

The object of the study is the processes of intellectualization of Ukraine's economy in the context of post-war reconstruction, structural modernization, digital transformation, and the formation of a knowledge-based economy. The problem addressed in the study is the low efficiency of managing the intellectualization of Ukraine's economy, which hinders innovation development and European integration. It is substantiated that intellectual potential is a systemic factor of socio-economic development and a key driver of the post-war economic reconstruction of Ukraine. In order to increase the innovation activity of the national economy, a holistic mechanism for the protection and commercialization of intellectual property objects integrated into the state science, technology and innovation policy is formed. A comprehensive political roadmap with cross-sectoral coordination and focus on the synergy of science, business and the state is designed, which allows bridge the gap between knowledge creation and its economic realization. The directions and tools for the effective use of intellectual potential based on its targeted integration with the technological modernization of key sectors of the economy are elaborated. The priorities for the development of the knowledge economy, structured according to sectoral and institutional principles, are substantiated, which made it possible to overcome the dispersion of strategic guidelines for innovation policy. It is pointed out that Ukraine needs to implement smart solutions and consolidate all entities of the national economic system in order to revive at a new higher level of intellectual and socio-economic development. The need for Ukraine's integration into European value chains was emphasized. Practical application of the results is possible subject to the implementation of comprehensive programs to strengthen the Ukrainian model on the path of an intellectual society in the process of modernization

**Keywords:** post-war reconstruction, intellectualization of the economy, intellectual potential, STI policy, intellectual security, European integration

# INTELLECTUALIZATION OF UKRAINE'S ECONOMY: INTERNAL DETERMINANTS AND STRATEGIC PRIORITIES FOR POST-WAR RECONSTRUCTION

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Received 04.12.2025

Received in revised form 28.01.2026

Accepted 13.02.2026

Published 27.02.2026

**How to Cite:** Ostrovska, H., Sherstiuk, R., Ivata, V., Mykhailov, M., Pashchenko, O., Volska, O. (2026).

Intellectualization of Ukraine's economy: internal determinants and strategic priorities for post-war reconstruction. *Eastern-European Journal of Enterprise Technologies*, 1 (13 (139)), 43–52.

<https://doi.org/10.15587/1729-4061.2026.352364>

## 1. Introduction

One of the defining twenty-first century trends is the increasing role of intellectual capital in the global economic

development structure. In response to the global economy's transformational challenges, a number of countries, including Ukraine, have declared a transition to an innovation-oriented growth model that involves the integration of knowl-

edge and the results of scientific and technological progress as key economic drivers. At the same time, the national policies adaptation in the field of intellectual property and innovation to the needs of structural economy modernization is becoming strategically important [1].

Modern Ukraine is going through historically significant changes that make intellectual potential a key driver of socio-economic progress. Scientific research, innovative technologies, and innovative approaches play a central role in this process, shaping the country's ability to compete on the global stage. In these conditions, the educational sector is viewed not only as an economic sector but also as a strategic resource, and the main factor of development is the personality that generates new knowledge, products and cultural values. Insufficient development and use of intellectual potential create risks that can have long-term consequences for society, much more serious than temporary economic fluctuations, and manifest themselves over decades or even centuries [2]. The main goal of intellectual-economic platform transformations in the process of post-war reconstruction of Ukraine is to ensure stable socio-economic development and improve the welfare of the population. Despite its considerable potential, the country needs to formulate its own structured development strategy, which will be implemented by innovative leaders with the active participation of all segments of society [3].

In the context of the urgent need for accelerated economic recovery, a concept of a "fast state" is proposed that integrates a cyber-critical approach with a human-centered management model. The main goal of the model is the efficient use of human capital and optimization of resource mobilization in public administration and the economy. The concept of a "fast state" is based on five key principles: speed, efficiency, certainty, engagement, and automation.

The implementation of these principles involves transforming public administration into a flexible, technologically supported system capable of responding quickly to the challenges of post-war reconstruction and increasing economic efficiency by maximizing the intellectual potential and capital use.

The relevance of the economic intellectualization topic is due to the growing role of knowledge, technology, and innovation in ensuring the competitiveness and structural modernization of national economies. Scientific substantiation of the mechanisms for the intellectual potential efficient use is necessary for the effective innovation policy formation and long-term economic growth ensuring.

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## 2. Literature review and problem statement

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The paper [3] offers a critical contribution to understanding the consequences of war for the country's scientific and technological landscape. Within the framework of monographic research, it is advisable to strengthen the integration of theoretical provisions with applied aspects of science, technology, and innovation (STI) development, which are key determinants of the sustainable socio-economic future of the country. In study [4] a comprehensive justification of the prospects for post-war reconstruction of Ukraine's economy is provided, the patterns of its spatial evolution in post-conflict conditions are identified, and conceptual approaches, mechanisms, and instruments for implementing innovation policy are developed. At the same time, the authors do not sufficiently reveal the mechanisms of systemic activation and commercialization of intellectual potential in the context of post-war transforma-

tion, which may be due to the authors' focus primarily on the spatial and structural aspects of economic reconstruction.

