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## SATELLITE INFRASTRUCTURE FOR STATE CAPACITY: GLOBAL TRENDS AND UKRAINIAN PATHWAYS TO SUSTAINABLE DEVELOPMENT

**Abstract.** This article examines how satellite infrastructure—satellite communications, Earth observation, and satellite navigation—can function as core state capacity, enabling better policy, service delivery, and resilience. The aim is to synthesize global technological and market trends, translate them into governance-relevant insights, and propose Ukrainian pathways that accelerate sustainable development. Methodologically, the study combines a structured review of standards and industry evidence with comparative benchmarking of policy instruments, a demand-first mapping of priority public-sector use cases, and a feasibility–impact assessment that informs a 2025–2030 implementation roadmap.

The analysis identifies five shifts reshaping the opportunity set for governments: rapid deployment of LEO constellations; standardization of non-terrestrial networks enabling direct-to-device services; maturation of AI-enabled EO analytics; modernization of secure and high-accuracy GNSS; and the rise of open data ecosystems and public–private partnerships. These shifts, when orchestrated as integrated platforms, improve inclusion (coverage and affordability for citizens and SMEs), resilience (redundant communications and risk monitoring), productivity (optimization in agriculture, energy, and logistics), and governance (evidence-based planning and digital-twin adoption).

For Ukraine, the paper proposes a sequenced agenda: near-term pilots in NTN/direct-to-device, EO-AI services, and secure GNSS for critical infrastructure; medium-term build-out of shared ground and edge assets and interoperable data marketplaces; and long-term institutionalization through mission-oriented procurement, spectrum stewardship, and capability development.

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The contribution is an implementation-oriented framework that links concrete public-sector needs to enabling technology stacks and measurable outcomes, offering a practical blueprint for leveraging satellite infrastructure to strengthen state capacity and deliver sustainable development.

**Keywords:** *Satellite Infrastructure, State Capacity, Public Administration, Sustainable Development, Global Trends, Ukraine.*

**Statement of the problem.** Ukraine's public administration is under simultaneous pressure to expand inclusive service delivery, strengthen resilience to shocks, and accelerate productivity-oriented recovery. Satellite infrastructure – satellite communications (SatCom), Earth observation (EO), and satellite navigation (GNSS) – can act as core state capacity to meet these demands. Yet today these technologies are approached largely as separate sectors or one-off procurements, not as an integrated platform that governments can reuse across ministries and regions. The result is fragmented planning, duplicated spending, and slow time-to-impact in priority public services.

First, the architecture of state use is siloed. Connectivity, sensing, and trusted positioning are specified and funded in separate projects, often without shared ground assets, interoperable data pipelines, or common security baselines. This hinders cross-sector reuse – for example, EO products generated for agriculture are not systematically discoverable or fit-for-purpose for environmental monitoring or municipal planning. Without a platform orientation, every new initiative repeats feasibility work and vendor integration from scratch, raising costs and elongating delivery cycles.

Second, policy and institutional instruments lag technology lifecycles. Spectrum stewardship for non-terrestrial networks, certification of direct-to-device services for public safety, data-policy rules for EO sharing, and mission-oriented procurement for dual-use capabilities are either incomplete or inconsistently applied. Roles and coordination between sectoral ministries, regulators, security actors, and local authorities are not always clear, which leads to stalled pilots, under-used assets, and limited private investment. Public-private partnership models remain under-standardized for ground segment, augmentation services, and long-term operations.

Third, market formation is weak in domains where the state is the anchor customer. There is no stable demand signal that aggregates multi-year needs across ministries into scalable service envelopes with performance-based payments. Vendors face uncertain volumes and bespoke technical requirements, which discourages domestic manufacturing and systems integration. Procurement focuses on hardware line items rather than outcomes and interoperability, locking agencies into single-purpose solutions and limiting competition on service quality, uptime, latency, accuracy, and security.

Fourth, critical technical gaps persist. Rural and high-risk areas lack redundant, emergency-grade communications; EO tasking, processing, and distribution are not consistently integrated with agency workflows; and secure or high-accuracy positioning is not uniformly available for critical infrastructure operations. Ground stations, edge processing, and data catalogues are often project-specific rather than shared. Cybersecurity, supply-chain assurance, and space security considerations are addressed unevenly, creating risk for safety-critical and mission-critical uses.

