in the interactions in the BRICS space.

At the Summit, Vladimir Putin has initiated the establishment of a standing committee for transport of the BRICS countries. It is designed to provide a comprehensive approach to addressing problems in the development of logistics and transport corridors and to promote joint initiatives for the development of transport and logistics infrastructures.

It is important that already now the creation of the North — South international transport corridor in fact continues the initiatives of Russia. Shipping of goods along this route from the centre of St. Petersburg to



the Gulf countries will be 10 days faster than via the Suez Canal.

The transport and logistics connectivity of the BRICS economies is important — this was discussed at the St. Petersburg International Economic Forum which has closed just recently. Today, the total railway freight turnover of the BRICS countries accounts for about two-thirds of the global amount. Evidently, the further expansion of turnover of goods between the BRICS countries will directly depend on effective operation of transport lines.

Today, foreign ministers of the BRICS countries are meeting in Nizhny Novgorod. In addition to the ten participating countries, the meeting chaired by Russian foreign minister Sergey Lavrov will be attended by BRICS-friendly nations. This is the first meeting of foreign ministers after the expansion of BRICS in 2023. At the forthcoming meetings, the ministers will discuss the topical issues of the international agenda.

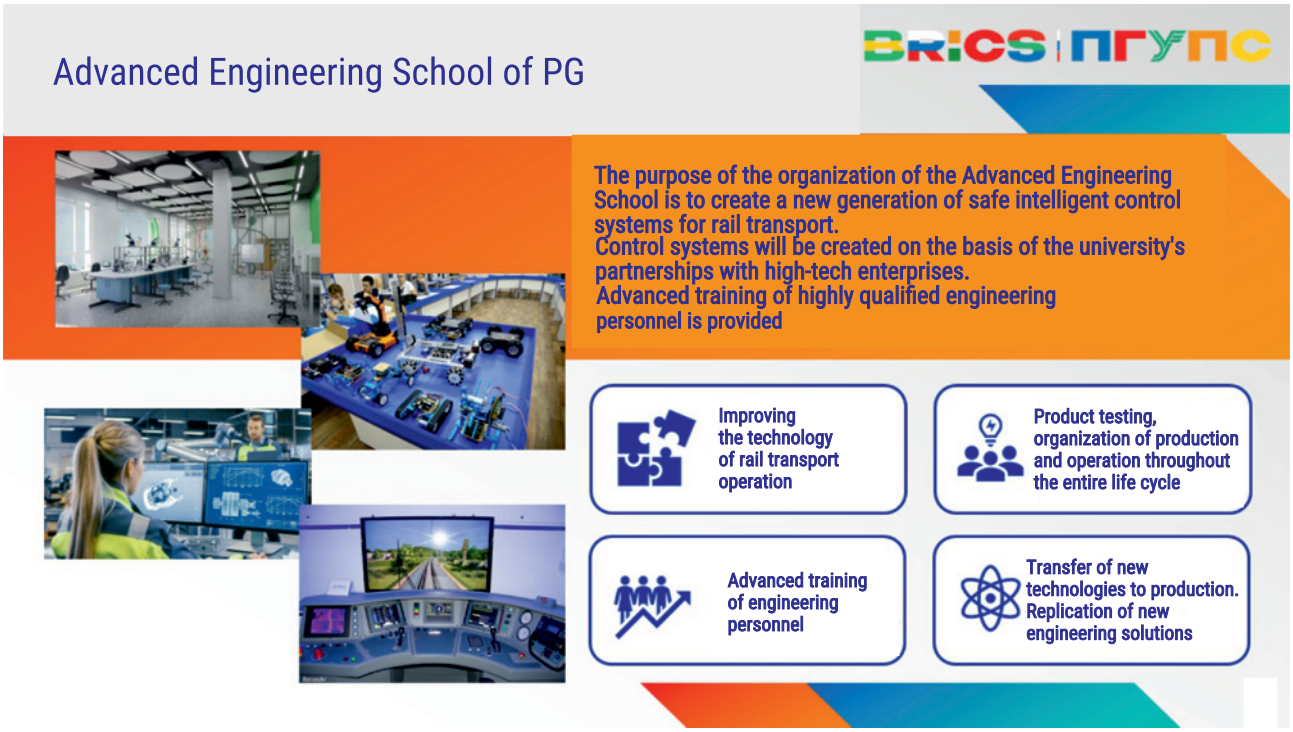
In the context of all these challenges, our countries have a desperate need for highly skilled engineers and technical personnel who can create state-of-the-art export-oriented products. In this connection, the Association should become an effective tool for the implementation of these important objectives, contribute to the progress of our countries by training high-skilled professionals in line with international development trends and demands of the labour market.

It is obvious that you cannot train such talents if you rely on outdated courses and approaches. One of the most promising models of education in Russia is Advanced Engineering School. Russia currently has 50 engineering schools operating in almost all of its regions. By 2030, about 100 of them will be created using the facilities of the country's leading universities. These schools are designed to train highly skilled personnel for high-tech and knowledge-intensive sectors of the economy with the view to create innovative solutions and products.

Therefore, training at an Advanced Engineering School should be radically different from the customary formats of teaching.

The Advanced Engineering School at the St. Petersburg State Transport University, which we call "ISKRA" (an abbreviation of the Russian words for integrated systems of complex distributed architecture), has won a solid victory in a competition and at the end of last year, it received a grant and became part of the federal education program. We, in collaboration with our industrial partners and scholarly organizations, have begun to train a new breed of engineers, establish new laboratories and educational programs, and deploy smart safety systems for operating domain-based control in rail transport. The University is ready to scale up all these projects, in particular, to the BRICS space.

We are interested in collaboration with various design and research organizations and transport and logistics companies. An agreement to carry out activities to improve the efficiency of interactions between market participants and the quality of railway services was made by our University and the project office of the Council of Railway Operators Market at the St. Petersburg International Economic Forum on June 6.



All of the above is directly related to determining the vector and program for further efforts of the Association, and also defines the circle of participants who need to be involved in its work.

I propose to include the intention to draft a Strategic Plan for the development of advanced educational models for transportation universities based on the experience of Advanced Engineering Schools in Russia in the resolution of this Conference. To this end, we need to develop mechanisms for the promotion of mobility of scholars, organize topical workshops, draw up relevant training courses, scale up and replicate the best practices, and carry out joint research within our Association.

The St. Petersburg State Transport University is open to share our practical experience and pave the way for other transport universities. I am sure that our countries can benefit from the consistent integration of the educational space and the development of intellectual and creative capabilities of our people, and what is important, all this will contribute to the achievement of our technological sovereignty.

Bionotes

Oleg S. Valinsky — Cand. Sci. (Eng.), Rector; **Emperor Alexander I St. Petersburg State Transport University (PGUPS)**; Editorial board chairman of the journal; **"BRICS Transport"**; I; 9 Moskovsky pr., St. Petersburg, 190031, Russian Federation; rector@pgups.ru.

Об авторе

Олег Сергеевич Валинский — кандидат технических наук, ректор; **Петербургский государственный университет путей сообщения Императора Александра I (ПГУПС)**; председатель редакционной коллегии журнала; **«Транспорт БРИКС»**; 190031, г. Санкт-Петербург, Московский пр., д. 9; rector@pgups.ru.

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Transport as a basis for development of mutual trade and economic growth of BRICS countries

Kirill L. Muzalevskiy[1]✉, Trofim F. Iakovlev[2], Ivan V. Muzykin[3]

[1, 2, 3] Joint Stock Company "Russian Railways" (JSC "Russian Railways"); Moscow, Russian Federation
[1] muzalevskiykl@center.rzd✉
[2] yakovlevta@center.rzd
[3] muzykiniv@center.rzd

ABSTRACT The article deals with a new perspective on increasing logistics connectivity of BRICS countries through development of transport routes. The typology of routes was proposed for the first time as a result of activities of the Subgroup for Transport and Logistics of the BRICS Business Council and summarized in the Guide of BRICS Transport Routes. Descriptions of main parameters of the routes as well as barriers to their development are presented in the article. The value of research lies in the preparation of recommendations to overcome barriers to development of these routes, which will create conditions for the growth of mutual trade and economic growth of BRICS countries.

KEYWORDS: BRICS Transport Routes, logistics connectivity, Subgroup for Transport and Logistics of the BRICS Business Council, railway transport, BRICS

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Доклад

Транспорт как основа для развития взаимной торговли и экономического роста стран БРИКС

К.Л. Музалевский[1]✉, Т.А. Яковлев[2], И.В. Музыкин[3]

[1, 2, 3] Открытое акционерное общество «Российские железные дороги» (ОАО «РЖД»); г. Москва, Россия
[1] muzalevskiykl@center.rzd✉
[2] yakovlevta@center.rzd
[3] muzykiniv@center.rzd

АННОТАЦИЯ В статье предложен новый взгляд на вопрос повышения логистической связанности стран БРИКС посредством развития транспортных маршрутов. Типология маршрутов предложена впервые как результат работы Подгруппы по транспорту и логистике Делового совета стран Объединения, оформленной в Обзор транспортных маршрутов БРИКС. Представлено описание основных параметров маршрутов, а также барьеров для их развития. Ценность исследования заключается в подготовке рекомендаций по преодолению барьеров в развитии указанных маршрутов, за счет чего будут сформированы условия для роста объемов взаимной торговли и экономического роста стран БРИКС.

КЛЮЧЕВЫЕ СЛОВА: транспортные маршруты БРИКС; логистическая связанность; Подгруппа по транспорту и логистике Делового совета БРИКС; железнодорожный транспорт; БРИКС

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BRICS members are actively developing business cooperation in the fields of transport and logistics within the association, which is currently growing in both quantitative and qualitative terms. The BRICS countries are increasingly gaining significance in the world's economy, as their GDP exceeds that of the Group of Seven. Some economists estimate that in the future this gap will only grow.

The mutual trade turnover between the BRICS countries is increasing too. For example, in 2023, the turnover between Russia and China reached nearly one-fourth trillion US dollars (USD 240 billion vs. expected USD 200 billion). The turnover with India grew 1.8 times to reach 65 billion US dollars (with Moscow ranking fourth in the list of Delhi's largest partners). The turnover with Brazil hit a record high reaching almost 11 billion US dollars and the turnover with the South African Republic grew by about one-third (more than USD 1.5 billion).

The volumes of trade between Russia and the countries that joined BRICS this year are also growing. Thus, the turnover with the UAE grew by 70 % compared to 2022 (over USD 15 billion), and there is still space for growth.

The geographical remoteness of the member countries from each other makes the issue of logistics connectivity a top priority, as it affects the dynamics of mutual trade and implementation effectiveness of the Strategy for BRICS Economic Partnership 2025. Railways in the BRICS countries will be tightly integrated into global supply chains while becoming increasingly important in the provision of both domestic transport services and mutual flows of goods, even as sea transport, which is essential and connects the continents too.

As of January – May of 2024, the volume of traffic between Russia and the BRICS countries carried by JSC Russian Railways (including with the use of sea transport) reached 121.5 million tons, which is a 5.2 % increase compared to the same period of the previous year (the most sought-after container services increased by 14.3 %). Traffic to and from BRICS countries accounted for about one half of the total foreign transportation of the Russian Railways during this period (220 million tonnes).

In the BRICS countries, railways make a notable contribution to development of trade and economic relations, with the total freight turnover (about 7.3 trillion tkm) accounting for almost two-thirds (64 %) of the global rail turnover (about 11 trillion tkm).

JSC Russian Railways has been working with each of the countries of the association for quite a time. For example, cooperation with China Railways in international transport operations has been strengthening, as well as the field of digitalization and logistics infrastructure has been developing with Chinese partners in. In the middle of May 2024, the President of the Russian Federation visited China. The visit resulted in signing a Joint Statement for deepening of the comprehensive partnership and strategic cooperation relationship. A particular emphasis was put on transport-related matters, such as development of cross-border infrastructure and international transport corridors.

The Russian Railways and the China Railways have, in turn, signed a Strategic Partnership Agreement setting out their intentions to develop transport corridors, border-crossing points, container transportation and transportation of agro-industrial products in Eurasia. Besides, the Agreement includes provisions on cooperation in the fields of science, technology, innovation and personnel training.

As for cooperation with India, we have experience in implementing educational projects and developing a feasibility study for high-speed railways in India. Also projects in the field of telecommunications and infrastructure development continue to be elaborated.

Subsidiaries of JSC Russian Railways in logistics sphere are also actively involved in cooperation with Indian, Iranian and UAE container and port operators with initiatives to create new logistics services, including the North – South international transport corridor.

The ITC is being actively developed and has a potential for increasing traffic along all of its routes.

The South African partners show interest in the field of HR-development. Previously, the Russian Railways and Transnet exchanged their experience in traffic control, development of tourism services and commuter services management. The potential for further cooperation is significant.

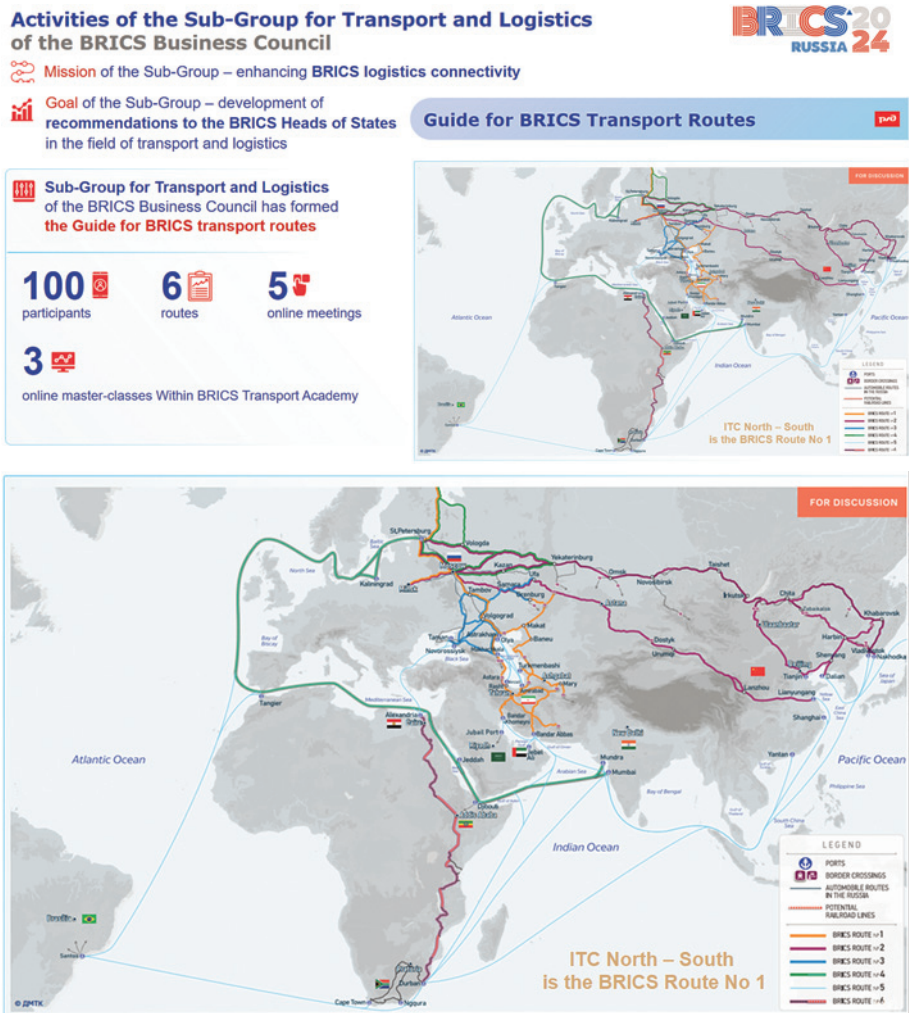
Following the proposal of JSC Russian Railways in 2024 the Subgroup for Transport and Logistics of the BRICS Business Council was established as a platform for transport players in the member countries to discuss important issues related to the development of transport and logistics for the improvement of logistics connectivity among BRICS countries. At the moment, about 100 organizations took part in the meetings of the Subgroup. These include not only transport and logistics companies, but also educational and academic institutions, research organizations in the field of transport and logistics.

Based on the main purpose of the BRICS Business Council to develop proposals for the growth in exchange of goods between the member countries, the Subgroup is responsible for some issues as follows:

1. Building a vision for the development of the major transport routes in BRICS — currently there are six directions that are most sought after based on the existing trade flows: the North – South and East – West corridors, international sea lines between the BRICS countries, and promising trans-African corridors. The development of sea, road, and air transport is provided along with railway transport.

2. Creating an online platform for sharing best practices and innovation in the implementation of joint projects. In this area, we cooperate with the *BRICS Transport* journal published by the Emperor Alexander I St. Petersburg State Transport University.

3. Building the BRICS Transport Academy which is to be based on online master classes held by the Russian Railways Corporate University. This is the first step in the work which will be expanded to include new areas in the future, aiming at both Russian and foreign audiences from BRICS countries. At the same time there is substantial potential for collaboration with transport universities. Cooperation through transport universities can provide conditions for development of human resources in the transport and logistics spheres of BRICS countries.



Thus, the development of transport and logistics is highly important for the implementation of the Strategy for BRICS Economic Partnership until 2025, as it provides an environment for the expansion of international trade, free movement of individuals, and increasing investment.

Moreover, development of infrastructure will provide opportunities for young specialists in mastering new, interesting and sought-after professions. The synergy from the combined efforts of transport and logistics businesses in these areas will help better adapt to dynamic changes in the global agenda.

Bionotes

Kirill L. Muzalevskiy — Cand. Sci. (Econ.), First Deputy Head of Foreign Projects and International Cooperation Department; **Joint Stock Company "Russian Railways" (JSC "Russian Railways")**; build. 1, 2/1 Novaya Basmannaya st., Moscow, 107174, Russian Federation; muzalevskiykl@center.rzd;

Trofim F. Iakovlev — Cand. Sci. (Econ.), Head of Division for Analysis and Strategy of Foreign Projects and International Cooperation Department; **Joint Stock Company "Russian Railways" (JSC "Russian Railways")**; build. 1, 2/1 Novaya Basmannaya st., Moscow, 107174, Russian Federation; yakovlevta@center.rzd;

Ivan V. Muzykin — Leading specialist of Division for analysis and strategy of Foreign Projects and International Cooperation Department; **Joint Stock Company "Russian Railways" (JSC "Russian Railways")**; build. 1, 2/1 Novaya Basmannaya st., Moscow, 107174, Russian Federation; SPIN-code: 6931-2940; muzykiniv@center.rzd.

Об авторах

Кирилл Леонидович Музалевский — кандидат экономических наук, первый заместитель начальника Департамента зарубежных проектов и международного сотрудничества; **Открытое акционерное общество «Российские железные дороги» (ОАО «РЖД»)**; 107174, г. Москва, ул. Новая Басманная, д. 2/1 стр. 1; muzalevskiykl@center.rzd;

Трофим Анатольевич Яковлев — кандидат экономических наук, начальник отдела Департамента зарубежных проектов и международного сотрудничества; **Открытое акционерное общество «Российские железные дороги» (ОАО «РЖД»)**; 107174, г. Москва, ул. Новая Басманная, д. 2/1 стр. 1; yakovlevta@center.rzd;

Иван Владимирович Музыкин — ведущий специалист Департамента зарубежных проектов и международного сотрудничества; **Открытое акционерное общество «Российские железные дороги» (ОАО «РЖД»)**; 107174, г. Москва, ул. Новая Басманная, д. 2/1 стр. 1; SPIN-code: 6931-2940; muzykiniv@center.rzd.

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Corresponding author: Kirill L. Muzalevskiy, muzalevskiykl@center.rzd.
Автор, ответственный за переписку: Кирилл Леонидович Музалевский, muzalevskiykl@center.rzd.

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Transport support and prospects for the development of the freight frame on the Moscow Railway

Valery F. Tanaev
Moscow Railway is a branch of JSC Russian Railways; Moscow, Russian Federation; N@msk.rzd.ru

ABSTRACT Talking points for the speech by the Head of Moscow Railway V. F. Tanaev at the III Conference of the Association of Rectors of Transport Universities BRICS as part of the events of the BRICS Business Council Subgroup on Transport and Logistics. June 10, 2024[1].

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Доклад

Транспортное обеспечение и перспективы развития грузового каркаса на Московской железной дороге

В.Ф. Танаев
Московская железная дорога – филиал ОАО «РЖД» (МЖД – филиал ОАО «РЖД»); N@msk.rzd.ru

АННОТАЦИЯ Тезисы выступления начальника Московской железной дороги В. Ф. Танаева на III Конференции Ассоциации ректоров транспортных вузов БРИКС в рамках мероприятий подгруппы Делового совета БРИКС по транспорту и логистике. 10 июня 2024 г.

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Good afternoon, Conference Participants,

In a world of constantly evolving technologies, the logistics industry is experiencing external challenges and requires continual improvement. Accelerating the pace at which processes are being digitalized, adapting to changing trade routes and economic conditions / are forming a new logistics landscape for the country. Against this background, Moscow Railway is carrying out the large-scale technological **transformation** of the transportation process.

First off, I would like to note the uniqueness of our railway. We ensure the functional unity of our lines

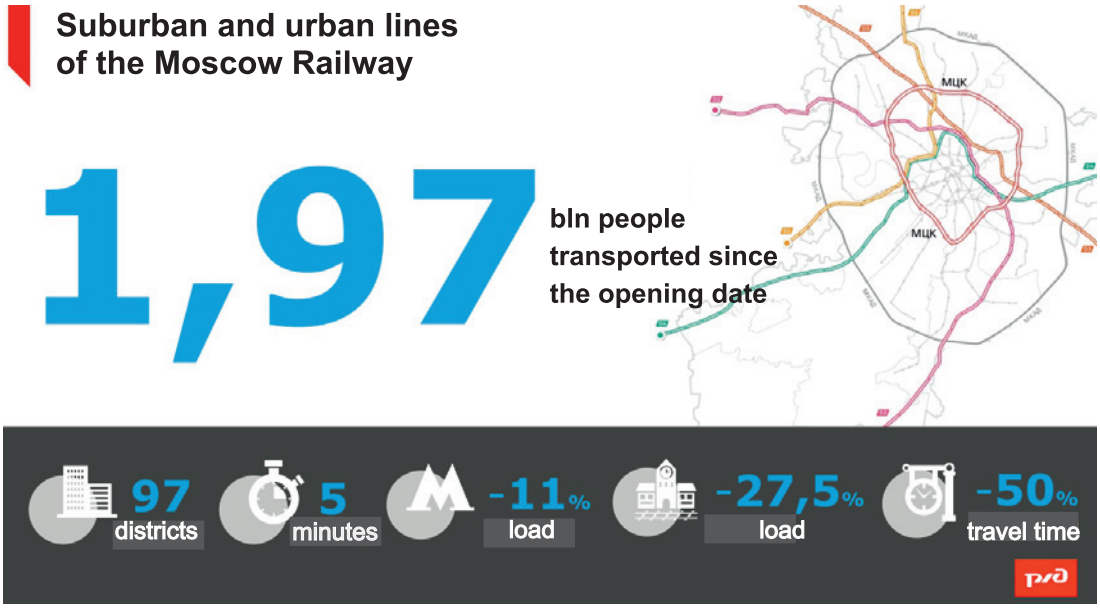
[1] The text is published in the author's edition, translated into English by specialists of the Moscow Railway, a branch of JSC Russian Railways.
[2] Публикуется в редакции автора, перевод на английский язык выполнен специалистами Московской железной дороги – филиала ОАО «РЖД».

Slide 1. Moscow Railway

and the sustainable interconnection and development of strategically important territories, economic centres and production zones / the Central Federal District. We guarantee transport accessibility in **15** constituent entities of the Russian Federation (*full accessibility in nine regions, partial accessibility in six*), home to **one fifth** of the country's population. The network includes **ten radial lines** (*11 if you count the main section of the Oktyabrskaya route between Moscow and St. Petersburg*), connected by two **circle lines** (*the 54-km Moscow Central Circle, and the 558-km Greater Ring of the Moscow Railway*), as well as east–west routes. Ours is the most complex route network in the whole of Russia.

Every day, approximately **5000 commuter trains** (*4952 regularly scheduled*), **300 passenger trains** (*314 regularly scheduled*) and more than **1000 freight trains** (*6250 regularly scheduled*) depart from the stations on the network.

