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Development of the Trans-Caspian International Transport Route “East-West” in the Context of the Strategic Partnership Between Azerbaijan and Kazakhstan

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Abstract

Relevance. Against the backdrop of a large-scale transformation of Eurasian logistics routes, the Trans-Caspian International Transport Route (TIMT, or Middle Corridor) has become a critically important alternative to traditional transport routes, ensuring risk diversification and supply predictability in a context of geopolitical instability.

Subject and methods. This article examines the infrastructural, institutional and digital aspects of the MCR’s development through the prism of the strategic partnership between the Republic of Azerbaijan and the Republic of Kazakhstan, which serve as key transit hubs in the Caspian region.

Results. The author conducts a comprehensive analysis of the modernisation of coastal infrastructure (the ports of Baku, Aktau and Kuryk) and the synergies of the Caspian merchant fleet. Particular attention is paid to the removal of non-physical barriers: the creation of a single logistics operator, Middle Corridor Logistics; the introduction of end-to-end tariff pricing; and the launch of the Tez Customs digital customs protocol. Based on the identified “bottlenecks” related to the shallowing of the Caspian Sea and the shortage of vessels, practical recommendations are proposed for the implementation of blockchain solutions and joint shipbuilding.

Practical significance. The conclusions and recommendations of the study can be used by transport authorities and logistics companies in both countries for long-term planning and to enhance the international competitiveness of the Middle Corridor.

Keywords: Trans-Caspian route, Middle Corridor, Azerbaijan, Kazakhstan, port infrastructure, containerisation, through tariff, paperless transit, digital integration.

Introduction

Against the backdrop of a fundamental transformation of global logistics chains, the Trans-Caspian International Transport Route (TCITR, or Middle Corridor) is no longer viewed as a purely regional project. Today, it serves as a critically important alternative to traditional Eurasian transport routes [6]. The main driver of growing interest in the corridor is the urgent need to diversify logistics risks. Geopolitical instability in the Red Sea region and stringent sanctions in northern latitudes are forcing global shippers to seek stable routes offering a high degree of security and predictability [7]. The interconnection of the Middle Corridor with China's 'Belt and Road' initiative and the European "Global Gateway" strategy transforms this corridor into a key intersection of the strategic interests of East and West [10].

In this context, the Caspian region serves as the core and main link of the entire route, where the dynamics of the corridor's development depend directly on the effectiveness of bilateral cooperation between the key transit hubs – the Republic of Azerbaijan and the Republic of Kazakhstan [4]. The strategic partnership between Baku and Astana, underpinned by large-scale investments in port infrastructure, the digitalisation of customs procedures and the harmonisation of tariff policies, is becoming the main driver behind the transformation of the Middle Corridor into an end-to-end, high-tech transport artery [9].

The growth in container traffic volumes, which reached a record high of 76,900 TEU by the end of 2025 (almost four times the 2023 level), clearly demonstrates that Eurasian businesses perceive the TCITR as not merely a raw materials corridor for transshipment of bulk and liquid cargo, but as a high-speed intermodal bridge for high value-added products [1].

The aim of this article is to analyse the current state and development prospects of the Middle Corridor through the prism of the strategic and infrastructural partnership between Azerbaijan and Kazakhstan, as well as to assess their joint potential in overcoming the existing "bottlenecks" along the route.

Main body

1. The infrastructure basis of the Middle Corridor

The port and shipping infrastructure of the Caspian Basin forms the foundation for the sustainable operation of the Trans-Caspian International Transport Route (Middle Corridor). The specific nature of multimodal transport along the Middle Corridor places a

particular responsibility on the maritime section of the route: it is here that the change of transport modes “train–ship–train” takes place. The effectiveness of this transit “bridge” depends directly on the throughput capacity of the coastal terminals in Azerbaijan and Kazakhstan, as well as on the cargo volume and the regularity of operations of both countries’ merchant fleets.

1.1. Development of coastal infrastructure at the ports of Baku (Alat), Aktau and Kuryk

The key hubs on the eastern and western coasts of the Caspian Sea are the Baku International Sea Trade Port in the village of Alat on the Azerbaijani side, and the ports of Aktau and Kuryk on the Kazakh side. Their modernisation in recent years has been complementary in nature.

