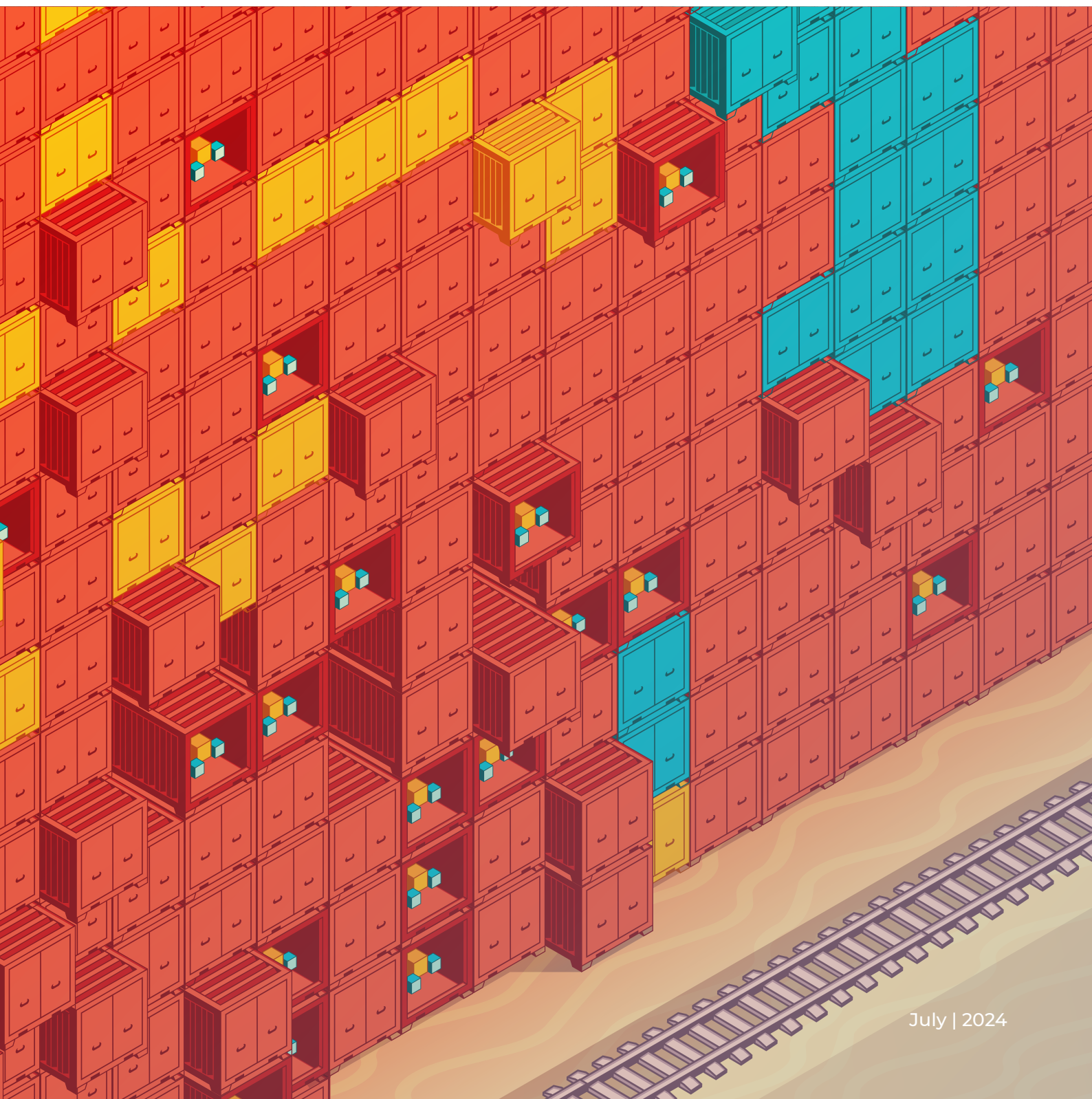


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## DIGITAL PAYMENT AND SETTLEMENT INFRASTRUCTURE FOR RAIL TRANSIT TRAFFIC

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# DIGITAL TRANSPORT INFRASTRUCTURE

No matter who you ask within the logistics sector, everyone, including in the rail freight transport segment, understands the need to transition to digital business processes.