Fifth, data governance and analytics capacity are insufficient for policy-relevant products at scale. Public bodies struggle to convert raw EO and GNSS-enabled data into timely indicators and decision tools that fit civil-service processes. Metadata standards, quality assurance, and API access are inconsistent, hampering integration with digital twins and sectoral information systems. Talent constraints – in geospatial engineering, RF systems, security, and applied data science – limit absorption and sustained operations.

Finally, measurement for public value is under-developed. Projects seldom define baseline–target pairs for inclusion, resilience, productivity, and governance outcomes, so it is difficult to prioritize, justify budgets, and course-correct. Without shared indicators and evaluation cycles, agencies cannot compare alternatives, pool resources, or scale what works.

In sum, the core problem is not a lack of satellite technologies but the absence of an integrated, standards-aligned, and governance-ready platform that links specific public-sector needs to shared infrastructure, clear procurement and PPP instruments, robust security and data policies, and measurable outcomes. Addressing this problem requires a coherent state strategy that sequences pilots into platforms, platforms into institutions, and institutions into durable state capacity for sustainable development.

**Analysis of recent research and publications.** Recent international research treats satellite infrastructure as a fast-converging triad of SatCom, EO, and GNSS, driven by LEO constellation scaling, non-terrestrial network standardization, and AI-enabled analytics. Studies on SatCom emphasize capacity economics, latency reduction, and the emergence of direct-to-device services under 3GPP NTN releases; EO literature documents the migration from imagery supply to decision services in agriculture, climate adaptation, disaster risk reduction, and urban management; GNSS work highlights secure and high-accuracy positioning through SBAS, PPP, and RTK, alongside resilience to interference. A common thread is platformization: value shifts from hardware to integrated service stacks where spectrum, space and ground segments, cloud pipelines, and application ecosystems are orchestrated end-to-end to deliver measurable outcomes.

A second body of work – at the intersection of public administration, digital government, and industrial policy – examines how states convert these technologies into public value. Here, scholars and policy reports converge on several enablers: open data regimes and interoperability standards; mission-oriented procurement and outcome-based contracting; PPP templates for ground infrastructure and augmentation services; and capability building in geospatial analytics and cybersecurity. There is growing attention to governance of dual-use capabilities, certification for safety-critical applications, and the ethics of data use. Notably, debates persist around market formation when the state is the anchor customer: whether governments should prioritize service-level agreements over capital acquisition, how to aggregate multi-year demand across ministries, and how to price resilience, security, and sovereignty attributes within procurement.

Regional and country-specific publications relevant to Ukraine document pilots in EO-for-agriculture, public safety communications, and GNSS augmentation, as

well as evolving legislative and program frameworks. These sources underscore practical bottlenecks – fragmented spectrum stewardship, under-standardized PPP models, uneven integration of EO products into agency workflows, and limited analytics capacity – while also pointing to opportunities in ground segment modernization, interoperable data marketplaces, and direct-to-device coverage for remote and high-risk areas. The literature gap is clear: while technical and policy strands are rich, there are few implementation-oriented frameworks that link concrete public-sector use cases to shared platform components, procurement instruments, security baselines, and measurable sustainable-development outcomes. This article addresses that gap by synthesizing dispersed evidence into a prioritization and sequencing agenda tailored to Ukraine's state-capacity needs.

**Purpose of the article** is to develop an implementation-oriented framework that shows how satellite infrastructure – satellite communications, Earth observation, and satellite navigation – can be organized as core state capacity to strengthen public administration and service delivery in Ukraine.

**Applied methodology and methods.** This study employs a mixed-methods, problem-driven design that treats satellite infrastructure – satellite communications, Earth observation, and satellite navigation – as an integrated stack linked to priority use-cases in Ukraine. The research proceeds in four sequential movements: evidence synthesis of global technology and market trajectories; demand-first scoping of Ukrainian sectoral needs; a feasibility–impact assessment that maps those needs to enabling technologies and institutional preconditions; and a backcasting exercise that assembles a realistic implementation roadmap for 2025–2030.