Research [5] analyzes the processes of shaping public policy in the field of STI and the development of innovative ecosystems in post-crisis economies, particularly in Ukraine. In this context, the issue of systematic state support for intellectual capital as a key factor in innovative development has not been sufficiently addressed.

Work [6] is devoted to the digital economic integration of Ukraine with the European Union, which, in the context of the post-war state reconstruction, is gaining a structured perspective. Given the dynamic development of digital technologies, it is considered expedient to integrate digital tools into the implementation of the Sustainable Development Goals in the post-war period [7]. The research [8] monitored digital competitiveness in the framework of economic growth and strengthening information security protection as a factor in increasing trust in the country. At the same time, insufficient attention was paid to intellectual security, focusing only on digital competencies and technological infrastructure.

The authors of papers [9, 10] argue for the advisability of transitioning to an updated economic organization model for enterprises and the economy as a whole, focused on maximizing human potential involvement and minimizing risks associated with the use of digital technologies. In this context, emphasis should be placed on strengthening competitive advantages in the struggle for highly qualified human resources. In studies [11, 12], the doctrine of intellectual commercialization is considered as the conceptual basis of high-tech and competitive entrepreneurship, the progress of which is determined by the creation of an intellectual product as a manifestation of human potential realization. Investing in intellectual assets within strategic priorities is a key mechanism for the development of a knowledge-based society.

Research findings [13, 14] confirm that ideological and value orientations aimed at building social and intellectual capital determine competitiveness. Effective mobilization of intellectual potential is ensured by technologies based on high-quality humanities education, which play a key role in the system of managing state and social values. A synthesis of existing scientific data shows that intellectual potential, based on knowledge and scientific achievements, is a determining factor in Ukraine's reconstruction and sustainable development as well as a prerequisite for its effective integration into the European space.

A summary of the critical analysis results shows that current approaches to developing Ukraine's intellectual potential and intellectualizing its economy are fragmented, insufficiently aligned with post-war reconstruction goals, and do not adequately address systemic socio-economic challenges. The scientific and practical problem of comprehensive identification of key institutional and structural constraints on economic intellectualization and the development of practical recommendations for determining its priority areas in the post-war period remains unresolved.

All this allows stating that it is expedient to conduct research devoted to the intellectualization of Ukraine's economy amid the strategic priorities of post-war recovery.

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## 3. The aim and objectives of the study

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The aim of the study is to determine the role of intellectual potential in ensuring Ukraine's innovative development.

This will enable the development of practical recommendations for the formation of effective state policy and management mechanisms for the preservation, reproduction, and capitalization of intellectual potential as a key factor in the modernization of Ukraine's economy.

Achieving this aim involved solving the following scientific objectives:

- identifying the prerequisites for the widespread introduction of innovations in modern society;
- developing measures to create an open network platform for intellectual property management;
- developing directions and tools for the effective use of intellectual potential through the implementation of advanced technologies in key sectors of the national economy;
- developing a political roadmap for the implementation of Ukraine's STI policy aimed at activating Ukraine's intellectual potential in the context of post-war economic reconstruction;
- defining priorities for knowledge-based economic development as the foundation for long-term competitiveness and sustainable economic growth.

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#### 4. Materials and methods

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The object of the study is the processes of Ukraine's economy intellectualization in the context of post-war reconstruction, structural modernization, digital transformation and knowledge-based economy formation. The main hypothesis of the study is that the effective use of intellectual potential, integration of digital technologies and structural modernization accelerate Ukraine's post-war reconstruction and contribute to the formation of a knowledge-based economy. It is assumed that intellectual potential and effective innovation management are key factors in accelerating post-war reconstruction and the formation of a knowledge-based economy. For simplicity, the analysis focuses on the internal determinants of economic intellectualization and key sectors, without fully considering external factors and all sectors simultaneously.

The methodological basis of the study is formed on the basis of cross-disciplinarity, which involves a combination of political, institutional and economic analysis tools for a comprehensive study of Ukraine's post-war reconstruction. To achieve the objectives of the study, general scientific and special methods were used: induction and deduction, scientific abstraction, analysis and synthesis to form the theoretical and methodological foundations of the investigation. Comparative analysis method used to establish the correlation between the competitive positions of Ukraine and foreign countries. Comparison, grouping, and systematic analysis aimed at studying existing scientific achievements in the context of such components of society's intellectual potential as STI. Structural and logical analysis to justify the feasibility of developing and interconnecting the STI spheres in the post-war period. The method of scientific generalization used to examine the definitions of the categories "intellectual security" and "intellectual potential of society" and to provide relevant conclusions and practical recommendations. The method of logical generalization – in the interaction of social and economic processes, proves the legitimacy of considering intellectual potential as a driver of unique competitive advantages. The method of critical analysis was used to identify the impact of war and crisis on intellectual potential and to establish trends in the quality of intellectualization.

The validity and reliability of the results are confirmed by the application of systemic, resource, socio-cultural, humanistic, civilizational, axiological, and institutional approaches.