Efforts to promote cross-continent transport connectivity between China and the European Union as one of the key axes of global trade, provides a case in point when discussing the digital transition in terms of its role and effectiveness. For China, maintaining overland freight links to the EU is a way to diversify its shipment logistics with this region and operates as a supplement to shipments by sea with all their volatility and risks. The Eurasian rail route meets all the standards and checks all the boxes in terms of freight transport quality and speed, accessibility and safety.

Quite often, overland freight shipments cannot compete with sea transport as far as costs are concerned. In fact, one container ship carries about 10,000 TEUs, on average. It would take hundreds of trains to deliver the same volume. Building more rail lines may be the most simple and straightforward solution for speeding up freight shipments by rail. However, this requires a lot of investment. Efforts to streamline operations and document flow by harmonising standards and promoting the digital transition can also help achieve faster delivery times.

The potential for reducing transit time through digital solutions has been the talk of the town lately amid the global push to promote the digital transition. Far from a one-off undertaking, the digital transformation can be better described as a continuous effort to adapt the transport infrastructure to the evolving technological capabilities and requirements. In our [previous review](#), we discussed opportunities for capacity building in the rail sector in terms of technology, including electronic navigation seals, introducing valid and binding e-document management solutions and AI-driven digital solutions in the rail freight transport sector. In this review, we focus on the digital payment and settlement infrastructure.

Even a two-hour reduction of the time it takes to get the required clearances matters for speeding up transit across the entire route. Seamless logistics and e-document management solutions can produce this effect so that trains spend less time on borders and checkpoints.

Finally, the so-called sanctions wars made digital payment and settlement tools even more relevant. The key transport and logistics companies and route operators are economic operators and nothing more, while banks are prone to over-compliance and tend to be too zealous when executing sanctions norms, which affects transport costs. Operators have to go through a series of conversions. With the effort to move away from the dollar and dedollarise the supply chains underway, transport and logistics companies focus on adopting digital financial instruments in order to benefit from the new opportunities they provide.