Moscow Railway currently carries over / **two MILLION passengers** (*2.1 million*) **per day**. More than **316 million people** (*316.16 million*) used our services in the first five months of this year. This makes up **65 %** of **all** rail passengers in the country (*on the Russian Railways network*). Just think, **every 15 seconds** a commuter train leaves *from one of our stations*! These are truly **unprecedented** numbers!



Slide 2. Moscow Railway's urban and suburban routes

The rapid economic, industrial and **territorial** development of the Moscow metropolitan area has forced us to completely overhaul the entire logistics model. A system of high-intensity urban and suburban routes was set up — starting with the Moscow Central Circle, and later the four Moscow Central Diameters — connecting densely populated areas of Moscow and Moscow Region. (*Lyublino*, *Dolgoprudny*, *Odintsovo*, *Krasnogorsk*, *Podolsk*, *Zelenograd*, *Khimki*, *Lyubertsy*, *Ramenskoye*, *and Balashikha*). **Almost two billion** people have travelled on the routes since their opening (*1.97 billion people as of June 1, 2023*).

Today, multi-track sections allow us to route trains depending on speed and category, and traffic intensity **does not exceed five** minutes during peak hours. The load on the underground system and at train stations has been **reduced** significantly (*by 11 % on average; 27.5 % of Moscow residents have started to change trains before they reach their final station*), and the road network is far less jammed. This has, in turn, reduced emissions of pollutants into the atmosphere. A **synergistic** effect was achieved, with significant improvements observed in social, economic, manufacturing and environmental indicators.

Dear conference participants, the formation of a high-intensity network / passenger service / took place in conjunction with the transformation of freight traffic at the Central Transport Hub.

A network of terminal and logistics centres has been set up with a view to creating a unified technological and information space, and it continues to be **improved**.

Built on the principles of "sectoral service" / the development of industrial and economic clusters / that allow for the vector distribution of freight flows, transport and logistics centres serve as **modern complexes** for processing, warehousing, customs clearance, and freight transshipment.

The main transport and logistics centres process up to **10,000** (*9620 TEU*) **20-foot** containers per day. Freight flow processing has been stably trending upwards for a long time now (*7 years*).

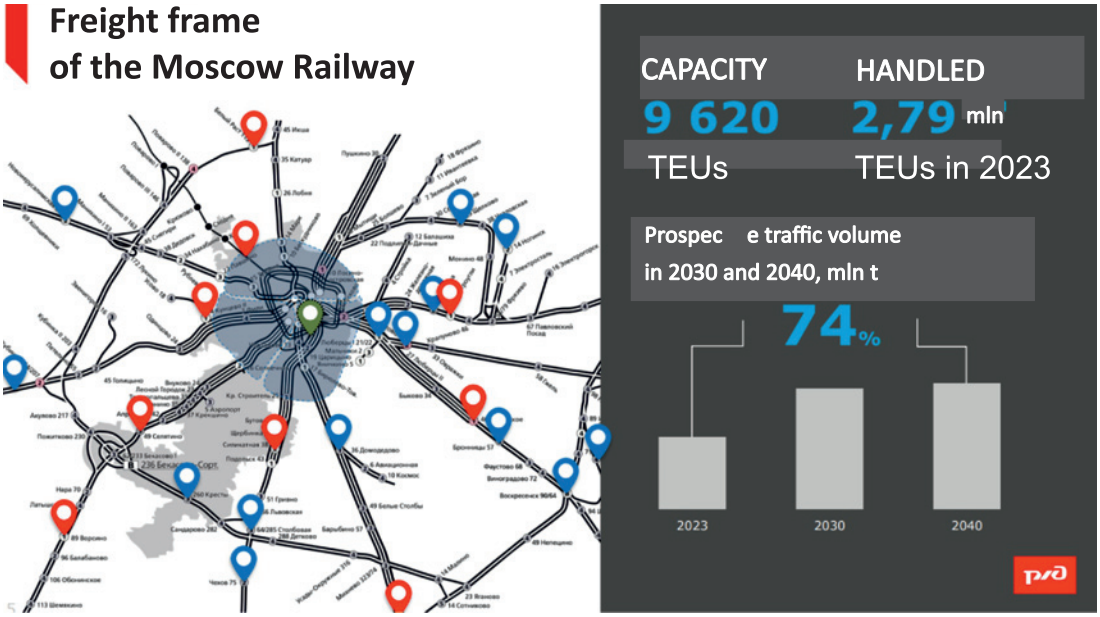
The creation of a robust transport and logistics centres for freight transport, along with the introduction of a full range of services for operators and freight owners / expanded multimodal capabilities, has allowed us to ensure the stable growth of work with freight in international transport.

Moscow Railway is located at the intersection of the East–West and North–South international transport corridors (ITC) that connect Asia-Pacific countries with Europe, the Persian Gulf and the Baltic states / through the Russian sea ports and border crossings in the far eastern and north-western parts of the country.

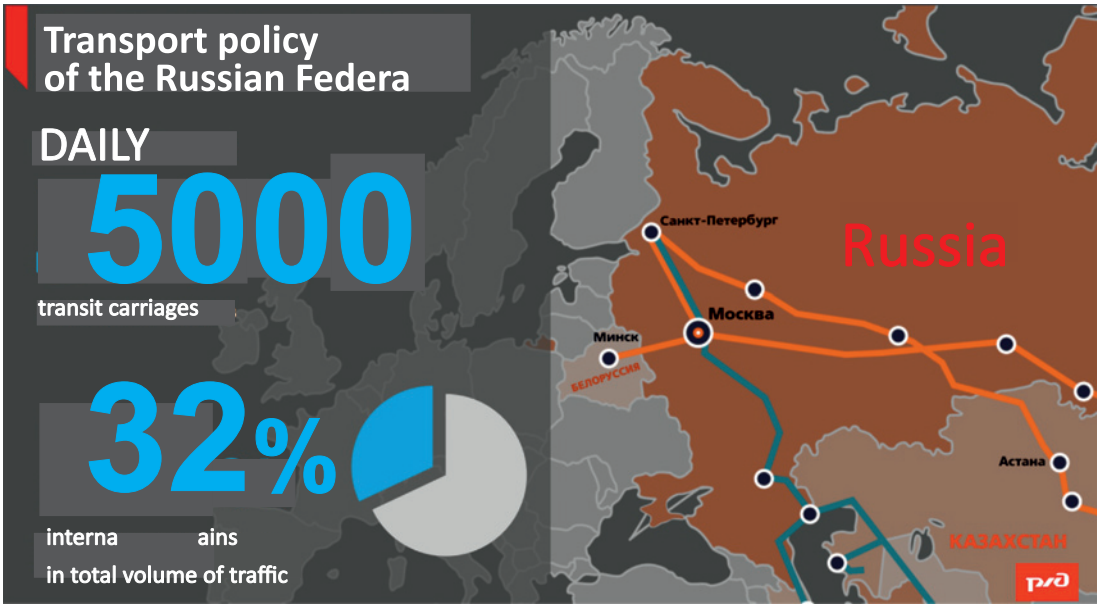
Every day, **5000** carriages travel through the territory operated by Moscow Railway in transit to other countries. The **share of international** trains / in the **total volume** of freight transit traffic on the route / is **32 %**.

Work is under way to turn logistics flows around and ensure transport mobility, and will continue to develop in the format declared by the President of the Russian Federation / Vladimir Putin.

We **maintain** and **strengthen** friendly relations with all BRICS countries. We are expanding freight transport and logistics projects. (Currently, Agroexpress, container flexitanks, and Myasnoy Shuttle).



Slide 3. The Moscow Railway freight network

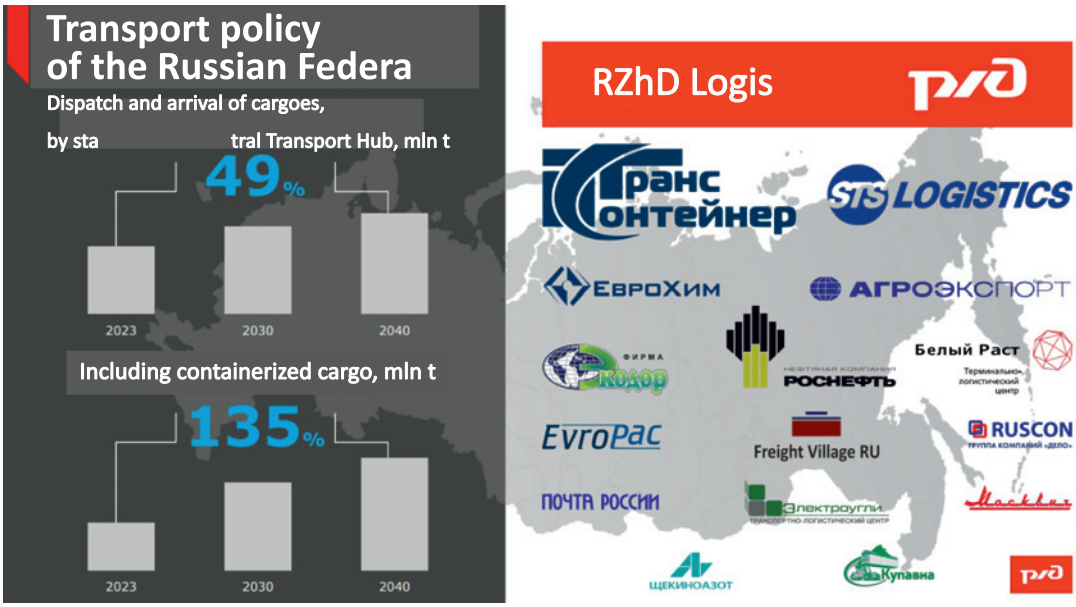


Slide 4. The transport policy of the Russian Federation

Slide 5. The transport policy of the Russian Federation

More than 1 million TEU (*1,086,494 TEU in total*), or **10 million** tonnes of containerized freight were processed **last year** (*as part of international freight transportation with BRICS member countries*). We **handled almost 4,086,000** tonnes of various types of freight, (*4,085,800 tonnes. **Most of this** is made up of deliveries of chemical and mineral fertilizers (51 %), container freight (25 %), and iron ore (12 %). Key consumer countries were the People's Republic of China (42 %), and the Federative Republic of Brazil (48 %)*), which is **double the amount handled during the same period last year**. (*for the first five months of 2024*)

(3,125,500 tonnes were handled during the first five months of 2024, compared to 1,590,500 tonnes for the first five months of 2023, an increase of 96.5 %. This growth was achieved thanks to the export of petroleum products to the United Arab Emirates (accounting for a bump of 819,000 tonnes), as well as to grain loading to the Arab Republic of Egypt and the Kingdom of Saudi Arabia (+712,300 tonnes), a positive effect of the expansion of the BRICS organization). The petroleum products are mostly produced by enterprises owned by Ryazan Oil Refining Company (Stenkino 2 Station, RN-Trans shipper) and JSC Moscow Oil Refinery (Stant-



Slide 6. The transport policy of the Russian Federation

siya Yanichkino, GPN Logistics shipper). The following enterprises constitute the main exporters of grain: JSC Russian House (Udobritelnaya Station), JSC Izmalkovsky Elevator (Izmalkovo Station); Grainrus JSC (Otreshkovo Station); and LLC Orlovsky Leader (Glazunkova Station)).

In the interests of the national economy, business, and citizens / Moscow Railway continues to build new and develop existing / railway and logistics infrastructure. We are purchasing rolling stock, developing and implementing innovative services, and creating **trans/national**, **multi/modal** transport chains.

*We are working on a **unique** project with the Moscow Government to set up the "Southern Port", a **new** transport and logistics centre (the Southern Port TLC), at Yuzhny Port station **in the heart of the Moscow metropolitan area**, which will act as a hub for permanent container rail transportation from the People's Republic of China to the Moskvitch Plant and serve the needs of the city.*

*For reference: The **first stage** of the construction of the Southern Port TLC will include:*

— a container yard for working primarily with exports and empty containers (mainly with the Moskvitch Plant, with a capacity of 2560 TEU for temporary storage, two 520-metre tracks, a freight handling terminal complex (500m×20m), and a customs control zone);

— a container yard for working with containers intended primarily for Moscow residents and consumers, as well as with sheltered warehouses (with a capacity of 1216 TEU for temporary storage).

Second stage:

— a Class A sheltered warehouse (with an area of approximately 52,500 square metres and a 250-m entrance track);

— parking areas for trucks and passenger vehicles, administrative buildings, a petrol station for vehicles (including electric vehicles), a customer service office, a garage, and other technological and domestic facilities.

To illustrate, in April of this year, a project was launched on the joint Russian–Chinese–Kazakhstani construction of a new warehouse complex at Moscow Railway's Selyatino Station (*CRK Terminal*) as part of the signing (*in 2022*) of the "One Train – One Route" international agreement. The project will increase overland exports of products transported in containers to China and boost transit freight flows through Kazakhstan.

Organizing logistics and transport support today requires constant adjustment, including introducing new products and technologies. Moscow Railway has set itself the goal of becoming the driver of a comprehensive reboot of the system.

Our employees, experts, and unique team carries out a huge amount of work. We currently employ **over 66,500 people** (*66,452 people as of June 3, 2024*).

We continue to develop our competencies and work with leading research and educational institutions. We pay great attention to the professional development of our employees through specialized universities, professional training centres, and on-the-job learning.

Freight processing volumes in transit transportation will continue to grow. And this means that the "Development of High-Speed Railways" federal project will become even more important, and the need for employees who have undergone training in the latest programmes, including in international and multimodal logistics, will increase steadily.

Slide 7. Workforce policy of Moscow Railway

Slide 8. Workforce policy of Moscow Railway

I would like to make it clear to everyone here today that Moscow Railway is open to cooperation. We are ready:

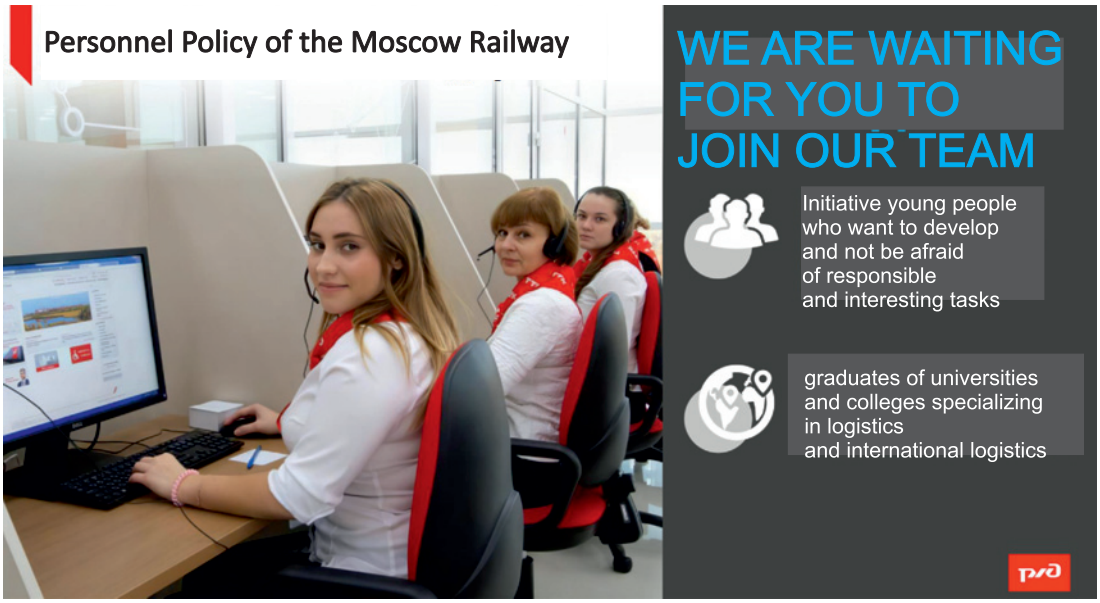
— to provide platforms for students, including foreign students, to acquire the necessary theoretical knowledge and practical skills;

— to send company experts and managers to educational institutions to hold lectures and seminars and advanced training for students;

— to share new teaching methods and technologies with specialized educational institutions in the BRICS countries.

I propose setting up an internship programme, as well as a system of secondments for specialists (*workers*). And actively recruit university graduates (*for industrial jobs*).

Moscow Railway pays close attention to its young employees. We are implementing numerous projects aimed at adapting and improving the professional skills and competencies of newly hired employees: the "Youth Gathering"; the "Youth Workers Forum"; the "My Company" event for young professionals aimed at their adaptation and development; the "Golden Reserve 2.0" project management community, among



Slide 9. Workforce policy of Moscow Railway

others. We are ready to share our experience, take on young specialists from other countries, and send our own for similar exchange programmes

In conclusion, I would like to stress once again that the multifaceted partnership and interaction within BRICS opens up new opportunities for trade, contributes to the improvement of the global economy, and gives a powerful impetus to the development of our countries.

I am confident that the **Association of Transport Universities** *BRICS* will continue its constructive work to deepen contacts between educational and research institutions, railways, and transport companies.

Thank you for listening!

Bionotes

Valery F. Tanaev — chief; **Moscow Railway is a branch of JSC Russian Railways**; 20 Krasnoprudnaya st., Moscow, 107996, Russian Federation; letter@msk.rzd.ru.

Об авторе

Валерий Фаритович Танаев — начальник; **Московская железная дорога — филиал ОАО «РЖД» (МЖД — филиал ОАО «РЖД»)**; 107996, г. Москва, ул. Краснопрудная, д. 20; letter@msk.rzd.ru.

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ADVANCED ENGINEERING TRAINING FOR THE ECONOMY 4.0
ОПЕРЕЖАЮЩАЯ ПОДГОТОВКА ИНЖЕНЕРНЫХ КАДРОВ
ДЛЯ ЭКОНОМИКИ 4.0

Conference report
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Prospects for the development of transport and logistic routes connecting the BRICS Countries

Andrey A. Tikhomirov
JSC Institute of Economics and Transport Development (JSC IEDT); Moscow, Russian Federation; tihomirov@iedt.ru

ABSTRACT This article examines the current metrics and future prospects for the development of transportation and logistics routes connecting BRICS member countries (Brazil, Russia, India, China, South Africa, Egypt, Ethiopia, UAE, Saudi Arabia and Iran). It analyses railway transport indicators, the dynamics and structure of mutual trade, as well as the main destinations of Russian exports. A special focus is placed on infrastructure projects and trends in multimodal transportation. The study highlights the significance of investment in infrastructure and the optimization of logistics processes, emphasizing the potential for enhanced economic cooperation among BRICS members.

KEYWORDS: the BRICS countries; transport and logistics routes; international transport corridors; railway transport; mutual trade; trade turnover; infrastructure projects; economic cooperation; free trade zones

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Доклад

Перспективы развития транспортно-логистических маршрутов, связывающих страны — участницы БРИКС

А.А. Тихомиров
АО «Институт экономики и развития транспорта» (АО «ИЭРТ»); г. Москва, Российская Федерация; tihomirov@iedt.ru

АННОТАЦИЯ Рассматриваются текущие показатели и перспективы развития транспортно-логистических маршрутов, связывающих страны-участницы БРИКС (Бразилия, Россия, Индия, Китай, Южная Африка, Египет, Эфиопия, Объединенные Арабские Эмираты, Саудовская Аравия и Иран). Анализируются показатели железнодорожного транспорта, динамика и структура взаимной торговли, а также основные направления экспорта России. Особое внимание уделено инфраструктурным проектам и тенденциям в области мультимодальных перевозок. В исследовании отмечается важность инвестиций в инфраструктуру и оптимизацию логистических процессов, подчеркивается потенциал для расширения экономического сотрудничества между странами БРИКС.

КЛЮЧЕВЫЕ СЛОВА: БРИКС; транспортно-логистические маршруты; международные транспортные коридоры; железнодорожный транспорт; взаимная торговля; товарооборот; инфраструктурные проекты; экономическое сотрудничество; зоны свободной торговли

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INTRODUCTION

I high level of economic development in the BRICS countries provides a favourable environment for investment, including into the development of transport and logistics facilities in the BRICS member countries (Brazil, Russia, India, China, South Africa, Egypt, Ethiopia, the United Arab Emirates, Saudi Arabia, and Iran). In 2023, railway transport in the BRICS countries accounted for a considerable portion of both domestic and international traffic of goods, which reminds us of its importance for sustainable economic growth and development.

The BRICS countries place a significant focus on the development of railway transport and innovative technology that aim at improving the efficiency and environmental safety of transportation.

One of the essential areas of development for BRICS is to develop the existing and plan prospective transport routes between its member countries.

This paper reviews the current status and prospects for the development of transport and logistics routes in the BRICS countries. It presents the key performance metrics for railway transport in the BRICS countries, dynamics and the structure of trade between Russia and BRICS, and the main destinations of Russian exports. It also outlines the projects for the development of infrastructure of international transport corridors (ITCs) in Russia and the main trends in the development of trade relations between the BRICS countries.

MATERIALS AND METHODS

The research was based on an analysis of reports from railway companies and national statistics agencies regarding the development of the transport sector in the BRICS countries.

The following research has been undertaken to assess the economic development of the BRICS countries and development prospects for transport and logistics routes in BRICS:

1. A statistical analysis of trade turnover data for Russia and the BRICS countries using the data of the Federal Customs Service of Russia, UN Comtrade, and ITC/UNCTAD.

2. An analysis of railway infrastructure development in the BRICS countries.

3. An analysis of prospective transport and logistics routes in the BRICS countries.

FINDINGS

The findings achieved in this research are as follows:

1. The growth of trade turnover between the BRICS countries contributes to the active development of transport infrastructure and the expansion of transport routes.

2. The railway infrastructure in the BRICS countries is an important element of the transport sector and has a substantial potential for further development.

3. The development of multimodal transportation and transport routes between the BRICS countries is an important focus area for ensuring efficient operation of the transport system in the BRICS countries.

Economic metrics and railway infrastructure development indicators in the BRICS countries

The geography of ITCs is related to that of commercial traffic flows between countries, regions and microregions.

The accession of new members to BRICS in January 2024 will have a number of positive effects on the organization, such as:

- the organization will have more influence on the global economy;
- diversification of trade and economic ties;
- access to new markets and resources;
- expansion of cooperation in the fields of science and high technology.

The stronger positions of BRICS on the world arena is confirmed by the key economic metrics of its member countries.

The BRICS countries (*Fig. 1*) have a considerable economic potential that provides favourable conditions for the development of transport and logistics infrastructure. As at the end of 2023, BRICS countries counted for more than 25 % of total global GDP, which is equivalent to USD 27.4 trillion[1].

Good economic performance provides favourable conditions for investments, including into the development of the transport and logistics sector in the BRICS countries (*Fig. 2*).

The continuing positive dynamics of social and economic metrics and railway transport development indicators in the BRICS countries will contribute to the improvement of trade ties between members of the association in the future.

