

# Ukraine as a Scientific-Technological, Economic, and Logistical Bridge between China and the European Union

By Serhii Muravitskyi  
*Non-Resident Fellow, Applied Research & Academic  
Exchange*

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# Ukraine as a Scientific-Technological, Economic, and Logistical Bridge between China and the European Union

Serhii Muravitskyi

Applied Technology Research Institute (Chongqing, China)

E-mail: serhiimuravitskyi@gmail.com

<https://orcid.org/0009-0009-9578-3610>

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*Ukraine possesses a unique geo-economic, logistical, and scientific-technological potential that allows it to be regarded as a natural and strategically important intermediary – a “bridge” – between the People’s Republic of China (PRC) and the European Union (EU). This article provides a comprehensive analysis of the structural factors determining this role: its advantageous geographical position at the intersection of Eurasian transport corridors, deep integration into trans-European and regional logistical networks, the impact of the full-scale invasion by the Russian Federation in 2022 on the transformation of supply routes and logistical chains, and the preserved significant scientific-technological potential of the country, including leading competencies in superhard materials, aerospace technologies, robotics, digital developments, and applied materials science. Particular attention is devoted to the institutional history of Ukrainian-Chinese cooperation from the late 20th century to the present, contemporary sustainable formats of scientific-technological interaction (such as joint laboratories and research institutes based at leading Ukrainian universities, including cooperation with Huawei), analysis of unrealised projects and institutional lessons, priority areas of cooperation in civilian and high-technology sectors, and the prospects for Ukraine’s post-war reconstruction as a multi-level platform for market expansion, attraction of investment, and deepening of international technological and economic cooperation. The theoretical and methodological foundation of the study is based on the concept of the “bridge state”, approaches of geo-economics, and science diplomacy, which enables a comprehensive justification of Ukraine’s capacity to perform the functions of a multi-level connecting link between European and Asian economic, logistical, regulatory, and technological systems, ensuring the convergence of standards, knowledge transfer, the formation of sustainable value-added chains, and the balance of interests among key global actors.*

*Keywords: Ukraine, People’s Republic of China, European Union, geo-economics, bridge state, science diplomacy*

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## **Introduction**

Ukraine occupies a unique strategic position at the intersection of key transport and economic corridors between East Asia and the European Union. This geographical advantage creates significant opportunities for the country's integration into Eurasian logistical chains, the formation of distribution hubs, and the development of economic cooperation with global partners, primarily the People's Republic of China (Bandura et al. 2024; Dovhan, 2025; DHL Press Release, 2021; Economic Truth, 2022).

The contemporary international situation, exacerbated by the consequences of the full-scale invasion of Ukraine by the Russian Federation in 2022, has substantially heightened the need to reassess Ukraine's role as a bridge between East and West. Beyond the traditional logistical and economic dimensions, the country's strategic role is increasingly evident in the scientific-technological sphere, where accumulated potential, a high level of engineering and research competencies, and preserved infrastructure for academic and applied research provide a solid foundation for long-term interaction with leading global actors (Dovhan, 2025; DHL Press Release, 2021; Institute for Problems of Materials Science, n.d.; National Academy of Sciences of Ukraine, 2025).

The aim of this article is to conduct a comprehensive analysis of the opportunities and specific mechanisms through which Ukraine can effectively serve as a scientific-technological, economic, and logistical bridge between China and the European Union. Primary focus is placed on the institutional history of bilateral and multilateral cooperation, contemporary sustainable formats of scientific-technological interaction (including joint laboratories, educational programmes, and research centres), the impact of the war on Ukraine's geo-economic role, priority areas of cooperation in civilian technologies, and the prospects for post-war reconstruction as a unique platform for market expansion, attraction of foreign investment, and deepening of international cooperation in high-technology sectors.

To achieve this aim, the article employs the conceptual framework of the "bridge state", alongside approaches from geo-economics and science diplomacy. This synthesis enables a thorough assessment of Ukraine's opportunities, identification of institutional constraints, and formulation of recommendations for a strategic partnership with China while simultaneously integrating into European economic, regulatory, and scientific spaces (Cooper & Schulz, 2023; Embassy of Ukraine in the PRC, 2022; Embassy of Ukraine in the PRC, 2019).