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# DIGITAL PAYMENT AND SETTLEMENT SOLUTIONS

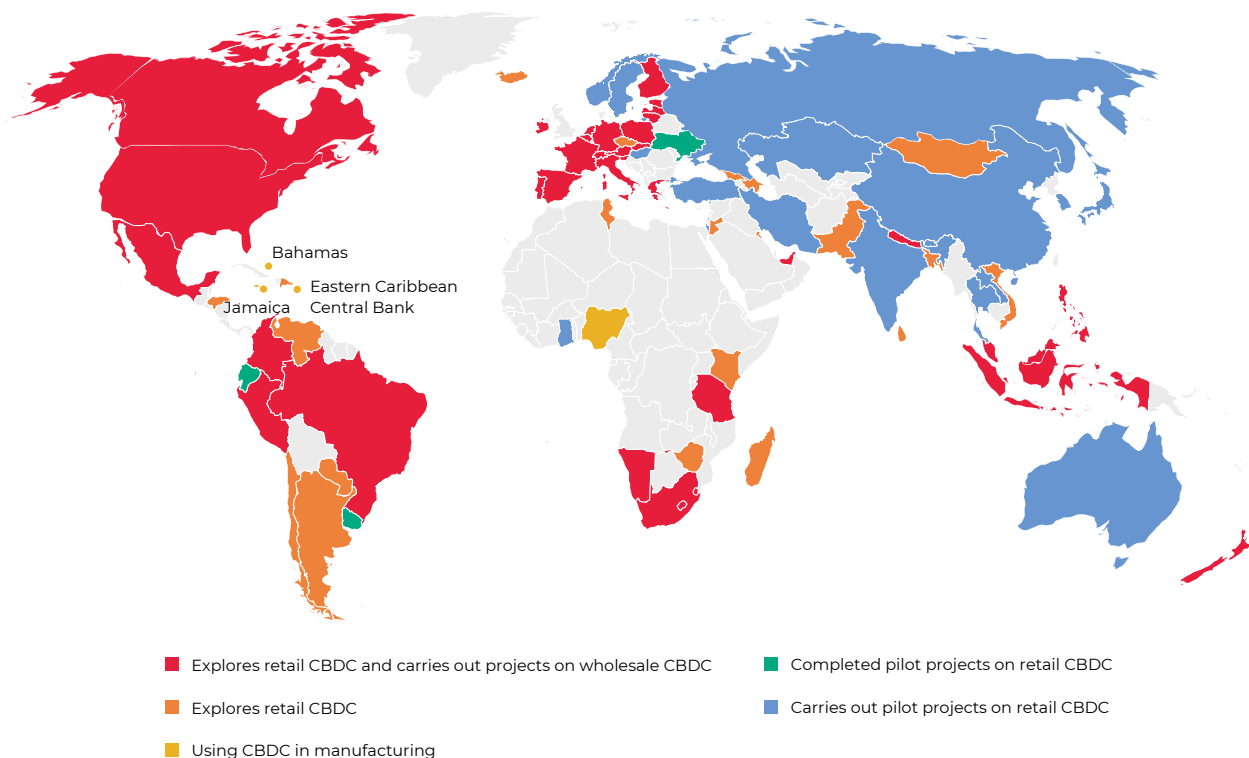
The Eurasian freight transit sector has been feeling the impact from the digital transformation, which is underway within the payment and settlement industry. The sanctions war created new costs, but digital payments and settlements offer an effective solution for cutting them, while also improving performance in the operation of the Eurasian rail route.

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## Digital currency

More and more countries around the world use Central Bank Digital Currencies (CBDCs). A digital currency can be described as a third digital iteration of money, supplementing and combining elements proper to the first two: cash payments and bank transfers. It is important to note that digital currency and cryptocurrency are two different terms. Cryptocurrencies are decentralised and operate outside of conventional regulatory frameworks. In addition to this, the value of cryptocurrencies is defined by a mix of factors, including supply and demand, while central banks set the value of a digital currency on par with their fiat currency. Digital currencies can be used to make instant payments that are also confidential, smart, affordable, as well as reliable and secure. Moreover, digital currencies are totally legal and legitimate as a means of payment. They present unique strings (tokens) of digital code stored in dedicated digital accounts.

## COUNTRIES EXPLORING DIGITAL CURRENCIES AND CARRYING OUT PILOT PROJECTS TO ADOPT THEM



Source: Compiled by the authors based on data from the [Bank for International Settlements](#)

In 2022, [the share of central banks](#) engaged in some form of CBDC work rose to 93%. CBDCs come in two types: retail (for the general public) and wholesale. The main purpose of retail CBDCs is to promote financial inclusion, while wholesale CBDCs are for cross-border transactions. During the 2023 SCO summit, the President of China [put forward a proposal](#) for the SCO countries to step up cooperation on sovereign digital currencies.

CBDC payments can help address technical interoperability issues when carrying out cross-border payments by reducing their dependence on the international payment infrastructure. This way, they can operate as a SWIFT alternative. CBDC-driven cross-border settlements may well emerge as a critical element in the trade and financial infrastructure considering that the global financial infrastructure has been increasingly prone to fragmentation.

It would be advisable for EAEU countries to ensure that their national digital currencies are technically compatible, while also harmonising their approaches to designing cross-border payment models using digital currency. This would reduce their dependence on the international payment infrastructure and help forge closer trade and investment ties.