The railway infrastructure in most of the BRICS countries is the key component of their national econo-

[1] International Monetary Fund. URL: https://www.imf.org

Fig. 1. BRICS member countries

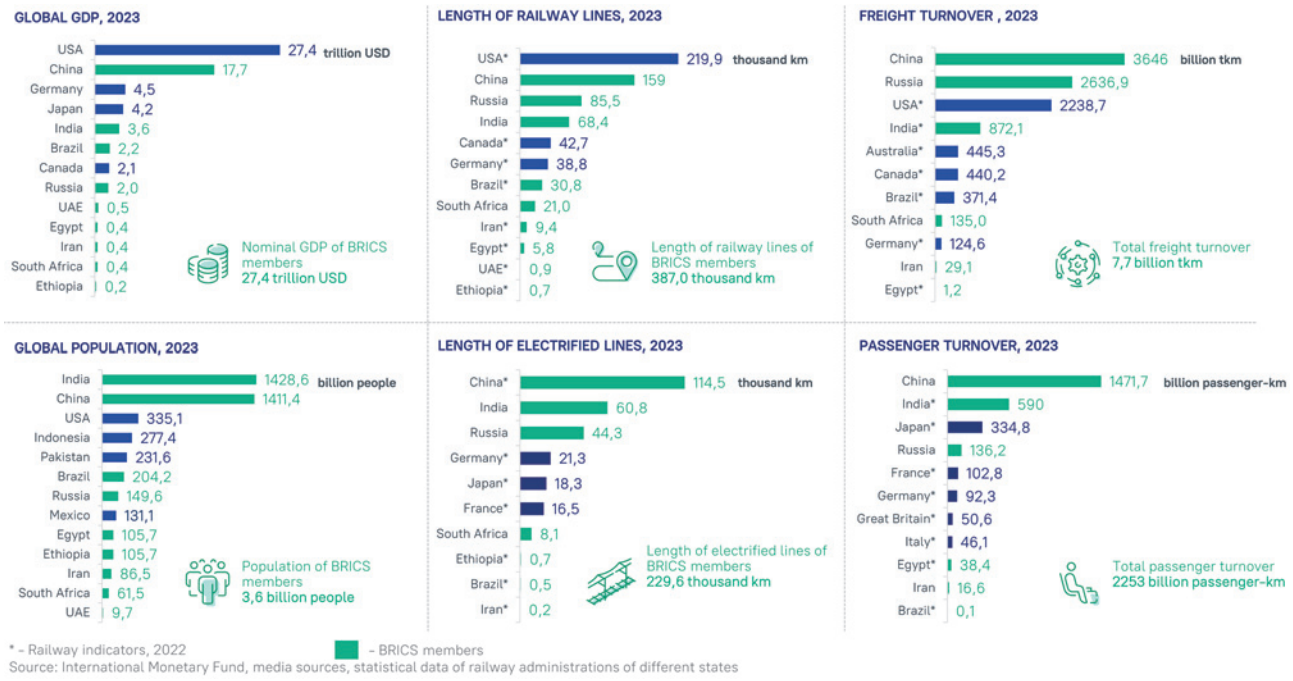

Fig. 2. Development indicators: BRICS versus the leading countries

mies and transport systems, supporting both domestic and international transportation.

In 2023, the total length of railways in the BRICS countries was 387 thousand kilometres, of which 230 thousand kilometres had electrified lines (*Fig. 3*)[2].

As at the end of 2023, the total freight traffic on railways was 8.5 billion tonnes, freight traffic load was 7.7 trillion tonne-kilometres, and passenger traffic load was 2.2 trillion passenger-kilometres.

All railway indicators are steadily growing and have a significant potential for further development.

[2] Statistical data from railway administrations of the BRICS countries.

BRICS RAILWAY INDICATORS FOR 2023	
Length of railway lines	**387** thousand km
Length of electrified lines	**230** thousand km
Volume of freight	**8531** million tons
Freight turnover	**7692** billion tkm
Passenger turnover	**2253** billion passenger-km

Fig. 3. BRICS railway indicators for 2023

Dynamics and structure of mutual trade between Russia and the BRICS courtiers

Mutual trade between Russia and the BRICS courtiers has been steadily growing. As at the end of 2023, turnover of goods between Russia and other BRICS countries was RUB 498 million tonnes[3], which is a 47 % increase from the previous year (*Fig. 4*).

The considerable growth of goods turnover is largely due to the increase in Russian exports[3] to 467 million tonnes (*Fig. 5*). The highest rates of growth of goods traffic from Russia are recorded for China and India.

On the other hand, in 2023, imports from the BRICS countries to Russia amounted to 31 mln tonnes. About 3/4 of total traffic was accounted for by goods from China (22.9 mln tonnes)[3] (*Fig. 6*).

It is important to note that not only China, but also other BRICS members are expanding their presence on the Russian market. In 2023, the total imports from these countries have increased by 1.4 million tonnes to reach 8.0 million tonnes.

Main destinations of Russian exports

In 2023, Russian exports continued to switch from destinations in the West to eastern and southern regions of the world. The share of Russian exports to the countries that did not join the sanctions against Russia has increased from 57 % in 2022 to 81 % in 2023.

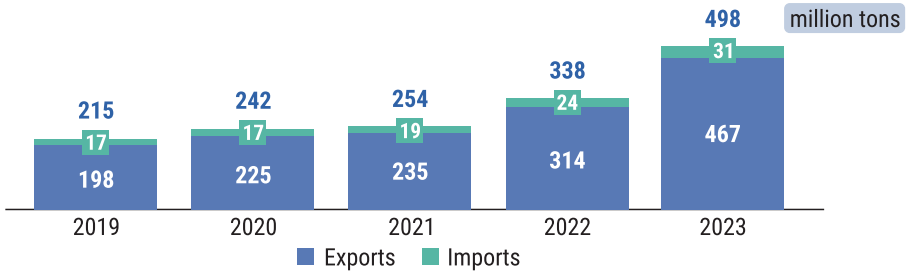

Fig. 4. Goods turnover between Russia and the BRICS countries

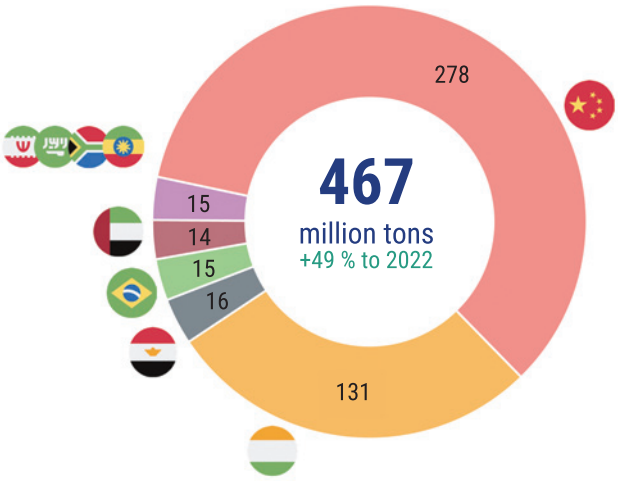

Fig. 5. Exports from Russia to BRICS in 2023

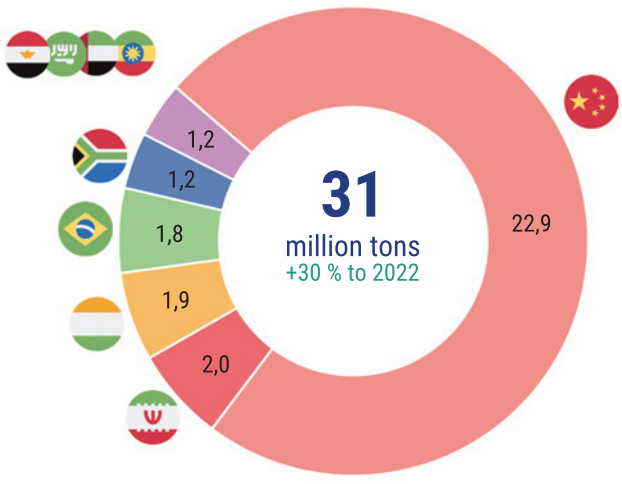

Fig. 6. Imports from BRICS to Russia in 2023

[3] UN Comtrade. URL: https://comtradeplus.un.org/

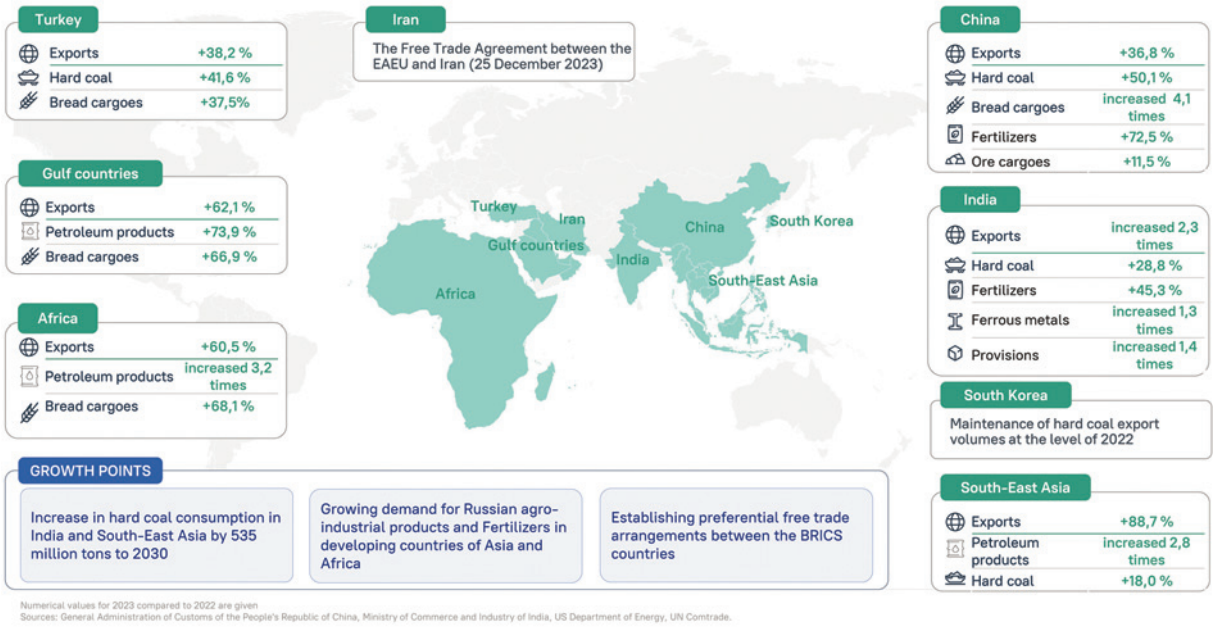

Fig. 7. Main destinations of Russian exports, 2023

Russian exporters increased the amount of supplies to China by 36.8 %[4], and to Turkey by 38.2 %[3], and to India 2.3 times[5] (*Fig. 7*).

One the outcomes of the efforts made to develop commercial and economic ties is the Free Trade Agreement signed between the EAEU and Iran.

In the future, the key drivers of growth for Russian exports may be as follows:

1. Increasing the amount of consumption of coal and petroleum cargoes in India and Southeast Asia.

2. Growth of demand for agricultural products and fertilizers from Russia in the developing countries in Asia and Africa.

3. Possible establishment of free trade zones between the EAEU and BRICS, which will ensure the mutual integration of commodity markets in the BRICS countries.

Main areas of development of the export potential of Russian trade and economic ties in the period until 2030

In order to support the export potential of the Russian economy, investment projects aimed at the comprehensive development of the railway infrastructure of transport and logistics corridors are implemented in accordance with the current strategic and policy documents for the development of railways in the Russian Federation.

In 2022, the Government of the Russian Federation approved action plans for the development of the North – South ITC, as well as transport and logistics corridors in the Azov-Black Sea and Eastern areas (*Fig. 8*).

In order to develop Russia's export potential, JSC Russian Railways is currently implementing the following investment projects:

- the development and upgrading of the railway infrastructure at the approaches to the ports of North – West basin;
- the development and upgrading of the railway infrastructure at the approaches to the ports of the Azov-Black Sea basin;
- the development of the railway infrastructure of the Eastern Operating Domain (Stage III);
- the development of North – South ITC, including the development of a railway entry point Derbent and construction of a new station Samur II.

The comprehensive implementation of the potential of the North – South ITC will result in building a transcontinental route which will be resilient to external challenges and provide access of goods via the Northern Sea Route and ports of Iran to commodity markets of Russia, countries of the Gulf, East and South Asia.

Geography of transport routes connecting the BRICS countries

The Subgroup on Transport and Logistics was set up this year in order to plan the prospective areas of cooperation between the BRICS countries in the field of transport.

[4] Main Customers Directorate of PRC. URL: http://english.customs.gov.cn/
[5] Ministry of Trade and Industry of India. URL: http://www.commerce.nic.in/

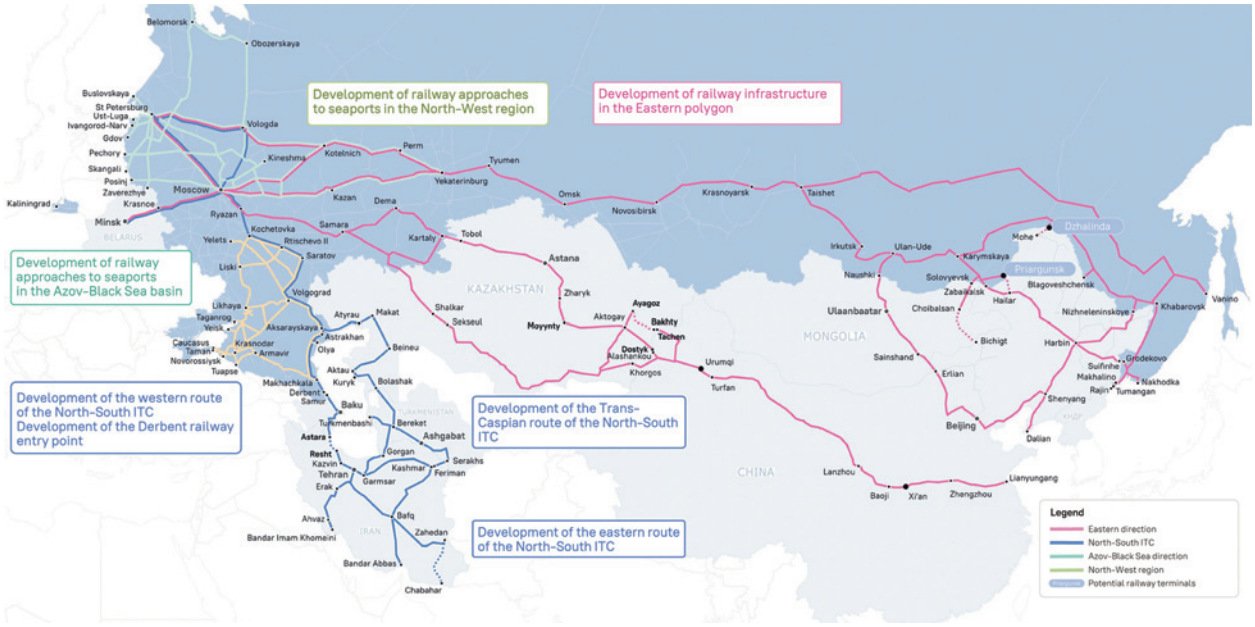

Fig. 8. Main areas of development of the export potential of Russian trade and economic ties

One of the focus areas of the Subgroup is to develop the existing and plan prospective transport routes between the BRICS countries. The Subgroup is planning six main transport and logistics routes between the BRICS countries (*Fig. 9*).

The development of international ties within the BRICS space enable countries of the African continent to join transportation by developing the BRICS route No. 1, the North – South ITC, which runs across Russia, Iran and India.

The implementation of the potential of the route will in many respects facilitate the creation of integral railway infrastructure by implementing the Rasht — Astara project.

The development of transport for foreign trade between China, Russia and European countries will ensure the development of the BRICS route No. 2, the East – West ITC, some sections of which run through Russia and China.

In the eastern part of the East – West corridor, JSC Russian Railways is developing the infrastructure for the main route of Transsib.

The development of BRICS routes No. 3 and No. 4 to connect the Russian ports on the Baltic, Barents and

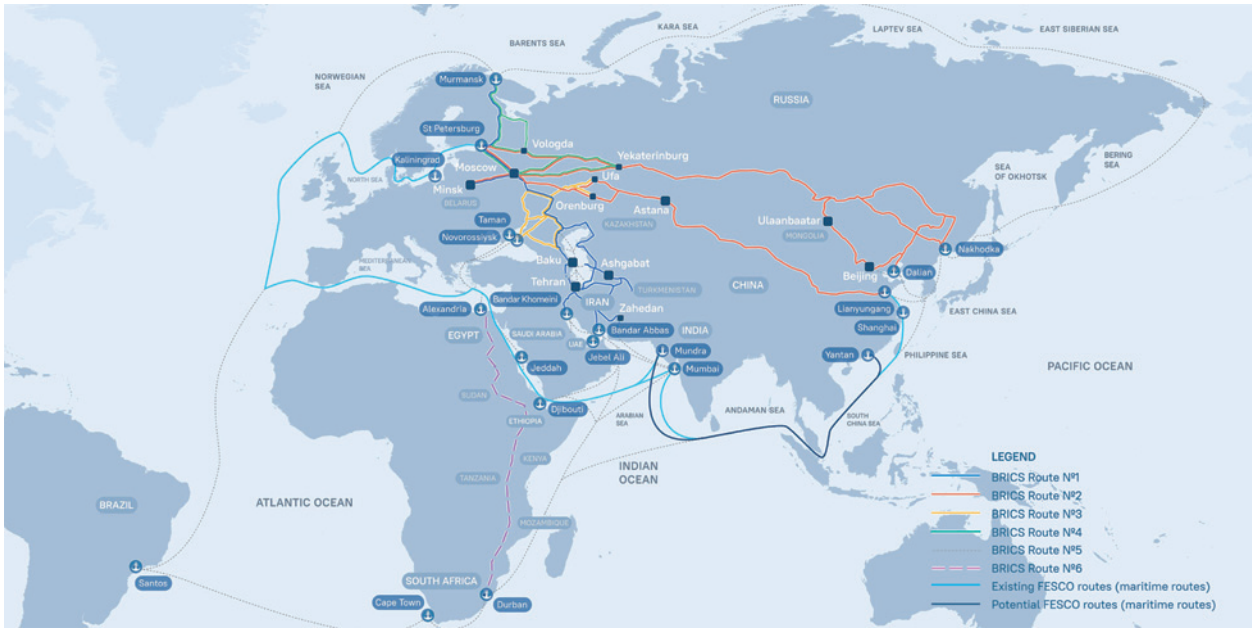

Fig. 9. Geography of transport routes connecting the BRICS countries

Black Seas and the ports in Turkey, Saudi Arabia, the UAE, India, Africa, and Latin America, will have a substantial influence on strengthening the trade and economic connections of the BRICS countries.

Large geographical distances to the BRICS countries necessitate the creation of a comprehensive approach to addressing logistics issues. The Subgroup on Transport and Logistics plans international sea routes (such as BRICS route No. 5) that will be optimal in terms of costs and delivery times. They will connect the ports in all of the BRICS countries and will thus contribute to the integration processes between BRICS members.

The increasing urbanization and industrialization in African countries provide an environment for the development of trade and economic cooperation between the BRICS countries which can be contributed to by a new prospective route on the African continent.

The future trans-African route (route BRICS No. 6) will contribute to the creation of a railway corridor between the Alexandria Port in Egypt, the capital of Ethiopia Addis Ababa, and the Port of Durban in South Africa.

According to preliminary assessments, this route may be as long as 10 thousand kilometres and include about 8 thousand kilometres of the existing railway lines in Egypt, Sudan, Ethiopia, Kenya, Mozambique, and South Africa.

Main trends in the development of trade relations between the BRICS countries

Worth mentioning are some of the key drivers of the future economic cooperation and further development of commercial relationships within the BRICS space, such as:

- the development of transport routes for the enhancement of economic cooperation and improvement of the efficiency of logistics;
- accession of new members and expansion of socio-economic cooperation with the developing countries opening new opportunities for trade;
- the development of e-commerce and logistics via simplification of customs procedures and development of goods tracking systems;
- more intensive cooperation in the energy sector, including long-term contracts and energy security measures;
- the development of multimodal transportation to optimize routes and time of delivery, integrate logistics networks, and create terminal and logistics centres.

These factors and trends will have positive influence on the deepening of relationship between the trading parties and the development of transport routes between BRICS members.

CONCLUSION

The development of transport and logistics routes between the BRICS countries is key to strengthening economic ties and improving trade performance.

Railways in the BRICS countries have a potential for further development, which is supported by the increasing trade turnover and active expansion of transport routes.

The Subgroup on Transport and Logistics of the Infrastructure Group at the Business Council of BRICS is currently working on six prospective transport and logistics corridors which include both land and marine routes.

Further coordination of actions of the BRICS countries with respect to the balanced development of transport and logistics corridors along with the attraction of a required amount of investment in the development of their infrastructure will enable the BRICS countries to increase the volume of transportation related to foreign trade.

The current level of cooperation between the BRICS countries provides promising trends for deepening trade relations within the member countries, including the development of transport lines, expansion of socio-economic cooperation, development of e-commerce and logistics, and deepening of cooperation in the energy sector.

Bionotes

Andrey A. Tikhomirov — Head of Macroeconomics and Forecasting Methodology Department; **Institute of Economics and Transport Development (IEDT)**; 24 Novoryazanskaya st., Moscow, 105066 Russian Federation; tihomirov@iedt.ru.

Об авторе

Андрей Александрович Тихомиров — начальник центра макроэкономики и методологии прогнозирования; **АО «Институт экономики и развития транспорта» (АО «ИЭРТ»)**; 105066, г. Москва, Новорязанская ул., д. 24; tihomirov@iedt.ru.

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The epic of the Baikal-Amur Mainline is the fate of millions. On the 50th anniversary of the start of construction

Egor Komarov[1]✉, Ekaterina Sergeeva[2]
[1, 2] Independent researcher; St. Petersburg, Russian Federation
[1] komar77@internet.ru✉
[2] sergeevaer@gmail.com

ABSTRACT The Baikal-Amur Mainline is one of the most ambitious and controversial Soviet projects on the socio-political and historical trail of perception. The proposal to build a new railway north of the Trans-Siberian Railway was put forward at the beginning of the 20th century. The idea was approached in the 1920s and 1930s. Surveys were conducted, and construction began on one of the sites, which was interrupted by the Great Patriotic War (World War II). Moreover, during the war years, the upper structure of the track and a number of engineering structures were dismantled on the constructed site, which were used for the construction of the extremely important rockade railway in the Stalingrad area, which played a significant role in supplying Soviet troops during the Battle of Stalingrad. The interest in the construction of the BAM of the Soviet leadership in the 1960s and 1970s arose again in the context of an aggravation of the political situation — the complication of relations between the USSR and the People's Republic of China. However, already during this period, the question was reasonably raised not only about the political, but also the economic strategic significance of the project from the perspective of the country's development prospects, the development of natural resources in this region, the development of transport links between the European, Siberian, and Far Eastern territories of the state. In the period after the collapse of the USSR, the BAM construction project, not without the influence of those who were under Western influence in the country's leadership circles, was classified as erroneous, extremely costly, economically and socially unjustified. Today, in society, the state, under the influence of many factors of recent years, there is an understanding of the importance of completing and developing the BAM construction project. This project has played a big role in the lives of millions of people, many organizations and institutions. Among them is the Leningrad Institute of Railway Engineers — today the St. Petersburg State University of Railways of Emperor Alexander I, whose students, graduates, scientists and specialists have been involved in various forms in the construction of the Baikal-Amur Mainline for half a century.

KEYWORDS: Baikal-Amur Mainline; BAM; Leningrad Institute of Railway Engineers; St. Petersburg State University of Railway Engineering; student construction teams; military builders of BAM

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Обзорная статья

Эпопея Байкало-Амурской магистрали — судьба миллионов. К 50-летию начала строительства

Егор Комаров[1]✉, Екатерина Серегеева[2]
[1, 2] Независимый исследователь; г. Санкт-Петербург, Россия;
[1] komar77@internet.ru✉
[2] sergeevaer@gmail.com

АННОТАЦИЯ Байкало-Амурская магистраль — один из самых амбициозных и противоречивых советских проектов по общественно-политическому и историческому шлейфу восприятия. Проект новой железной дороги, севернее Транссиба, был предложен еще в начале XX в. К идее обратились в 1920–1930-е годы. Велись изыскания,

на одном из участков началось строительство, прерванное Великой Отечественной войной (Второй мировой войной). Более того в военные годы на построенном участке было демонтировано верхнее строение пути и ряд инженерных сооружений, которые использовались для строительства чрезвычайно важной рокадной железной дороги в районе Сталинграда, сыгравшей заметную роль в снабжении советских войск в период Сталинградской битвы.

Интерес к строительству БАМа советского руководства в 1960–1970-е гг. вновь возник в условиях обострения политической обстановки — осложнения взаимоотношений СССР с КНР. Однако уже в этот период вполне обоснованно ставился вопрос не только о политической, но и экономической стратегической значимости проекта с позиций перспектив развития страны, освоения природных богатств этого региона, развития транспортных связей между европейскими, сибирскими, дальневосточными территориями государства.