### **1. Theoretical-Analytical Framework: "Bridge State", Geo-Economics, and Science Diplomacy**

Contemporary international relations theory identifies a distinct category of states that act as intermediaries between major centres of power, economic blocs, and technological ecosystems. Such states are designated through the concepts of hub state and bridge state and are characterised by their ability to connect heterogeneous political, economic, institutional, and technological spaces, facilitating the circulation of goods, investment, technologies, regulatory norms, and knowledge (Bandura et al., 2024).

#### **1.1. The Concept of the "Bridge State."**

The "bridge state" combines three key parameters: geographical position enabling transit and infrastructure convergence; institutional flexibility allowing the adaptation and harmonisation of norms across different economic systems; and the presence of endogenous

development resources, including an industrial base, scientific-technological potential, and qualified human capital (Loshkariov & Kopyttsev, 2025).

Ukraine fully meets these criteria. On the one hand, the country is deeply integrated into European political, economic, and regulatory structures, including trans-European transport networks and EU research programmes. On the other hand, Ukraine has a long history of cooperation with China in infrastructure, industry, and scientific-technological projects. This combination positions it as a potential “translator” between European and Asian models of economic and technological development, capable of reducing institutional barriers and facilitating standard convergence (Economic Truth, 2022; Embassy of Ukraine in the PRC, 2022).

The concept of the “bridge state” provides a theoretical foundation for analysing Ukraine’s role in the Eurasian space, allowing the country to be viewed not merely as a transit territory or market but as an active intermediary contributing to the formation of new regional and global value-added chains.

### **1.2. Geo-Economics as an Analytical Tool**

Geo-economics views trade, investment, technologies, and infrastructure as key instruments of state strategy, emphasising structural advantages and the potential for influence through economic levers rather than traditional military power. Unlike classical geopolitics, the geo-economic approach focuses on states’ capacity to shape and control resource flows, supply chains, and technological standards (DHL Press Release, 2021).

In the Ukrainian context, geo-economics highlights several critically important factors: developed infrastructural connectivity with the EU, the Black Sea region, and the Caucasus countries; potential participation in diversified Eurasian transport corridors; the presence of an industrial and scientific-technological base capable of integration into international production chains; and the possibility of transitioning from simple transit to the formation of distribution nodes, industrial clusters, and multimodal logistical hubs (Economic Truth, 2022; Harbin Institute of Technology, 2025; Huawei, n.d.); Hu et al., 2022; Railway Supply, 2024).

Contemporary studies emphasise that, amid the transformation of global supply chains and increasing attention to resilience and route security, Ukraine possesses the potential to create its own geo-economic advantages, particularly as a regional node for converging European and Asian interests.

### **1.3. Science Diplomacy as a Mechanism for Sustainable International Interaction**

Science diplomacy comprises a set of instruments aimed at strengthening international ties through joint scientific research, technological cooperation, educational programmes, knowledge exchange, and the establishment of joint laboratories. Unlike traditional political diplomacy, science diplomacy relies on long-term institutional projects that demonstrate high resilience to political crises and geopolitical fluctuations (Dovhan, 2025; Flink & Schreiterer, 2010; Royal Society, 2010).

For Ukraine, science diplomacy acquires particular strategic importance for several reasons: the preserved significant scientific-technological potential encompassing world-class fundamental and applied research; the high degree of integration of Ukrainian scientists and engineers into international research networks, including European grant programmes; the possibility of forming joint research centres and laboratories with partners from China and the EU; and the proven resilience of scientific cooperation even under conditions of war and political instability (Flink & Schreiterer, 2010; International Science Council, n.d.; Nazarovets, 2018; Royal Society, 2010).

Science diplomacy enables Ukraine to enhance its international agency, establish long-term channels of trust, and develop technological platforms that serve as a neutral foundation for interaction amid global technological fragmentation.

The synthesis of the “bridge state” concept, geo-economics, and science diplomacy creates a comprehensive analytical framework for understanding Ukraine’s role as a multi-level intermediary connecting logistics, science, technology, and institutional standards between Europe and Asia.