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### 5. Results of the research on internal determinants and strategic priorities of Ukraine's economy intellectualization

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#### 5.1. Prerequisites for the widespread introduction of innovations in modern society

As Ukraine is facing a war with Russia, the presence of highly skilled and experienced professionals, the development of digital, industrial, socio-humanitarian technologies, and the accumulation of the intellectual potential of society are another invisible front in countering the aggressor. The foundation for the country's development is people, ideas, and intellectual potential. It should be noted that the intellectual potential of society, given the growing needs of mankind and limited resources, is becoming almost the only inexhaustible source of innovation, incentives to gain and maintain competitive positions in the domestic and global markets.

The society's intellectual potential is a set of its members' capabilities to influence the noosphere on the basis of their intellectual potential accumulated by the scientific, cultural and spiritual heritage, ensuring historical progress [11]. Thus, intellectual potential encompasses a set of intellectual components of human activity that enhance its creative and innovative nature, ensure adaptability and allow it to go beyond standardized action algorithms.

Organizing the development of intellectual potential is a strategic direction of modernization of the Ukrainian economy, and the speed of achieving its quality depends on the transition of Ukraine's economy to a peaceful track.

Ukraine is a European country with great potential. However, today the issue of the Ukrainian nation's intellectual potential in the context of its loss is attracting close attention of Ukrainian society. This aspect is related to forced migration. Given that Ukrainians are forced to go abroad, problems regarding destructive trends in intellectual development and their impact on intellectual security indicators have intensified in Ukraine.

Intellectual security is the state of the socio-economic system that ensures the rational use and capitalization of intellectual potential to ensure competitiveness and guarantee the safe life of an individual, enterprise, and country at the current and strategic levels. In this regard, let's consider it inappropriate to raise the question of the possibility of progress of the economic system without fundamental measures to strengthen Ukraine's intellectual security.

The mass emigration of citizens results in the loss of the state's own intellectual resources. The forced displacement of creative professionals and scientists is a serious threat to the country's intellectual security, which is assessed by the level of creative and professional qualification potential development, in particular, the number of employees with academic degrees, the state of professional training of scientific intellectuals, etc. As a result of the growing emigration trends and the systemic "outflow" of creative potential, there is a systemic crisis in the economy. In this context, the issues of interaction between knowledge, innovations and traditions, preservation of historical and cultural values, multiplication and transfer of the accumulated intellectual heritage to future generations, as well as strengthening intellectual

security are becoming more relevant. The priority organizational and economic levers for strengthening Ukraine's intellectual security are the formation of a regulatory framework, coordination of the state personnel policy, monitoring of foreign programs for recruiting creative professionals, and improvement of incentives for developing creative potential and attracting foreign experts.

Successful modernization of Ukraine's economy requires the integration of scientific, technological, innovative, and cultural components of intellectual potential. Progress in STI depends on the development of human resources and the alignment of policy strategies by all stakeholders. Investments in training, professional development, mentoring, and exchange of experience at the national, regional, and international levels build unique competencies of managers and researchers. The national innovation system is being actively developed, and R&D and commercialization of scientific results are being stimulated to accelerate economic recovery. Modern challenges require transformation of the interaction of science with the state, business, and society, strengthening of defense capabilities, and formation of national development strategies. The main elements of this restructuring are shown in Fig. 1.

- the state of national science development; the level of national science integration into the global knowledge network;
- the availability of appropriate state policy to support science and innovation;
- economic prerequisites for innovation implementation; socio-humanitarian prerequisites for innovation [15].

**5. 2. Measures to create an open network platform for intellectual property management**

The core of the economy is the intellectual property institution: the results of creative and intellectual activity and their legal protection in international markets precede the material circulation of goods and services. The economic growth rate, the gross domestic product level and the national economy's competitiveness are largely determined by the extent to which intellectual assets are involved in economic circulation, the speed of their commercialization and market value.

Under current conditions, the intellectual potential of society is not sufficiently transformed into intellectual property, which leads to a decrease in the effectiveness of scientific and technological activities (Table 1).

In this context, the share of the total titles of protection number received in 2024 by higher education and research institutions of the Ministry of Education and Science was 54.3% (respectively, 54.9% in 2023) [16].

Digitalization is one of the key factors in the intellectual property institution transformation in Ukraine and the world. It radically changes the mechanisms of creation, distribution and use of intangible resources. Ukraine is entering the phase of digital intellectual property markets development amid an underdeveloped culture of production and consumption of intangible goods. Harmonization with EU Directive 2019/790 strengthens the institutional framework for copyright protection and introduces modern mechanisms for fair remuneration and revision of license agreements [17, 18].

A key tool for strengthening the competitiveness and technological sovereignty of the state is the creation of open standards and a public network platform for intellectual property management that stimulates the creative potential and development of the digital economy (Table 2).

The institutionalization of an open public-private technology platform and its regulatory consolidation in national legislation forms the basis for coordinating the interaction of key stakeholders – high-tech businesses, universities, creative laboratories and collective rights management organizations within the framework of unified technical standards.