However, EAEU countries are not on the same page in terms of their efforts to develop and introduce digital currencies. This reflects the global trend — in fact, all the countries are advancing at their own pace. Russia and Kazakhstan have made the biggest strides in developing their national digital currencies, while other EAEU countries are only beginning to weigh whether they need digital currency.

In August 2023, the Bank of Russia launched [a pilot project](#) on using the digital rouble in transactions. Individuals and businesses will be able to use the digital rouble beginning in 2025. By using this payment method in the logistics sector, operators can cut costs by spending less on bank fees, as well as benefit from quicker settlements and conversions of the digital rouble into other types of currency. In fact, a digital rouble transfer comes with a 0.3 percent transaction fee. Soon, Russian logistics companies will be able to carry out settlements with their foreign partners without relying on the SWIFT financial messaging system or its Russian equivalent — the System for Transfer of Financial Messages (SPFS). Incidentally, approved in June 2024, the EU's [14<sup>th</sup> sanctions package](#) makes it illegal for European entities to use the Russian system. This may force foreign companies to refrain from using this mechanism considering the risk of facing restrictions.

In November 2023, Kazakhstan launched [the first stage](#) in its effort to roll out a digital tenge platform for its manufacturers. It is expected to scale this project in 2024 by adding new participants and offering a wider range of services. The project to introduce the digital tenge includes three stages and is expected to be completed by the end of 2025. However, China and Kazakhstan will be able to use digital currency in their settlements even sooner than that. In July 2024, the National Bank of Kazakhstan and the People's Bank of China signed a [Memorandum](#) on Strengthening Digital Currency Cooperation.

Today, there are 16 international multi-CBDC platforms across various jurisdictions with Project mBridge as one of the major projects in developing cross-border payments. By relying on a shared platform, central banks can issue and exchange their respective CBDCs. This way, a multi-currency CBDC platform creates a network connecting central banks and business operators and stimulating international trade flows. The project's main participants include Thailand, Hong Kong, the UAE and China, while the number of observers stood at 27 as of June 24, including the National Bank of Kazakhstan.

It is important to note that efforts to use digital currency in settlements must be centralised and involve regulators, considering that pilot projects by private entities failed. In 2017, 300Cubits, a Hong Kong company, launched a project to create its own digital currency called TEU Tokens for container shipments by sea. In this sector, clients often face challenges when they reserve container slots but fail to deliver their cargo to the ship. To address this issue and make sure that freight owners and shipping companies can better trust each other, 300Cubits suggested using its TEU Tokens as deposits. This way, if the cargo owner cancels the reserved slot, the shipping company receives compensation in TEU Tokens, while if it fails to ship the cargo on time, it is the cargo owner who becomes entitled to compensation. However, this system processed just a few hundred containers despite the fact that major sea shipping companies such as Maersk, CMA CGM, MSC and Cosco joined this project. Lack of clarity in terms of regulations constituted the main obstacle for the project. It did not last long and had to be shut down due to insufficient demand from oceanic carriers.

In view of the above, here are the main advantages and shortcomings of using digital currencies in payment transactions.

Table 1.