## **2. Ukraine’s Geo-Economic and Logistical Position in the Eurasian Space**

Ukraine’s geo-economic significance has traditionally been determined by its location at the intersection of key transport and trade routes between Europe, Eurasia, and the Black Sea region. As the largest country in Europe by territory, Ukraine has historically functioned as a transit space linking the markets of Eastern and Western Europe while providing access to the Black Sea as a vital component of global maritime trade. In contemporary conditions, this position acquires new meaning, extending beyond classical transit to create potential for more complex forms of economic and logistical intermediation (4liberty.eu, 2025; Bandura et al., 2024); Dovhan, 2025; DHL Press Release, 2021; Economic Truth, 2022).

### **2.1. Ukraine as an Element of Trans-European and Eurasian Transport Corridors**

Ukraine’s territory is integrated into a range of trans-European transport networks, including road, rail, and inland waterway routes connecting Central and Eastern Europe with the Black Sea basin. Key rail corridors linking EU countries with the Caucasus, Central Asia, and, in a broader context, East Asia have traditionally passed through Ukraine (Bandura et al., 2024; Dovhan, 2025; DHL Press Release, 2021; Seatrade Maritime, 2024).

From a geo-economic perspective, it is important to emphasise that Ukraine’s logistical significance is not limited to the function of the shortest route. Rather, its infrastructure enables the formation of distribution nodes, storage and industrial zones, and multimodal transport hubs capable of servicing complex supply chains. This functional transformation of transit routes into logistical ecosystems is a key element in the conversion of a state into a geo-economic node (Cooper & Schulz, 2023).

### **2.2. Black Sea and Danube Directions in Regional Logistics**

Ukraine’s Black Sea ports have historically played a central role in the country’s foreign trade and in ensuring connections between Europe, the Middle East, and Asia. Even under conditions of full-scale war and substantial restrictions on maritime navigation, the importance of alternative routes, including the Danube direction, has significantly increased. The Danube has become a vital component of export-import logistics, providing Ukraine with access to EU markets and international transport corridors (4liberty.eu, 2025; Economic Truth, 2022; Seatrade Maritime, 2024).

From a geo-economic viewpoint, the development of the Danube direction demonstrates Ukraine’s ability to adapt to changing conditions and maintain its role in regional logistics. Moreover, the integration of Ukrainian infrastructure into European logistical networks contributes to accelerated institutional and technical convergence with the EU, thereby enhancing Ukraine’s potential as an intermediary between different economic spaces (4liberty.eu, 2025).

### **2.3. Ukraine in the Context of the Belt and Road Initiative**

China's Belt and Road Initiative initially envisaged the creation of alternative routes and logistical connections between East Asia and Europe. Ukraine was regarded as one of the potential elements of this architecture, primarily due to its geographical position and existing infrastructure. Although the implementation of large-scale infrastructure projects on Ukrainian territory was limited by political and institutional factors, the logic of the initiative itself underscores China's long-term interest in diversifying Eurasian routes (Harbin Institute of Technology, 2025; Nazarovets, 2018; Novynarnia, 2016; Ukrainian State Chemical Technology University, 2025; Ukrainian State University of Science and Technologies, 2025; UkrEnergy, 2018).

In the context of complicating relations between China and certain European countries, as well as the EU's growing focus on supply chain resilience and security, the role of intermediary spaces acquires particular importance. In this regard, Ukraine can be viewed not so much as part of a specific infrastructure corridor but as a platform for converging diverse logistical and production routes while taking into account European regulatory requirements (Harbin Institute of Technology, 2025; Odesa National University, 2020).

### **2.4. The Impact of the War on Ukraine's Geo-Economic Role**

The full-scale invasion of Ukraine by the Russian Federation in 2022 radically altered the conditions for the functioning of the Ukrainian economy and logistics. A significant portion of infrastructure was damaged or taken out of service, traditional routes were blocked, and risks for international transport increased substantially. However, from a geo-economic perspective, the war did not eliminate but, in certain aspects, even highlighted Ukraine's strategic importance (Seatrade Maritime, 2024; World Bank, European Commission, UN, 2025).

First, the crisis demonstrated the critical role of alternative routes and the necessity of logistical chain diversification. Second, Ukraine's accelerated integration into the EU's economic and regulatory space strengthened its potential as a point of convergence between European and external markets. Third, international support for infrastructure reconstruction creates preconditions for modernising logistical systems at a fundamentally new technological level (Flink & Schreiterer, 2010).