The evidence base combines a structured review of standards, technical specifications, industry analyses, policy documents, and peer-reviewed studies with comparative benchmarking across jurisdictions that have recently institutionalized open EO programs, universal-service or NTN pilots, GNSS augmentation, and PPP-based ground segments. Sources are screened for relevance to technology readiness, adoption status, and regulatory salience, with recency prioritized over the last five to seven years. From the benchmark set, we extract instruments, governance models, funding envelopes, and observed outcomes to distill patterns that are transferable to the Ukrainian context.

**Presentation of the main material.** First, it is necessary to summarize current international trends in satellite technologies that are of strategic importance for the development of products and services of enterprises involved in the creation of satellite communications, navigation, and remote sensing infrastructure. Studying international experience makes it possible to identify development dynamics, technological innovations, and formats for using satellite services that can be adapted in Ukraine, taking into account national needs and capabilities.

In terms of the size of revenues from the satellite industry as a whole, the largest share is accounted for by the production and maintenance of ground equipment (\$142 billion), followed by satellite services (\$118 billion), and then, significantly behind, satellite manufacturing (\$13.7 billion) and satellite launches (\$5.8 billion) (fig. 1).

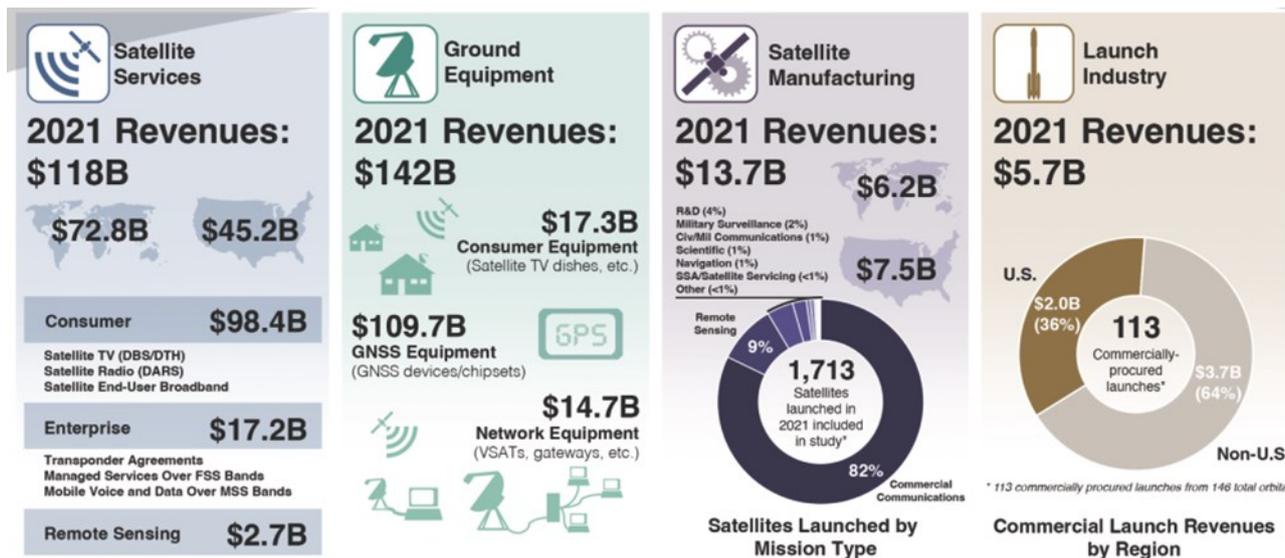


Figure 1. – Structure of the global satellite market by activity in 2021

Source: [27].

In the field of satellite communications, the dominant trend is the rapid development of low-orbit satellite constellations (LEO constellations) to provide global broadband Internet access. According to a report by the Satellite Industry Association, networks such as Starlink (SpaceX), O3b mPOWER (SES), and Kuiper (Amazon) provide a significant reduction in signal latency and increased bandwidth compared to traditional geostationary communication systems (GEO) [27]. These technologies allow satellite internet to be integrated into critical infrastructure – education, medicine, energy, and agriculture.