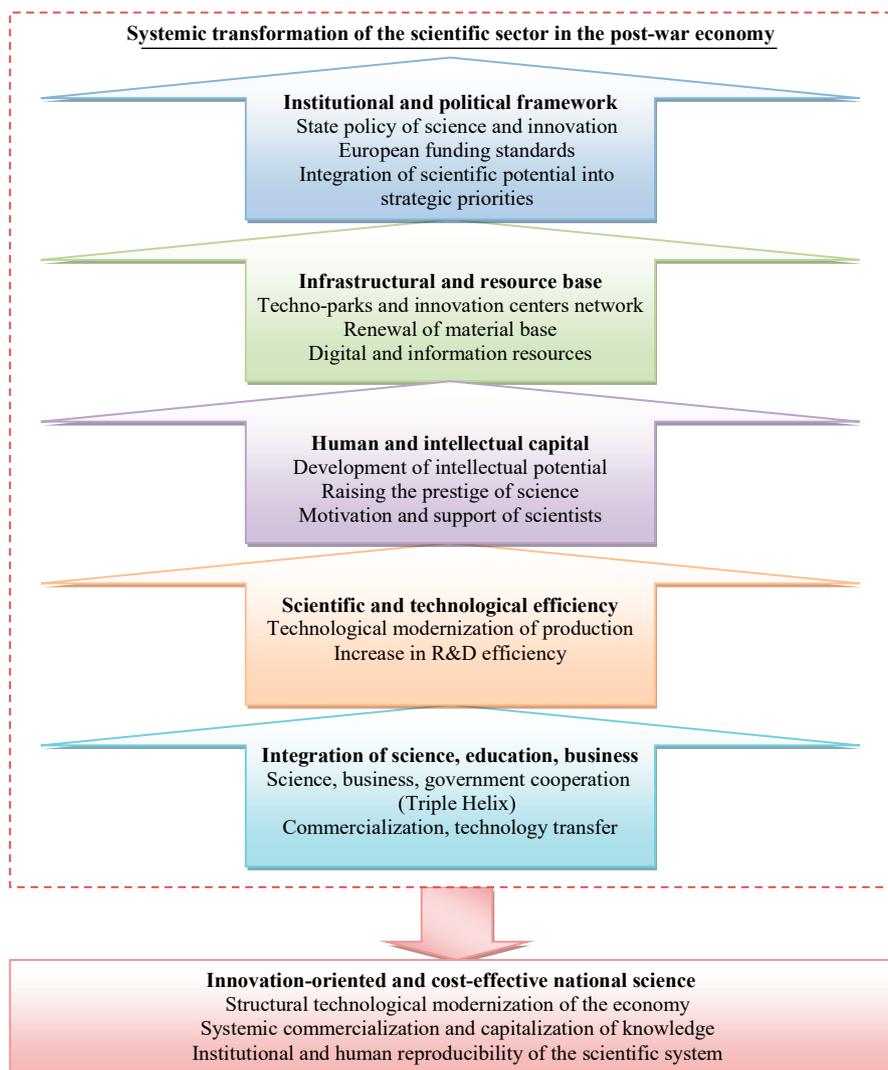


Fig. 1. Systemic transformation of the scientific sector in the post-war economy

The most important prerequisites for the widespread introduction of innovations in modern society are as follows:

Table 1

Dynamics of filed applications and titles of protection acquisition for the results of scientific (scientific and technical) works, units

Indicator	Total						At the expense of the general fund					
	2019	2020	2021	2022	2023	2024	2019	2020	2021	2022	2023	2024
Number of applications for titles of protection, total, including:	9019	3089	2845	1820	2133	2168	7412	2162	2163	1430	1548	1425
in Ukraine	9000	3084	2837	1816	2131	2165	7398	2157	2156	1428	1546	1422
abroad	19	5	8	4	2	3	14	5	7	2	2	3
Number of received titles of protection, total, including:	6743	3391	2969	1627	1901	1701	5364	2577	2301	1317	1465	1294
in Ukraine	6718	3387	2962	1625	1896	1697	5351	2573	2296	1316	1460	1290
abroad	25	4	7	2	1	4	13	4	5	1	5	4

Source: systematized based on [16].