В период после развала СССР проект строительства БАМа, не без влияния находившихся под западным влиянием лиц в руководящих кругах страны, был причислен к ошибочным, чрезвычайно затратным, экономически и социально неоправданным. Сегодня в обществе, государстве, под влиянием многих факторов последних лет приходит понимание важности завершения и развития проекта строительства БАМа. Этот проект сыграл большую роль в судьбах миллионов людей, многих организаций и учреждений. Среди них — Ленинградский институт инженеров железнодорожного транспорта, сегодня — Петербургский государственный университет путей сообщения Императора Александра I, чьи студенты, выпускники, ученые и специалисты на протяжении полувека в различных формах были вовлечены в проект сооружения Байкало-Амурской магистрали.

КЛЮЧЕВЫЕ СЛОВА: Байкало-Амурская магистраль; БАМ; Ленинградский институт инженеров железнодорожного транспорта; Петербургский государственный университет путей сообщения; студенческие строительные отряды; военный строители БАМ

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SALUTE, THE CONSTRUCTION SITE OF THE CENTURY!

2024 is the anniversary year in the epic of the Baikal-Amur Mainline (BAM). 50 years ago, a decision was made on the government level and construction of the BAM began. Since then, the attitude to the socialist "construction project of the century" — one of the most ambitious and largest transport infrastructure projects of all times and peoples — have changed both among the ruling government bodies, agencies and political figures, and the public in general. The changing opinions ranged from declaring it was strategically necessary, relevant and required to promptly implement the project to its complete negation as one of the government's decisions considered wrong in the perestroika years...

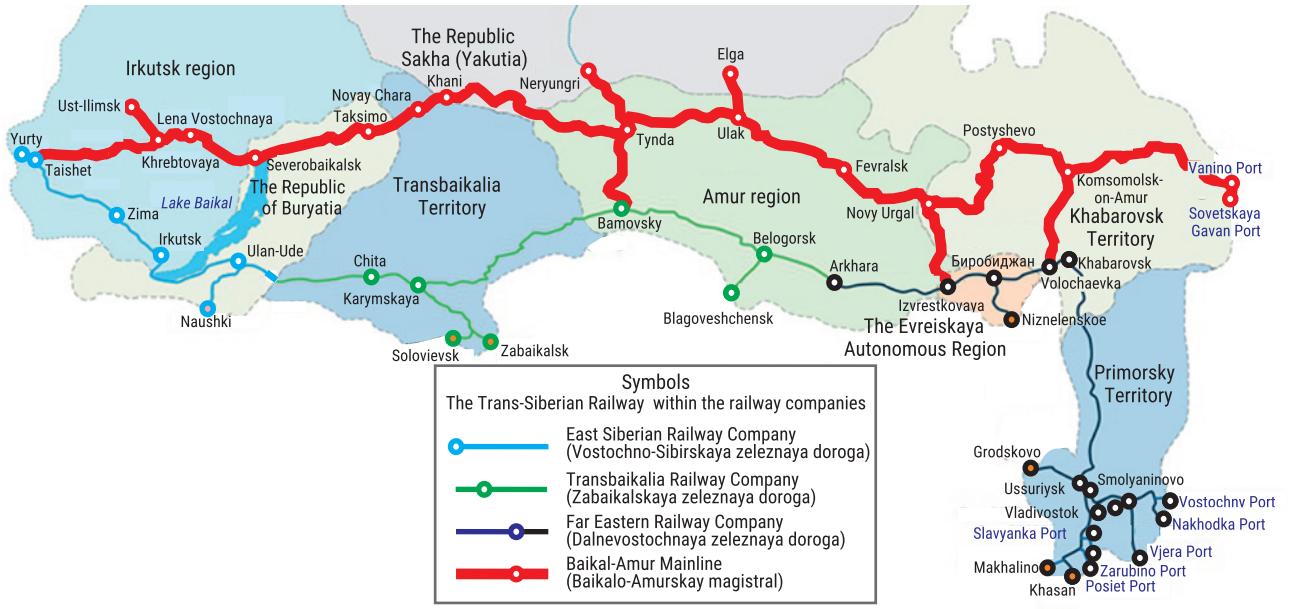
Today, both the government's decisions and public opinions reinstate the understanding of the importance of this mainline for the development of the so-called "Eastern operating domain", which is a network of railways with a total length of more than 14 thousand kilometres, stretching from west to east and combining the transport potential of the Trans-Siberian Railway and the Baikal-Amur Mainline [1].

The new reality in the context of the sanctions pressure from Russia's unfriendly countries, which the Russian economy has been experiencing since the beginning of the Special Military Operation in Ukraine in 2022, has led to a dramatic redistribution of the main export freight flows from the North West towards the Far East and South of Russia. Loads on the railways leading to the sea ports of the Far East and Azov and Black Sea basins have increased significantly.

In this situation, the role of the Baikal-Amur Mainline becomes more conspicuous as it is one of the essential components of the Eastern operating domain (In Russian: «Восточный полигон» The Eastern polygon) with a great potential for the development of its traffic-carrying capacity. In the autumn of 2022, the first phase of construction of the BAM and Transsib railway facilities was completed, with a potential of adding 144 million tonnes of various freights to the carrying capacity of the Eastern operating domain. In 2023–2024, about 30 new facilities, such as tunnels, bridges and power substations, are planned to be built [2].

The construction of the Baikal-Amur Mainline remains one of the projects that affected the destinies of a great many people. During the peak period of construction in the late 1970s – early 1980s, the number of BAM builders engaged in track laying reached 130 thousand people [3]; the total number of participants in the construction project over all years was about 2 million people [4]; and the number of the new permanent population settled in the areas adjacent to the BAM was about 1 million people in 1984 [3].

For several decades, the design and construction of the BAM was an important and complex high-priority project that combined the research, engineering and academic efforts of several generations of scholars, professors, teachers, students and graduates of the oldest transport higher educational institution in Russia



Scheme of the Eastern operating domain (The Eastern polygon. In Russian: «Восточный полигон». Trans-Siberian Railway and Baikal-Amur Mainline

the Leningrad Institute of Railway Transport Engineers named after Academician Vladimir Obraztsov (LIIZhT). Today it is bringing together, in its new capacity as an important component of the Eastern operating domain, employees and students of this institute, which is currently known as Emperor Alexander I St. Petersburg State Transport University (PGUPS).

ACTIVITIES DEDICATED TO THE 50TH ANNIVERSARY OF THE START OF THE CONSTRUCTION OF THE BAIKAL-AMUR MAINLINE

The 50th anniversary of the start of the construction of the Baikal-Amur Mainline is widely celebrated in Russia at both the federal and regional levels, in many transport, construction, design, and research organisations, and educational institutions.

On April 22, 2024, President of the Russian Federation Vladimir Putin and President of the Republic of Azerbaijan Ilham Aliyev met in the Kremlin with veteran builders and workers of the Baikal-Amur Mainline on the occasion of the 50th anniversary of the start of its construction. At the beginning of the meeting, Vladimir Putin noted that the father of Ilham Aliyev, Heydar Aliyev, *"played a special, enormous role in the history of the BAM. As the First Deputy Chairman of the Council of Ministers of the USSR, Heydar Aliyev supervised the construction of the Baikal-Amur Mainline and did everything possible to get this extremely complex project accomplished"* [4].

In his speech during the meeting, Vladimir Putin noted that *"The BAM is also the embodiment of the titanic work and courage of two million very young people from all over the Soviet Union. They carried out a project which is unique in all senses and has no equivalent in world's history. Today, we can see that the BAM in many respects determines global logistics for the entire 21st century. Our country has gained great opportunities for the exploration and development of Siberia and Far East, for the expansion of freight transport towards the Pacific Ocean. Needless to say, it was due to the Baikal-Amur Mainline that the current turn towards East was possible"* [4].

In addition to the ceremonial meeting in the Kremlin, Moscow, other events in honour of the 50th anniversary of the BAM took place in various agencies, ministries and departments. On April 23, 2024, Head of the Federal Agency for Rail Transport Alexey Druzhinin awarded anniversary medals "50 years of the Baikal-Amur Mainline" to a group of BAM builders, including teachers and employees of Emperor Alexander I St. Petersburg State Transport University [5].

On April 23, 2024, a ceremony dedicated to the celebration of the 50th anniversary of the start of the construction of the Baikal-Amur Mainline took place in the Kremlin Palace.

Those who went "to get some fog and smell of taiga" in 1974, as well as a new generation, students participating in the BAM 2.0 project of JSC Russian Railways, including members of the Baikal student construction brigade from PGUPS came together 50 years after the declaration of the All-Union Komsomol shock construction project. The first builders of the BAM from among

Group of BAM builders — teachers and employees of PGUPS awarded with the anniversary medal "50 years of the Baikal-Amur Mainline", participants of the ceremony in the Kremlin Palace dedicated to the 50th anniversary of the start of the construction of the BAM on April 23, 2024 (from left to right): Evgeny I. Shekhtman, Pyotr K. Rybin, Vladimir F. Ravgeisha, Gennady E. Egorov, Alexey I. Dergachev, Nikolay S. Rogalev, Alexey G. Korablev. (Photo by PGUPS)


УДОСТОВЕРЕНИЕ

Егоров
Геннадий
Евгеньевич

награжден(а) юбилейной медалью
«50 лет Байкало-Амурской магистрали»
(учреждена Указом Президента Российской Федерации от 29 августа 2022 г. № 588)
от имени Президента Российской Федерации медаль вручена

Министр транспорта Российской Федерации В.Г. Савельев

28 февраля 2024 г.

Certificate for the anniversary medal "50 years of the Baikal-Amur Mainline" in the name of Gennady E. Egorov, the contributor to the construction of the mainline, retired Colonel, Head of the Human Resources Management Department, PGUPS. 2024. The certificate says: "Certificate. Gennady E Egorov was awarded the jubilee medal "50 years of the Baikal-Amur Mainline". It was established by decree of the President of the Russian Federation. The medal was awarded on behalf of the President of the Russian Federation. Minister of Transport of the Russian Federation V.G. Saveliev. [signed] February 28, 2024". (Photo by PGUPS)

the teachers and staff of PGUPS also took part in the ceremony at the Kremlin Palace.

President of the Russian Federation Vladimir Putin attended at the anniversary meeting in the Kremlin Palace. The head of the state congratulated the BAM builders on the holiday, recalled the historical milestones of the project, and emphasized the much broader purpose that the project serves nowadays: to lay continuous second tracks along the entire length of the BAM. *"The further development of the BAM will serve to increase export and transit capabilities of Russia as an important link in the Russian transport system. I am certain, we will definitely fulfil all the plans we have and we will do this for the benefit of Russia and our people"*, stressed the President [6].

On April 26, 2024, the science-to-practice conference "Recent History and Prospects for the Development of Russian Railways" dedicated to the 100th anniversary of the Department of Surveying and Design of Railways of the Emperor Alexander I St. Petersburg State Transport University (PGUPS) and the 50th anniversary of the start of the construction of the BAM took place in the assembly hall of PGUPS.

The conference was opened by Rector of PGUPS Oleg S. Valinsky. In his address, he noted that *"in total, about two million people were involved in the Komsomol shock construction project, and for many of them, the construction of the BAM and their subsequent work*

PGUPS students — members of the Baikal Student Construction Brigade participating in the ceremony dedicated to the 50th anniversary of the start of the construction of the BAM at the Kremlin Palace on April 23, 2024. In the centre of the photo is Gennady M. Fadeyev, the former Minster of Rail Transport of the Russian Federation in 1992–1996 and 2002–2003, Advisor to the Minister of Transport of Russia, Adviser to General Director — Chairman of the Management Board of JSC Russian Railways. (Photo by PGUPS)

Rector of PGUPS Oleg S. Valinsky is speaking.
(Photo by PGUPS)

on the mainline has been the lifetime project, a real feat without any exaggeration" [7].

Professors, teachers and employees of PGUPS and other organisations who took part in the implementation of the Baikal-Amur Mainline project in different years as part of scientific expeditions, surveying parties, student construction brigades, and units of military railway workers who participated in the construction delivered addresses and presentations at the conference.

Some of the speakers who were warmly received by the audience (mostly comprised of PGUPS students) were President of the PGUPS Alumni Corps Viktor N. Lobko; Head of the Department of Surveying and Design of Railways at PGUPS Sergey V. Shkurnikov; Head of the Department of Wagons and Rolling Stock at PGUPS, Professor Yuri P. Boronenko; Deputy Chief Engineer of Lengiprotrans JSC Alexey P. Konyukhov; Major General in reserve, Director of the Leningrad Technical School of Railway Transport, Professor Evgeny I. Shekhtman, and others.

In their presentations, the construction participants shared their memories of the difficulties that were faced and persistently overcome by the first BAM builders, who were then students, young engineers, soldiers and officers of the Soviet Army, and also talked about the role that the legendary construction project played in the development, growing-up, experience acquisition, and character training of future specialists and, in many cases, operational managers. They noted that despite the severe living and working conditions and hard work which often lasted as long as daylight allowed, they had enough time for singing songs with a guitar, sports competitions, and amateur performances. Today, they remember all this as a wonderful time of their youth and feel themselves proud for having been part of the Great Construction Project and having made their personal contribution to it.

FROM THE HISTORY OF BAM

The Baikal-Amur Mainline, the legendary BAM, is one of the greatest transport projects in the history of Russia and globally, as well as one of the longest rail

In the conference hall of the science-to-practice conference "Recent History and Prospects for the Development of Russian Railways". Head of the Surveying and Design of Railways Department at PGUPS, Associate Professor Sergey V. Shkurnikov is speaking.
(Photo by PGUPS)

mainlines. The project is not only ambitious, but also very difficult to implement.

The main period of construction of the BAM was from 1974 to 1986. However, the idea to build a railway north of Lake Baikal with the view to explore Siberia and the Far East was put forward as early as the beginning of the 19th century. Survey work to pursue the idea began in the first decades of the 20th century. The first projects for the construction of a railway line in parallel with, but to the north of, the Trans-Siberian Railway date back to the 1910s–1920s. For the first time, this direction of the Baikal-Amur Mainline was indicated on the contour map of prospective development of railways in the USSR approved by the Council of Labour and Defence in 1924 [8, 9].

The Soviet leadership turned to the project in 1930. A document on the design and construction of a railway with access to the Pacific Ocean was sent from the Far Eastern Regional Committee of the All-Union Communist Party of Bolsheviks to the Central Committee of the All-Union Communist Party of Bolsheviks and the Council of People's Commissars (SNK) of the USSR. Probably, it was this document that first named the future railway "Baikal-Amur Mainline" [10].

On April 13, 1932, Decree of the Council of People's Commissars of the USSR No. 542 "On the construction of the Baikal-Amur Railway" was issued to launch design and survey work[1]. On October 23, Decree of the Council of Labour and Defence "On the construction of the Baikal-Amur Mainline" was approved. The construction of the Baikal-Amur Railway was entrusted to the United State Political Administration under the Council of People's Commissars of the USSR (OGPU under SNK of the USSR) using prisoners of forced labour camps as workforce. Sergey V. Mrachkovsky was appointed head of construction for the Baikal-Amur Railway[2]. The construction began on several sections of the line, but was suspended because of the Great Patriotic War.

The project was reopened in the 1960s when in 1967, the Central Committee of the Communist Party of the Soviet Union (CC CPSU) and the Council of Ministers of the USSR made a decision to resume the design and survey works on the BAM. On March 24, 1967, the Central Committee of the CPSU and the Council of Ministers of the USSR adopted Decree "On strengthening of survey work for the BAM" requiring organisations under the Ministry of Transport Construction (Mintransstroy) of the USSR to start design and survey works for the future mainline[3].

On November 17, 1971, the Ministry of Transport of the USSR issued Order No. 204 "On the creation of a general contractor organisation "Bamstroyput" Construction Directorate at Skovorodino Station in the Amur Oblast under the Ministry of Transport". Valentin I. Mokrovitsky was appointed head of the Directorate[4].

It is enough to look at a railway map to get an understanding of how necessary the line is. A developed network of railways existed only in the area to the west of the Urals, while to the east the country had limitless expanses and only one railway, the Trans-Siberian Railway, which was built between 1891 and 1916.

The length of the BAM between Tayshet and Sovetskaya Gavan stations is 4,341 km. For comparison, let's consider a section of the Trans-Siberian Railway between Tayshet and Vladivostok stations, which is 4,614 km long. So, the BAM section is shorter than that of the Trans-Siberian Railway by 273 km.

The construction of the BAM is fraught with great difficulties[5]. A considerable part of the mainline passes through areas with severe natural and climatic conditions, including high levels of seismic activity (from 6–7 points in the east of the route to 9 points in the west in the area of Tayshet and Lena), and perpetually frozen ground. The depth of soil freezing reaches 200 m from the surface. There are also places with buried ice, thermokarst sites (craters filled with ice), famous rocky clamps on rivers where mountain ranges drop almost vertically to the water, and equally famous swampy areas on permafrost known as mari. The mountain slopes feature naturally produced screes and stone runs (clusters of sharply angular stone blocks) that look like a closed, undivided cover on the surface of the earth. Another problem is aufeises (naleds) in places where groundwater erupts to the surface[1] [8, 9, 11].

Worth a special note here is the fact that the route of the BAM crosses more than 3,500 watercourses, including eleven full-flowing rivers, such as Lena, Amur,

[1] Decree of the Council of People's Commissars of the USSR No. 542 "On the construction of the Baikal-Amur Railway" / BAM Through Space and Time: Database on the History of the BAM. URL: http://ihaefe.org/bam/.
[2] Decree of the Council of Labour and Defence "On the construction of the Baikal-Amur Mainline" "On the construction of the Baikal-Amur Railway" / BAM Through Space and Time: Database on the History of the BAM. URL: http://ihaefe.org/bam/.
[3] BAM: The Chronicle of Events: 1967. URL: http://ihaefe.org/bam/
[4] BAM: The Chronicle of Events: 1971. URL: http://ihaefe.org/bam/
[5] A section characterizing the BAM and the operational area of the railway prepared on the basis of the report. Konyukhov, A.P. "Contribution of Lengiprotrans JSC to the survey and design of the BAM" A.P. Konyukhov is a railway engineer, a participant of the survey, design and construction works at the Baikal-Amur Railway in 1976–1982 as a head of the surveying party and a deputy head of the expedition on the Central Section of the BAM — Tynda – Chara. Currently, he is Deputy Chief Engineer at Lengiprotrans JSC.

Buryat section of the BAM line. 1977. (Photo by S.F. Spiridonov. Science and Technology Library (NTB) of PGUPS)

Zeya, Vitim, Olekma, Nyukzha, Selemdzha, Bureya, and others. Besides, it runs through seven large mountain ranges, including the Baikal Mountains, the Northern Muya Range, the Udokan Range, the Kodar Mountains, the Olyokma-Stanovik, the Turan Range, and the Dusse-Alin. The construction of the Baikal-Amur Mainline is an entire stage in the implementation of a grandiose programme for the development of Eastern Siberia and the Far East. The task was to "conquer" this vast region, and most importantly, to create a powerful industrial area here.

It should not go unmentioned that work was done in severe climatic and natural environments, with air temperature fluctuations from +40 °C in summer to –40 °C in winter, which is typical of a sharply continental climate; the abundance of gnats in the taiga wilds in the summer season, the remoteness of construction sites from supply bases, and the lack of roads in primeval forests and mountain ranges that can only be reached with the use of all-terrain vehicles or small aircraft.

The beginning of the construction of the new mainline was first formally mentioned in the speech of General Secretary of the Central Committee of the CPSU Leonid Brezhnev at a ceremonial meeting in honour of the 20th anniversary of the development of virgin and fallow lands that took place in Alma-Ata on March 15, 1974 [12].

In April 1974, the 17th Congress of the Komsomol was held in Moscow. It was there that the start of a large-scale project for the construction of the Baikal-Amur Mainline was announced a couple of months before the government's official decision made in June. On April 27, 1974, the first brigade of young builders left for the mainline construction site from the Yaroslavsky Railway Station in Moscow [12, 13].

A strategic decision to build the Baikal-Amur Mainline was made by the Central Committee of the CPSU and the Council of Ministers of the USSR on July 8, 1974, when they issued Decree No. 561 "On the construction of the Baikal-Amur Mainline". The Ministry of Railways and the Ministry of Transport Construction *"were decreed to build the Baikal–Amur mainline with a length of 3,145 km from the town of Ust-Kut to the city of Komsomolsk-on-Amur via Nizhneangarsk, Chara, Tynda and Urgal in 1974–1983 with the view to further the development of productive forces in Eastern Siberia and the Far East and to support the increasing transportation of goods in the regions"* [13].

The Central Committee of the CPSU approved the proposal of the Communist, Komsomol, and trade union organisations to declare the construction of the Baikal-Amur Mainline as a nationwide construction project. Thus, the BAM was given the status of the main All-Union Komsomol shock construction project, attracting even more people to take part in it.

The BAM construction included three stages:

Stage 1: 1931–1942. By 1941, the Izvestkovaya – Urgal – Dusse-Alin (339 km) and BAM – Tynda (178 km) sections, a 68 km long line from Tayshet towards Bratsk, and a 180 km long line from Komsomolsk to Sovetskaya Gavan, including the Kuznetsovsky tunnel, were built and put into operation for train traffic.

On August 18, 1941, the construction work on the BAM was suspended. In 1942, the track superstructure, bridge and other structures of the BAM – Tynda sec-

tion were dismantled and used to build the Stalingrad – Saratov – Sviyazhsk belt road, which made a significant contribution to the victorious outcome of the Battle of Stalingrad.

Stage 2: 1943–1953. This included building the Komsomolsk – Sovetskaya Gavan line, which was of great significance in ensuring the defeat of the Japanese militarists (this required the dismantling of the track superstructure on the Izvestkovaya – Urgal section); building the Tayshet – Ust-Kut section, and restoring the Izvestkovaya – Urgal line. In total, more than 1,150 km of tracks were built. The BAM began to operate as a backbone line for the provision of transportation in the poorly developed region [13, 14].

Stage 3 of the BAM construction project began when the Central Committee of the CPSU and the Council of Ministers of the USSR adopted Decree "On strengthening of survey work for the BAM" on March 24, 1967. It took more than 12 years, from April 5, 1972 to October 27, 1984, to build the major part of the railway. On September 29, 1984, the teams of Alexander Bondar and Ivan Varshavsky met at the Balbukhta junction. On October 1, 1984, the rail length with the golden spike was ceremoniously laid at Kuanda station connecting the both parts of the line into a single whole [13, 14].

On September 1, 1989, the State Commission led by Head of the Baikal-Amur Railway named after Lenin Komsomol, Deputy Minister of Transport of the USSR Valery Gorbunov signed a certificate of acceptance for continuous operation of the eastern section of the BAM from Tynda to Komsomolsk-on-Amur. On November 1, 1989, a completion certificate for the western section was signed. The entire new 3,000-kilometer-long section of the mainline was put into continuous operation. The Severomuysky Tunnel, which is the longest tunnel in Russia, spanning 15.343 kilometres, was put into continuous operation in December 2003 [14]. Before it was complete, a temporary operating bypass with large slopes was used.

PARTICIPATION OF LIIZHT – PGUPS IN THE BAM EPIC

The contribution of the staff of Russia's oldest transport educational institution to the construction of the Baikal-Amur Mainline encompassed two important areas of activity: first, scholars of many departments provided scientific and engineering support for the design and construction of important facilities on the mainline, and second, student construction brigades comprising students and teachers took part in construction works during the summer season.

In the summer of 1973, a year prior to the official launch of the BAM construction, a brigade of 65 people from the Bridges and Tunnels Faculty went to the BAM in Komsomolsk-on-Amur at the initiative of the Komsomol Committee of LIIZhT which was supported by the party committee, rector's office, and leadership of the Ministry of Railways of the USSR. The students took part in the construction of a bridge crossing over the Amur River [16].

In 1975, the Baikal zonal student brigade comprised of 440 people from four faculties of LIIZhT — Construction; Bridge and Tunnels; Mechanical; and Electrical Engineering — was set up. The brigade was headed by commander V. Babich and commissioner A. Zorin who were graduates from the Institute. Subsequently, it became a tradition to deploy line zonal construction brigades of LIIZhT on the Buryat section of the BAM, between the Baikalsky and Severomuysky Tunnels [17].

