Objectives, Key Tasks, Orientations, Solutions, and Resources for Implementing National Comprehensive Planning during the Initial Stage of Digital Transformation in Vietnam

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Abstract

The achieved results in digital transformation have positively contributed to enhancing the capacity of state management, directing, and administering administrative reforms, providing convenient administrative procedures for citizens and organizations. Digital transformation has also influenced the perception of leaders, increased efficiency, productivity, improved collaboration among staff, and better risk management while ensuring safety and security.

Regarding the National Comprehensive Planning, one of the crucial directions to create new development space is prioritizing the establishment of a framework for national transportation infrastructure, with a particular focus on urban network planning. In practice, these areas pose significant bottlenecks and barriers to current development. To overcome these challenges and promote economic growth, major policies and solutions need to be implemented.

This article discusses the development objectives, key tasks, orientations, and the current state of spatial organization and main content in National Comprehensive Planning, specifically focusing on urban network planning and transportation infrastructure. It also addresses the solutions, resources for implementation, and recommendations for the initial stage of digital transformation in Vietnam.

Key words: *Comprehensive Planning, Urban Network Planning, Transportation Infrastructure Framework*

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1. Problem Statement

1.1. The Necessity of National Comprehensive Planning

The enactment of the Planning Law in 2017 marked a significant institutional reform, fundamentally changing the mindset, approaches, content, and methods of planning. It aimed to enhance inter-sectoral and inter-regional coordination, minimize fragmentation and localism, and effectively allocate resources, including capital, human resources, and assets, to achieve common development goals. The Planning Law contributed to addressing the dispersal and proliferation of previous planning documents and established the "National Planning System," consisting of 111 plans from provincial to national levels, replacing 3,654 plans of the same kind, representing a reduction of 97% in the number of planning documents.

Within the National Planning System, National Comprehensive Planning holds a central position and serves as the fundamental basis for various purposes, including: (i) Formulating long-term (5-year) and annual social development plans; (ii) Deciding on the investment direction for important national projects in accordance with relevant laws (such as the Public Investment Law, Investment Law, Construction Law, and other legal documents); (iii) Developing national sectoral and regional plans; (iv) Serving as an effective tool for the state in managing economic and social development.

Therefore, the establishment and approval of National Comprehensive Planning are great significance as it lays the foundation for other planning documents as stipulated in the Planning Law. Additionally, it serves as a basis for identifying and deciding on investment projects to support the development of different sectors, regions, and localities.

1.2. The Necessity of Digital Transformation in National Comprehensive Planning

Digital technology in planning provides diverse information with open and highly interconnected data, which can be integrated into software for analysis and comprehensive evaluation in reports. This technology proves to be highly effective in sectoral planning, such as transportation, education, healthcare, waste management, water supply, drainage, power supply, markets, craft villages, cemeteries, water bodies, and road infrastructure data.

Through the digital transformation in the field of National Comprehensive Planning, databases will become vital sources of information, serving in the process of developing construction plans, information retrieval, and report generation. When a digitized database system, especially in planning, is fully established, it will provide better reference for planners, thereby enhancing the quality of planning. Additionally, the database will assist management authorities in monitoring and supervising plan implementation.

It can be asserted that digital transformation, the application of Geographic Information System (GIS), and digital platforms in construction planning, in particular, and National Comprehensive Planning, in general, are highly necessary for Vietnam's present and near future.

2. Current Situation of National Comprehensive Planning Development in Vietnam

2.1. Achieved Results

After more than 35 years of renovation, Vietnam has achieved significant and historically meaningful accomplishments. It has harnessed the potential and advantages of the country in various ways:(i) Developed and linked regions, fostering positive transformation and establishing large economic regions in the country; (ii) Formed economic corridors across regions and inter-regions; (iii) Expanded urban spaces, gradually establishing an urban network, contributing to economic growth; (iv) Developed several large-scale concentrated production areas; (v) Focused on investing in economic infrastructure, giving the country a new look, especially in transportation, irrigation, energy, urban, information, and communication infrastructure; (vi) Paid attention to investing in important social infrastructure projects; (vii) Protected and expanded national parks, nature reserves, and contributed to biodiversity; (viii) Established relationships and development connections between sectors and industries, particularly between infrastructure sectors and production, business, and urban development at the local and sub-regional levels.