In 2022–2024, there is a trend towards the "democratization" of satellite communications – a transition from centralized, expensive, and complex systems to more mass-market, affordable, and personalized solutions. This is happening thanks to the spread of direct-to-device (D2D) technologies [29], which eliminate the need for separate ground stations to receive signals. The use of D2D is becoming critically important for rescue services, humanitarian missions, security agencies, as well as during wars and emergencies [14].

In the field of satellite navigation (GNSS), the main vector of development is to improve positioning accuracy and reliability. Universal multi-frequency receivers capable of working in parallel with several systems – GPS (US), Galileo (EU), BeiDou (China), GLONASS (Russia) – provide high accuracy in real time (up to 2–3 cm) thanks to PPP and RTK technologies [10]. At the same time, there is an increased focus on security, with the development of systems for detecting and countering spoofing and jamming, as well as secure government services, such as Galileo PRS [6]. Stable revenue growth is expected in the satellite navigation industry in the coming years (fig. 2).

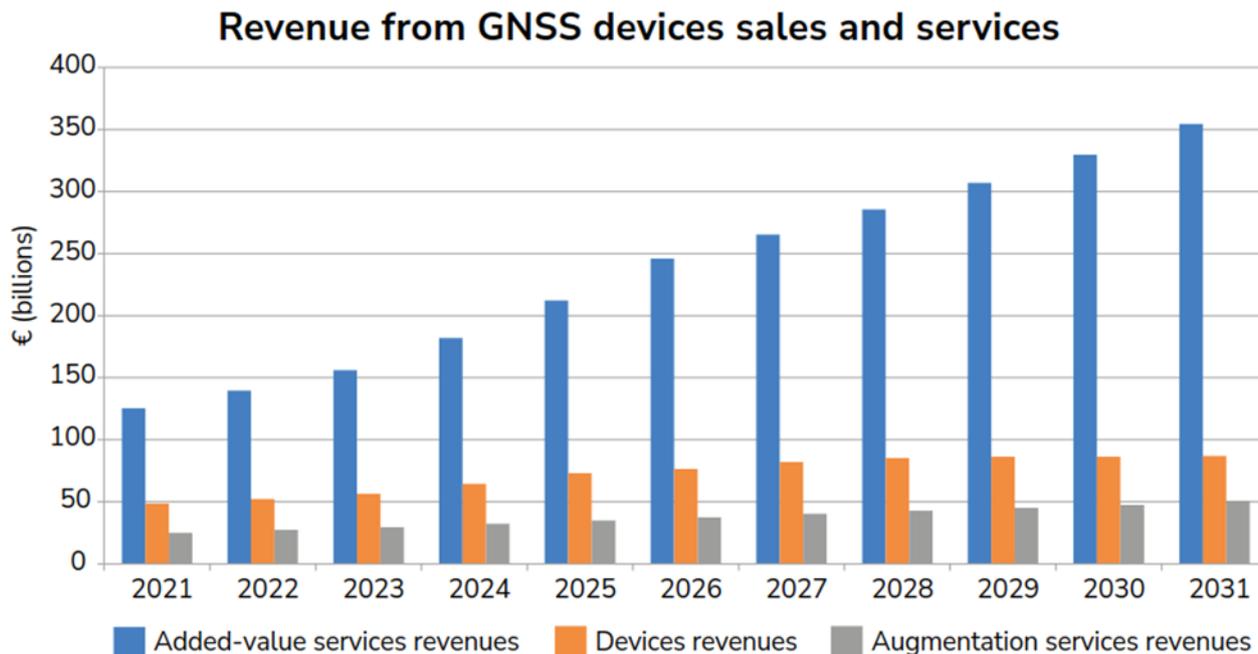


Figure 2. – GNSS revenue dynamics

Source: [10].

The EU and the US are gradually integrating navigation services into public administration and commercial processes – transport logistics, cargo control, "smart cities", environmental monitoring, and land use control. It is important that GNSS services are combined with Earth remote sensing data, which allows the creation of integrated spatial platforms [10; 18].