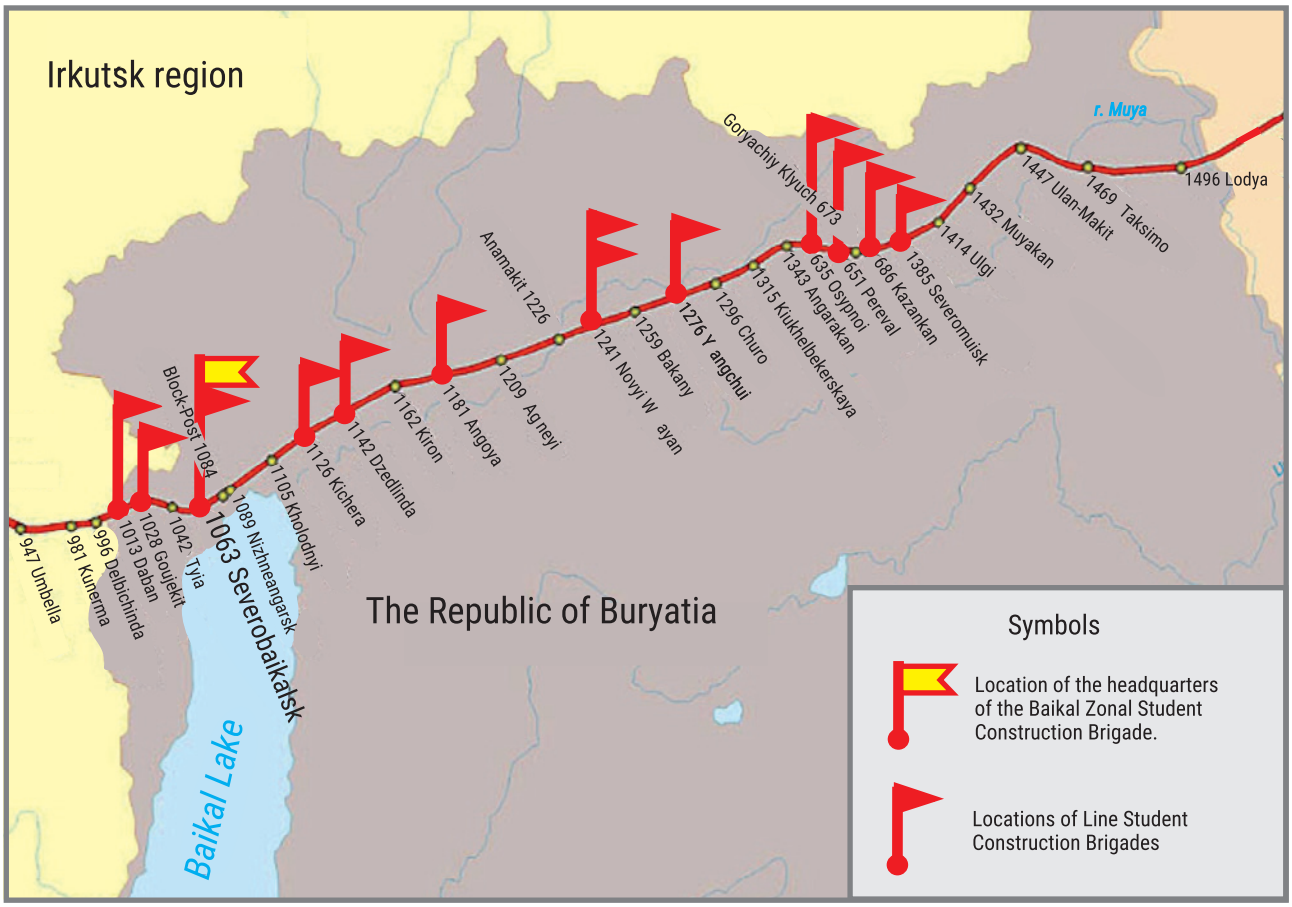
After the adoption of Decree of the Central Committee of the CPSU and the Council of Ministers of the USSR "On the construction of the Baikal-Amur Mainline" in 1974, the LIIZhT team became involved in solving the problems of design, construction and subsequent operation of the huge construction site [17, 18].

The range of scientific and technological problems was so broad that it was necessary to organise research at Institute's departments and the Scientific Research Institute of Bridges in a streamlined manner[6]. LIIZhT Rector Evgeny Kraskovsky[7] initiated the establishment of the Council for Coordination of Research for the BAM which was chaired by Professor Yuri Limanov. The Council included professors Mikhail I. Voronin, Georgy N. Zhinkin, Yuri M. Silnitsky, and Mikhail M. Filippov. At the beginning of 1975, LIIZhT entered into agreements on creative collaboration with the Lengiprotrans, Lengiprotransmost and Giprotranssignalsvyaz design institutes, the Directorate of the BAM, and other organisations [19].

The issues covered by scientific research included studying the conditions of construction and prepara-

[6] The Scientific Research Institute of Bridges was a division of LIIZhT until the early 1990s.

[7] Evgeny Y. Kraskovsky (1918–1993) was the twenty-fifth rector of LIIZhT, an outstanding figure in higher education, one of the most successful rectors of the Institute. Under his leadership, the Institute accomplished great plans for its social and economic development, achieved significant results in academic, scientific, cultural, educational and character-building activities, significantly expanded its physical, technical and scientific assets, including the construction of new educational buildings, student dormitories and a Sports Palace with a swimming pool. LIIZhT. became one of the country's leading engineering and technology higher education institutions. In 1984, LIIZhT was awarded the Order of the October Revolution.



Deployment of Line Student Construction Brigades of LIIZhT on the Buryat section of the BAM. A yellow flag on the map shows the location of the headquarters of the Baikal Zonal Student Construction Brigade. Triangular red flags on the map show the locations of Line Student Construction Brigades [17]

tion of efficient technical solutions for managing the construction in areas of concentrated work on the Chara – Tynda section; purification of oily wastewater at BAM sites; construction and operation of railway water

Evgeny Kraskovsky, LIIZhT Rector in 1968–1989. (Photo by PGUPS)

pipelines in permafrost areas; designing efficient crossing loops and stations for the Chara – Tynda section. The results of the research on complex issues of design and construction of the BAM were widely discussed by the country's scientific and engineering community. Science-to-practice conferences were held at the initiative of the Ministry of Railways of the USSR, the Railway Research Institute (VNIIIZhT) and railway higher education institutions to facilitate the integration of research and development outcomes into engineering practices for the construction of the mainline [20].

The Institute provided scientific and technical assistance to design and construction organisations involved in the construction of bridges and pipes on the Baikal-Amur Mainline. During the construction of bridges with columns, corrugated metal culverts, the northern version of pre-stressed reinforced concrete spans and other artificial structures of a new type for the BAM, the Institute carried out systematic field observations of their condition, deformations, features of the stressed state and made changes to designs and construction technology, as and when necessary.

Scholars in LIIZhT involved more and more of its students in research work on BAM-related topics and

the latter used real life subjects concerning facilities on the BAM route for their final qualification works (graduation projects). In 1975, the Training and Production Association of the Department of Surveying and Design of Railways and the Technical Department of Lengiprotrans was established. According to an expert review opinion from the Ministry of Railways on the technical design of Lengiprotrans, specialists of the design institute proposed 17 topics for graduation projects on the development and comparison of options for the route of the Chara–Tynda section of the BAM [20]...

Students involved in these projects did their pre-graduation internship at Lengiprotrans with its leading specialists acting as second thesis supervisors.

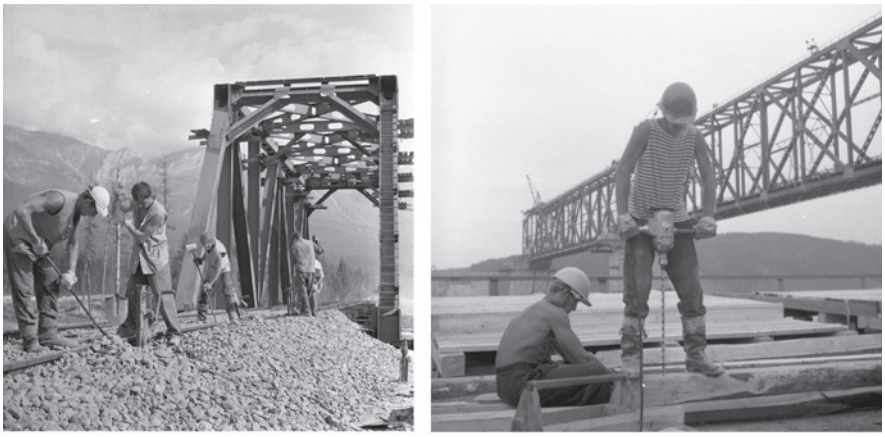
By 1976, LIIZhT developed 60 research topics for the BAM, involving 24 departments and the Research Institute of Bridges of LIIZhT. 73 graduation projects on topics relating to the construction of the BAM were completed in the Institute in 1975 [19]...

Assistance to the Institute's Komsomol organisation in setting up and managing student construction brigades was under increased scrutiny from the rector's office and the party organisation of LIIZHhT. For several years, LIIZHhT Rector Evgeny Kraskovsky travelled to the BAM construction site to visit student construction brigades of the Institute, meet with students and managers of construction organisations, and take part in gatherings and festivals of construction brigades which were traditionally timed to coincide with the Railway Worker's Day (the 1st Sunday in August) or the Builder's Day (the 2nd Sunday in August).

In 1984, ten student construction brigades of the Institute with a total of 450 people worked on the construction of the Baikal-Amur Mainline [21] Besides, the Institute sent its students to do internships at Bamstroymekhanizatsiya and Tyndatransstroy trusts, in surveying parties, and on the operating Tynda section of the Baikal-Amur Mainline.

PHOTO REPORTS: LIIZHT STUDENTS ON THE BAM

LIIZhT students. Late 1970s. (Photo by PGUPS)



a *b*

Members of LIIZhT student construction brigades building bridge crossings on the BAM. Late 1970s. (Photo by PGUPS)

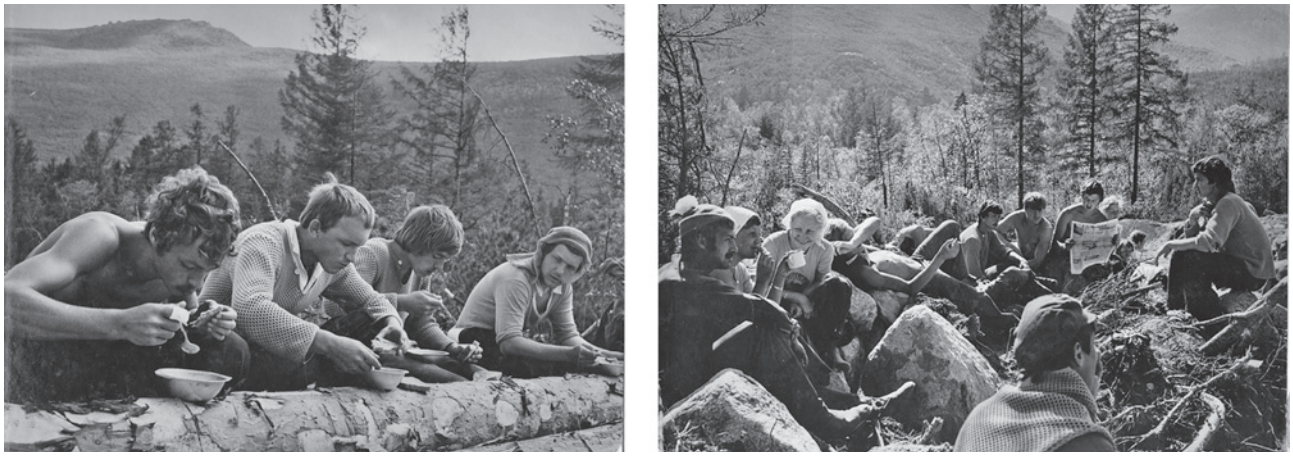
Members of a LIIZhT student construction brigade at the construction site of the Severomuysky Tunnel on the BAM. Late 1970s. (Photo by PGUPS)

Rector of LIIZhT Evgeny Kraskovsky (in the centre) and the manager of Nizhneangarsktransstroy trust, Hero of Socialist Labour F.V. Khodakovsky (to the left of Kraskovsky) arrived by a helicopter at the place of stationing of one of the brigades. On the far left is the commander of Baikal zonal student brigade Yuri Boronenko. 1977. (Photo by S.F. Spiridonov. Science and Technology Library (NTB) of PGUPS)

Meeting of the command unit of Baikal zonal student brigade. On the photo, from left to right, are chief engineer O. Klishev, chief of the command unit V. Korovkevich, secretary of the command unit, Baikal commander Yu. Boronenko, commissioner V. Volkov, and chief physician V. Luchkevich. (Photo by S.F. Spiridonov, Science and Technology Library (NTB) of PGUPS)

LIIZhT students building a drainage collector for the east portal of the Severomuysky Tunnel. The Buryat section of the BAM. 1977. (Photo by S.F. Spiridonov, collection of A.V. Kabanov. Science and Technology Library. PGUPS)

The west portal of the Severomuysky Tunnel. 1977. (Photo by S.F. Spiridonov, collection of A.V. Kabanov. Science and Technology Library (NTB) of PGUPS)



Long-awaited lunch time and a short break. Baikal-1 student construction brigade. 1977.
(Photo by S.F. Spiridonov, collection of A.V. Kabanov. Science and Technology Library (NTB) of PGUPS)

Thermal radon baths on the job. 1977. (Photo by S.F. Spiridonov, collection of A.V. Kabanov. Science and Technology Library (NTB) of PGUPS)

Preparing an issue of the Taiga Pravda wall newspaper of Baikal-1 student construction brigade. 1977.
(Photo by S.F. Spiridonov, collection of A.V. Kabanov. Science and Technology Library (NTB) of PGUPS)

Camping site of Baikal-1 student construction brigade. 1977. (Photo by S.F. Spiridonov, collection of A.V. Kabanov. Science and Technology Library (NTB) of PGUPS)

Celebration of the initiation into the "glorious tribe of construction brigade members". 1977.
(Photo by S.F. Spiridonov, collection of A.V. Kabanov. Science and Technology Library (NTB) of PGUPS)

Celebration of the initiation into the "glorious tribe of construction brigade members". 1980.
(Photo by E. Komarov. Science and Technology Library (NTB) of PGUPS)

Brigade! Front and centre!... Brigade commander A.V. Kabanov in the first row on the left (sitting). Baikal-1 student construction brigade. 1977. (Photo by S.F. Spiridonov, collection of A.V. Kabanov. Science and Technology Library (NTB) of PGUPS)

Gathering of Baikal zonal student brigades. Ceremonial assembly of brigades. Commander of Baikal zonal student brigade Yuri Boronenko (on the left) and commissioner I.P. Kiselev are accepting reports from brigade commanders. Severobaikalsk. 1980. (Photo by E. Komarov. Science and Technology Library (NTB) of PGUPS)

Rector of LIIZhT Evgeny Kraskovsky and the manager of Nizhneangarsktransstroy trust F.V. Khodakovsky are viewing the exhibition of wall newspapers of student construction brigades during a gathering. Severobaikalsk. Late 1970s. On the far left of the photo is commander of one of the brigades A.P. Ledyayev. (Photo by S.F. Spiridonov. Science and Technology Library (NTB) of PGUPS)

SEVEROBAIKALSK 1980

Severobaikalsk. 1980 (Photo by E. Komarov. Science and Technology Library (NTB) of PGUPS)

Roadbed of the future line. 1980. (Photo by E. Komarov. Science and Technology Library (NTB) of PGUPS)

Severobaikalsk. 1980. A future supermarket. (Photo by E. Komarov. Science and Technology Library (NTB) of PGUPS)

Severobaikalsk. 1980. Central square. (Photo by E. Komarov. Science and Technology Library (NTB) of PGUPS)

Severobaikalsk. 1980. The so-called “new houses”. (Photo by E. Komarov. Science and Technology Library (NTB) of PGUPS)

Future Severobaikalsk. A gift from builders from Leningrad — the first block of modern, comfortable, earthquake-resistant residential buildings. 1980. (Photo by E. Komarov. Science and Technology Library (NTB) of PGUPS)

The future is here. Severobaikalsk nowadays. 2020.
(Photo by Yu.P. Boronenko. Science and Technology Library (NTB) of PGUPS)

The Severobaikalsk station referred to as “the Baikal Wave” by residents.
Architect: Vladimir Avksentyuk. 1990. (Photo by Roman Denisov.
URL: https://periskop.su/2071040.html?from=sds)

Severobaikalsk. Station Square.
Monument to city builders from Leningrad.
(Photo by Roman Denisov.
URL: https://periskop.su/2071040.html?from=sds)

Certificate for the medal "For the construction of the Baikal-Amur Mainline" which was given to Yuri Boronenko for many years of participation in the movement of Student Construction Brigades and a great contribution to the construction of the BAM. Yuri Boronenko is Chair of the Wagons and Wagon Facilities Department at PGUPS, Doctor of Engineering Sciences, Honorary Professor of PGUPS. (Photo by PGUPS).

In the mid-1980s, the movement of student construction brigades reached its acme. After the beginning of the period subsequently known as "perestroika" and the start of political and economic turbulence in the country, the number of student construction brigades began to decrease. However, in 1985, the Institute's combined student brigade still had 57 line brigades with a total of 1,595 people, including about 500 people working at BAM sites. Many activists of student construction brigades subsequently grew into professors, teachers, heads of divisions and the Institute as a whole. These include: V.V. Babich, A.A. Blatt, Yu.P. Boronenko, N.S. Bushuyev, V.P. Bykov, N.A. Eliseyev, N.N. Kachan, I.P. Kiselev, V.B. Korovkevich, S.M. Kurmashev, A.P. Ledyayev, E.N. Malyshev, V.M. Petrov, V.L. Uralov, S.V. Shkurnikov, V.V. Shmytinsky, P.P. Yakubchik, and many others [19].

The certificate says: "Certificate. Yuri P. Boronenko, on behalf of the Presidium of the Supreme Soviet of the USSR, was awarded the medal "For the Construction of the Baikal-Amur Mainline" by the Decree of the Presidium of the Supreme Soviet of the Russian Soviet Federative Socialist Republic [RSFSR] dated November 29, 1984. Secretary of the Presidium of the Supreme Soviet of the RSFSR [signed]".

The participation of PGUPS in the development of the Eastern operating domain, including the BAM, is currently becoming more and more significant. In 2014–2023, specialists of the University provided methodological support (technology audits) for facilities of the Baikal-Amur Mainline of particular national importance.

The project provides for specific activities to reconstruct and reinforce infrastructure facilities, build second tracks and double-track inserted sections, new large investments are planned to this end. In the attraction zone of the BAM, the commercial development of mineral deposits is underway.

The movement of student construction brigades is being reactivated too. PGUPS again sends its students to the current "construction project of the century" in the area of the BAM for the third working semester in the summer season.

22 student brigades of the university will take part in the 2024 summer work semester. They will be stationed in St. Petersburg, Nizhny Novgorod, Michurinsk, Nizhny Novgorod, and on the BAM. These brigades will employ more than 600 students from the parent university and 460 students from its branches [23].

MILITARY CONSTRUCTION WORKERS AND THE CONSTRUCTION OF THE BAIKAL-AMUR MAINLINE

Groups of military railway workers[8] began to take part in survey and construction works on the BAM in 1926 when the military of the Separate Corps of Railway Troops of the Workers' and Peasants' Red Army engaged in topographical surveying for the future route of the Baikal-Amur Mainline.

After the government made a decision to build the BAM in 1974, railway troops were entrusted to build the eastern part of the mainline, from Tynda to Komsomolsk-on-Amur, with the main line of 475 km and 535 km of station tracks. The construction period was nine years[9] [24].

[8] Railway troops are a kind of special troops that provide logistics support in the Armed Forces of the Russian Federation as part of the system for ensuring the defence capability and national security of the state. The first units of railway troops in the world were created in Russia as part of the engineering troops of the Russian Imperial Army in 1851. Railway troops developed as part of the armed forces of the USSR and then of the Russian Federation.

[9] A section about the contribution of military railway workers to the construction of the BAM prepared on the basis of the report: Shekhtman E.I. "Accomplishing a mission for the construction of the Eastern section of the Baikal-Amur Mainline using the railways troops (1974–1989)". E.I. Shekhtman took part in the construction of the BAM in 1984–1990 (from lieutenant to captain) and 1997–1997 (colonel). He is currently a Major General in reserve, Doctor of Military Sciences, Director of the Leningrad College of Railway Transport, professor at the Railway Track Department of Emperor Alexander I St. Petersburg State Transport University (PGUPS), Professor.

Deployment of military railway workers at the BAM construction sites

In accordance with the order of the Minister of Defence of the USSR, two railway corpses, a total of 40,180 people, were sent to the construction site in 1974. The headquarters of the 35th Railway Corps (ZhDK), which arrived at the village of Tynda, was set up in Sverdlovsk. The headquarters of the 1st Railway Corps was relocated from Kharkov to Chegdomyn station. The central headquarters of railway troops was converted into the main headquarters of the railway troops.

Railway troops acted as the general contractor for the BAM, with all that this implies. It was the first time that railway troops faced a challenge of such a magnitude, which they had to solve under quite peculiar climatic, organisational and engineering conditions. Addressing the challenge required change in approaches to managing construction and installation works. It was necessary to reorganise BAM units and formations, strengthen them with trained personnel, and provide machinery capable of operating under severe conditions. They had to introduce major changes to the logistics and administrative support procedures, set up new patterns for interactions with the country's policymakers, government agencies, executive and local government bodies, with the customer — the Ministry of Railways and the BAM Construction Directorate, as well as with design institutes, specialized divisions of the Ministry of Railways, and other subcontractors.

In the end of November 1974, the first troop trains left for the BAM. Their movement was constantly monitored by traffic controllers of the administration of brigades and line bodies of military communications (VOSO). The commandership was daily updated to have a clear understanding about where they were and whether their provision was full.

The first units began to move into taiga to their stations along winter roads through frozen mari and numerous watercourses. In November 1974, the first sledge-and-tractor train of the 4th Separate Railway Brigade (OdZhDB) began to lay a 168-km-long winter road from the village of Tynda eastward to what would be Dipkun station in the future. It took one month to go that distance.

The work was planned to be carried out on a broad front using an integrated flow method based on a five-beam scheme: from Tynda eastward to Tungala; from Urgal westward to Tungala and eastward to Urkaltu; from Berezovka westward to Urkaltu and eastward to Komsomolsk-on-Amur.

It was necessary to create base stations for the construction project at Tynda, Urgal, Berezovka and Komsomolsk-on-Amur. Moreover, intermediate base stations were designed to be established at Dipkun, Zeisk, Fevralsk, and Alonka. Thus, 14 work clusters were formed that were assigned to particular formations.

By the beginning of construction of the Tynda – Urgal – Komsomolsk-on-Amur section, the transport network was poorly developed. Therefore, in the beginning of the construction it was necessary to solve the problem of building roads for delivering personnel, machinery, materials and structures to the project sites.

The role of road transport increased with the construction and reconstruction of roads. In the winter, winter roads along the rivers Amgun, Duki, Gorin, Gilyuy, Bureya and Niman were widely used. In the summer, earthworks to create sites for military camps were performed and roads were built on both sides of the camps.

Upon the arrival of railway troops at their designated stations, a preparation period began with works to provide normal everyday stationing of units and the beginning of construction works. These included felling and uprooting of trees and bushes; construction and reconstruction of haul roads; construction of basic military construction camps; construction of temporary operations support facilities and maintenance yards; construction of rail length assembly shops and logistics facilities; earth excavation; demolition of structures and removal of utilities; setting up communications and temporary power supply, water supply, and warehouse facilities; arranging for meals, household and medical services for military personnel and their families.

Earth excavation and a range of earthworks

To build the roadbeds for the motorway and railway, borrow pits were explored and excavated. About 6,700 thousand m3 of soil were removed and laid on the Tynda – Urgal section.

In 1984–1989, when the railway sections were prepared for commercial commissioning, it became necessary to reinforce the roadbed and drainage systems with stone. Rock was used to reinforce side slopes and excavations, while cone-shaped elements of engineering structures were reinforced with graded rock fill.

As trees and shrubs were removed in clearings within the right-of-way, the construction of a temporary side road began. In 1975, military railway workers began the construction and reconstruction of the road simultaneously in the following directions: from Urgal eastward; from Komsomolsk westward; from Berezovka, Dzhamku and Dusse-Alin in both directions. On the Tynda – Urgal section, works began immediately after the relocation of units to their base stations: toward Marevaya and Dipkun on the Tynda side; and toward Chabygda, Alonka, Vosporukhan and Fevralsk on the Urgal side.