## THE MAIN ADVANTAGES AND DISADVANTAGES OF IMPLEMENTING DIGITAL CURRENCIES

Parameter	Advantages	Shortcomings
<b>State control</b>	Considering the globalised state of the world economy, states take part in international trade and use logistics services, which creates an incentive for acting more diligently to introduce digital currency and cut logistics costs.	The state has a major bearing on designing and introducing digital currency as its owner, and defines the relevant standards. Therefore, digital currencies may take different forms and shapes depending on the country, making it harder to integrate them within a single international settlement framework or adopt international standards for this sector.
<b>Insulation</b>	The effort to introduce digital currencies will enable logistics companies to transact freely across the world without relying on SWIFT-like legacy international settlement systems.	The current international environment and the ongoing fragmentation of the world into separate economic blocs prevent foreign companies from using new international settlement systems, which may be an obstacle for logistics companies when dealing with their foreign clients.
<b>Costs</b>	Using digital currency reduces costs to a minimum compared to other settlement methods.	Introducing a digital currency requires a high level of technological prowess, as well as a lot of investment from the state and users with the former creating the settlement system and its standards and the latter developing the necessary infrastructure and changing the way they transact their business.
<b>Know-how</b>	Switching to settlements in digital currency is a step forward in terms of streamlining operations. They offer lower costs, speed-up logistics (customs clearance times), and make it easier to manage the document flow, etc.	This is a new method of settlements, which implies that all interested countries and other actors must fast-track their projects on digital currencies, which is a serious impediment, since not all countries are ready to keep up with this pace.

Source: Compiled by the authors

Therefore, digital currency in transport and logistics has the potential to reduce the dependence from the Western interbank settlement system and provide for quicker cross-border payments. But there are restrictive factors too, since most of the CBDCs are currently in beta. Still, it is the transport and logistics sector and specifically cross-border freight transit which can serve as a regulatory sandbox as part of the general push to adopt and master digital currency.

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## Smart contracts

The effort to introduce smart contracts became a major step towards promoting digital transactions. This solution brings together the entities involved in rail freight shipments within a single space and enables them to monitor the way they fulfil their shipping obligations.

Smart contracts rely on blockchain technology and ensure reliable transactions by automatically following their terms and conditions, making it much easier for all the parties to execute and perform shipping contracts. This technology can be a tool for ensuring that shipping data are transparent and unbiased. It enables its users to track their shipments during delivery, which is a major competitive advantage when delivering freight by rail. In addition to this, all the parties involved benefit from not having to sign too many contracts, since a single digital instrument sets forth all the rules, including on settlement and automatic debits when someone fails to abide by the contract terms, which makes complaint and dispute resolution procedures redundant. Smart contracts can offer a favourable environment for introducing innovative financial services such as settlements in digital currency.

The entities involved in container shipments need to be able to track their container trains in real time, and blockchain offers them equal access to this information. They can then use it to better allocate their resources on border checkpoints, enabling shipping companies to respond to any delays more effectively and promptly.

In 2023, smart contracts covered over 60 technological operations on the Russian domestic rail freight transport market, including loading and unloading operations at train stations, car supply and cleaning, timely delivery and transport, etc. Moving forward, the sector is expected to adopt a role-based model for these smart contracts between payers and shipping operators, while also scaling up its geography by expanding the blockchain to include international shipments to and from Kazakhstan and Belarus as well as transit shipments between China and Europe through three countries.

Apart from overland freight transport, sea shipping operators also use smart contracts. In 2018, Maersk and IBM created TradeLens, a blockchain platform designed to facilitate information exchange using digital solutions, including smart contracts. It handled over 154 million transactions in its first year of operation with over 90 companies and over 20 ports and terminals joining it, including the port of St Petersburg. In 2019, Maersk signed a [memorandum](#) of understanding with Russia's Transport Ministry to launch the platform in Russia with St Petersburg serving as its base. In addition, it has been reported that this blockchain platform cuts oceanic shipping times by 40 percent. However, [Maersk and IBM announced](#) that they were scrapping the platform in late 2022, citing competition with Global Shipping Business Network (GSBN), a Hong Kong-based consortium, as a reason behind this decision.

In fact, nine major oceanic shipping companies — CMA CGM, Cosco Shipping Lines, Cosco Shippings Ports, Hapag-Lloyd, Hutchison Ports, OOCL, SPG Qingdao Port, PSA International and Shanghai International Port Group — founded this independent consortium and launched their own blockchain platform for handling almost all transport-related processes digitally. The [consortium](#) went on to focus on bringing the bills of lading into the digital age, which is expected to save the stakeholders involved in sea shipments up to \$6.5 billion per year. This Hong Kong



consortium joined efforts with Ant Group, an Alibaba Group subsidiary, to develop a digital bill of landing using blockchain. In 2023, the started issuing electronic bills of landing and at the end of the year, this platform registered 120,000 transactions. GSBN is now working on introducing e-bills of landing on an even broader scale. According to its CEO, the number of transactions is expected to double in 2024.