The Baku International Sea Trade Port (Alat) is situated at the intersection of the “East–West” and “North–South” corridors and was designed to be the region’s largest logistics hub. At the current stage of implementation of the First Phase, its throughput capacity stands at 15 million tonnes of cargo per year, including the handling of up to 100,000 TEU (twenty-foot equivalent units) in container terms [3].

Within the framework of the Azerbaijan-Kazakhstan partnership, expanding the port’s capacity to receive and handle ferries and container ships is of strategic importance. Azerbaijan is actively implementing the second phase of the Baku-Makhachkala International Sea Port’s expansion, the aim of which is to bring the port’s total capacity to 25 million tonnes of cargo and 500,000 TEU per year [3]. The modernisation includes the construction of new specialised container terminals and the deepening of the harbour basin, which will enable the port to accommodate vessels with greater draught even under the conditions of the cyclical low water levels currently observed in the Caspian Sea.

Kazakhstan’s port complex – the ports of Aktau and Kuryk on the eastern coast of the Caspian Sea Kazakhstan has divided cargo flows between the two ports, reducing the risk of congestion. The port of Aktau focuses on the transshipment of dry cargo, crude oil and containers. As part of the integration with the Middle Corridor, a specialised ‘container hub’ is being established here (in collaboration with major international logistics operators), which will enable container traffic volumes to be increased from current levels to 300,000 TEU per year [2].

The Port of Kuryk, which was launched relatively recently, specialises exclusively in road and rail ferry transport (Ro-Ro and Ro-Pax). The presence of two railway berths

allows wagons to be rolled directly onto the ferry ramps without intermediate unloading, which is critical for reducing transit times for trains coming from China.

The synergy factor – infrastructure compatibility – is reflected in the fact that the technical parameters of the ferry complexes in Alat and Kuryk are fully synchronised. The track gauge, quay wall specifications and ramps ensure the seamless through-transport of wagons from allied railway administrations without technical delays.

1.2. Structure, vessel shortage and feeder routes of the Caspian merchant fleet

The transport capacity of the coastal infrastructure can only be realised if there is a merchant fleet with sufficient tonnage and regularity. Here, the interaction between the national shipping companies CJSC “Azerbaijan Caspian Shipping Company” (ASCO) and LLP “NMSK Kazmorttransflot” (KMTF) plays a key role [8]. Table 1.1 presents the parameters for comparison/synergy between the national shipping companies.

Table 1.1

Comparison / Synergy Parameter	“ASCO” CJSC (Azerbaijan)	“Kazmortsflot” LLP (Kazakhstan)
Fleet Specifications	The largest fleet of ferries and dry cargo ships on the Caspian Sea, as well as tankers and support vessels.	Oil tanker fleet (“Aframax” and Caspian-class tankers), container ships.
A leading role in TCITR	Ensuring uninterrupted rail-ferry services (Alat – Kuryk / Aktau).	Development and operation of feeder container services on the Aktau–Alat route.
Direction of expansion	Shipbuilding at the Baku Shipyard for the needs of both countries.	The acquisition of large-capacity vessels and the joint management of dry cargo ships with Azerbaijan.

The most significant achievement of bilateral cooperation has been the establishment of regular feeder services and the creation of a reliable timetable for feeder (container) trains and shipping routes. Regular services between Aktau and Alat enable shippers to plan logistics from China to the EU with an accuracy of just a few hours. Whereas previously ships departed “as cargo accumulated”, today a strict schedule is in place (Fixed Day Service), which has reduced container dwell time at terminals to a minimum [1].

Despite these successes, the development of the route faces specific challenges, such as a shortage of suitable vessels and climatic challenges. The sharp rise in demand for the Middle Corridor has revealed a shortage of specialised container ships and rail ferries. The existing fleet is operating at the limits of its capacity.

The falling water level in the Caspian Sea is reducing the actual cargo capacity of vessels. Due to the reduction in permissible draught, tankers and dry cargo ships are forced to set sail with a 15–20% underload [8].