The digital transformation of the national planning information system has achieved certain results:

- Management of the national planning database: Initial management and public disclosure of plans at all levels in accordance with the Planning Law.

- WebGIS digital map platform: Ability to display planning maps and interact on the web platform.

- Integration of international standard data (OGC): Services according to OGC standards (WMS, WFS, GML, KML, GeoJSON, WCS, etc.) have been integrated.

- Data sharing: Flexible API set up for sharing the database.

- Planning utilities: Providing many utilities to support exploration, analysis, and spatial retrieval.

- Diverse coordinate system conversion: Easy data spatial conversion between different coordinate systems (WGS 84, VN2000, UTM, etc.).

- A comprehensive data repository is being developed for various sectors using a multidisciplinary, multi-domain integration approach (e.g., construction, transportation, water supply and drainage, industry and commerce, environment, etc.) to be integrated into a unified plan.

- The application of GIS systems, digital technology, and digital platforms has been implemented in planning and urban development, including building a database for sustainable smart urban development in Vietnam for the period 2018-2025 and toward 2030.

2.2. Main Limitations and Existing Issues

Alongside the achieved results, there are still significant limitations and existing issues:

a. Regarding National Comprehensive Planning: (i) Spatial development is fragmented based on administrative boundaries, and regional linkages still face numerous shortcomings; (ii) Investment and development are dispersed across different regions and areas, lacking a concentrated allocation of resources to establish dynamic regions that can lead and drive the country's economic growth; (iii) A comprehensive and modern national infrastructure framework has not been fully established. Transportation and energy infrastructure do not yet fully meet development requirements, and some important social infrastructure projects are slow to receive investments; (iv) Urban distribution is not rational, mainly expanding outward, with limited spreading impacts; (v) Large financial centers have not been well established. The development of economic zones, industrial zones, and tourist areas is dispersed, and the efficiency remains relatively low; (vi) Environmental pollution in large urban areas, craft villages, and some river basins has been slow to be addressed, while marine and island pollution is increasing; (vii) Infrastructure for climate change adaptation, disaster prevention, and mitigation is still limited; (viii) A close linkage between the development of sectors and fields to form priority areas for investment has not been well-established, leading to conflicts of interest in certain regions.

b. Regarding Digital Transformation in National Comprehensive Planning:

The construction industry lacks GIS standards for planning, urban development, and urban management. Extensive research and application of GIS at the central and local levels to ensure dynamic and effective urban construction activities have not been carried out.

A comprehensive national planning database system and direct information technology applications to support planning, evaluation, and urban management have not been established.

2.3. Causes of Limitations and Existing Issues

a. Main reasons related to professional planning practices leading to the limitations and existing issues in the country's spatial development include:(i) Development mindset of dispersion and lack of focus and concentration; (ii) Lack of a comprehensive national planning to clearly define the development model across the entire territory of the country; (iii) Insufficient attention and relatively low-quality in planning activities; (iv) Lack of mechanisms and policies to promote inter-sectoral and inter-regional economic development, addressing local and provincial fragmentation; (v) Inadequate allocation of resources for establishing a comprehensive national infrastructure framework and prioritized development areas such as dynamic regions, key economic regions, and economic corridors; (vi) Sustainable development has not become the dominant thinking in policy formulation and implementation.

b. Main reasons related to digital transformation leading to the limitations and existing issues in National Comprehensive Planning:

- Slow adaptation to change: The awareness of digital transformation among some leaders is not high enough, and digital transformation is not considered an urgent task. Insufficient investment in time and effort for digital transformation has resulted in delayed implementation.