Table 2

Key functions, accompanying activities and expected effects of an open network platform creation for intellectual property management

Unit	Context
Strategic goal	Increasing Ukraine’s competitiveness and technological independence by creating an open public network platform for intellectual property management based on international standards
Platform functionalities	Automated recording of transactions with intellectual property objects, including registration of rights, licensing, and transfer of rights using digital registries. Deposit of digital objects and use of smart contracts. Engaging independent accredited expert organizations to assess novelty and industrial applicability. Recording transactions with digital objects to form evidence base for judicial practice. Expanding the standards for digital description of legal objects and harmonizing technical and legal regulatory requirements
Accompanying policy and institutional measures	Supporting the creation of “digital factories” and simplifying the digital product certification. Development of mechanisms for international legal protection and monitoring of infringements based on Big Data. Formation of a culture of using patent information. Development of intellectual property management systems in scientific and educational institutions. Implementation of regional programs for the intellectual property market development
International dimension	Proactive promotion by Ukraine of new international initiatives and cooperation standards in the field of intellectual property based on proven national practices
Expected national effects	Reducing the working capital deficit and decreasing dependence on external financial resources. Involvement of citizens’ creative potential in the productive economy regardless of their geographical location. Expanding the participation of strategic partners in the global digital market of intellectual property rights. Optimization of public spending in the field of intellectual property and shifting the investment center to the private sector. Increasing the availability of services for creators and integration into global value chains

**5. 3. Intellectual potential use: implementation of advanced technologies**

Ukraine has not yet created real conditions for the transition to an innovative path of development and the widespread introduction of high technologies. Appropriate changes in the institutional environment are needed to combine different development models depending on the state of affairs in a particular economy sector. Elements of such a combination can already be seen in Ukraine. In order to change the existing trends, a number of organizational, economic and managerial measures need to be taken:

1. To develop specific support measures and formulate appropriate state policy within the framework of Ukraine’s commitments to trade liberalization and state support, primarily the WTO and the EU-Ukraine Association Agreement. However, the framework established by these agreements should be viewed from the perspective of opportunities to build a new, more effective public policy system, including in terms of the development and dissemination of new technologies in Ukraine.

2. To implement measures to stimulate scientific, technical and innovation activities and the development of high technologies in Ukraine, it is important to use modern

assessment tools, in particular the European Innovation Scoreboard. This will allow for correct international comparisons and make policy in the STI sector more harmonized with EU policy.

3. Ukraine remains active in generating and implementing advanced technologies, with the R&D sector playing a leading role. At the same time, the analysis of technology production and consumption shows that the existing state regulatory mechanisms are limited in their effectiveness. Given the strategic importance of technology for national competitiveness and the specifics of the economic structure, there is a need to accelerate the closing of the technology gap by stimulating high-tech supply and developing the human resources potential of the science and technology sector.

4. The development of nanotechnology is a means of ensuring the competitiveness of domestic production. To this end, it is necessary to increase targeted investments in research and development in the relevant areas on the basis of national long-term development strategies for 2016–2025 prepared and approved at the legislative level. Efforts should be concentrated on three areas: fundamental knowledge development; technological innovation and their commercializa-

tion activation; and socially responsible technological development ensuring.

5. To improve the effectiveness of high-tech development state policy, it is necessary to eliminate duplication of mechanisms, reduce competition between authorities, concentrate resources on strategic aspects, and ensure transparency and coordination of decisions.

6. In general, Ukraine’s current position in international markets can be characterized as that of a recipient country. At the same time, most Ukrainian enterprises face the risk of a significant decline in their competitiveness, which may even lead to market exit. In the current situation, Ukrainian industrial enterprises need to integrate more deeply into the international market in order to actively modernize their main production facilities. Under these conditions, expenditures on innovation should grow at a faster pace.

7. In the long run, it is important for Ukrainian industry to preserve existing R&D schools and integrate them into the global scientific space. It is also advisable to create several centers for the production of developments in relevant areas. This can be realized through the development of networks of key laboratories and equipment sharing centers.

8. The analysis of the innovation development “triple helix” concept shows that effective commercialization of knowledge-intensive products requires the inevitable convergence of research and education institutions with industry, as well as with the innovation and financial infrastructure. Integration of universities into cluster formations will allow taking advantage of the most effective ways of coordinating the economic system, which makes it possible to commercialize new knowledge quickly and efficiently.

9. Improving the system of intellectual property rights protection, primarily in the area of monitoring and enforcement of court decisions.

Measures to build up intellectual potential and human capital in STI sphere are presented in Table 3.

The cultural aspect of modernization is directly related to the spiritual life of society, its moral values, and is essentially a way of life. Therefore, for successful modernization to cover all spheres of public life, it is necessary to provide an appropriate socio-cultural framework. After all, a person with the intellectual, cultural and creative potential is also a productive force that creates the conditions for technological development of society. Ukraine, with its rich history and traditions, will be able to solve the historical task of building a new model of socio-economic development on the basis of respect for spiritual values.

Table 3

Main directions of intellectual potential and human capital development in STI sphere

Direction of activities	Brief description/expected impact
Identification of key concepts	Setting up clear definitions of STI terms (startup, innovation center) and ensuring common understanding by all system participants
Investing in human resources policy	Continuous funding for development of teams responsible for policies, programs and projects in ministries and agencies
Development of management and research capacity	Increased competencies of management teams and scientists to develop and manage STI projects
Information campaigns for students	Motivating pupils and students in all regions to pursue STI careers from an early age
Flexible training system	Engaging students in hands-on projects that stimulate creativity, innovation and entrepreneurship throughout their education
Career development and continuing education	Creating career and employment opportunities in STI
Mobility initiatives	Supporting the placement of teachers and students in enterprises in the regions and the country
Evaluation of researchers’ performance	Encouraging patenting, result-oriented research and commercialization, reducing the emphasis on publications
Raising awareness of intellectual property	Measures to protect intellectual property rights and encourage patenting in firms, research centers and universities
Researchers’ mobility	Ensuring national, regional and international mobility of R&D staff
Strengthening governance mechanisms	Improving the effectiveness of organizational and managerial incentives for intellectual and innovation activities at the macro and micro levels
Integration of science, education and business	Increased R&D capacity and efficiency; creation of mechanisms for widespread implementation and commercialization of results