### **2.5. Geo-Economic Conclusion: From Transit to Intermediation**

Thus, Ukraine's geo-economic and logistical position should be considered not only through the prism of geography or transit volumes but as a foundation for forming a more complex model of intermediation between China and the European Union. Amid the transformation of global supply chains and the growing importance of regional logistical hubs, Ukraine possesses the potential to transition from the role of a transit corridor to that of an active geo-economic node (Economic Truth, 2022; Institute for Problems of Materials Science, n.d.).

This potential, however, is not automatic. Its realisation requires institutional reforms, investment in infrastructure, and synchronisation with European standards. It is precisely the combination of geo-economic factors with scientific-technological and institutional potential that allows for the possibility of sustainable positioning of Ukraine as a bridge between China and the European Union.

### **3. Ukraine's Scientific-Technological Potential as a Factor in International Interaction**

Ukraine's scientific-technological potential is one of the key yet often underestimated factors of its international agency and geo-economic role. Unlike many post-socialist countries, Ukraine has preserved a developed multi-level system of academic and applied research closely linked to industrial production, engineering education, and high-technology sectors. This potential allows the country to be viewed not only as a transit space or market but as a fully-fledged source of knowledge, innovative technologies, and qualified personnel demanded in both European and Asian economic spaces (Embassy of Ukraine in the PRC, 2022; Embassy of Ukraine in the PRC, 2019; Future Market Report, n.d.); Institute for Problems of Materials Science, n.d.; National Academy of Sciences of Ukraine, 2025).

#### **3.1. Structure and Key Directions of Ukraine's Scientific-Research System**

Ukraine's scientific-research system was historically formed as a comprehensive multi-level structure comprising the National Academy of Sciences of Ukraine (NASU) as the leading centre for fundamental research, sectoral academies, a network of specialised research institutes, and a system of technical universities. Despite chronic underfunding and the consequences of war, the system has retained competencies in strategic areas: materials science (including superhard materials), mechanical engineering, aerospace, energy, IT, and robotics (Future Market Report, n.d.; Igor Sikorsky Kyiv Polytechnic Institute, 2024; Institute for Problems of Materials Science, n.d.; National Academy of Sciences of Ukraine, 2025; UNIAN, 2016; Verified Market Reports, 2025a; Verified Market Reports, 2025b).

According to Sergii O. Ivakhnenko, Leading Researcher at the Institute for Superhard Materials of the NASU, Professor, and Corresponding Member of the NASU (author's personal interview), the main scientific-technological directions in Ukraine are aerospace vehicles and technologies, materials science of superhard and refractory materials, fundamental mathematics, theoretical physics, robotics, and a wide range of digital technologies. Key achievements include the creation of modern aircraft, ballistic and cruise missiles, unmanned aerial vehicles, and the production of superhard materials (diamond and cubic boron nitride) for industrial applications in metal, wood, glass, plastic processing, and microelectronics. These competencies hold high potential for international cooperation, particularly in civilian applications.

#### **3.2. Universities, Science Parks, and Innovative Infrastructure as Platforms for International Cooperation**

A pivotal role in preserving and developing this potential is played by leading technical universities (Igor Sikorsky Kyiv Polytechnic Institute, Kharkiv Polytechnic Institute, National Aviation University, and others), which serve as platforms for international programmes, including cooperation with Huawei (laboratories, ICT Academy) (Huawei, n.d.; Igor Sikorsky Kyiv Polytechnic Institute, n.d.; Investing.com, 2022; Lviv Tech City, n.d.; Ministry of Agrarian Policy and Food of Ukraine, 2024; National Academy of Sciences of Ukraine, 2025).

Science parks (KPI Science Park, UNIT.City, LvivTech.City) facilitate the commercialisation of developments and attraction of foreign partners (Igor Sikorsky Kyiv Polytechnic Institute, n.d.; Lviv Tech City, n.d.; UNIT.City, n.d.).

NASU institutes (including the Institute for Superhard Materials and the Institute of Single Crystals) support applied research and cooperation with China in materials science (Ministry

of Infrastructure of Ukraine, n.d.; National Academy of Sciences of Ukraine, 2025; National Academy of Sciences of Ukraine, n.d.).

### **3.3. Conclusion: The Role of Scientific-Technological Potential in International Positioning**

The preserved scientific-technological potential serves as a strategic resource for science diplomacy, enhancing Ukraine's role as an intermediary between China and the EU through knowledge transfer, human capital development, and joint innovation (International Science Council, n.d.; Nazarovets, 2018).