- Insufficient resources to meet the requirements: Regarding human resources: There is a shortage of experts and practitioners with sufficient knowledge of digital transformation, and a limited number of personnel who are proficient in applying digital technology in their work. Regarding technology infrastructure: The technology infrastructure has not been adequately invested in, from hardware equipment to software integration during the digital transformation process.

- Inconsistent digital databases, inappropriate software choices: Digital transformation, particularly in building a digital government, digital economy, and digital society, relies on digital databases. However, Vietnam currently lacks unified regulations to determine coding, barcoding, identification codes, and formats for digital databases in a standardized manner between ministries, sectors, localities, and fields, from top to bottom, and horizontally. [3]

3. Main contents of the National Comprehensive Planning in the initial phase of digital transformation

3.1. Main Content of National Comprehensive Planning in the Early Stage of Digital Transformation

a. Development Perspective: The development perspective of the National Comprehensive Planning during the period of 2021-2030 is aligned with the "Market-driven mechanism plays a dominant role in mobilizing, allocating, and efficiently utilizing resources. Rapid and harmonious development of economic regions, with private economic development truly serving as an important driver of the economy."

b. Perspective on Spatial Development Organization:

- The national spatial development must be efficiently organized and unified on a national scale, ensuring internal and inter-regional connections and leveraging comparative advantages of each region to enhance the national competitive capacity.

- Development should be focused and centralized on some areas with favorable conditions in terms of geographical location, economic and social infrastructure, high-quality human resources, and other potential advantages to form dynamic regions, economic corridors, growth poles, creating ripple effects to drive the rapid, effective, and sustainable development of the national economy until 2030. Simultaneously, there should be appropriate mechanisms, policies, and resources to ensure social security for disadvantaged areas.

- Efficient and economical use of resources, especially land, water, forests, and minerals; ensuring energy security, food security, and water security; developing a green economy, circular economy, environmental protection, proactive response to climate change and natural disasters.

- The organization of national spatial development, regions, economic corridors, and urban systems must be linked to the development of a comprehensive, modern, and harmonious infrastructure network for urban and rural areas; the organization of national spatial development must be connected between land and sea spaces; efficiently exploiting and using underground, maritime, and airspace; effectively leveraging important economic corridors of the region and the world. Close combination of economic, cultural, and social development with security and defense assurance.

c. Development Objectives: Strive for Vietnam to be a developing country with modern industry, high average income, economic growth based on scientific and technological foundations, innovation, and digital transformation; having an efficient, unified, and sustainable organization model for national spatial development, forming economic regions, dynamic urban centers, with a network of comprehensive, modern infrastructure; ensuring major balances and enhancing the resilience of the economy; protecting the ecological environment, adapting to climate change; improving the material and spiritual life of the people; ensuring stable national defense and security until 2030.

d. Digital Transformation Development Objectives:

- Select specific subjects within the scope of state management to carry out digital transformation.

- Apply Geographic Information System (GIS) in planning and managing construction planning work.

- Apply Building Information Modeling (BIM) in construction investment activities.

- Apply digital technology and artificial intelligence in the management and operation of smart cities and digital enterprises.

3.2. Key Tasks During the Planning Period

a. Key tasks in digital transformation during the planning period:

- Establishing the fundamental framework of national infrastructure, with a focus on transportation, urban and rural areas, energy, digital infrastructure, cultural and social infrastructure, water management, environmental protection, disaster prevention, and climate change adaptation.

- Accelerating economic restructuring in line with innovative growth models, prioritizing the development of sectors with potential, advantages, and substantial potential for growth in new development areas.

- Developing dynamic regions and important growth poles to lead the country's development. Selecting specific locations, cities, and regions with special advantages to establish economic and financial centers, special administrative-economic units with breakthrough policies, and high international competitiveness. Implementing appropriate policies for the development of remote, border, and island regions to contribute to political stability and national security.