To build the roadbed for the motorway, the material was taken from local borrow pits; gravel and cobble sediments in the floodplains of the rivers crossed were widely used, too. In parallel with the construction of the roadbed, temporary works and, where necessary, anti-ice structures were erected. Before the construction of bridges across rivers, temporary ice crossings were widely used in the winter season.

The roadbed for the motorway and railway were built in compliance with specifications for the preservation of vegetation.

Thanks to the dedicated work of railway soldiers, the 596-km-long motorway on the Fevralsk – Urgal – Berezovka section was completed in 1977, and the section from Fevralsk to Tynda was put into operation in 1981.

A bridge across the Bureya River and approaches to it were a barrier site. To avoid hindering track laying operations, a bridge on the bypass for the railway and motorway and a roadbed leading to it were built in 1975.

On October 2, 1980, one year ahead of schedule, mechanization battalions were the first to cross the border of the Khabarovsk Krai and the Amur Oblast on the eastern section of the BAM. Here, at the top of the pass, they met with the advanced battalions of the 39th Separate Railway Brigade commanded by Colonel G.I. Kogadko. A rally was held to celebrate this, which was attended by the winners of the socialist competition from units of the brigades. On the border of the two regions, the unit of Captain B. Shinybayev installed a stele formed by two 12-metre rails topped with the emblem of the railway troops.

Due to the elimination of the barrier site on the excavation where the route goes through the Turan Pass on the Ulma – Isa section and here, in the area of five large bridges, the roadbed was ready and the track laying operations could start in 1981 instead of 1980 expected in the plan. These pits had soils of categories 9–11 rather than categories 6–7 used in the design.

Laying the superstructure

The first so-called silver spike was driven into the rail length of the main track on the eastern wing of the Baikal-Amur Mainline near Urgal station on February 5, 1975. In 1976, builders installed a large granite cube on this site, assigning it an honourable role to testify to history the site of the BAM's first spike and to serve as a monument for the descendants.

In 1975, rail length assembly workshops equipped with PPZL-650 semi-automatic rail length assembly lines, sets of gantry cranes, and electric tool kits were established at Dzhalingra, Urgal and Postyshevo stations. Later, rail length assembly workshops were created at Verkhnezeisk and Fevralsk stations, and in

Track laying on the central section of the BAM. 1970s.
(Science and Technology Library (NTB) of PGUPS)

1976 they were opened in the area of Komsomolsk station. 25-metre-long rail lengths were assembled at the workshops and then sent to laying sites using roller platforms.

On the Tynda – Postyshevo section, track was laid by railway battalions using PB-3M track-laying vehicles, while on the Postyshevo – Komsomolsk-on-Amur section, the old rail-sleeper grid was dismantled and a new one was laid with the help of a UK-25/9 track-laying vehicle.

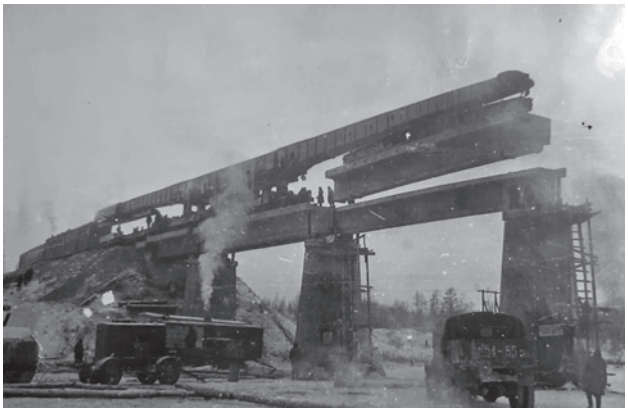
April 17, 1984 marked a historical event when units of the corps moving towards each other met at the junction named after Hero of the USSR V. Miroshnichenko.

As at the end of 1989, military railway workers have in total installed superstructure for 1,465.7 km of the main track and 341.2 km of station tracks on hauls and operation points, excluding Tynda and Urgal junctions.

Engineering structures

One-third of the BAM length is accounted for by bridges, tunnels, viaducts, avalanche protection walls and other engineering structures.

The construction of 15 of the 50 large bridges was entrusted to units of Mostostroy-8 and Mostostroy-10



Military railway workers are replacing temporary spans with permanent ones on the river between 70 km and 90 km from Tynda. Early 1980s. (Photo from the collection of N.S. Rogalev. Science and Technology Library (NTB) of PGUPS)

trusts, and 1,345 engineering structures were built by bridge units and units of the railway troops.

Operation points

Operation points were designed and built based on the capacity of the line to allow for the required amount of traffic and on the availability of convenient sites for building stations and settlements depending on the terrain surface relief and geological structure.

The layout type for passing loops and through stations was mainly longitudinal, with the useful length of 1,080 metres and the number of receiving and departure tracks of two at passing loops and three at through stations taken to allow for the operation of double-length trains.

The completed eastern section of BAM is designed to accommodate freight trains of 6,000 tonnes with 4,000-tonne 4TE10S diesel locomotives and passenger trains with 2TE10M diesel locomotives.

Two tracks with a length of 300 metres were built at each of Verkhnezeisk and Fevralsk stations for parking a fire-fighting train and a wreck train. Besides, these stations each had high side and end platforms, two loading platforms, and a control and technical inspection station. Eight stations tracks were built at Verkhnezeisk station. Fevralsk, Marevaya, Dipkun, Dugda, and Alonka stations got railway warehouses, open platforms, and bulk load platforms. All passing loops were built to a longitudinal design.

Communications and signalling systems

To communicate with external addressees, railway troops used the available communications channels of the Ministry of Communications of the USSR, the Ministry of Defence of the USSR, and the Ministry of Railways of the USSR.

Certain railway communications battalions built communications lines ahead of the completion of the roadbed and engineering structures. The communications line was built using four pairs of wires with a traverse profile. Two pairs were intended to support the operation of construction trains (for communications between the stations and with dispatchers) and the other two were to provide operational communications with units.

With the deployment of heavy r-404 multi-channel radio relay stations, Urgal, Alonka, Verkhnezeisk and Dipkun military camps were able to make long-distance calls directly from the mainline site.

All types of communications used in combination by railway troops when building the BAM provided reliable and continuous management of formations and units.

Power supply of the mainline

The most labour-intensive work during the construction of the 35/10 kV longitudinal transmission line was excavation for the foundations and supports of the transmission lines. In fact, 93–95 % of all the pits on the eastern section of the BAM were dug manually using shovels, jackhammers, concrete breakers, and by no-blowout loosening of rock soils with blasthole charges.

Railway soldiers had major problems when excavating pits in water-bearing ground.

The electrical installation work was performed by wiring trains (EMP-760 in Khabarovsk and EMP-764 in Tynda) of Transenergomontazh trust of Glavtranselektromontazh under the Ministry of Transport Construction.

Construction project outcomes

The Tynda – Komsomolsk-on-Amur railway line was commissioned into commercial operation strictly in accordance with the completion dates and the scope of works for start-up complexes stated in decrees of the Central Committee of the CPSU and the Council of Ministers of the USSR. The acceptance procedures were performed by state acceptance commissions appointed by orders of the Ministry of Railways of the USSR.

The last section of the eastern BAM between Zeisk and Tungala (156 km) was put into commercial operation on September 29, 1989. The entire 1,466-kilometre-long eastern section of the BAM was added to the existing lines of the Ministry of Railways within the scope of the start-up complex. This date began to be celebrated as the Day of Labour Glory of Railway Troops.

The commissioning of the Baikal-Amur Mainline has created favourable grounds for expanding steel mainlines to undeveloped areas in the Asian part of Russia. The construction of the BAM has been essential

Opening a 1,050-metre bridge across the Zeiskoye Reservoir. In 1976–1982, the construction work was carried out by Mostotryad-70 of Mostostroy-10 with the participation of 42 railway brigades and 351 bridge battalions. May 12, 1982. (Photo from the collection of N.S. Rogalev. Science and Technology Library (NTB) of PGUPS)

for the strengthening of the national economy and defence capability of the country.

The work of military railway workers was highly appreciated by the leadership of the country and the Ministry of Defence.

More than 56 thousand railway troops were awarded the medal "For the construction of the Baikal-Amur Mainline"; 25 officers who were Komsomol members were awarded the Lenin Komsomol prizes in the field of production; generals and officers G.I. Kogatko, V.V. Kupriyanov, M.K. Makartsev, S.N. Palchuk, and A.A. Shantsev were awarded the title of Hero of Socialist Labour along with the Order of Lenin and the "Hammer and Sickle" Golden Star.

Orders and medals of the USSR for the construction of the eastern section of the BAM were given to 1,000 people. Medals of the Minister of Defence of the USSR were awarded to 180 recipients. General V.A. Vasiliev and Captain A.B. Chudakov received the USSR State Prize.

By building the eastern section of the BAM the troops were able to gain experience in managing units and military bases in the context of construction management with work being performed on a wide front under severe climatic conditions typical of the Transbaikal region and the Far East, including managing the relocation and movement of units to uninhabited areas.

The silver rails of the BAM running through glens among taiga, crossing rivers and mountain ranges, with trains running around the clock in any weather, carrying passengers and commercial cargo, have become a monument to all of the BAM builders.

Miroshnichenko junction, 497 km. Military railway workers are laying the final rail length with the golden spike on the Tynda–Urgal section during a ceremony dedicated to the occasion. April 17, 1984. To provide the possibility of through traffic, the sections of the 35th Railway Corps (also known as the Tynda Corps) and the 1st Railway Corps (Urgal Corps) were connected to produce a total length of about 1,000 km and open through traffic. (Photo from the collection of N.S. Rogalev. Science and Technology Library (NTB) of PGUPS). The "Golden Word" about military labour valour, responsible attitudes, and the sense of duty during the construction of the Baikal-Amur Mainline (URL: https://dzen.ru/a/Y3byG_R-fXGUjEyg)

REFERENCES

1. Eastern training ground — Transsib and BAM. General characteristics. *Russian Railways*. URL: https://cargo.rzd.ru/ru/9787/page/103290?id=19716 (In Russ.).

2. *Eastern range: the path to a comfortable life for residents and road development*. 2022. URL: https://xn--80aapampemcchfmo7a3c9ehj.xn--p1ai/news/vostochnyy-poligon-put-k-komfortnoy-zhizni-dlya-zhiteley-i-razvitie-dorog/ (In Russ.).

3. Krylov I. *BAM in numbers*. URL: https://arzamas.academy/materials/1729 (In Russ.).

4. *Meeting with veteran construction workers of the Baikal-Amur Mainline*. 2024. URL: http://www.kremlin.ru/events/president/news/73922 (In Russ.).

5. *Alexey Druzhinin presented medals for the 50th anniversary of BAM and the 20th anniversary of Roszheldor*. 2024. URL: https://rlw.gov.ru/news/document/19915 (In Russ.).

6. *50th anniversary of the start of construction of the BAM*. 2024. URL: http://www.kremlin.ru/events/president/transcripts/73928 (In Russ.).

7. Chizhova M. *Live and teach!* 2024. URL: https://www.pgups.ru/news/science_and_innovation/vek-zhivi-vek-uchi/ (In Russ.).

8. *Baikal-Amur Railway: in 4 Parts. Part 1: Surveys and design (according to technical design)* / ed. V.A. Brezhnev. Moscow, 1990; 31. (In Russ.).

9. *Baikal-Amur Railway: technical report on surveys, design and construction: in 2 volumes* / ch. editor V.A. Brezhnev. Velsk, 1997; 1:383; 2:530. (In Russ.).

10. What is known about the Baikal-Amur Mainline. TASS. 2024. URL: https://tass.ru/info/20613909 (In Russ.).

11. Konyukhov A.P. Contribution of Lengiprotrans JSC to the survey and design of the BAM. *Recent history and prospects for the development of Russian railways: scientific and practical conference. Manuscript*. (In Russ.). St. Petersburg, PGUPS, 2024. 15 (NTB PGUPS – Scientific and Technical Library of PGUPS).

12. BAM: The Chronicle of Events: 1974. URL: http://ihaefe.org/bam/

13. *Baikal-Amur Railway: Chronicle of construction 1967–1989: in 2 volumes*. Ministry of Railways of Russia, 1993;2:86. (In Russ.).

14. *A brief chronicle of the construction of BAM*. URL: http://www.tynda.ru/sasw/win/bam/bam_chr.htm

15. *Komsomol chronicle of BAM. Continuation. The second part*. URL: https://komsomol-100.clan.su/publ/komsomolskaja_letorist_bama_prodolzhenie_vtoraja_chast/8-1-0-250

16. Kraskovsky E.Ya. Institute — construction of the century. *Vestn. higher schools*. 1976;3:18. (In Russ.).

17. Boronenko Yu.P. The contribution of the construction teams of LIIZhT and the Zonal Student Team (ZSO) "Baikal" to the construction of the Buryat section of the BAM. *Recent history and prospects for the development of Russian railways: scientific and practical conference. Manuscript*. (In Russ.). St. Petersburg, PGUPS, 2024. 16 (NTB PGUPS – Scientific and Technical Library of PGUPS).

18. Bushuev N.S., Shkurnikov S.V. The contribution of LIIZhT — PGUPS to the construction of BAM. *Student teams: yesterday, today, tomorrow: mater. meeting-competition of student teams of universities of the Ministry of Railways of Russia*. 2004;61-63. (In Russ.).

19. *The Trans-Siberian and Baikal-Amur Railways are a bridge between the past and future of Russia*. Moscow, Transport, 2005;348. (In Russ.).

20. Kiselev I.P., Voronina M.M., Eliseev N.A. *History of the St. Petersburg State Transport University: monograph. In 2 volumes, 3 books. Volume 2, book 1*. St. Petersburg, PGUPS, 2009;404. EDN SYVNNF. (In Russ.).

21. *Design, construction and operation of BAM. Collection of reports of the scientific and technical conference organized by VNIIZHT and LIIZHT* / ed. MM. Filippova. Leningrad, LIIZhT, 1978;229. (In Russ.).

22. Eliseev N.A., Makarov G.G. *60 years with the name of Lenin. From the history of the Komsomol organization LIIZHT: Manuscript*. (In Russ.). St. Petersburg, PGUPS, 1984. 44. (NTB PGUPS – Scientific and Technical Library of PGUPS).

23. Chizhova M. *A student is worth his weight in gold*. 2024. URL: https://www.pgups.ru/news/student_life/student-na-ves-zolota/ (In Russ.).

24. Shekhtman E.I. Fulfillment of tasks for the construction of the Eastern section of the Baikal-Amur Mainline by the Railway Troops (1974–1989). *Recent history and prospects for the development of Russian railways: scientific and practical conference. Manuscript*. (In Russ.). St. Petersburg, PGUPS, 2024. 21. (In Russ.) (NTB PGUPS – Scientific and Technical Library of PGUPS).

ЛИТЕРАТУРА

1. Восточный полигон — Транссиб и БАМ. Общая характеристика // РЖД. URL: https://cargo.rzd.ru/ru/9787/page/103290?id=19716

2. Восточный полигон: путь к комфортной жизни для жителей и развитие дорог. 2022. URL: https://xn--80aapampemcchfmo7a3c9ehj.xn--p1ai/news/vostochnyy-poligon-put-k-komfortnoy-zhizni-dlya-zhiteley-i-razvitie-dorog/

3. *Крылов И.* БАМ в цифрах. URL: https://arzamas.academy/materials/1729

4. Встреча с ветеранами-строителями работниками Байкало-Амурской магистрали. 2024. URL: http://www.kremlin.ru/events/president/news/73922

5. Алексей Дружинин вручил медали к 50-летию БАМа и 20-летию Росжелдора. 2024. URL: https://rlw.gov.ru/news/document/19915

6. 50-летие начала строительства БАМа. 2024. URL: http://www.kremlin.ru/events/president/transcripts/73928

7. *Чижова М.* Век живи, век учи! 2024. URL: https://www.pgups.ru/news/science_and_innovation/vek-zhivi-vek-uchi/

8. Байкало-Амурская железнодорожная магистраль: в 4 ч. Ч. 1: Изыскания и проектирование (по техническому проекту) / Под ред. В. А. Брежнева. М., 1990. С. 31.

9. Байкало-Амурская железнодорожная магистраль: технический отчет об изысканиях, проектировании и строительстве: в 2-х томах / гл. редактор В.А. Брежнев. Вельск, 1997. Т. 1, 383 с.; Т. 2. 530 с.

10. Что известно о Байкало-Амурской магистрали // ТАСС. 2024. URL: https://tass.ru/info/20613909

11. *Конюхов А.П.* Вклад АО «Ленгипротранс» в изыскания и проектирование БАМ» // Новейшая история и перспективы развития железных дорог России: научно-практическая конференция Рукопись. СПб, ПГУПС, 2024. – 15 с. (НТБ ПГУПС).

12. БАМ. Хронология событий: 1974. URL: http://ihaefe.org/bam/

13. Байкало-Амурская железнодорожная магистраль: Летопись стройки 1967–1989 гг.: в 2 т. МПС России, 1993. Т. 2. С. 86.

14. Краткая хроника строительства БАМа. URL: http://www.tynda.ru/sasw/win/bam/bam_chr.htm

15. Комсомольская летопись БАМа. Продолжение. Вторая часть. URL: https://komsomol-100.clan.su/publ/komsomolskaja_letorist_bama_prodolzhenie_vtoraja_chast/8-1-0-250

16. *Красковский Е.Я.* Институт — стройке века // Вестн. высш. школы. 1976. № 3. С. 18.

17. *Бороненко Ю.П.* Вклад стройотрядов ЛИИЖТа и Зонального студенческого отряда (ЗСО) «Байкал» в строительство Бурятского участка БАМа // Новейшая история и перспективы развития железных дорог России: научно-практическая конференция. Рукопись, СПб, ПГУПС, 2024. – 16 с. (НТБ ПГУПС).

18. *Бушуев Н.С., Шкурников С.В.* Вклад ЛИИЖТа — ПГУПСа в строительство БАМа // Студенческие отряды: вчера, сегодня, завтра: матер. слета-конкурса студенческих отрядов вузов МПС России. Рукопись, СПб, ПГУПС – 2004. С. 61–63. (НТБ ПГУПС).

19. Транссибирская и Байкало-Амурская магистрали — мост между прошлым и будущим России. М.: Транспорт, 2005. 348 с.

20. *Киселев И.П., Воронина М.М., Елисеев Н.А.* История Петербургского государственного университета путей сообщения: монография. В 2-х томах, 3-х книгах. Том 2-й, книга 1-я. СПб.: ПГУПС, 2009. 404 с. EDN SYVNNF.

21. Проектирование, строительство и эксплуатация БАМа. Сборник докладов научно-технической конференции, организованной ВНИИЖТ и ЛИИЖТ / под ред. М.М. Филиппова – Л.: ЛИИЖТ, 1978. 229 с.

22. *Елисеев Н.А., Макаров Г.Г.* 60 лет с именем Ленина. Из истории комсомольской организации ЛИИЖТ: Рукопись. Л., ЛИИЖТ, 1984. – 44 л. (НТБ ПГУПС).

23. *Чижова М.* Студент — на вес золота. 2024. URL: https://www.pgups.ru/news/student_life/student-na-ves-zolota/

24. *Шехтман Е.И.* Выполнение задач по строительству Восточного участка Байкало-Амурской магистрали силами Железнодорожных войск (1974–1989 гг.) // Новейшая история и перспективы развития железных дорог России: научно-практическая конференция. СПб, ПГУПС, 2024. Рукопись (НТБ ПГУПС).

Bionotes

Egor Komarov — Independent researcher; Saint Petersburg, Russian Federation; komar77@internet.ru;

Ekaterina Sergeeva — Independent researcher; Saint Petersburg, Russian Federation; sergeevaer@gmail.com.

Об авторах

Егор Комаров — независимый исследователь; г. Санкт-Петербург, Россия; komar77@internet.ru;

Екатерина Сергеева — независимый исследователь; г. Санкт-Петербург, Россия; sergeevaer@gmail.com.

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Corresponding author: Egor Komarov, komar77@internet.ru.
Автор, ответственный за переписку: Егор Комаров, komar77@internet.ru.

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You are remembered by grateful memory, Mr. Betancourt

Mikhail V. Ivanov[1], Igor P. Kiselev[2]✉
[1,2] Emperor Alexander I St. Petersburg State Transport University (PGUPS); Saint Petersburg, Russian Federation
[1] mvifp@mail.ru
[2] kis1347@mail.ru✉

ABSTRACT The article covers the life and certain episodes of the activities of Augustin Betancourt (1758–1814), an outstanding engineer, scientist, architect, teacher, and statesman of Spain and Russia, in Russia. Arriving in Russia at the personal invitation of Emperor Alexander I, and being in the Russian service from 1808 to 1824, A. Betancourt left a notable mark in the history of engineering and construction, in the development of industry and transport of the Russian Empire, and formation of engineering education in the country.

Based on the sources, including those of the XIX century, the article provides information on the main projects implemented by him in Russia, offers characteristics of the relations between Augustin Betancourt and Emperor Alexander I, and other statesmen of that epoch, and reveals some personal and psychological peculiarities of behaviour of the engineer and scientist.

An attempt is made to study the reasons for the tsar's disfavour of Augustin Betancourt and his resignation from government posts. The article describes the conspicuous merits of A. Betancourt, his contribution to speeding up the industrial revolution in Russia, gives the main facts related to the special role of the scientists of Emperor Alexander I St. Petersburg State Transport University (PGUPS),the successor of the Institute of the Corps of Railway Engineers (IKIPS), organised by Betancourt, and the Betancourt's Legacy International Scientific and Educational Project held since 2015 and the annual Betancourt International Engineering Forums dedicated to the development of higher engineering education in the world.

This article is dedicated to the memory of Augustin Betancourt and is published in the year of the 200th anniversary of his passing on July 26 (14), 1824.

KEYWORDS: Augustin Betancourt; Emperor Alexander I; engineering activity; engineering education; industrial revolution; industry; construction; transport

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Обзорная статья

Вас помнят благодарной памятью, господин Бетанкур

М.В. Иванов[1], И.П. Киселев[2]✉
[1,2] Петербургский государственный университет путей сообщения Императора Александра I (ПГУПС); г. Санкт-Петербург, Россия
[1] mvifp@mail.ru
[2] kis1347@mail.ru✉

АННОТАЦИЯ Освещаются жизнь и отдельные эпизоды деятельности в России выдающегося инженера, ученого, архитектора, педагога, государственного деятеля Испании и России Августина Бетанкура (1758–1814). Прибывший в Россию по личному приглашению императора Александра I, и находившийся на русской службе с 1808 по 1824 г., А. Бетанкур оставил заметный след в истории инженерного, строительного дела, развитии промышленности и транспорта Российской империи, становлении в стране инженерного образования.

На основе источников, в том числе XIX в., приводятся данные об основные проектах, осуществленных им в России, дается характеристика взаимоотношений Августина Бетанкура с императором Александром I, другими государственными деятелями той эпохи, раскрываются некоторые личностные и психологические особенности поведения инженера и ученого.

Предпринята попытка исследовать причины царской опалы на Августина Бетанкура и его отставки с государственных постов. Дано описание выдающийся заслуг А. Бетанкура, его вклада в ускорение промышленной революции (промышленного переворота) в России, приведены основные факты, связанные с особой ролью ученых Университета путей сообщения Императора Александра I (ПГУПС) — правопреемника организованного Бетанкуром Института Корпуса инженеров путей сообщения (ИКИПС), проведением с 2015 г. Международного научно-просветительского проекта «Наследие Бетанкура» и ежегодных Бетанкуровский международных инженерных форумов, посвященных развитию высшего инженерного образования в мире.

Статья посвящена памяти Августина Бетанкура и публикуется в год 200-летия его ухода из жизни 26 (14) июля) 1824 г.

КЛЮЧЕВЫЕ СЛОВА: Августин Бетанкур; император Александр I; инженерная деятельность; инженерное образование; промышленный переворот; промышленность; строительство; транспорт

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Augustin Betancourt[1]

BACKGROUND

Augustin Augustinovich Betancourt[2] (1758–1824), as he was called in Russia, an outstanding engineer, scientist, architect, educator, statesman of Spain and Russia, who arrived in the Russian service at the personal invitation of Emperor Alexander I, left a notable mark in the history of engineering, construction, development of industry and transport of the Russian Empire.