In the field of remote sensing (RS), the key trends are:

- the development of multispectral and radar sensors,
- massive use of microsatellites for daily monitoring of territories (e.g., Planet, Capella Space, ICEYE),
- access to open satellite data from Copernicus (EU) and Landsat (US) programs,
- processing of REM data using cloud technologies and artificial intelligence (AI/ML) [21; 22; 26].

Remote sensing is becoming a powerful tool for forecasting, modeling, and decision-making in many areas – agriculture (assessment of crop yields, moisture, and crop condition), ecology (monitoring of fires, floods, emissions), security (monitoring of equipment movements and infrastructure changes), urban planning (control of construction) [2; 18; 26].

In international practice, public-private partnerships play a special role, allowing the capabilities of state space agencies (NASA, ESA, EUSPA) to be combined with the flexibility and innovation of commercial operators. Most new satellite systems are implemented as mixed financing and management models, which speeds up development, reduces launch costs, and allows services to be adapted more effectively to user needs [21; 27].

Another important aspect is the standardization of data formats, interfaces, and exchange protocols between satellite communication, navigation, and Earth observation systems. The creation of compatible solutions contributes to the formation of a global digital infrastructure and is a prerequisite for the transnational application of services [18].

In the Ukrainian context, international trends are of strategic importance. Domestic researchers emphasize the advisability of creating a national satellite cluster with the possibility of cooperation with European and American providers, the use of open data, simplification of access to technologies, and active participation in international consortia [2; 22].

Summary information on the main international trends in the field of satellite technologies is presented in table 1.

Table 1. – Major international trends in satellite technology

Area	Key technologies and initiatives	Main advantages	Potential for Ukraine
Satellite communications (LEO, D2D)	Starlink, O3b mPOWER, Kuiper, Direct-to-Device	Broadband access, low latency, mobility	Expansion of coverage in rural and frontline regions
Satellite navigation (GNSS)	Galileo, GPS, BeiDou, multi-frequency receivers, RTK, PRS	High accuracy, reliability, signal protection	Integration into logistics, agriculture, transport, cities
Remote sensing of the Earth	Copernicus, Planet, Capella, AI/ML analytics	Forecasting, modeling, data visualization	Environmental monitoring, agromonitoring, defense
Public-private partnerships	NASA-Private, ESA-Copernicus Services, EUSPA incubators	Cost reduction, speed of innovation, accessibility	Joint projects, incubators for startups
Standardization and open platforms	Interoperability, API, open protocols	Global compatibility, mass adoption	Participation in international consortia and initiatives

Source: compiled by the authors.

Thus, the international development of satellite technologies demonstrates the rapid integration of orbital solutions into telecommunications, logistics, security, agriculture, science, and risk management. This creates a wide range of opportunities for national manufacturers and developers, provided they adapt in a timely manner to modern technological standards, service models, and principles of open data exchange.

Further analysis is devoted to the study of the regulatory, institutional, and programmatic framework for the development of the satellite industry in Ukraine. Analysis of legislation, strategic documents, initiatives of state bodies, and public statements allows us to determine the current state and prospects of the satellite services market within the national economy and security environment.

The legislative framework for the national space industry is defined by a number of key acts. In particular, Resolution No. 281 of the Cabinet of Ministers of Ukraine dated May 14, 2015 regulates the activities of the State Space Agency of Ukraine (SSAU), which is the central executive body responsible for implementing state policy in the field of space research and use [5].

Industry development programs include modernizing satellite communications infrastructure, developing remote sensing, and expanding the capabilities of national

satellites. The government supports the launch of new spacecraft (such as Sich-2-30) as an example of national production in the space technology sector [16; 20]. State bodies, in particular the Economic Security Bureau, are also implementing satellite monitoring to detect economic offences and protect state resources [4].

At the level of the Ministry of Defense of Ukraine and the Ministry of Digital Transformation, initiatives are being actively implemented to form the space component of defense policy. This involves the creation of a space policy department that will coordinate the development of new satellite programs and the development of relevant military-industrial capabilities [8; 19]. Defense programs involve the deployment of a number of satellites for observation, navigation, and encrypted communications.