1.3. Joint investment projects and shipbuilding

Baku and Astana see the solution to the problem of the fleet shortage not in the piecemeal purchase of second-hand vessels on external markets, but in the creation of a unified production and investment chain. The Baku Shipyard is at the heart of this strategy. The facility possesses the technological capabilities to build any type of vessel required in the Caspian Sea, including modern Ro-Pax ferries and tankers.

Kazakhstan and Azerbaijan are conducting negotiations and implementing projects to place orders for the construction of new dry cargo ships and large-tonnage ferries for the needs of “Kazmortransflot” at the Baku Shipyard [4]. This makes it possible to:

- standardise the technical standards of the Caspian fleet, which simplifies and reduces the cost of its subsequent maintenance;
- avoid competition for dock space at foreign shipyards by localising capital within the Caspian macro-region;
- ensure flexibility in orders to adapt to the Caspian Sea’s changing hydrological conditions, by designing vessels with shallow draughts and wide hulls specifically for shallow-water conditions.

Furthermore, the establishment of joint ventures between logistics operators ensures end-to-end financing of port terminals. The Kazakh side gains the opportunity to

invest in the development of the logistics zones at the port of Alat, whilst Azerbaijani businesses are involved in the modernisation of the hinterland infrastructure at the ports of Aktau and Kuryk [5].

Azerbaijan and Kazakhstan are thus successfully moving beyond their status as isolated coastal states by transforming their ports and fleets into a single, seamlessly integrated logistics system. The infrastructure base of the Trans-Caspian International Transport Route (TCITR) currently demonstrates a high degree of readiness for growth in cargo flows; however, its further scalability is strictly dependent on the speed at which the problems of Caspian Sea siltation are resolved and the pace of fleet renewal.

2. The establishment of joint ventures and an end-to-end tariff for the Trans-Caspian International Transport Route

While the modernisation of ports and the renewal of the fleet form the physical 'framework' of the Trans-Caspian route, the institutional environment and tariff policy determine its economic viability. Historically, the main competitive disadvantage of multimodal corridors compared to monomodal ones (e.g., entirely rail-based across the mainland) has been the difficulty of coordinating end-to-end commercial terms.

The need to cross several national borders, changes in transport jurisdictions and the tariff particularism of national carriers led to increased logistics costs. Within the framework of the strategic partnership between Azerbaijan and Kazakhstan, overcoming these barriers has become a priority area for institutional development [11].

2.1. The Role of the International Association of the Trans-Caspian International Transport Route in Harmonising the Regulatory Environment

The central coordinating body responsible for establishing a level playing field along the route is the International Association of the Trans-Caspian International Transport Route, headquartered in Astana. The Association brings together the corridor's key stakeholders: railways, ports, shipping companies and logistics operators from Kazakhstan, Azerbaijan, Georgia, Turkey and Central European countries.

The main areas of the Association's institutional activity in the context of the Azerbaijan-Kazakhstan dialogue are: harmonisation of the regulatory framework, technological integration and marketing promotion. Harmonisation of the regulatory

framework involves synchronising cargo transport rules and standardising waybills, including the adaptation of the CIM/SMGS waybill for multimodal transport.

Technological integration involves establishing uniform regulations for interaction at the interfaces between different modes of transport (railway – port – vessel).

Marketing promotion involves establishing a consolidated position for the corridor in the international transport services market to attract major cargo owners from China and South-East Asia.

Thanks to the Association's institutional framework, cooperation between Azerbaijan Railways CJSC (ADY) and "Kazakhstan Temir Zholy" JSC (KTZ) has reached the level of daily operational planning, enabling a rapid response to fluctuations in freight volumes.

2.2. Establishment of the single logistics operator Middle Corridor Logistics

A historic milestone in overcoming the fragmentation of the route was the implementation of the agreements reached by the heads of state of Azerbaijan and Kazakhstan to establish a joint venture in the logistics sector. Together with the Georgian side, the railways of the two countries established a single route operator – the company Middle Corridor Logistics [11].

The creation of this joint venture fundamentally changed the commercial architecture of the Middle Corridor. Prior to its establishment, shippers were forced to conclude separate contracts with Kazakh, Azerbaijani and Georgian freight forwarders, independently coordinating vessel freight and rail segments.