Augustin Betancourt was born on February 1, 1858 in Puerto de la Cruz, Tenerife, Canary Islands, Spain, a son[3] of Augustin de Betancourt y Castro y Jaquez de Mesa (1720–1795), lieutenant colonel of the provincial militia, an educated and successful manufacturer. Their ancestor was Baron Jean de Betancourt, King of the Canary Islands, who conquered the archipelago for the Spanish crown in the early 15th century.

In the late 1790s, Augustin Betancourt, who received his university and art education in Madrid[4] and studied engineering in Paris[5], was one of the most educated and successful engineers, scientists, and entrepreneurs in Europe. He excelled in a number of scientific and engineering fields: mechanics, machine theory, thermal engineering, construction, and carried out a number of important building and industrial projects in Spain and France.

In 1801, Betancourt was appointed Inspector General of Roads and Canals of Spain (Minister of Transport). He was directly involved in the collection and creation of one of the first technical museums in Europe — the Royal Cabinet of Machinery in Madrid and one of the first engineering educational institutions in Spain — the School of Engineers of Roads, Canals and Ports.

[1] Platon Tyurin. Augustin Betancourt. 1859. Canvas, oil. 70×60 cm. The Central Museum of Railway Transport of the Russian Federation (TsMZhT RF).

[2] Spanish by *Agustín José Pedro del Carmen Domingo de Candelaria de Betancourt y Molina*.

[3] There were 11 children in the family. Augustin's brothers: Jose (1757–1816), Juan (1759–1759), Pablo (1763–1834), Marcos (1771–1806); and sisters: Maria del Carmen (1758–1824), Maria Magdalena (1760–?), Luisa (1764–1841), Catalina (1765–1837), Maria del Pilar (1768–1850), Leonor (1769–?).

[4] He graduated from the Escuela *Reales Estudios de San Isidro (Reales Estudios de San Isidro)*, a broad-based university-type institution of higher learning, and concurrently from the Real Academia de Bellas Artes de San Fernando (Real Academy of Fine Arts of San Fernando).

[5] The Royal School of Bridges and Roads (École royale des ponts et chaussées, today the École nationale des ponts et chaussées in Paris, French: L'École nationale des ponts et chaussées).

The political situation in Europe that changed in the early years of the 19th century — the occupation of Spain by Napoleon and the immediate threat to Augustin Betancourt's life — forced him to leave Spain. He accepted the proposal of Russian Emperor Alexander I and in 1808 Augustin Betancourt arrived in St. Petersburg and was involved in the preparation of' the manifesto[6] "Ordinance on the Management of Water and Land Communications" under the guidance of M.M. Speransky, the closest associate of Emperor Alexander I [1]. Betancourt participated in the creation of the Corps of Railway Engineers in accordance with this document and in the organisation of the Institute of the Corps of Railway Engineers (IKIPS), the first Russian engineering transport university[7]. In his new position of the inspector (rector) of this Institute, Betancourt built a system of training engineers in it based on deep personal knowledge of the best European experience, combining deep theoretical training with specific and diverse practical training, laying the foundations of modern engineering education in Russia.

On July 26 (14), 2024 we marked the 200th death anniversary of Augustin Betancourt. Two centuries! And the memory of him is not erased, does not pass into a brief encyclopaedia article, becoming a tribute of historical courtesy to many figures of the past, forming the background for the true giants — path breakers. For historians of science and technology, Betancourt is an outstanding engineer and scientist, educator and organiser who greatly influenced the formation and development of the technical civilisation of Russia, Spain, and Europe as a whole and... world engineering. But he is hardly properly appreciated in the mass consciousness. And this cannot be explained by the fact that General Betancourt was a foreigner for Russian people, was not a member of social groupings ready to give him his due and thus strengthening their authority (aristocrats, military, academics, bohemians, etc.). And the memoir literature about him is scarce. However, a more convincing approach to solving this paradox is the explanation given by outstanding philologist and cultural critic Yury Mikhailovich Lotman. He noted that culture is most sensitive to the "outbursts" of new ideas and deeds that change the image of the epoch: they are remembered. And engineering is perceived as a calm and slow embodiment of "bursting" discoveries of science in ordered and inconspicuous, almost routine procedures. *"The creativity of even a good engineer seems to melt into the general anonymous progress of engineering. If a bridge collapsed, the engineer's name would probably be remembered because it would be an extraordinary event. The virtues of a good bridge, unless they are extraordinary, are not noticed by anyone. The development of engineering is generally predictable"* [2]. And Betancourt's bridge did not collapse even during the terrible St. Petersburg floods, and the granite columns of St. Isaac's Cathedral and the Alexander Column, installed using his technology, are steadfast.

Articles reflecting some well-known person's contribution to science, culture, and politics are most often published on the anniversary of the birth of the great man: the initial date of his birth seems to open the prospect of growth of the talent, its development to manhood and heavenward flight. And death is a personal matter, tragically intimate and sad. The last breath of a genius brings us back to his past — the human past, compassion plunges us into sadness, but also invites to a warm desire to understand the casual, but so close to everyone side of the experience of the joys and sorrows of ordinary, everyday life, communication with relatives and friends, hopes and worries, ups and bad luck. All the prosaic actions of a genius are certainly imbued with a high idea of fulfilling one's mission. But, paraphrasing an image from Mandelstam's poem, we can say that not only lists of discoveries and works of the remarkable man have come down on us from the past, but *"his breath, his warmth have already laid on the panes of eternity"*. Therefore, we would like to remember the great achievements of Betancourt and everything human, very human, connected with him.

Augustin Betancourt's deeds in the Russian Empire are truly grandiose, their enumeration sometimes causes disbelief. Here are just the main projects implemented by A.A. Betancourt: the design and construction of a giant complex of the Nizhny Novgorod Fair with numerous commercial buildings, warehouses, religious buildings, service and transport infrastructure — actually a new city at the confluence of the Volga and Oka Rivers; reconstruction of the Tula arms factories with steam engines, new machine tools and mechanisms; construction of a cannon foundry in Kazan as per Betancourt's design; surveys and preparation of reconstruction projects for the Vyshnevolotsk, Tikhvin and Mariinsk water systems; survey of communications in the southern regions of Russia, including the Caucasus and the Crimean Peninsula; reconstruction of the Saint Petersburg-Moscow Highway; construction of flood protection structures in Tver; re-

[6] *Manifesto* (Latin *manifesto* — showing, revealing; Late Latin *manifestum* — call) — a type of legislative document (act) issued by the head of state or the highest body of state power and addressed to the population of the country. In the Russian Empire — a state document of the highest legal force, adopted in connection with an important political event (declaration of war, peace, etc.), proclamation of any fundamental ideas, innovation, transformation.
[7] Today it is Emperor Alexander I St. Petersburg State Transport University (PGUPS).

equipment of the Imperial Alexander Manufactory using new technologies; organisation of regular cleaning of the Kronstadt Port by a steam dredger of own design built at the Izhora Plant; construction of new bridges in Tula and across the Izhora River in the suburbs of Saint Petersburg; construction of the first permanent bridge, the Kamenoostrovsky Bridge, over the Malaya Nevka River in Saint Petersburg and construction of permanent approaches with abutment piers to the St. Isaac's pontoon bridge; construction of the Moscow Manege of unprecedented size with a floor 45 m wide and 180 m long without interior supports within less than six months, in which *"a regiment could freely manoeuvre"*; development of the project and construction of the complex of buildings of the State Printing Office (now part of Goznak Federal State Unitary Enterprise (the National Mint)) in Saint Petersburg, with the organisation of technological production, complicated both then and now, of special paper for paper money issue (the technology of paper cooking and the design of most of the machines were developed by Betancourt); preparation of the project and organisation of the construction of the Mint in Warsaw; direct participation in the engineering project for the construction of St. Isaac's Cathedral in St. Petersburg; development of the project for "Girl with a Jug", a world-famous park fountain in Tsarskoye Selo, with a sculpture by Pavel Sokolov. Starting from 1816, A.A. Betancourt headed the Committee of Structures and Hydraulic Works, the town-planning authorities of Saint Petersburg in the 19th century, which created the unique architectural appearance of the centre of Saint Petersburg; from 1819 to 1822, Augustin Betancourt was General Director of Transport Routes, as currently defined — the Minister of Transport of the Russian Empire and much, much more... [3, 4].

But the greatest achievement of Augustin Augustinovich Betancourt was the creation of the Institute of the Corps of Railway Engineers: the first engineering higher transport educational institution of the country, which laid the foundation for modern engineering education in Russia [5].

What was this great man who made such a significant contribution to Russian technological, and not only technological culture, like? The memoirs and accounts of his contemporaries give an "external" approach to his personality. Whereas the recently published correspondence between Betancourt and his relatives is an "internal" source. The most in-depth and concise characteristics by an external observer is probably given by an extract from the memoirs of F.F. Vigel[8] who became a translator and assistant to a Spanish general who came to Russia. F.F. Vigel was an unpleasant person. As writer V.V. Veresaev, a great connoisseur of Pushkin's time, wrote, *"he was a person of the most disagreeable disposition: angry, envious, selfish, and contentious... At the same time, he was educated and very intelligent... Even his relatively soft words were evil"* [6]. Though Vigel's praises in most cases can be considered to be specks of that genuine gold of life which has reached us, having been sifted through a fine sieve of Vigel's ill-will. Pushkin and Betancourt were the two contemporaries Vigel used to speak about almost with delight: *"The old man seemed lively, cheerful, but nevertheless honourable.... The old man's veins blazed with the heat of the glowing sky, under which he was born, and, like all quick-tempered people, he had a good heart and cheerful disposition. He had a profound intellect, and his conversation was interesting"* [7].

At a cursory glance at the life of Betancourt, one might think that he was always lucky and got everything easily, happiness came easy to him almost by itself: a man of birth, natural aptitude, good education, support of relatives, favour with ministers and rulers. But if we take a closer look, things do not look so radiant. At the age of fifty Betancourt left Spain forever because of Napoleon's invasion. Madrid was taken by the French, his engineering school was destroyed by enemy artillery, all projects for the improvement of the country turned to dust, the safety of Augustine's family was in danger, and the fifty years lived were covered with ashes. And yet the Minister-Engineer invited to Russia by Alexander I emitted light and warmth!

Later, Betancourt himself revealed the secret of his "luck". 62-year-old Betancourt expressed his life credo in a letter to his sister Maria, without falling into easy optimism, but defending the "determination" and adherence to his cause: *"St. Petersburg, June 10, 1820. My Dear Maruca... So many things have happened since we parted in 1777! While you, on your part, have suffered so much meanness, I, on my part, have experienced not less, though the Lord has given me excellent health and determination, so that nothing has frightened me on any occasion, and I have immediately resumed my party according to the circumstances I faced, so that as a result I do not regret a single step I have taken in life to find prosperity for my family without deviating from what honour and patriotism prescribe..."* [8].

He followed his way of self-actualisation. At the age of fifty, Betancourt went to Russia. It was a feat. Born at the latitude of Cairo and Delhi, Betancourt was mensch enough to move 30 degrees northward to damp, rainy and cold Saint Petersburg. Betancourt died at the age of

[8] Filipp Filippovich Vigel (1786–1856) — Russian statesman, one of the most famous memoirists of the Pushkin era, author of "Notes", widely known and popular in the XIX century. repeatedly reprinted since 1864.

66. Most of his Western contemporary engineers who avoided changing the climate lived longer.

While in France, in 1790, Betancourt married Anne Jordaan, an Englishwoman of humble birth; it was a civil marriage, based on revolutionary rules — without any wedding. The commoner Englishwoman could not but cause triple alertness among Augustine's compatriots with noble Spanish royal blood in their veins. The marriage was not registered in Spain and thus it was legally null and void. In 1797 only, the Spanish authorities officially confirmed it, when the family had children jumping around and Betancourt held a high position.

Most importantly, Betancourt was happy in his family. *"And I can tell you without any exaggeration that there are few such well-bred children as mine, and that everything, everything they had was due to the excellent principles and constant care with which their mother always watched over all their actions"* (June 10, 1820) [8]. And this is what Vigel, who did not think much of Betancourt's wife, Anna Ivanovna, as she was called in Russia, wrote about his daughters: *"Fortunately, the daughters did not resemble Anna Ivanovna in any way, they were rather like their father Augustin Augustinovich... every word of them was full of grace of mind and heart; one could listen to them with admiration when they played the harp or piano, admire their drawings and their fandango folk dance and bolero... Could we wonder at their father's boundless tenderness to them, and who would not be happy with them?"* [7].

For the Betancourts, their family was a place where the essence of life is formed, which drives a person going out into the vastness of existence, rather than an escape from the imperfect "big" world. There was no good school in Tenerife, but the father taught his children foreign languages, maths, and literature. Augustine succeeded the most; in Madrid, the young man was admitted to the San Isidro Royal School (Institute) to continue his education. The family was intolerant to idleness and irresponsibility, and negligence to complete any work started. That is why Augustine had an aspiring desire to achieve the highest perfection in whatever he did — to surpass the results of others.

It became his life programme. In his correspondence with relatives, Betancourt evaluates his endeavours in this way: *"For the rest of my life I will have the joy of having created the best Cabinet of Machines in Europe"*. (Paris, March 6, 1789) [8]. *"I have created a military institute*[9] *here, that is, a College for engineers, and those who graduated from it, acquitted themselves well and even better than what was expected of them in the last war. (I can boast that no educational institution teaches mathematics better than my institution)"* (September 15, 1814) [8]. And this is not a boast, but a fair assessment of his work.

For Betancourt, the meaning of the family was reduced to an intimate and beautiful model to be expanded into the big world, improving it as much as possible until a clear and worthy result is achieved. Betancourt manifested the oneness of a good family and a good society in paradoxical solutions. For example, finding the situation in Spain dangerous for his family, he started looking for an acceptable refuge, but receiving an invitation from the Russian Emperor, he replied that he needed to discuss it with his family. In a letter to his elder brother from Saint Petersburg dated September 15, 1814, he wrote: *"Not to die together with my family, ask for refuge in a foreign kingdom, where I could arrange it in safety, Russia seemed the most suitable for this... I left my family in Paris... and arrived here... and I was honourably welcomed by the Emperor, who made me such tempting offers through other people, if I enter his service. However, I neither accepted his offer, nor refused, but returned to Paris, saying that I needed to discuss it with my family"*. [8].

And it is no wonder that Betancourt also perceived his service with the Russian Emperor in a family context, continuing his story as follows: "The Emperor and all the members of his family welcomed me with due respect, which I did not expect and which I did not count on... I can assure you that he treats me as a friend, rather than as a monarch treats a subject" [8].

At that time, the Tsar, under the influence of Speransky, was going to educate a new generation of Russian reformers and create two special educational institutions: the Tsarskoye Selo Lyceum and the Institute of the Corps of Railway Engineers. The Lyceum became the family that developed the core of future statesmen. And the engineering institute with its "family atmosphere" (of high education and creative flight) was to cherish responsible Russian engineers.

Betancourt himself chose Prince Yusupov's Palace to house the Institute of Railway Communication. The mansion was purchased with the sovereign's funds, and Betancourt settled in it with relief, although it was state-owned accommodation. Betancourt's choice was not random. The beautiful building, designed by Giacomo Quarenghi, was a manor house. A park spread between the planned streets of the "regular" capital, with a low elegant mansion with a portico and two wings in

[9] This is the Institute of the Corps of Railway Engineers, already mentioned earlier, which was a paramilitary school. Betancourt partly rightly calls it a "Military Institute". The idea of organising a paramilitary institution of higher engineering education, whose graduates received military ranks, expressed by M.M. Speransky and supported by Emperor Alexander, made it possible to attract people from the nobility, where military and diplomatic service was highly valued, to the institute.

the middle of the park. *"Here, after the establishment of the institute really founded by him, we can say, he enjoyed settled lifestyle. He occupied the largest, best part of the building... The building of the institute with all its accessories was like a separate kingdom"* [7].

The cultural attitudes of the House of Betancourt implemented a sentimental model very popular in Europe in the early 19th century. Positive feelings of care, affection, love and friendship unite people into an informal circle. Here the unity of people with nature is restored (a palace with a park, a manor of the nobility or country-house). Reducing such interpersonal dealings to purely family relations only would be oversimplification. Betancourt sought to create the Institute as a large family, including, first of all, teachers, whose high professionalism was combined with tolerance and softness in communication. To describe the close circle of Betancourt's colleagues, we turn to the same acrimonious Vigel: a man not inclined to idealise anyone. He described almost all of them with a tone of sentimentalism. Professor Bazen: *"He did not allow himself to rebuke anyone, but found a way to give praise to everyone and about everyone... He was extremely loved by everyone, starting with me"* [7]. Professor Potier: *"...instead of courtesy, good-naturedness, with certain mischief"* [7].

But one should not think that neither the Institute nor the Imperial Lyceum of Tsarskoye Selo became a refuge for Manilov's dreams. Pushkin called the Lyceum students of the first admission brothers, members of one family, exclaiming: *"Tsarskoye Selo is our Homeland!"*. Betancourt carried out that cultural programme which asserted personal independence of an individual in the House. Betancourt strived to establish the Institute as a large family. Betancourt's Institute became a carrier of that spirit of freedom and creativity, humanism and democracy, which at that time was called liberalism.

Betancourt was surrounded by radicals and freethinkers, and identified with reformer M.M. Speransky. Both of them were guardians and immediate superiors of G.S. Batenkov, a graduate of the Institute of Transport, meant by the Decembrists to become the nominal head of the state. Ivan Matveyevich Muraviev-Apostol, who was an ambassador to Madrid in the early 19th century (until 1805), was one of the most active participants in the conspiracy that ended with the assassination of Paul I on March 11, 1801. They thought of transferring the power to Alexander I through the restriction of his authority by a constitutional document.

Betancourt met Muraviev-Apostol in Madrid. Then they met in Russia, and when in 1809 the first students were admitted to IKIPS, two of Ivan Matveyevich's sons — elder Matvey and middle Sergey — were among them. Their junior brother Ippolit did not study at the Institute. All three brothers became Decembrists. Junior Ippolit shot himself when he realised that the uprising had been crushed, middle Sergey was hanged, and elder Matvey was sentenced to death, replaced by hard labour.

A Decembrist, a famous writer Aleksandr Bestuzhev-Marlinsky, who was exiled to the Caucasus as a soldier in 1826, was Betancourt's adjutant. The Betancourt's Institute was considered unreliable. Its graduate, A.I. Delvig (a cousin of poet A.A. Delvig, a friend of Pushkin) recalled: *"Emperor Nicholas and Grand Duke Mikhail Pavlovich did not like the engineers from the Institute of Transport very much, and thus — the institution that nursed them. This dislike was based on the opinion that scientists, and therefore, freethinkers come out of the institute..."* [9].

The thirteen-year long idyll at the House (the Yusupov Palace) ended in 1822, when Betancourt had to move to a rented private apartment, and part with the Institute's management. By the early 1820s, Alexander I knew that some graduates of the Tsarskoye Selo Lyceum and Institute of Railway Transport had become conspirators. It was not Betancourt's personal fault, but the fruits of Speransky's ideas who became a disgraced liberal at that time. And Betancourt was dismissed from the position of inspector of the Institute to interrupt the process of liberalisation of the minds of his students. It is known that Betancourt took part in the selection of the first students of the Institute of Railway Transport: *"following the course of admission examinations tirelessly, General Betancourt tried to personally familiarise himself with the abilities and degree of knowledge of every applicant, which is proved by the notes he made on the examination lists"* [10]. Therefore, it is no wonder that Betancourt's resignation did not entail a decline in the level of the institute: the traditions of teachers and students were already deeply rooted in the soil prepared by Betancourt. Moreover, Betancourt also chose his direct successor: the leader of engineering in Russia.

In 1822, during the first graduation of warrant officers (technicians) from the Military Construction School[10] to the Railway Construction Unit, they were presented to Inspector of the Institute A.A. Betancourt. According to A.I. Delvig, Betancourt *"noticed a handsome, but not very tall young man, Melnikov, who was among them... And, noticing that he spoke good French, he said that the young man should continue his studies, and according to the degree of knowledge acquired by*

[10] This is about the Military Construction School (Vocational School) organised in 1820 by A. Betancourt at IKIPS — a specialised secondary technical school with a two-year term of study.

Melnikov at the Military Construction School, seconded him to continue his studies at the Institute of Railway Communication" [10]. At the time of Alexander's II Great Reforms, an outstanding engineer Pavel Petrovich Melnikov became the Minister of Railways. He was the first teacher to start lecturing students on mechanics in Russian already in the 1830s, thus setting the standard of teaching at higher technical schools, repeating the experience of Lomonosov in translation of foreign culture into the Russian national version when writing scientific texts and conducting classes at the academic university.

Betancourt's cultural attitudes combined layers of different historical types. He adopted enlightened monarchism from Spanish culture, dating back to the medieval tradition of suzerain worship, and strict rules of morality. In England, Betancourt was imbued with the spirit of freedom of scientific technical enquiry and uninhibited economic activities. In France, Betancourt saw the strengths of the alliance between the state and science.

The formation of any sphere of the national culture is fruitful only when it is open to contact with other cultures, which in turn have the same openness. A close network of intersections of traditions emerges, which is the world culture, where each individual culture acts as a national version of the world culture.

Betancourt ensured the transfer of general European scientific and technical practices to Russian soil. This great Spaniard introduced us not to the Spanish closed tradition, but the Spanish version of the broad European culture, which was further enriched in Russia thanks to the universal education and versatility of Betancourt's cognitive interests. In his youth, he studied engineering at St Isidore's School, and attended the Academy of Fine Arts. Betancourt became an excellent draughtsman and was later elected a full member of this Academy and sat in Madrid as an academician next to Goya. Betancourt always had passion to create beautiful things. All the sides of his rich and versatile talent were manifested in Russia.

From the beginning of Peter the Great's Reforms, Russia began getting out of the Middle Ages. The Renaissance was the nearest civilisational stage of national development. There is every reason to believe that the Renaissance succeeded in Russia and Betancourt was one of the brightest figures of the Russian Renaissance, commensurate with the Renaissance of other European countries [11]. Intercultural ties are fundamental to the fruitful development of every national culture if they are equitable and constructive, rather than a seductive manipulation of one party for the purpose of "soft" but self-serving subjugation of the other. Coming to Russi8a in the early XIX century, Spanish engineer Augustin Betancourt showed an optimal option of noble and non-traumatic interaction between the Western European and Russian cultures for the benefit of the development of the world civilisation. And technical achievements were carried out on the basis of broad cultural transformations.

The main conflict of Betancourt's personality structures revealed itself in the inconsistency of the patriarchal legitimist attitudes to the informal, personal, "warm-hearted" co-operation between the engineer and the absolute monarch and to the technical, originally Renaissance transformation of the world through the construction of a perfect city, opening a way to the free development of the society.

DECLINING YEARS

The alliance between the Tsar and the engineer was temporary. Starting from 1814, the Emperor abandoned his policy of reforms and gradually turned to protective actions, transferring executive power to Arakcheev. The management of the Institute was handed over to the Emperor's gruff, poorly endowed uncle, Duke Alexander of Württemberg. Betancourt accepted this honourable dismissal with usual dignity, especially as his health was failing. But for thirteen years the students of the Institute received the most important proof of the high, honourable professional existence: they had the image of a brilliant engineer, thinker and teacher before them.

The strength of his warm-hearted affection is eloquently evidenced by the fact that the death (in childbirth) of his eldest daughter Caroline — his favourite — hastened the death of Betancourt. He was buried next to her at the Smolensk cemetery. The father lived only six months longer than his daughter.

The universality of Betancourt's personality manifested itself precisely in the fact that he did not evaluate intellectual activity as abstract theorising. It was the beginning of creativity only. Therefore, in Russia, he was able to implement almost all his plans, which he failed to do in Spain. Colonel I.S. Rezimon (later Major-General, in 1835 — acting director of the Institute), who worked under Betancourt, recalled his late boss in the obituary article "On the Service and Labours of Lieutenant-General de Betancourt": *"He cared not only about the science; he was more or less familiar with all mechanical arts. Improving in practice and theory, he had certain skilfulness in the production of crafts, with which he often excelled the most skilful workers. He could equally practise with the most skilful turner and the commonest carpenter. Working with implements equally handily, he invented those he lacked, and every day he expanded the field of technology. To show how quick his hands were, it is enough to mention that he separated a hair lengthwise with a simple razor, without the slightest difficulty"* [12].