Here are the main advantages and drawbacks of using blockchain-based smart contracts.

*Table 2.*

## THE MAIN ADVANTAGES AND DISADVANTAGES OF IMPLEMENTING SMART CONTRACTS

Parameter	Advantages	Shortcomings
<b>Security</b>	The blockchain encrypts all the data to ensure that the parties operate anonymously and shield the smart contracts from any outside interferences.	There is no mechanism for changing information, which makes it impossible to correct mistakes in the software code. In addition, there is no legal framework, which makes it harder to settle disputes in court.
<b>Costs</b>	Removing intermediaries helps cut costs.	Smart contracts heavily rely on the so-called oracles <sup>1</sup> to retrieve data about what is happening in the offline world. If these data prove to be inaccurate, this can cause serious errors at the software level, causing financial losses when closing deals.
<b>Performance</b>	The transactions and contract execution happen almost instantaneously, and rule out any man-made errors.	The throughput capacity limits the transactions processing speed. For example, Bitcoin can process between seven and 10 transactions per second, PayPal brings this number up to 450, while Visa and MasterCard handle up to 56,000 transactions per second.

Source: Compiled by the authors

Today, smart contracts are an extremely useful digital solution that has its drawbacks. It can streamline some logistics processes, especially as far as controls are concerned, and helps cut costs, but does not create a binding environment since it remains outside of the regulatory framework. Overland and oceanic shipping operators have already launched pilot projects to test smart contracts with most of them focusing on introducing smart contracts in the sea freight transport sector rather than in overland shipments.

Moving forward, smart contracts can emerge as an indispensable tool for managing logistics processes and transactions by streamlining them and offering a secure environment for all the stakeholders.

<sup>1</sup> A blockchain oracle is a reliable data source that sends information to the blockchain for use by smart contracts.

# National Digital Transport and Logistics Platform

President of Russia Vladimir Putin ordered the creation of the National Digital Transport and Logistics Platform (NDTLP) as part of an effort to set up a national platform of this kind and ensuring its integration with the international transport sector, which is designed to enable Russia to fulfil its transport potential.

By creating the NDTLP, Russia can create a single digital space covering the corresponding standards and services for all carriers, shipping agents and freight owners. This platform has a lot of potential in terms of enhancing performance in the logistics sector, helping cut costs, speed up deliveries and minimise risks for the parties involved.

With the NDTLP, Russia can overcome the challenges its domestic transport industry currently faces.

*Table 3.*

## METHODS FOR OVERCOMING MAJOR OBSTACLES IN THE TRANSPORT INDUSTRY THROUGH NDTLP

Key challenges	Requires solutions
▶ Too many hard-copy shipping documents (freight exports and imports by rail require 26 documents, and this number stands at 31 for domestic shipments).	▶ Reducing the number of documents and harmonising them, developing unified classifications, switching to digital documents and e-document management solutions.
▶ Obtaining approvals and permits takes too long and the process for submitting them to the relevant agencies remains ineffective.	▶ Establishing a one-stop-shop mechanism so that operators can upload the documents only once in order to submit them to various agencies.
▶ Some carriers use informal operating schemes and operate outside of the legal framework. There are also shell companies in this sector.	▶ Creating a digital profile for entities operating in the transport and logistics market.
▶ There is no effective solution for tracking cargo shipments and their location in real time, or for monitoring shipments and deliveries.	▶ Developing a system for tracking the movements of goods across all means of transport.
▶ Отсутствие актуальной информации о параметрах и уровне загрузки объектов транспортной инфраструктуры, в том числе в режиме реального времени.	▶ Создание базы данных по объектам транспортной инфраструктуры и основным маршрутам перевозок, мониторинг грузопотоков и уровня загрузки объектов.