The functions and advantages of the single operator are as follows:

1. The 'Single Window' principle, whereby the customer receives a single rate, a single contract and end-to-end responsibility for the safety and delivery times of the cargo along the entire route from the Chinese border to the borders of the European Union.

2. Optimisation of the operation of wagon and container fleets. The joint venture carries out centralised management of feeder platforms and containers, minimising empty runs. Whereas previously wagons could remain idle after unloading at the port of Alat whilst awaiting return freight, the single operator allocates rolling stock based on an end-to-end demand balance.

3. Management of end-to-end delivery times. The operator carries out continuous dispatch control, eliminating delays at junction stations and transshipment ports.

2.3. The mechanism for setting and maintaining the stability of end-to-end tariffs

The economic attractiveness of TMTs depends directly on the predictability of transport costs. Price volatility, particularly in sea freight, has always been a key challenge for Eurasian routes. As part of the Azerbaijan-Kazakhstan regulatory framework, a methodology for end-to-end tariff pricing has been introduced.

The through tariff is formed as the sum of fixed rates charged by national carriers for a specific medium- or long-term period, usually a calendar year [1] (Table 2.1).

Table 2.1

Component of the through fare	Responsible party / Institutional mechanism	The financial benefit for the customer
Rail transit (Kazakhstan)	“Kazakhstan Temir Zholy” National Company JSC	A fixed rate per container-kilometre, protected against fluctuations during the season.
Sea freight and transshipment in the Caspian Sea	Ports of Aktau/Kuryk – KMTF / ASCO – Port of Alat	Stabilisation of feeder vessel freight rates and port handling charges per TEU.
Rail transit (Azerbaijan)	Azerbaijan Railways CJSC	A single rate for the section from the port of Alat to the border with Georgia (Beyuk-Kesik).

The factors underpinning the stability of the tariff policy are:

1. The elimination of discriminatory charges. The parties have agreed not to apply additional transit and infrastructure surcharges that could reduce the corridor’s competitiveness compared to the Southern (maritime) or Northern routes.

2. Long-term rate planning. Long-term tariff corridors are established for major Chinese hubs (such as Xi’an, Chengdu and Chongqing). This allows Chinese exporters to factor the cost of logistics via the Caspian Sea into their production costs a year in advance [7].

3. Coordination of discounts. As container traffic volumes grow (with guaranteed volumes from shippers), ADY and KTZ apply symmetrical downward adjustment factors to base rates [11].

However, the institutional system for regulating rates faces a specific external challenge – currency risks. As international settlements are traditionally pegged to hard currencies, sharp fluctuations in the exchange rates of national currencies (the tenge and the manat) against the US dollar or the euro require the creation of more flexible clearing mechanisms within the joint venture.

A transition to long-term tariff grids denominated in the participants' national currencies or the currency of the main shipper (yuan) is being discussed as a promising direction, which would help reduce transaction costs.

The institutional integration of Azerbaijan and Kazakhstan within the framework of the Middle Corridor has evolved from framework agreements of intent to the establishment of robust supranational commercial structures. The establishment of Middle Corridor Logistics and the setting of end-to-end tariffs have made it possible to dismantle “tariff barriers” in the Caspian region. Nevertheless, the long-term sustainability of this system will depend on the participants' ability to promptly underpin the tariff agreements with end-to-end digital freight management technologies.

3. Digitalisation and overcoming route bottlenecks. Paperless transit and the integration of Azerbaijan and Kazakhstan's information systems

Modern competition between international transport corridors is shifting from a focus solely on physical infrastructure (track length, port draught) to a focus on information technology. For the TCITR multimodal route, which crosses several customs borders and requires frequent changes of transport mode, the speed of data processing becomes a critical factor.

Traditional “paper-based” document handling causes delays for ships and trains at interchange stations and in ports, negating the advantages of the corridor's geographical location. In this regard, the digital transformation and integration of Azerbaijan's and Kazakhstan's IT platforms serve as the primary tool for eliminating non-physical “bottlenecks” in the Middle Corridor [5].