- Establishing and developing economic corridors along the North-South and East-West axes, coastal economic belts, and efficiently connecting major seaports, airports, international border gates, major trade hubs, economic centers, and growth poles. Developing industrial-service-urban belts in dynamic regions and large urban areas.

b. Key tasks in digital transformation:

- In the provincial planning system, key digital transformation tasks include: (i) Publishing approved plans in digital map format in accordance with the Planning Law; (ii) Enabling plan information retrieval on the digital map platform; (iii) Integrating plans at various levels; (iv) Establishing two-way linkages between planning documents and planning maps; (v) Providing various utilities to exploit planning maps for leaders, experts, and citizens.

- For the public, key digital transformation tasks include: (i) Retrieving information about plans/projects on the digital map platform; (ii) Developing multiple utilities to enhance functions such as land plot positioning on maps, stacking different planning layers, etc.; (iii) Allowing citizens to contribute their opinions during the planning process; (iv) Utilizing the platform on both web and mobile devices.

- For Mobile GIS in planning, key digital transformation tasks include: (i) Enabling plan information retrieval on mobile devices such as smartphones and tablets; (ii) Allowing administrators to actively create applications for updating data related to planning map layers, serving the planning process and operation.

- In planning management, key digital transformation tasks include: (i) Managing planning documents (drawings, documents, designs, etc.); (ii) Managing and building planning maps from standard spatial data formats (Shapefile, CAD, Geo Database, Postgre/PostGIS, KML, GML, etc.); (iii) Creating specialized maps using standard symbols/colors in accordance with specific sectors; (iv) Establishing two-way linkages between planning documents and maps, as well as spatial analysis and exploitation tools for planning purposes.

3.3. Orientation for Development, Organization, Spatial Distribution, and Utilization in the National Master Plan

To contribute to addressing the bottlenecks in urban network planning and national transportation infrastructure, let's discuss some of the following orientations in the early phase of the national master plan's digital transformation:

a. Development and spatial distribution orientation of key sectors:

- For production and business sectors:

In the industrial sector, industrial spaces should be planned in connection with urban systems and service centers to form economic corridors and dynamic regions. The development of industrial zones should expand to the western region of the North-South highway, the midland area, and the Trung du region to reduce land pressure in the delta and minimize the impact of climate change.

In the service sector, commercial and financial centers with regional and global significance should be developed in major cities, linked to the development of dynamic regions and economic corridors. Establishing large-scale, modern logistics centers linked to major seaports, airports, and international border gates. Developing competitive regional and international tourist centers.

For agricultural production, concentrated agricultural production areas should be planned in connection with the development of industrial processing centers. Increasing the proportion of aquaculture and fruits while reducing the proportion of rice cultivation reasonably in the Mekong Delta.

- For technical infrastructure sectors: Concentrate resources to develop the infrastructure network to support the formation of economic corridors and establish a synchronous and modern infrastructure system in dynamic regions.

b. Spatial organization orientation by region and territory:

- Development orientation of national dynamic regions and economic corridors: (i) Selecting a few areas with the most favorable conditions to form national dynamic regions, including the Northern dynamic region, the Southern dynamic region, the Central region, and the Mekong Delta, with corresponding growth poles being Hanoi, Ho Chi Minh City, Danang, and Can Tho. (ii) Developing prioritized economic corridors by 2030, including the North-South economic corridor and two economic corridors: Lao Cai - Hanoi - Hai Phong - Quang Ninh and Moc Bai - Ho Chi Minh City - Vung Tau. (iii) Gradually forming and developing long-term economic corridors: Economic corridors along the Hanoi-Ho Chi Minh City route and the West North-South route through the Central Highlands and the Southeast region.