The SSAU has formed functional units responsible for scientific and technical expertise of projects, cooperation with international structures, and development of the state segment of the satellite market. Among the key organizations is the National Center for Space Facilities Control and Testing (NCSFCT), which provides satellite flight control, reception, and processing of Earth remote sensing data [23].

An important component of the industry's development is its integration into the European and global satellite services markets. Ukraine participates in the Copernicus program, has access to ESA satellite data, and receives technical assistance within the framework of European projects. This opens up opportunities for both the public sector (environment, agricultural policy, emergency monitoring) and private business (precision farming, logistics, geodesy) [1].

Public discourse increasingly raises the issue of forming a national space cluster that would include equipment manufacturers, software developers, infrastructure operators, and service customers. Such initiatives can increase the innovativeness of the economy and strengthen national security through the development of its own critical infrastructure [7; 17].

At the same time, there are challenges related to fragmented legislation, the lack of a specialized law on satellite communications, limited funding for the industry, and the need to update the regulatory framework to integrate new service formats (e.g., direct-to-device, cloud platforms for processing satellite data, and service models such as "space as a service").

An overview of the national satellite services market shows that Ukraine is consistently forming an institutional and programmatic framework for the development of the satellite industry, focusing both on internal security and economic needs and on international integration into global satellite services and initiatives. Further improvement of the legislative and institutional system, expansion of public-private partnerships, and introduction of technological standards will form the basis for the sustainable development of the satellite services market in Ukraine.

Finally, it is necessary to examine the current state of satellite infrastructure development in Ukraine, as well as ways to integrate it into the global technological environment. Analysis of practical initiatives by operators, scientific institutions, government agencies, and private companies allows us to outline the real technical capabilities and existing growth points of the satellite segment in the country.

Recent years have seen growing activity among leading Ukrainian telecommunications operators in implementing innovative satellite solutions. In particular, Kyivstar, in collaboration with its global partner Starlink, is implementing a project to launch a satellite SMS and mobile communication service using Direct-to-Cell technology, which will enable mobile devices to connect to satellite networks without the intermediation of ground stations [24; 25]. This project is supported by the National Commission for the State Regulation of Communications and Informatization (NCCIR) [24]. Importantly, this type of communication has the potential to be critical for emergency situations, rural areas, and military applications.

At the same time, foreign suppliers, in particular TS2, are actively working in the Ukrainian market, providing Thuraya and Iridium satellite terminals, as well as broadband services for the defense and civil sectors [11]. In the midst of hostilities, such solutions have become critical for ensuring stable and secure data exchange, which also paves the way for scaling systems in peacetime [12].

At the navigation infrastructure level, Ukraine participates in global initiatives to modernize satellite positioning systems. In particular, state institutions announce tenders for the renewal and expansion of GNSS ground infrastructure – towers, sensors, and monitoring stations. This ensures the accurate geodetic data necessary for transport logistics, agricultural planning, infrastructure projects, and the defense industry [13].

Ukraine's integration into global satellite services is also taking place through active scientific cooperation. Ukrainian radio astronomers keep pace with leading global institutions, providing ground support for space missions using the URAN and UT-2 telescopes, which allow for satellite tracking and interaction with space monitoring networks [9]. Scientific potential in this area is growing, as evidenced by participation in projects related to the global space observation system.

A key component of the infrastructure is the National Geospatial Data Infrastructure (NGDI), which forms the basis for integrated management of territories, cadastral registers, environmental protection, and urban solutions. Satellite images obtained from international systems (Sentinel, Landsat) are adapted to the needs of national planning [3].

At the same time, satellite technologies are being actively integrated into agriculture: from detecting drought and plant diseases to automatically managing fertilizer application. This reduces costs, increases yields, and prepares the agricultural sector for the challenges of climate change [15].

Another positive sign is the stabilization of the satellite telecommunications segment, despite the difficult security situation. Ukraine is actively implementing projects using satellite internet platforms, including local data centers integrated with global traffic exchange hubs [28]. This opens up opportunities for the development of startups, the data industry, and artificial intelligence-based services.