3.1. Architecture for the integration of national carriers' information systems

The core of the TMT's digitalisation is the creation of a seamless information space between JSC National Company "Kazakhstan Temir Zholy" (KTZ) and CJSC "Azerbaijan Railways" (ADY). Historically, both administrations used automated control systems (ACS) that were isolated from one another, which required manual data entry when transferring cargo across the Caspian Sea.

At the present stage, integration is based on the interconnection of the two countries' key digital platforms. A breakthrough was the introduction of end-to-end data exchange based on technologies from Singaporean and global IT partners (including the PSA International platform), which help to automate supply chain management along the Middle Corridor.

System integration enables advance notification (Advanced Cargo Information) to be provided as soon as a container train leaves the terminal on the China-Kazakhstan border (Dostyk/Altynkol), the port authorities in Baku (Alat) and the Azerbaijani customs authorities can already view the full digital cargo profile (manifests, nomenclature, weight specifications). This enables the scheduling of vessel berthing and the preparation of berthing facilities several days before the train's arrival at the port of Aktau or Kuryk.

3.2. Paperless transit technology and the simplification of customs procedures

For a long time, customs administration remained the main cause of delays. The transfer of cargo from train to ferry required the closure of one customs procedure and the opening of another, accompanied by a physical inspection of stacks of paper documents.

To address this issue, Azerbaijan and Kazakhstan are introducing end-to-end paperless transit technology: the unified CIM/SMGS consignment note, electronic customs declarations and the "Tez Customs" corridor.

The CIM/SMGS unified consignment note. The use of an electronic version of the consignment note, combining the provisions of European (CIM) and Eurasian (SMGS) transport law, eliminates the need to re-process documents when moving from one legal zone to another.

Electronic customs declaration and the "Tez Customs" corridor. Joint efforts by the State Customs Committee of the Republic of Azerbaijan and the State Revenue

Committee of the Ministry of Finance of the Republic of Kazakhstan are aimed at the mutual recognition of electronic digital signatures (EDS) and customs seals.

Thanks to the digital recognition of documents, the time taken for customs clearance and transit formalities at the ports of Aktau and Alat has been reduced from a historical 10–12 hours to a record 15–30 minutes per train [2, 3]. Container trains pass through the Caspian transit hub without any physical delays caused by bureaucratic procedures. Trains from Xi'an (China) to European ports now cover the distance in 12–15 days, making the Middle Corridor competitive compared to sea transport.

3.3. Prospects for the implementation of blockchain solutions for end-to-end cargo tracking

Despite the successes achieved, end-to-end monitoring of the multimodal supply chain still has vulnerabilities relating to data verification during the maritime leg. A promising response to this challenge is the implementation of distributed ledger (blockchain) technologies and smart contracts [5].

The application of blockchain architecture in the Baku–Astana logistics ecosystem enables three fundamental tasks to be addressed (Table 3.1)

The use of a distributed ledger also addresses the issue of trust on the part of European regulators and banks. A verified digital trail of cargo passing through Azerbaijan and Kazakhstan guarantees compliance with international environmental and safety standards (ESG standards), making the Middle Corridor a priority route for funding under the European Union's Global Gateway strategy.

The main barrier to the full blockchainisation of the route remains the difference in national legislation between Azerbaijan and Kazakhstan regarding the regulation of digital assets and the legal validity of smart contracts. Nevertheless, the creation of regulatory sandboxes based in Special Economic Zones (SEZ "Aktau Seaport" and SEZ "Alat") allows these technologies to be tested on a local scale without radically altering national laws.

Thus, the digital synergy between Azerbaijan and Kazakhstan is transforming the TCITR route from a physical delivery route into an intelligent logistics system. The simultaneous introduction of paperless transit and end-to-end integration of automated control systems has enabled a qualitative leap – the speed at which information travels along the corridor has now outpaced the speed of the goods themselves. This lays a solid

foundation for transforming the Middle Corridor into the most predictable and secure route in the Eurasian space.