- Organizing the development of regions and linking regional orientation: (i) The Northern Midland and Mountainous region: Develop the region in a green, sustainable, and comprehensive manner. Focus on protecting and restoring forests, developing sustainable forest economy, and exploiting and using mineral resources efficiently. (ii) The Red River Delta: Focus on developing modern industrial and service sectors. Develop agriculture with high-tech, clean, organic practices to serve urban areas. (iii) The North Central and Central Coastal region: Develop a strong maritime economy in combination with ensuring national defense and security. Improve the efficiency of seaports, coastal economic zones, and industrial zones. (iv) The Central Highlands: Protect special-use forests, protective forests at headwaters linked to water security. Strengthen the development of agroforestry, renewable energy industries, and sustainable bauxite mining, processing, and aluminum production. (v) The Southeast region: Become the most dynamic and largest growth driver in the country, a center for science, technology, innovation, high-tech industry, logistics, and highly competitive international financial center in the region. Lead in innovative growth model, digital transformation. (vi) The Mekong Delta: Develop the region into a sustainable, dynamic, and efficient agricultural economic center. Focus on agricultural production, develop green and renewable energy industries. Proactively adapt to climate change and rising sea levels.

c. Orientation for the development of the national urban and rural system: (i) Building the national urban system based on a network model, green, smart, sustainable, and adaptive to climate change. Developing and upgrading Hanoi, Ho Chi Minh City, and centrally-run cities into dynamic, innovative, leading urban centers that create ripple effects and link urban areas; competitive enough to integrate regionally and internationally. (ii) Developing comprehensive, modern, green, clean, and beautiful rural areas linked to the process of urbanization, with synchronized infrastructure and accessible to urban areas; preserving and promoting the cultural identity of ethnic groups; ensuring stable rural society; improving people's knowledge; and ensuring security and order. Planning settlement models suitable for each ecological region and the cultural and ethnic characteristics, economic and social conditions.

d. Orientation for resource use, environmental protection, disaster prevention, and climate change adaptation:

- Regarding resource usage: (i) Allocate water resources harmoniously and reasonably between sectors and localities, ensuring overall effectiveness in economics, society, and the environment in river basins. (ii) Restructure the exploitation of fisheries, gradually reduce the level of exploitation in line with the reserves, ensuring the protection and development of fishery resources. (iii) Conserve, protect, and sustainably use forest resources, combining harmonious development of the economy with environmental protection and climate change adaptation. (iv) Ensure a balance between short-term exploitation and use with long-term reserves of mineral resources. Form clusters of mines of sufficient scale to attract investment and apply modern technology from exploration to processing.

-Regarding environmental protection: Prevent the increasing trend of pollution and environmental degradation; solve urgent environmental issues; gradually improve and restore environmental quality. Conserve, protect, and expand the system of natural reserves, wetland areas, important ecological landscape areas, and biodiversity corridors.

- Regarding disaster prevention and climate change adaptation: Proactively adapt to climate change, gradually manage natural disaster risks, and create conditions for sustainable development. Strengthen and upgrade the system of disaster prevention and control works. Implement greenhouse gas emission reduction in all sectors, aiming for net-zero emissions by 2050.

4. Planning urban network and national transportation infrastructure in the initial phase of digital transformation

4.1. National Urban Network Planning to Create Development Space and New Growth Drivers

Based on the guidance of the Politburo on planning, construction, management, and sustainable development of Vietnamese urban areas until 2030 and the vision towards 2045, urbanization is an objective necessity and an important driving force for fast and sustainable socio-economic development in the early phase of digital transformation. The target is to achieve a minimum urbanization rate of 45% by 2025 and over 50% by 2030. The percentage of urban land on the total natural land area should be about 1.5 - 1.9% by 2025 and 1.9 - 2.3% by 2030. The vision towards 2045 aims to build at least 5 cities that meet international standards. The economic structure of urban areas will develop in a modern direction, with a significant share of green and digital economies. [1]

a. National urban network: The existing network will continue to be maintained and developed, with adjustments to basic urbanization areas, major urban areas, large cities, mega-cities, economic border areas, coastal areas with the role of leading growth centers, or secondary national growth centers. The development of key economic-urban corridors from North to South will be promoted, as well as the dynamic East-West economic-urban corridors, the fan-shaped corridors, and the border belts, coastal areas, and island areas linked to maritime and border economy.