**5. 4. Political roadmap for the development of Ukraine’s STI policy in the context of economic intellectualization and post-war reconstruction**

In the post-war period, the formation of a comprehensive STI policy has become a strategic tool for activating intellectual potential, accelerating economic modernization and increasing national competitiveness. Taking into account current developments, institutional resources and socio-economic challenges, it is advisable to implement a systematic roadmap for the development of STI policy to create a knowledge-based economy (Table 4).

In early 2025, an updated standard “Eco-industrial parks: sustainability criteria and assessment methods” was presented as part of the hybrid event “Global Eco-Industrial Parks Program in Ukraine” (GEIPP) with the support of UNIDO and funding from SECO [19]. The implementation of the project for the introduction of eco-industrial parks in Ukraine will contribute to socio-economic development.

The introduction of eco-industrial parks will help rebuild the national economy on the basis of industrial symbiosis and within the framework of the smart concept, which also includes sustainable development narratives:

- formation of “growth poles” through concentration of production, innovation, and science-business communication;
- selective public investment with a transition to private financing;
- optimal location of industry for business development, employment, and regional revenues;
- intensification of innovations and development of high-tech industries; regional equalization and stimulation of overall economic growth.

Table 4

## Political roadmap for the development of Ukraine's STI policy with KPIs and macroeconomic effects

Priorities	Measures	KPI	Macro effects
Institutional and programmatic strengthening of innovation policy	Implementation of modern methodologies for STI policy program development (problem tree, Theory of Change, SMART indicators, M&E, regulatory support)	Share of policy instruments with ToC and SMART indicators, %; number of programs with a full M&E cycle; public innovation management quality index	Increased efficiency of public spending on R&D; increased confidence of investors and donors
Focus on social and inclusive innovations	Strengthening the social dimension of innovation policy (inclusiveness, gender equality, youth support, social innovations)	Share of women and youth among support recipients, %; number of social and innovation projects; youth employment in high-tech sectors	Increased economic activity of the population; reduced socio-economic inequality
Mobilization of Ukrainian diaspora's intellectual potential	Formation of a diaspora network of Ukrainian scientists for investment, knowledge transfer, research outsourcing and mentoring	Number of diaspora scientists involved; volume of grants from international networks; number of joint publications and patents	Accelerated knowledge transfer; increased international scientific integration of Ukraine
Development of scientific culture, education and communications	Information-educational campaigns and media popularization of STI and quality standards	Number of STI campaigns; level of public trust in science, %; number of STEM graduates per 10 thousand people	Expansion of human capital; long-term growth of labor productivity
Creation of innovation and entrepreneurship culture	Comprehensive support for creativity, innovation and entrepreneurship (education, startups, UBI cooperation, favorable regulation)	Number of startups per 1 million people; startup survival rate after 3 years, %; share of SMEs with implemented innovations	Growth of small innovative businesses; increased competitive advantage of the economy
Developing technology and knowledge transfer system	Technology transfer programs from international investors to SMEs, R&D institutions and start-ups to develop the domestic innovation market	Number of licensing and technology agreements; revenues from R&D commercialization; share of import substitution in high-tech industries, %	Increased technological autonomy; increased exports of high-tech products
Implementation of sectoral R&D support programs	Sectoral STI programs to support R&D and innovation in strategic sectors (healthcare, agriculture, education)	Share of R&D expenditures in GDP, %; number of innovative projects in medicine, agriculture and education; number of patents and scientific publications	Accelerated technological modernization; increased productivity in economic sectors
Diversification of financial mechanisms to support innovation	Multichannel system of science and innovation financing (government grants, loans, tax incentives, private investment, venture capital)	Share of private R&D funding, %; volume of venture capital investments; number of grant programs and financial instruments	Reduced burden on the state budget; stimulation of capital inflows into innovation
Regional development through innovation clusters	Support for the creation and development of innovation clusters in the regions and scientific centers of the capital	Number of functioning clusters; volume of innovative products in the regions; employment rate in high-tech sectors of the regions	Balanced regional development; reduction of interregional economic disparities
Implementation of eco-industrial parks as a sustainable development model	Implementation of the eco-park model for the integration of innovation, industrial and environmental development	Number of eco-parks; volume of green investments; energy efficiency of industrial enterprises	Reducing the carbon footprint of the economy; forming the basis of a "green" economy

### 5.5. Priorities for the development of the knowledge-based economy as a basis for long-term competitive advantage

Taking into account the priorities of building a knowledge-based economy, the policy and management measures for STI activities agreed with the OECD and the EU are systematized and presented in the context of Ukraine's post-war reconstruction (Table 5).