Table 3.1

Task	Blockchain-based implementation mechanism	Results for TMT participants
Absolute immutability of data	Every operation (loading onto the platform, crossing the border, boarding the ferry) is recorded in a distributed ledger, with no possibility of retroactively altering the timestamp.	Elimination of disputes between ADY, KTZ and maritime carriers regarding the allocation of liability for delays.
Smart contracts in payments	Automatic debiting of funds from the single operator's accounts in favour of ports or shipowners when the sensor detects that cargo has been transhipped.	Reducing cash flow gaps, eliminating interbank delays and ensuring transparent clearing in national currencies.
Integration with the Internet of Things (IoT)	The containers are fitted with 'smart' GPS/BLE sensors that transmit data on tampering, temperature and geolocation to the blockchain network.	Shippers from China or the EU can monitor the physical status of their cargo in the Caspian Sea in real time.

Conclusions

An examination of the current state and medium-term prospects for the development of the Trans-Caspian International Transport Route (TCITR) in the context of the strategic dialogue between Azerbaijan and Kazakhstan allows us to draw a number of key conclusions that reflect both the scale of the successes achieved and the nature of the systemic challenges facing Eurasian integration:

1. The global status of the “Middle Corridor”. Under the influence of tectonic shifts in the geopolitical and geo-economic architecture of Eurasia, the Middle Corridor has definitively evolved from a local transport project into an indispensable, secure and commercially predictable artery linking the markets of Asia and Europe. The alignment of the route with the global “Belt and Road” and Global Gateway initiatives has institutionally cemented the Caspian macro-region’s status as a key transit hub of the 21st century [10].

2. Transition to high-tech containerisation. The main economic indicator of the TMT’s maturity over the three-year period (2023–2025) was the qualitative and quantitative surge in container transit. The growth in container traffic volumes, which reached a record high of 76,900 TEU by the end of 2025 (almost four times the 2023 level), clearly demonstrates that Eurasian businesses perceive the TCITR as not merely a raw materials corridor for transshipment of bulk and liquid cargo, but as a high-speed intermodal bridge for high value-added products [1].

3. The effectiveness of bilateral synergy. The strategic alliance between Azerbaijan and Kazakhstan has served as the foundation for the corridor’s sustainability. During the period under review, the countries succeeded in moving towards the creation of supranational management mechanisms. The infrastructure synchronisation of port capacities (Baku/Alat – Aktau/Kuryk) [2, 3], the formation of a single logistics operator, Middle Corridor Logistics [11], and the introduction of an end-to-end paperless tariff and the Tez Customs digital customs protocol [5] have enabled a significant improvement in the delivery times of container block trains. [1].

Recommendations

To maintain the current growth momentum and ensure the corridor’s further scalability up to its design capacity (over 10 million tonnes of cargo per year), it is recommended to focus on addressing the following tasks:

1. Mitigating climatic and hydrological risks. The growing problem of cyclical shallowing of the Caspian Sea requires coordinated dredging works in the approach channels to the ports of Aktau and Kuryk, as well as the rapid design and construction of a new generation of vessels with shallow draughts and wider hulls at the Baku Shipyard.

2. Localisation and development of the legal framework for blockchain technologies. For a widespread transition to smart contracts and end-to-end cargo monitoring, it is necessary to harmonise the national legislation of the two countries regarding the recognition of the legal validity of distributed ledgers. The first step should

be the creation of a unified regulatory 'sandbox' based on the 'Alat' SEZ and the 'Aktau Seaport' SEZ.

3. Expansion of the fleet of feeder vessels and platforms. The current shortage of specialised container ships remains the main factor in the non-physical bottleneck of transit. There is a need to step up joint investment programmes for placing forward orders for Caspian dry cargo vessels and Ro-Pax class ferries.

4. Diversification of mutual settlements. To minimise transaction costs and protect against external currency shocks, it is advisable to consider a transition to clearing settlements within the single TCITR operator using national currencies (tenge and manat) or the currency of a key exporter (yuan).

Ultimately, the success of the Middle Corridor has demonstrated that the synergistic effect of combining the infrastructural, digital and political potentials of Azerbaijan and Kazakhstan significantly exceeds the sum of their individual capabilities. The further deepening of this strategic partnership will determine not only the economic future of Baku and Astana, but also the stability of the entire transport and logistics landscape of Eurasia for decades to come [4, 9].

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