b. Adjustment of basic urbanization areas: This will be in line with the projected national socio-economic restructuring to create new economic-social spaces: (i) Mountainous areas in the North will develop based on their local potential, utilizing resources from land, cultural heritage, and economic border areas; (ii) The Red River Delta and North Central region will develop mainly based on the Capital region, (iii) The North Central and South Central regions will develop mainly based on the Economic Central region with Thanh Hoa, Vinh, Hue, Da Nang, Quy Nhon as the chain of dynamic urban areas; (iv) The South Central Coast will develop mainly based on the Southern Economic Center with Ho Chi Minh City as the high urbanized region, the main growth driver; (v) The Mekong Delta will develop mainly based on the Mekong Delta's economic focal points.

c. Formation of large urban areas (economic-urban regions): Besides the capital city Hanoi and Ho Chi Minh City, which have basically become large/very large/leading growth center urban areas in the overall structure of the national urban network, having a great impact on the domestic and international competitive environment, additional urban areas like Da Nang and Long Thanh International Airport will be supplemented. Hanoi, Ho Chi Minh City, and Da Nang are the three cities meeting international standards (global cities), acting as the nucleus of three large urban areas, major urbanized regions with high competitiveness and importance for Vietnam. Long Thanh Airport area plays the role of an important air gateway in the Southern region of Vietnam and internationally.

d. Formation of leading growth centers: Large and vast cities play the role of central urban areas, leading growth centers and secondary national growth centers such as Hanoi, Ho Chi Minh City, Hai Phong, Vinh, Hue, Da Nang, Quy Nhon, Can Tho, Long An... Additionally, Bac Ninh and Vinh Phuc urban areas will be added and developed according to the multi-center model, green, intelligent, and sustainable growth. In addition, due to the unique characteristics, Hanoi will continue to be developed in the cluster of urban areas model. Hanoi, Ho Chi Minh City, Hai Phong, Hue, Da Nang, Can Tho, and Phu Quoc are cities that meet international standards, acting as the connection and development hub with the regional and international network.

e. Formation of central economic-urban corridors:

- Corridors in the North-South direction: (i) Economic-urban corridor along the coastal and island areas; (ii) Border corridor linking socio-economic development, economic border areas with ensured national defense and security; (iii) Support corridor along the Ho Chi Minh Highway... The main economic-urban corridors in the North-South direction play a crucial role in connecting regions, major growth centers, leading dynamic urban areas, and secondary centers, forming the backbone and main arteries of the country...

- Corridors in the East-West direction: (i) Con Minh - Hanoi - Hai Phong, Lang Son corridor; (ii) East-West corridor/QL19; (iii) QL22 corridor... In addition, there are other support East-West corridors like QL8, QL19, QL26... The East-West corridors have many potentials, advantages, creating strong connections or "flow" with attractive resources and investments in national and international relations, creating attractive coastal gateways for the Western region...

f. Formation of urban clusters and chains: Depending on natural conditions, relationships, resources, and development situation, the development of urban clusters and chains in the Northern coastal region; Urban chain in the North Central region; urban chain in the Central coastal region; Urban chain in the Central South coastal region; Urban cluster in the Central Highlands; Urban cluster in the Mekong Delta...