## **4. Sustainable Formats of Ukrainian-Chinese Scientific-Technological Cooperation after 2022**

Analysis of Ukrainian-Chinese interaction practice indicates that, following the full-scale invasion of 2022, the most viable formats of cooperation have been those oriented towards institutionalisation, joint research, human capital development, and civilian technologies unrelated to sensitive or defence-related areas. These models demonstrate resilience to geopolitical risks and regulatory constraints, allowing the preservation and even development of scientific ties under complex conditions (Embassy of Ukraine in the PRC, 2022; Embassy of Ukraine in the PRC, 2019).

Key examples of such formats are long-term partnerships based at leading Ukrainian universities and academic institutes. In particular, the cooperation between Igor Sikorsky Kyiv Polytechnic Institute and Huawei includes the operation of specialised laboratories (including the Digital Power Lab for solar energy), Huawei ICT Academy programmes, training of specialists to international standards, and integration of students into global technological projects. This partnership, initiated in 2016, continues today, providing knowledge transfer, access to modern equipment, and development of human capital demanded in both European and Asian markets (Huawei, n.d.; Hu et al., 2022; Igor Sikorsky Kyiv Polytechnic Institute, 2024; Investing.com, 2022; Ukrainian State University of Science and Technologies, 2025).

Similar sustainable links are observed in materials science, where joint research initiatives with Chinese universities and institutes (e.g., Harbin Institute of Technology) focus on superhard materials for civilian use. Such projects are built on principles of joint development, intellectual property distribution, and academic exchange, minimising political risks (Harbin Institute of Technology, 2025; Ukrainian State Chemical Technology University, 2025; Ukrainian State University of Science and Technologies, 2025; UkrEnergy, 2018).

These formats highlight the shift from one-off investments to institutionally anchored mechanisms that ensure long-term sustainability of cooperation.

## **5. Unrealised and Restricted Projects: Institutional Lessons**

Ukrainian-Chinese cooperation practice includes examples of projects that encountered serious restrictions or were entirely unrealised, primarily in the aviation and defence sectors. Analysis of these cases allows identification of key institutional and strategic lessons.

The most illustrative are initiatives surrounding Motor Sich enterprises and the An-225 Mriya project. Attempts to attract Chinese investment (including Skyrizon Aviation) and joint production faced political sensitivity, regulatory restrictions on export control of dual-use technologies, and sanctions from Ukraine and third countries. These projects demonstrated

high risks for both parties under conditions of geopolitical tension and military conflict (Novynarnia, 2016; NV, 2021; UNIAN, 2016).

Main reasons for restrictions:

- Political and geopolitical sensitivity of defence technologies.
- Lack of a sustainable institutional base for long-term contracts.
- Disruptions in supply chains and dependence on external components amid war.

Lessons from these cases underscore the need to focus on civilian technologies, institutionalisation through academic and research platforms, and flexible distributed cooperation models.

## **6. Priority Directions of Ukrainian-Chinese Cooperation in the Context of European Integration**

Ukraine possesses competencies enabling it to serve as a platform for converging the interests of China and the EU. Priority directions include:

1. High technologies and superhard materials: joint development of tools, semiconductors, and quantum technologies based on Ukrainian scientific schools (Institute for Problems of Materials Science, n.d.; Ukrainian State University of Science and Technologies, 2025; UkrEnergy, 2018; Verified Market Reports, 2025a; Verified Market Reports, 2025b).
2. Information-communication technologies and digital transformation: Huawei programmes and similar (Huawei, n.d.; Hu et al., 2022).
3. Energy and “green” modernisation: renewable sources, energy efficiency (Embassy of Ukraine in the PRC, 2019).
4. Agro-industrial and biotechnologies (Ministry of Agrarian Policy and Food of Ukraine, 2024).
5. Science and education: academic exchange, joint grants (Odesa National University, 2020).

These directions organically fit into European integration, creating competitive value-added chains.

## **7. Ukraine’s Post-War Reconstruction as a Platform for Market Expansion and Cooperation**

Post-war reconstruction represents a unique opportunity for forming new economic and technological ties. Large-scale projects in infrastructure, energy, industry, and logistics create a platform for integration into global chains. Cooperation with China can accelerate modernization, open markets, and ensure technology transfer, subject to compliance with European standards and security (Flink & Schreiterer, 2010).