There is also a growing need to create Ukraine's own satellite platform for data collection and processing, particularly in the areas of defense, border monitoring, combating illegal resource extraction, and disaster forecasting. To this end, it is important to develop not only infrastructure but also specialists through training, the creation of centers of excellence, and a national data hub.

A comparison of the state of integration of satellite technologies in key areas, summarizing the level of development, degree of international integration, barriers, and prospects, is presented in table 2.

Table 2. – Comparative characteristics of satellite technology integration in Ukraine by main areas

Area of use	Current level of development	Integration with global systems	Main barriers	Prospects for development
Telecommunications	Direct-to-Cell pilot projects, active use of Starlink	Partial (through partnerships with global providers)	Lack of local equipment production	Mass deployment of mobile satellite communications
Navigation and positioning (GNSS)	Modernization of GNSS infrastructure, participation in tenders	Integration with Galileo, GPS, GLONASS	Insufficient accuracy in some regions	High-precision positioning for agriculture, logistics, drones
Geospatial data (GIS)	Development of NIGD, use of satellite imagery	Obtained from Sentinel, Landsat	Lack of localized analytical services	Building a national geoportal with analytics
Space science and monitoring	Support from URAN and UT-2 telescopes	Cooperation with ESA, participation in observations	Limited funding	Creation of new types of space observatories
Agricultural sector	Use for monitoring, fertilizer application	Access to global satellite data	Lack of digital skills among farmers	Widespread use of AgriTech platforms

*Source: compiled by the authors.*

This table shows that Ukraine has significant prerequisites for deeper integration into the global satellite infrastructure, provided that there is further institutional support, investment in R&D, and the development of local digital ecosystems.

Thus, Ukraine is in an active phase of transforming its satellite infrastructure to adapt it to global technological trends. The key areas of development will remain:

- the development of a network of direct-to-device terminals;
- integration with ESA, Copernicus, and Galileo programs;
- localization of satellite equipment production;
- creation of open satellite data platforms;
- development of industry-specific services based on satellite information for the needs of public administration, business, and science.

All this creates the conditions for the sustainable growth of the Ukrainian satellite industry as an element of the country's digital sovereignty.

Conclusions. This article has shown that satellite infrastructure – satellite communications, Earth observation, and satellite navigation – functions best as an integrated stack rather than as three parallel sectors. Five reinforcing global shifts make this integration both feasible and timely: rapid LEO constellation deployment, standardization of non-terrestrial networks enabling direct-to-device services, maturation of AI-enabled EO analytics, modernization of GNSS with secure and high-accuracy augmentation, and the rise of open data ecosystems and public–private partnerships. Together, these shifts expand the frontier of what can be delivered to citizens and enterprises in terms of connectivity, sensing, and trusted positioning.

For Ukraine, the analysis indicates a clear opportunity to convert these shifts into development gains – if technology choices are matched with institutional

readiness. The highest-value path is to design satellite capabilities as shared platforms that multiple sectors can reuse: common ground and edge assets, interoperable data pipelines, and procurement models that reward performance and interoperability. This platform orientation reduces duplication, accelerates time-to-impact, and builds a domestic learning curve in manufacturing, integration, and services.

A pragmatic 2025–2030 sequencing emerges from the feasibility–impact assessment. Near-term pilots should focus on direct-to-device coverage for public safety and remote communities, EO-AI services for agriculture and environmental risk, and secure/high-accuracy GNSS for critical infrastructure. Medium-term priorities include building shared ground infrastructure and edge processing, standing up an interoperable EO data marketplace, and scaling augmentation networks. Long-term institutionalization requires durable PPP frameworks, mission-oriented procurement, and stable cycles for standards adoption and certification. Across these phases, success hinges on coordinated spectrum stewardship, streamlined licensing, data-governance clarity, and targeted workforce programs.

The development logic is straightforward: inclusion improves when basic coverage and affordability reach underserved users and SMEs; resilience rises with redundant communications and earlier risk detection; productivity grows through route, fuel, yield, and inspection optimization; and governance strengthens when open data and digital-twin practices inform planning and oversight. Translating this logic into measurable outcomes suggests practical targets by 2030, such as extending emergency-grade coverage to high-risk rural districts, reducing service-restoration times after disruptions, achieving centimeter-level accuracy for GNSS-dependent operations in priority corridors, and publishing routine EO layers for land, water, and infrastructure management with documented uptake by municipalities and operators.