4.2. National Transport Infrastructure Planning to Connect Development Spaces and New Growth Drivers

The planning and development of national transport infrastructure play a crucial role in the process of industrialization and modernization, in line with the three core breakthroughs to promote fast and sustainable socio-economic development. The national transport infrastructure serves as the framework defining the territorial space and the connecting backbone between development spaces and new growth drivers within the country and internationally.

a. Road transport network: The planning of the road transport network covers the period from 2021 to 2030 with a vision towards 2050. [2]

- The planned highway network consists of 41 routes with a total length of about 9,014 km, including the North-South vertical axis, such as the North-South highway (from Huu Nghi Border Gate to Ca Mau City) with a length of about 2,063 km and a width of 4 - 10 lanes; The West of the North-South highway (from Tuyen Quang City to Rach Gia City) with a length of about 1,205 km and a width of 4 - 6 lanes... These highways ensure interregional connections, linking international seaports, international airports, major international border gates with significant import and export demands, special and type I urban areas, and facilitate convenient connections with national highways to type II seaports, international airports, major inland waterway ports, and urban transportation hubs of type II and below.

- The national highway network includes 172 routes with a total length of about 29,795 km. The North-South vertical axis includes: National Highway 1: From Huu Nghi Border Gate to Nam Can District, Ca Mau Province, with a length of about 2,482 km, meeting level III standards, with 4 lanes; The Ho Chi Minh Road: From Pac Bo to Dat Mui, with a length of about 1,762 km, meeting minimum level III standards, with 2 - 4 lanes...

b. Railway network: The planning of the railway network covers the period from 2021 to 2030 with a vision towards 2050. [3]

The national railway network until 2030 includes 7 existing routes with a total length of about 2,440 km; Planning for 9 new railway routes with a total length of 2,362 km. Among them, the high-speed railway from the North to the South from Ngoc Hoi station to Thu Thiem station is a double-track, 1,435mm gauge, with a length of about 1,545 km.

The planned national railway network until 2050 will include 25 routes with a total length of 6,354 km. The railway network of Vietnam will connect across Asia, link Asia and Europe through the Chinese railway at Huu Nghi Border Gate and Lao Cai; connect with the ASEAN railway through Laos and Cambodia.

c. Aviation network: The planning of the aviation port network follows a spine-like model with two main hubs in Hanoi and Ho Chi Minh City, forming 28 airports, including 14 international airports (Van Don, Cat Bi, Noi Bai, Tho Xuan, Vinh, Phu Bai, Da Nang, Chu Lai, Cam Ranh, Lien Khuong, Long Thanh, Tan Son Nhat, Can Tho, and Phu Quoc); 14 domestic airports (Lai Chau, Dien Bien, Sa Pa, Na San, Dong Hoi, Quang Tri, Phu Cat, Tuy Hoa, Pleiku, Buon Ma Thuot, Phan Thiet, Rach Gia, Ca Mau, and Con Dao).

The vision until 2050 aims to form 29 airports, including 14 international airports (Van Don, Hai Phong, Noi Bai, Tho Xuan, Vinh, Phu Bai, Da Nang, Chu Lai, Cam Ranh, Lien Khuong, Long Thanh, Tan Son Nhat, Can Tho, and Phu Quoc); 15 domestic airports (Lai Chau, Dien Bien, Sa Pa, Cao Bang, Na San, Dong Hoi, Quang Tri, Phu Cat, Tuy Hoa, Pleiku, Buon Ma Thuot, Phan Thiet, Rach Gia, Ca Mau, Con Dao). Especially, during this period, the second airport to support Noi Bai International Airport will be established in the southeast of Hanoi, and some airports and airfields on islands or archipelagos with favorable natural conditions for economic and social development, ensuring national defense and security will be developed.

d. Waterway network: The planning of inland waterway infrastructure structure covers the period from 2021 to 2030 with a vision towards 2050. [4]

By 2030, the planning includes 9 waterway transportation corridors, including 1 coastal corridor, 4 corridors in the Northern region, and 4 corridors in the Southern region. Planning for 54 clusters of cargo ports with a total capacity of about 361 million tons: 25 clusters in the North with a total capacity of about 199 million tons; 8 clusters in the Central region with a total capacity of about 9 million tons, and 21 clusters in the South with a total capacity of about 153 million tons. Planning for 39 main passenger ports with a total capacity of about 53.4 million passengers: 10 clusters in the North with a total capacity of about 10.9 million passengers; 14 clusters in the Central region with a total capacity of about 2.5 million passengers, and 15 clusters in the South with a total capacity of about 40 million passengers.

