

STRATEGIC PRIORITIES OF SCIENCE DEVELOPMENT UNDER MODERN CHALLENGES

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The paper identifies the strategic directions of science development shaped by current global and national challenges. The emphasis is placed on security, digital transformation, energy transition, biotechnology, agri-food innovation, and environmental sustainability, as well as the role of education and international cooperation. The proposed framework highlights the need for a comprehensive science policy capable of ensuring resilience, enhancing competitiveness, and fostering Ukraine's integration into the global research ecosystem. Science is the cornerstone of sustainable development, ensuring state competitiveness and generating responses to contemporary global challenges. Under conditions of transformation, research priorities must be oriented towards security, socio-economic, technological, and ecological needs:

1. The rise of hybrid threats, large-scale cyberattacks, and military conflicts underscores the need for advanced defense technologies. Strategic areas include cyber defense, the integration of artificial intelligence into security systems, and the design of innovative surveillance, early-warning, and command-control solutions.

2. The information society demands advanced data governance, automation of production processes, and the deployment of artificial intelligence, machine learning, and digital platforms. These innovations drive efficiency gains across the economy, education, public administration, and the social sector.

3. Responding to energy crises and climate change requires the development of renewable energy systems (solar, wind, bioenergy, hydrogen technologies), energy-efficient solutions, smart grids, and the advancement of the circular economy.

4. Global health risks, pandemics, and demographic changes highlight the urgency of biotechnological innovation. Key areas include genetic engineering, bioinformatics, telemedicine, advanced pharmaceutical research, and personalized medicine. Special emphasis is placed on vaccine development, biomaterials, and biosafety solutions that increase resilience to biological threats.

5. Food security challenges necessitate precision agriculture, smart farming systems, drones, IoT-based sensor technologies, and big data analytics in agriculture. Research must also focus on the breeding of resilient crop varieties to withstand climate pressures.

6. There is an urgent need for both fundamental and applied research into climate processes, advanced environmental monitoring systems, and the implementation of nature-based and low-carbon solutions.

7. The synergy of education and science, interdisciplinarity, open science practices, and active international partnerships are key to strengthening national research capacity and global integration.

Strategic priorities of science under current global challenges must be directed toward national security, energy and food independence, digital transformation, healthcare, and environmental stability. Only a holistic and coordinated implementation of these priorities will enable Ukraine to respond effectively to global risks, strengthen its innovative capacity, and build a sustainable future.

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