Risks are real – spectrum coordination delays, supply-chain constraints, cyber and space security, and talent shortages – but manageable. The mitigations proposed here favor modular architectures, multi-vendor procurement with open interfaces, staged certification for safety-critical uses, and deliberate capability building in universities and firms. Sensitivity checks indicate that while costs and lead times can shift, the relative ranking of quick wins and platform enablers is robust under plausible scenarios.

The principal contribution of this work is an implementation-oriented framework that links concrete use-cases to enabling stacks, policy instruments, and indicators. By starting from sectoral demand and working backwards to shared platforms, it offers a replicable method for aligning investments with development outcomes. Limitations remain – fast-moving standards, context-dependent costs, and the reliance on secondary sources and expert elicitation – but they are mitigated by transparency in assumptions, prioritization logic, and measurement design.

In sum, Ukraine can turn satellite infrastructure into a backbone for inclusive growth, resilience, productivity, and better governance by pursuing an integrated, standards-aligned, and platform-centric strategy. The recommendations outlined here provide an actionable blueprint to mobilize operators, policymakers, and domestic industry around a coherent agenda, with early pilots de-risking scale-up and a measurable pathway to sustained impact by 2030.

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**СУПУТНИКОВА ІНФРАСТРУКТУРА ДЛЯ ДЕРЖАВНОГО ПОТЕНЦІАЛУ:  
ГЛОБАЛЬНІ ТЕНДЕНЦІЇ ТА УКРАЇНСЬКІ ШЛЯХИ ДО СТАЛОГО РОЗВИТКУ**

**Анотація.** У цій статті розглядається, як супутникова інфраструктура – супутниковий зв'язок, спостереження за Землею та супутникова навігація – може функціонувати як основ-

ний державний потенціал, забезпечуючи кращу політику, надання послуг та стійкість. Мета полягає в синтезі глобальних технологічних та ринкових тенденцій, перетворенні їх на релевантні для управління висновки та пропозиції українських шляхів, що прискорюють сталий розвиток. Методологічно дослідження поєднує структурований огляд стандартів та галузевих даних з порівняльним бенчмаркінгом політичних інструментів, картографуванням пріоритетних випадків використання в державному секторі на основі попиту та оцінкою доцільності та впливу, яка ґрунтується на дорожній карті впровадження на 2025–2030 роки.

В аналізі визначено п'ять змін, які змінюють набір можливостей для урядів: швидке розгортання сузір'їв низькоорієнтованих навколоземних орбіт (LEO); стандартизація неземних мереж, що забезпечують прямі послуги на пристрої; розвиток аналітики EO на основі штучного інтелекту; модернізація безпечної та високоточної GNSS; та розвиток екосистем відкритих даних та державно-приватного партнерства. Ці зміни, коли вони організовані як інтегровані платформи, покращують інклюзивність (охоплення та доступність для громадян та малих та середніх підприємств), стійкість (надлишкові комунікації та моніторинг ризиків), продуктивність (оптимізація в сільському господарстві, енергетиці та логістиці) та управління (планування на основі доказів та впровадження цифрових двійників).

Для України в документі пропонується послідовний порядок денний: короткострокові пілотні проекти в NTN/прямий зв'язок на пристрій, послуги EO-AI та безпечні GNSS для критичної інфраструктури; середньострокове створення спільних наземних та периферійних активів і сумісних ринків даних; та довгострокова інституціоналізація через цілеспрямовані закупівлі, управління спектром та розвиток можливостей. Цей внесок являє собою орієнтовану на впровадження структуру, яка пов'язує конкретні потреби державного сектору з технологічними стеками та вимірюваними результатами, пропонуючи практичний план використання супутникової інфраструктури для зміцнення державного потенціалу та забезпечення сталого розвитку.

**Ключові слова:** супутникова інфраструктура, державний потенціал, державне управління, сталий розвиток, глобальні тенденції, Україна.

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