Key areas: infrastructure (roads, ports), “green” energy, high-technology production, multimodal chains (Embassy of Ukraine in the PRC, 2022; Embassy of Ukraine in the PRC, 2019; Institute for Problems of Materials Science, n.d.; Odesa National University, 2020), innovation and scientific-technological development (joint research centers).

## **8. Strategic Implications for Ukraine, China, and the European Union**

Post-war reconstruction and the development of scientific-technological cooperation with China generate a range of long-term strategic consequences for all involved parties.

According to S. O. Ivakhnenko, in the medium term (5–10 years), Ukraine is capable of forming a sustainable scientific-technological platform oriented towards transforming Chinese technologies into applied solutions for European production. This interaction format minimizes costs for creating production chains and training personnel while retaining China's control over key technological know-how and providing the European Union with access to innovative solutions in strategically important sectors.

### *1. For Ukraine:*

- Strengthening technological and economic sovereignty: integration with Chinese technologies and investment enables modernisation of key sectors, forming a competitive industrial and scientific-technological base.
- Expansion of export potential: joint projects with Chinese companies create channels for accessing European markets through standardised logistical routes, increasing trade volumes and strengthening economic resilience.
- Diversification of international partners: cooperation with China reduces dependence on a limited number of traditional investors and opens new opportunities for multipolar foreign economic interaction.

### *2. For China:*

- Access to European markets via the Ukrainian corridor: investment in Ukraine's infrastructure and industrial reconstruction creates a reliable route for supplying Chinese technologies and products to the EU.
- Strengthening scientific-technological ties: joint research and production projects allow China to expand influence in high-technology sectors, including robotics, energy systems, and superhard materials.
- Formation of a positive international image: active participation in Ukraine's reconstruction can be presented as a contribution to peaceful and sustainable regional development, enhancing China's position as a responsible global partner.

### *3. For the European Union:*

- Regional stabilisation and strengthening of supply chains: Ukraine's reconstruction ensures the restoration of key transit routes and industrial potential, reducing the EU's vulnerability to external shocks.
- Development of partnership models with third countries: interaction with Ukraine and China opens new forms of cooperation in infrastructure, technological, and energy projects.
- Balancing the interests of global actors: EU participation in Ukrainian initiatives alongside China enables the formation of multipolar models of economic interaction, reducing risks of dominance by individual countries in the region.

Overall, the strategic implications confirm that Ukraine can effectively utilise its geo-economic and scientific-technological position to form a triple partnership: Ukraine–China–Europe, where each participant gains benefits through cooperation, innovation, and integration into global chains. This approach transforms Ukraine's reconstruction and development into an instrument of long-term regional stability, technological progress, and economic growth.

## Conclusion

Ukraine possesses unique potential to serve as a scientific-technological, economic, and logistical bridge between China and the European Union. Its strategic position, developed research infrastructure, and openness to international cooperation create conditions for forming sustainable partnership formats with China and for integration into European markets.

Historical experience of cooperation, beginning in the late 20th century, demonstrates that joint research, personnel exchange, and technological cooperation yield mutual benefits and stimulate development in critically important sectors, including mechanical engineering, robotics, energy, and high-technology materials production. A key factor for successful interaction is institutional preparedness, adaptability to external challenges, and implementation of long-term strategic projects.

Ukraine's post-war reconstruction represents a unique platform for market expansion, attraction of foreign investment, and introduction of advanced technologies. Joint projects with China can accelerate infrastructure modernisation, industrial restoration, and export potential growth while strengthening Ukraine's position as a reliable partner in the global economy.

For China, participation in Ukrainian projects and the development of scientific-technological ties open access to European markets and contribute to enhancing its international image. The European Union, in turn, gains the opportunity to stabilise the region, strengthen logistical and economic chains, and form models of multipolar interaction with global actors.

Thus, the formation of a triple partnership "Ukraine–China–EU" constitutes a strategically important instrument for ensuring sustainable regional development, technological progress, and economic growth. By leveraging its geo-economic, scientific-technological, and logistical position, Ukraine can effectively realise its role as a bridge connecting Eastern and Western economic and innovative spaces.

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