Source: Compiled by the authors

The NDTLP will help streamline operations along the transit routes, improve forecasting capabilities, speed up logistics and reduce the associated financial costs. Still, it falls short of addressing issues dealing with infrastructure-related limitations, market volatility and patchy regulations. In addition, the issue of who controls the relevant data, how, and who will provide for its security remains on the table, which can potentially expose the sector to cyberattacks.

With the overall concept to create the NDTLP being ready, preparations are now underway to design this platform. In 2024, the effort to create the NDTLP will include testing [five intermodal domestic and international routes](#): India (Mundra) — Russia (Moscow), Vietnam (Ho Chi Minh City) — Russia (Moscow), Russia (Irkutsk Region) — China (Shanghai), Vladivostok (Russia) — Sakhalin (Russia), Tula Region (Russia) — Novorossiysk (Russia). These test routes will help identify stages, which have yet to be integrated into the e-document management system and remove bottlenecks. The platform is expected to become fully operational in 2027. The [experiment](#) to create the NDTLP is scheduled to run from August 2024 until June 2025. It will ensure that all e-document management solutions cover freight shipments at all their stages, test the one-stop-shop mechanism for issuing permits and shipping documents, as well as test the NDTLP's interoperability with other information systems.

When the NDTLP becomes fully operational, it can be integrated with the transport platforms in neighbouring countries. Talks are already underway with China to ensure the NDTLP's interoperability with Logink, a Chinese transport and logistics platform, in order to track freight shipments in both Russia and China. The two countries have already shared their respective standards.

China's Logink offers a successful example of an effort to create a digital logistics system. It pulls together digital data from all railway stations, airports and seaports across China and other countries and brings together China's 50 largest companies, 91 logistics parks, 450,000 Chinese enterprises, all of China's railway stations and 26 Chinese, Japanese and Korean ports. By bringing together operators from all shipping segments, Logink helps promote multimodal freight shipments both domestically and internationally.

Therefore, the NDTLP has the potential to bring together the parties involved in freight shipments and streamline their interactions, while also promoting integration with international platforms. In addition to this, the upcoming [introduction of navigation seals](#) by the EAEU may enable the NDTLP to make this technology available outside of the EAEU by working with foreign partners.

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# OPPORTUNITIES

Efforts to introduce digital solutions are designed to make freight shipments by rail more efficient. An integrated approach to streamlining rail freight transits could help reduce delivery times and make shipping-related processes more transparent by using smart contracts, alternative settlement systems, as well as integrating transport and logistics digital platforms of all countries along the route.

Making transborder payments more accessible and effective is a major challenge in terms of developing payment services, which has special importance in the current international and political environment. Central banks are proactive in developing projects on digital currencies, with over 130 countries working on this agenda. They mostly rely on the retail or hybrid CBDC models by focusing on the potential of digital currency to replace cash transactions. Ensuring the interoperability of CBDC systems is viewed as the best way to make cross-border payments more effective against the backdrop of sanctions pressure.

Smart contracts can greatly accelerate continental shipments and have a lot of potential when it comes to streamlining freight shipments by rail. This would primarily lead to quicker data processing and transactions. In addition, smart contracts will help cut transaction costs and make operations more transparent and secure.

The digital transformation is currently in full swing and has already affected the transport sector. Against this backdrop, creating a single information space has become a strategic objective for every country along the existing transport corridors. Building a digital transport and logistics platform provides a pathway to overcoming challenges dealing with the interactions between government institutions and all the stakeholders in rail transport. This would enable all the operators to use a single system, while also introducing a centralised e-document management system as well as improving transparency and traceability for rail shipments. Importantly, integrating national platforms with similar foreign solutions for the transport sector is instrumental for forging closer ties and enhancing freight transport efficiency.