Thus, from the perspective of the strategic vision of Ukraine's post-war revival, innovation policy should play the role of a driver of transformation into a knowledge-based economy and a sustainable society of the 21<sup>st</sup> century. Achieving the Sustainable Development Goals requires a new innovation policy framework focused on transformational change, eliminating governance gaps and obstacles to research and business innovation.

Table 5

## Alignment of STI policy, system and governance measures with OECD and EU approaches in the context of Ukraine's post-war reconstruction and national economic development

STI policy and governance measures	OECD/EU approaches	OECD/EU STI Strategic Guidelines	Contribution to Ukraine's post-war reconstruction
1	2	3	4
Redistribution of NIS actors' roles and coordination	OECD: Whole-of-Government Approach; EU: Multi-level Governance	Coherent innovation policy governance	Restoration of the state's institutional capacity
Inclusive STI governance policies	OECD: Stakeholder Engagement; EU: Open Science & Open Innovation	Engaging science, business and society	Building trust and shared responsibility
Assessment and development of STI infrastructure	OECD: STI Infrastructure Policy; EU: ERA & ESFRI	Modernizing research infrastructure	Restoration of the scientific and technological base

Continuation of Table 5

1	2	3	4
Support for SMEs and grassroots innovation	OECD: Inclusive Innovation; EU: SME Instrument / EIC	Democratizing innovation	Activation of entrepreneurship and employment
Diversification of STI funding	OECD: Mission-oriented Innovation; EU: Blended Finance	Combining public and private resources	Attracting investment in reconstruction
Simplification of the regulatory environment	OECD: Regulatory Reform; EU: Better Regulation	Reducing administrative barriers	Increasing investment attractiveness
Monitoring and evaluation of STI policies	OECD: Evidence-based Policy; EU: Better Regulation Toolbox	Evaluation of policy effectiveness	Transparent use of recovery resources
Regional innovation ecosystems	OECD: Place-based Innovation; EU: Cohesion Policy	Territorial balance of development	Sustainable regional recovery
Smart specialization	EU: Smart Specializations (S3); OECD: Regional Innovation	Focus on competitive advantages	Accelerating structural transformation
“Single window” for access to STI tools	OECD: Policy Transparency; EU: Single Market Logic	Simplifying access to support	Increasing institutional accessibility
Public procurement of innovations	OECD: Public Procurement of Innovation; EU: PCP / PPI	Stimulating demand for innovation	Innovative infrastructure rebuilding
Innovation intermediaries	OECD: Knowledge Intermediaries; EU: Knowledge Transfer Offices	Strengthening knowledge transfer	Commercialization of R&D results
Scaling up pilot initiatives	OECD: Experimental Governance; EU: Innovation Pilots	Testing and dissemination of solutions	Rapid implementation of innovations
Interagency project coordination	OECD: Policy Coherence; EU: Horizontal Coordination	Synergy of public policies	Increasing the efficiency of reconstruction
Sustainable socio-economic infrastructure	OECD: Sustainable Growth; EU: Green & Digital Transition	Long-term sustainability of development	Inclusive and green recovery

The country can track the implementation of post-war reconstruction projects with some optimism. In particular, under the Ukraine Facility program [20], the EU plans to attract more than 50 billion EUR by 2027, which will be used to finance the state budget and stimulate investment. The 130 billion USD project aimed at energy self-sufficiency and participation in the Green Deal is considered even more ambitious. After all, all the relevant subparagraphs of this project are directly related to the development and dissemination of innovations in the energy sector.

**6. Discussion of the research results on the intellectualization of the economy as a strategic resource for the Ukraine’s post-war reconstruction**

In circumstances of war and post-war reconstruction, the intellectual potential of society becomes a strategic resource for ensuring the intellectual security and long-term competitiveness of the state. It has been established that human capital, knowledge, creativity and technological competencies form an “invisible front” to counter external threats. At the same time, the forced migration of highly qualified specialists creates risks of losing intellectual resources and weakening intellectual security. This necessitates the implementation of a comprehensive state policy for the preservation, reproduction and capitalization of intellectual potential as a basis for sustainable development. At the same time, the study goes beyond the traditional analysis [3, 5, 6]. It is proved that the successful modernization of Ukraine’s economy requires the integration of scientific, technological, innovative and cultural components of intellectual potential. In this regard, modern challenges require a systemic transformation of the interaction of science with the state, business and society, strengthening defense capabilities and the formation of national development strategies (Fig. 1).

The mechanisms of intensification of intellectual property protection and commercialization processes as a prerequisite for increasing the innovation activity of the economy are investigated. It is proved that a key tool for strengthening the competitiveness and technological sovereignty of the state is the creation of an open network platform for intellectual property management that stimulates the creative potential and development of the digital economy. In contrast to traditional approaches [17, 18], the key functions, accompanying measures and expected effects of creating an open network platform for intellectual property management are proposed (Table 2).