Maligned, belied, dismissed from offices, disfavoured by the sovereign who forgot, like his attendants, the achievements of the great engineer for the good of Russia, Augustin Betancourt died on July 26 (14), 1824 in a rented private apartment[11].

Augustin Betancourt was buried at the Smolensk Lutheran Cemetery. In the hour of grief for the family, they were supported by true Russian patriots and connoisseurs of his talent — merchants from Nizhny Novgorod. For many years, being eternally grateful to him, they admired and, with great effect for their trade, used the miracle he created: the Nizhny Novgorod Fair, or as defined currently, the largest trade and transport-logistic complex in the world at that time. The Fair became the embodiment of architectural, construction, technological, commercial, transport, cultural and social perfection of its time. The complex also had a spiritual and cultural component: the Orthodox Spassky Cathedral, the Armenian-Gregorian Church and a Muslim Mosque.

The merchants from Nizhny Novgorod took on the task of the funeral, at the cast-iron foundry in Nizhny Novgorod, a majestic monument in the form of a cast-iron column, about 7 metres high, was made to the designs of Auguste Montferrand. Cast-iron boards are on the edges of the pedestal, with an inscription in Latin on one of them: *"Noble scientist Mr. Augustin de Betancourt lies here. Born in the Canary Islands in 1758. He died in Saint Petersburg in 1824. Passer-by, pray for his salvation"*. The other edge of the pedestal holds a cast-iron plaque with an inscription in French: *"A Fair gift from Nizhny Novgorod"* [4].

In the tsarist era, Augustin Betancourt was not frequently referred to in the literature, seldom in the historical works devoted to the Railway Department and the Institute of the Corps of Railway Engineers. In the Soviet era, this trend maintained. The sixth volume of the Big Soviet Encyclopaedia (BSE), published in 1927, contains a small article about the French (?) Engineer A. Betancourt. In the second edition of the BSE (published in 50 volumes in 1949–1958) there is no reference to A. Betancourt[12].

The veil of silence about the activities of Augustin Betancourt started opening in the USSR in the mid-1960s in the atmosphere of the "Khrushchev's thaw". The first Soviet biographer of A. Betancourt, A.N. Bogolyubov (1911–2004), was a scientist-mathematician, mechanic by education and historian by vocation. His monograph "The History of Mechanics of Machines", which presented the multifaceted degree of detail of Augustin Betancourt, was published in 1964.

The Leningrad Institute of Railway Transport Engineers (LIIZhT)[13] is becoming the centre for studying the work of the great engineer and scientist. Under the guidance of Rector of the University E.Y. Kraskovsky, the University scientists professors V.E. Pavlov, V.I. Voronin, A.P. Ledyaev and others for many years conducted research work, studying the biography and works of Augustin Betancourt, bringing his name back from the oblivion.

In 1979, LIIZhT initiated a campaign to perpetuate Betancourt's memory, having obtained permission from the city authorities to transfer Betancourt's ashes from the Smolensk Cemetery, where he was buried in 1824, to the 18th century necropolis — to the Lazarevskoye Cemetery of the Alexander Nevsky Lavra. Here are the graves of many worthy people who left a significant mark in the history of the country and great city. The tombstone of Betancourt's grave was also moved here.

In recent decades, by the efforts of scientists, researchers, publicists of Russia, Spain, France and other countries, much work has been done to highlight the outstanding contribution of Augustin Betancourt to the development of engineering in the world, especially in Spain, Russia and France, to popularise his scientific and engineering creativity, the results of his organisational activities in the implementation of numerous industrial, transport and construction projects.

Since 2015, upon the initiative of PGUPS, the International Scientific and Educational Project "Betancourt's Legacy", which involves representatives of many engineering educational institutions and organisations from Russia, Spain, France and other countries, has been successfully developed. Since 2015, on the day of PGUPS's foundation on December 2, the Betancourt International Engineering Forum has been held in Saint Petersburg bring together a large audience of scientists and organisers of higher engineering education, [4].

Scientists from LIIZhT – PGUPS certainly play a special role in making the name of Augustin Betancourt more and more known to the broad public. This was especially noted by Juan Cullen Salazar — a famous Spanish chronologist, the keeper of the Betancourt family archive in La Orotava (the Tenerife Island, Spain), the author of the unique work "Augustin de Betancourt and Molina. Personal Letters". He placed the following words on the title page of this edition: *"Dedicated to the St. Petersburg Transport State University which did not allow the name of Augustin de Betancourt stay in oblivion"* [13].

[11] For the last two years of his life, A. Betancourt lived at 19, Bolshaya Morskaya St., Saint Petersburg.
[12] It should be recalled that there was an ideological and political campaign to combat cosmopolitanism in 1948–1953 in the USSR, which emphasised the unconditional priority of Russian figures in all areas of scientific and engineering developments.
[13] Today — the Emperor Alexander I St. Petersburg State Transport University (PGUPS).

REFERENCES

1. *Complete collection of laws of the Russian Empire since 1649*. St. Petersburg, 1830. T. XXX. 1808–1809. 23.996. November 20. Ch. VIII. § 133. P. 1312. (In Russ.).
2. Lotman Yu.M. *Culture and explosion*. Moscow, Progress, 1992;26-32. (In Russ.).
3. Kiselev I.P., Panychev A.Yu., Fortunatov V.V. *Betancourt's engineering heritage in Russia: textbook*. St. Petersburg, PGUPS, 2021;192. (In Russ.).
4. Kiselev I.P., Panychev A.Yu., Fortunatov V.V., Kuznetsov D.I., Zinchenko S.A. et al. *World Heritage of Betancourt: textbook*. St. Petersburg, St. Petersburg State Transport University of Emperor Alexander I, 2022;575. EDN DXPRFI. (In Russ.).
5. Kiselev I.P., Voronina M.M., Eliseev N.A. *History of the St. Petersburg State Transport University: monograph*. St. Petersburg, St. Petersburg State Transport University of Emperor Alexander I, 2009;404. EDN SYVNNF. (In Russ.).
6. Veresaev V. *Pushkin's companions. Vol. 1*. Moscow, 1993;380. (In Russ.).
7. Vigel F.F. *Notes. In 2 books. Vol. 2*. Moscow, 2003;789-792. (In Russ.).
8. Salasar G.J. *La familia de Agustín de Betancourt y Molina. Correspondencia intima. Islas Canarias*. Domibari Ediciones, 2008;242-243.
9. Delvig A.I. *My memories*. Vol. I. Moscow, 1912;87. (In Russ.).
10. Zhidkov S.M. *Institute of Railway Engineers of Emperor Alexander I: Historical sketch*. St. Petersburg, 1899;500. (In Russ.).
11. Ivanov M.V. Betancourt's cultural mission in Russia. *Proceedings of Petersburg Transport University*. 2008;26-36. (In Russ.).
12. Rezimon I.S. About the service and works of Lieutenant General de Betancourt. *Journal of Railways*. 1826;1:11;3-54. (In Russ.).
13. Augustin de Betancourt i Molina. *Personal letters*. Madrid, Publishing House of the Alexander Pushkin Foundation, 2009;103. (In Russ.).

ЛИТЕРАТУРА

1. Полное собрание законов Российской империи с 1649 года. Санкт-Петербург, 1830. Т. XXX. 1808–1809. 23.996. 20 ноября. Гл. VIII. § 133. С. 1312.
2. *Лотман Ю.М.* Культура и взрыв. М.: Прогресс, 1992. С. 26–32.
3. *Киселёв И.П., Панычев А.Ю., Фортунатов В.В.* Инженерное наследие Бетанкура в России: учебное пособие. СПб.: ПГУПС, 2021. 192 с.
4. *Киселев И.П., Панычев А.Ю., Фортунатов В.В., Кузнецов Д.И., Зинченко С.А. и др*. Всемирное наследие Бетанкура: учебное пособие. СПб.: Петербургский государственный университет путей сообщения Императора Александра I, 2022. 575 с. EDN DXPRFI.
5. *Киселев И.П., Воронина М.М., Елисеев Н.А.* История Петербургского государственного университета путей сообщения: монография. СПб.: Петербургский государственный университет путей сообщения Императора Александра I, 2009. 404 с. EDN SYVNNF.
6. *Вересаев В.* Спутники Пушкина. Т. 1. М., 1993. 380 с.
7. *Вигель Ф.Ф.* Записки. В 2 кн. Т. 2. М., 2003. С. 789–792.
8. *Salasar G.J.* La familia de Agustín de Betancourt y Molina. Correspondencia intima. Islas Canarias. Domibari Ediciones, 2008. Pp. 242–243.
9. *Дельвиг А.И.* Мои воспоминания. Т. I. М., 1912. С. 87.
10. *Жидков С.М.* Институт инженеров путей сообщения императора Александра I: Исторический очерк. СПб., 1899. 500 с.
11. *Иванов М.В.* Культурная миссия Бетанкура в России // Известия Петербургского университета путей сообщения. 2008. С. 26–36
12. *Резимон И.С.* О службе и трудах генерал-лейтенанта де Бетанкура // Журнал путей сообщения. 1826. Кн. 1. С. 11; С. 3–54.
13. *Августин де Бетанкур-и-Молина*. Личные письма. Мадрид: Изд-во Фонда «Александр Пушкин», 2009. 103 с.

Bionotes

Mikhail V. Ivanov — Dr. Sci. (Philol.), Professor, Professor of the Department of "Applied Psychology"; **Emperor Alexander I St. Petersburg State Transport University (PGUPS)**; 9 Moskovsky pr., St. Petersburg, 190031, Russian Federation; SPIN-code: 6760-5142, ID RSCI: 732770; mvifp@mail.ru;

Igor P. Kiselev — Cand. Sci. (Philos.), Dr. Sci. (His.), Associate Professor, Professor of the Department of "History, philosophy, political science and sociology", transport engineer; **Emperor Alexander I St. Petersburg State Transport University (PGUPS)**; 9 Moskovsky pr., St. Petersburg, 190031, Russian Federation; Chief Scientific Editor of the journal; **"BRICS Transport"**; SPIN-code: 4347-9926, ID RSCI: 541415, Scopus: 57220864567; kis1347@mail.ru.

Об авторах

Михаил Васильевич Иванов — доктор филологических наук, профессор, профессор кафедры «Прикладная психология»; **Петербургский государственный университет путей сообщения Императора Александра I (ПГУПС)**; 190031, г. Санкт-Петербург, Московский пр., д. 9; SPIN-код: 6760-5142, РИНЦ ID: 732770; mvifp@mail.ru;

Игорь Павлович Киселёв — кандидат философских наук, доктор исторических наук, доцент, профессор кафедры «История, философия, политология и социология», инженер путей сообщения; **Петербургский государственный университет путей сообщения Императора Александра I (ПГУПС)**; 190031, г. Санкт-Петербург, Московский пр., д. 9; главный научный редактор журнала; **«Транспорт БРИКС»**; SPIN-код: 4347-9926, РИНЦ ID: 541415, Scopus: 57220864567; kis1347@mail.ru.

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Corresponding author: Igor P. Kiselev, kis1347@mail.ru.
Автор, ответственный за переписку: Игорь Павлович Киселёв, kis1347@mail.ru.

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International Industrial Exhibition in Almaty: Prospects of cooperation

ABSTRACT On June 19–21, 2024, the Training and Methodology Centre for Railway Transport Education took part, at the invitation of JSC ZARUBEZH-EXPO, in the tenth anniversary International Industrial Exhibition EXPO EURASIA KAZAKHSTAN 2024 and the Almaty Business Forum.

Международная промышленная выставка в Алматы: перспективы сотрудничества

АННОТАЦИЯ По приглашению АО «ЗАРУБЕЖ-ЭКСПО» Учебно-методический центр по образованию на железнодорожном транспорте 19–21 июня 2024 г. принял участие в работе в юбилейной десятой Международной промышленной выставки «EXPO-EURASIA KAZAKHSTAN 2024» и Алматинском бизнес-форуме.

The exhibition was organised with the support of the Ministry of Foreign Affairs, the Ministry of Industry and Trade, the Ministry of Economic Development of Russia, and sectoral agencies of Russia and Kazakhstan under the sponsorship of the Chamber of Commerce and Industry of the Russian Federation.

On June 21, the roundtable “Priorities and tools of Eurasian cooperation in science and education” took place as part of the exhibition business programme. The purpose of the roundtable was to promote the project of the Government of the Russian Federation “Export of Education”, which notes the need to *“improve the competitiveness of educational services for foreign nationals by way of consolidated representation of Russian universities, lyceums, colleges and vocational training institutions at international exhibitions”*.

Participants of the roundtable “Priorities and tools of Eurasian cooperation in science and education”

Director of the Training and Methodology Centre for Railway Transport Education Olga V. Starykh made a presentation on the system of higher and secondary professional education in educational institutions under the Federal Agency for Railway Transport (Roszheldor). The roundtable was attended by Vice Consul, head of the Russian House in Almaty Maria S. Simakova, Director of Multidisciplinary Centre of Sciences at the National Academy of Sciences of the Republic of Kazakhstan under the President of the Republic of Kazakhstan Kuantar D. Alikhanov, representatives of educational organizations including International Transport and Humanities University, the Almaty College of Railway Transport, the Tynyshpayev Academy of Logistics and Transport, and the Almaty State College of Transport and Communications.

Representatives of educational organizations reported a shortage of instructional literature for railway professions in the educational market of Kazakhstan. The participants discussed the issues of cooperation and further interactions with respect to the acquisition of learning and teaching materials, content and programmes for additional vocational training, and connection to the electronic library of the Training and Methodology Centre for Railway Transport Education. In particular, representatives of the Centre reached an agreement with the Almaty State College of Transport and Communications to connect it to the electronic library and supply educational literature, and an agreement with the Academy of Logistics and Transport concerning the acquisition of literature, content and programmes of advanced training courses for additional vocational training.

As part of their business trip to the exhibition in Kazakhstan, the delegation of the Training and Methodology Centre visited International Transport and Humanities University and had negotiations with its President Amangeldy D. Omarov.

The meeting was attended by Auezkhan T. Turdaliev, Rector and Vice Rector for Education, Doctor of Technical Sciences, Professor; Yersaiyn K. Mailybayev, Vice Rector for Science and Digitalization, PhD, Academician of the International Informatization Academy (MAIN); Roza A. Kashabayeva, Vice Rector for Educational Affairs; and Akerke N. Korkakbayeva, head of the library.

The discussion covered matters of cooperation, such as the involvement of the University in Roszheldor's coordinating and instructional activities; mutual exchange of electronic educational resources; promotion of educational technologies through the Transport Technician and BRICS Transport journals; collaborative development of content for additional vocational training courses in related professions; resumption of the use of the electronic library of the Training and Methodology Centre by the University; and a number of other compelling questions. As a result of the meeting, the parties signed a cooperation agreement.

Work to develop mutually beneficial cooperation with educational institutions of railway transport in Kazakhstan will continue.

Following their participation in EXPO EURASIA KAZAKHSTAN 2024, the Training and Methodology Centre was awarded a diploma.

Developing international cooperation. FESCO

ABSTRACT FESCO Transportation Group is one of the largest transport and logistics companies in Russia with a portfolio of port, railway and integrated logistics assets which enables the Group to operate door-to-door shipping services and oversee all the stages in the intermodal transport chain. FESCO owns the Commercial Port of Vladivostok, FESCO Integrated Transport (an intermodal operator), Dalreftrans (a reefer operator), Transgarant, and FESCO Trans. The Group runs terminal complexes in Novosibirsk, Khabarovsk, Tomsk, and Vladivostok. FESCO has a container fleet of 170 thousand TEUs and more than 13 thousand fitting platforms. The Group's fleet includes more than 30 carrier ships in management which mainly operate along its own sea lines.

Развиваем международное сотрудничество. FESCO

АННОТАЦИЯ Транспортная группа FESCO — одна из крупнейших транспортно-логистических компаний России с активами в сфере портового, железнодорожного и интегрированного логистического бизнеса, которые позволяют Группе осуществлять доставку грузов «от двери до двери» и контролировать все этапы интермодальной цепочки. FESCO принадлежит «Владивостокский морской торговый порт», интермодальный оператор «ФЕСКО Интегрированный Транспорт», оператор рефрижераторных контейнеров «Дальрефтранс», а также компании «Трансгарант» и «ФЕСКО Транс». Группа управляет терминальными комплексами в Новосибирске, Хабаровске, Томске и Владивостоке. Контейнерный парк FESCO составляет более 170 тыс. TEU, количество фитинговых платформ превышает 13 тыс. единиц. Флот Группы включает более 30 транспортных судов в управлении, которые осуществляют перевозки преимущественно на собственных морских линиях.

In March 2024, a Meat Shuttle service for transporting meat products in refrigerated containers from central regions of Russia to China and countries of Southeast Asia was launched by FESCO Transportation Group in cooperation with the Russian Export Centre (REC)[1]. FESCO runs the new shipping service on its main sea, railway and intermodal routes, enabling the delivery of meat products both directly via land border-crossings and through St. Petersburg or ports in the Far East of Russia and then further to ports in the PRC, Vietnam or other countries in Southeast Asia.

The service operator is Dalreftrans — in FESCO, it is in charge of transportation of goods that need to be temperature controlled.

With the Meat Shuttle service, meat producers from various regions of Russia can export their goods to Asia in a single, end-to-end shipment without changing the reefer container throughout the journey, and can save on shipping time because no transhipment is needed at intermediate points.

The long and effective cooperation between FESCO and the REC has provided Meat Shuttle customers with an opportunity to be compensated for up to 25 % of their shipping costs under the program of government support of transportation of agricultural produce.

However, in order to develop this type of services, it would be reasonable to synchronize the systems for certification of reefer containers in Russia and China. Thus, for example, it is impossible to use containers with a centralized power supply system for sending food products between the two countries due to the lack of a mechanism for certification of Russia-made diesel generators in the PRC.

In this context, FESCO has drawn the attention of the BRICS Subgroup on Transport and Logistics to the need to work with sector-specific authorities in China to design a mechanism for certification of this Russian equipment. This will enable seamless delivery of food items with the use of a single container, thus reducing the risk of impairment of the quality and consumer properties of goods during transportation.

The expansion of trade between Russia and China and the launch of new logistics solutions are among the priorities in the economic policies of both countries. On the other hand, the capabilities of the available infrastructure are still be exhausted. At present, the Makhalino — Khunchun crossing point is not used to its full capacity. A hindrance to the full-scale operation on this destination is the lack of capability to transport popular goods, such as meat, fruit and vegetables.

When the limitations in terms of the types of goods are removed by both Russia and China, the parties will be able to launch a looped transport service via Makhalino — Khunchun and better use the potential of the crossing point. FESCO used the BRICS Subgroup for

[1] The Meat Shuttle, a new trade and logistics service for exports of meat produced in Russia to China, uses special-purpose reefer containers on the dedicated routes.

Основные маршруты компании FESCO

Transport and Logistics as a platform to involve sector-specific agencies in the discussion on the issue.

India is a no less promising destination than China for Russia in terms of increasing its foreign trade. Therefore, FESCO has put forward an initiative to establish a transport and logistics hub in India. The company, which currently operates two direct sea lines from Novorossiysk and St. Petersburg via the Suez Canal with a call to the Mundra Port in India, works with its Indian partners considering the possibility to use this port for the consolidation of goods from feeder lines for further shipment to the east coast of Africa. FESCO proposed to work with the interested BRICS countries to establish a transport and logistics hub in India.

Since the last year, FESCO has been actively developing its sea shipping services to India. In February 2023, FESCO launched its Indian Line West (FIL-W) from the Nhava Sheva and Mundra ports in India to Novorossiysk via the Suez Canal. As early as last summer, the Group increased its capacity by deploying its own container carrier on the route. In December 2023, it expanded its geography by connecting feeder lines to other Indian ports, as well as to Bangladesh and Pakistan by means of transhipment at the Mundra Port. In January 2024, the second ship was added to operate the FESCO Indian Line West. Thus, the total container capacity of the FIL-W exceeded 1,700 TEUs, and the frequency of shipments increased to two times per month.

Moreover, in March 2023, FESCO was the first among Russian companies to launch a direct sea shipping service using its own assets — FESCO Baltorient Line running from the ports in China and India to St. Petersburg along a deep sea route without transhipment in European ports. In May 2023, the Group added regular calls to the Indian ports of Mundra and Nhava Sheva; in June, new feeder lines connected the line with Malaysia, Vietnam and Thailand; and in September, the destinations were expanded to include Indonesia and South Korea.

In the end of 2023, the Group opened FESCO Egypt Direct Line, a direct sea container service between Egypt and Russia. It is mainly designed to deliver food items and agricultural produce in reefer containers along the route Novorossiysk — Alexandria — Novorossiysk without calling to transhipment ports.

For FESCO, the years 2022 and 2023 were in general marked with the development of logistics services for new destinations and markets. In this period, the Group also launched FESCO Turkey Black Sea, a sea shipping service connecting Novorossiysk and Istanbul, and FESCO Vietnam Direct Line, a regular sea line which served by the Group's own fleet which connects the Commercial Port of Vladivostok (VMTP, part of FESCO Group) and the Vietnamese ports of Ho Chi Minh and Haiphong.

As the service is in demand with both Russian and Vietnamese customers, FESCO has added new ships to the line and today the FVDL is served by the Group's three container ships. Moreover, FESCO has established a logistics hub in the Ho Chi Minh Port to consolidate cargoes from other Southeast Asian countries and ship them to Vladivostok.

In the end of 2023, President of Russia Vladimir Putin signed a decree to transfer the shares of Far-Eastern Shipping Compny PLC. (FESCO's parent company) to Rosatom State Corporation, opening a new chapter in the history of the Group. For FESCO, this opens even more prospects and opportunities for the expansion to new markets and the development of logistics routes that are strategically important for Russia.

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Memorial Day of the organizer and the first rector of PGUPS Augustine Betancourt

День памяти организатора и первого ректора ПГУПС Августина Бетанкура

July 26 marked the 200th anniversary of the death of Augustine Betancourt, an outstanding engineer, scientist, statesman, organizer and first rector of the Institute of the Corps of Transport Engineers of the present Emperor Alexander I St. Petersburg State Transport University.

On this day, red and yellow roses in the colors of the Spanish flag in memory of Augustine Betancourt were laid in St. Petersburg at the monument on the grave of the Spanish engineer with a Russian soul and at the monument erected in his honor in front of the main building of the higher educational institution organized by him. Here he laid the foundations for the education of transport engineers according to the curriculum, which combined scientific-theoretical, general engineering and special practical training of a future specialist.

Commemorative event with the participation of Acting Rector Tamila S. Titova, Emeritus Professor and leading historian of PSUPS Igor P. Kiselev, academics and students began at the monument to Augustine de Betancourt on Obukhovskaya Square near the main building of the university. Then the participants of the commemorative event went to the Necropolis of the XVIII century Lazarevsky Cemetery of the Alexander Nevsky Lavra (to the State Museum of Urban Sculpture), where the grave of an outstanding engineer is located, a flower-laying ceremony was held here.

As noted by the Acting Rector of PSUPS Tamila S. Titova, Augustine Betancourt, during his short life in

Russia, made a significant contribution to the development of the transport, the construction industry, and the industry of our country. But Betancourt's main merit is the creation of a modern Russian engineering school.

"His contribution as the creator of the architectural appearance of St. Petersburg in the 19th century is great. He discovered the talent of architect Montferrand to the world and laid the foundations for the engineering project of St. Isaac's Cathedral. This place in the Alexander Nevsky Lavra is sacred to us", Emeritus Professor of PGUPS Igor P. Kiselev addressed the participants of the ceremony, "We come here on Augustine Betancourt's birthday on February 1, on Memorial Day, as today, in July, on the day of the foundation of the Institute on December 2 — thereby continuing the connection between generations of students and graduates of our university that are the descendants of Betancourt activities".

Svetlana V. Minina for BRICS Transport

Светлана В. Минина
для журнала «Транспорт БРИКС»