It is found that the constraints to technological modernization are institutional fragmentation, limited support for innovation, and insufficient integration of science with production. In this context, in contrast to [4, 5, 8], systemic organizational and economic measures for the development of intellectual potential in the field of STI are proposed, including support for high technologies, R&D, commercialization of knowledge and the formation of integrated innovation ecosystems (Table 3). Emphasis is placed on the importance of preserving human resources, implementing the “triple helix” model, and strengthening the interaction between education, science, and business.

The necessity of forming a new framework STI policy model focused on transformational changes and compliance with European standards is substantiated. Taking into account modern developments [9, 10], institutional resources and socio-economic challenges, a systematic roadmap for the development of Ukraine’s STI policy with KPIs and macroeconomic effects has been implemented (Table 4). The proposed measures are aimed at developing innovation infrastructure, supporting socially inclusive innovations, attracting the diaspora, diversifying financing, and implementing eco-industrial parks.

It is proved that the knowledge-based economy is a key basis for Ukraine’s long-term competitive advantages. Taking

into account the priorities for the formation of this economy, the policy measures and management of STI activities agreed with the OECD and the EU are systematized in the context of Ukraine's post-war reconstruction (Table 5). This is made possible by ensuring institutional sustainability, improving the effectiveness of innovation management, and promoting the modernization of regional ecosystems. The implementation of smart specialization tools, the development of innovation clusters and transparent financing mechanisms creates preconditions for accelerated structural transformation of the economy.

Despite the results, the study has a number of limitations. The results relate only to the internal determinants of the intellectualization of Ukraine's economy, are based on publicly available data and may change depending on external factors, regional characteristics and further development of economic and social processes. Along with the above limitations, the study is characterized by a separate drawback – incomplete coverage of sectoral and regional features of the intellectualization of the economy, which limits the detail of practical recommendations.

Further researches could focus on improving the mechanisms for integrating intellectual property into innovation policy, commercializing intellectual potential, and assessing the effectiveness of introducing innovative technologies into key sectors of the economy.

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## 7. Conclusions

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1. Intellectual potential in the global political and economic challenges should be:

- a reserve of economic strength and power of the country;
- a component of the national policy;
- the main dominant and strategic resource of modern society's socio-economic development;
- a guarantor of economic and national security;
- a competitive factor in the world markets.

2. Digitalization is transforming the institution of intellectual property, changing the mechanisms of intangible resources creation, distribution and use. The creation of an open public network platform for intellectual property management based on international standards ensures the automation of transactions, the use of smart contracts and the involvement of independent experts, which eliminates the fragmentation of the national intellectual property system and stimulates the development of the digital economy. The result is attributed to the integration of technological, institutional and legal mechanisms, and the expected effects include increased participation of the citizens' creative potential, reduced dependence on external resources and increased Ukraine's global competitiveness.

3. The study identified a set of measures for the efficient use of intellectual potential through the implementation of advanced technologies, including the development of public policy, stimulation of high-tech sectors, human resources and integration of science, education and business, as well as improvement of IP rights protection. The peculiarity of the proposed measures is their systematic and cross-sectoral coordination, which allows bridging the technological gap

and accelerate the commercialization of knowledge-intensive products. The expected effects include increased competitiveness of enterprises, human capital development, and Ukraine's integration into global technology markets.

4. Ukraine's post-war reconstruction process is closely linked to its economic, geopolitical, and cultural characteristics. It is necessary to focus on the tools for economic growth: deregulation and liberalization, export orientation, energy self-sufficiency, job creation, and attraction of external financial resources. Having these tools at our disposal, it is important to use them effectively.

5. Given Ukraine's status as a candidate for EU membership, the reconstruction process should take into account the main trends of EU policy – the Green Deal, circular economy, inclusion, and digitalization of all spheres.

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## Conflicts of interest

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The authors declare that they have no conflicts of interest in relation to this study, including financial, personal, authorial, or any other that could affect the study or the results presented in this article.

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## Funding

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The study was conducted without financial support.

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## Data availability

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All data are available in the main text of the manuscript, either in numerical or graphical form.

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## Use of artificial intelligence

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The authors declare the use of generative AI in the process of manuscript preparation. Tasks delegated to generative AI tools under full human supervision: checking grammar, spelling, and punctuation without changing the context of the manuscript. The generative AI tool used: GPT-4.1.

The authors are solely responsible for the final manuscript.

Generative AI tools are not listed as authors and are not responsible for the final results.

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## Authors' contributions

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**Halyna Ostrovska:** Conceptualization, Methodology, Investigation, Supervision, Formal analysis, Writing – review & editing, Project administration; **Roman Sherstuk:** Methodology, Investigation, Writing – original draft; **Vyacheslav Ivata:** Investigation, Formal analysis, Visualization; **Mykhailo Mykhailov:** Investigation, Visualization; **Oleksiy Pashchenko:** Investigation, Writing – original draft; **Olena Volska** – Methodology, Investigation, Writing – review & editing.

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