The vision until 2050 aims to complete a modern, coherent, safe, and high-quality inland waterway infrastructure, significantly contributing to reducing logistics costs and becoming one of the major means of transportation for cargo.

4.3. Solutions and Resources for Implementing the Comprehensive National Master Plan in the Initial Phase of Digital Transformation

In the National Master Plan for the period 2021-2030, with a vision towards 2050, the total demand and investment capital structure required to implement the plan have been forecasted. To mobilize resources, the plan outlines a system of solutions that involve pooling resources from different economic regions. It also forecasts labor demand for the economy and proposes measures for human resource development and utilization. The plan emphasizes prioritizing the development of large-scale infrastructure networks in national growth-driving regions and promoting the establishment of priority economic corridors. Additionally, it focuses on supporting underprivileged areas and ensuring access to basic social services. Furthermore, the plan also includes solutions for advancing science, technology, environmental protection, and enhancing international cooperation.

The digital transformation in the National Master Plan involves several measures in the planning sector, including the establishment of a national planning information system, provincial planning systems, urban planning, planning management, and applications for the public.

The planning solutions are implemented based on several key legal foundations:

- Identifying priority sectors for digital transformation according to the "Construction Sector Digital Transformation Plan for the period 2020-2025, with orientation to 2030" [5].

- The digital database includes standards, regulations, norms, and unit prices to serve the state management of the Ministry of Construction; Implementing the Ministry of Construction's E-government; Planning for construction, urban development, and urban technical infrastructure. [5]

4.4. Some Recommendations for Urban Network Planning and National Transport Infrastructure in the Initial Phase of Digital Transformation

Urban network planning and national transport infrastructure development are essential aspects of the Comprehensive National Master Plan to create development spaces and new growth drivers, such as the formation of basic urban areas, large urban areas/economic-urban regions, major growth poles - large and mega urban areas, economic-urban corridors, coastal economic zones, and border gates. Additionally, planning and developing the national transport infrastructure play a crucial role in addressing bottlenecks and enhancing connectivity between development areas and new growth drivers through synchronized and modern road, rail, waterway, and aviation systems. This contributes to completing the national territorial structure and creating development spaces and new growth drivers to meet the country's development needs.

However, to effectively implement these two critical aspects (urban network planning and national transport infrastructure) of the Comprehensive National Master Plan, the following core recommendations should be considered:

a. Prioritize and focus on the planning and investment in developing the national transport infrastructure, especially resolving bottlenecks and enhancing connectivity between development areas and new growth drivers according to the Comprehensive National Master Plan.

b. The national urban network planning must create development spaces and new growth drivers. Planning involves organizing and distributing the space for economic, social, defense, and security activities, along with infrastructure development, resource utilization, and environmental protection within the designated territory to effectively utilize the country's resources for sustainable development during the defined period (Article 3, Planning Law).

c. Innovate the urban development model that suits Vietnam's specific natural, economic, social, cultural, and historical conditions. Develop compact urban areas in major and mega urban areas to save and enhance land use efficiency. Promote urban development towards green, smart, and sustainable growth, adapting to climate change and rising sea levels.

d. Continue to improve the institutional framework, innovate mechanisms, policies, and complete the system of legal documents on urban development. Research and develop the "National Urban Network Management Mechanism" based on the establishment of the Planning Law, Construction Law, Urban Development Management Law, and related legal documents, programs, plans, and schemes during the country's urbanization and industrialization-modernization process.

e. Manage the urban network following a "hierarchical model" at the provincial, regional, inter-regional (or zonal), and national levels. Build a management model with connectivity and integration, replacing the local and regional approach, based on the National Planning Database (GIS) for urban development planning.

f. Mobilize maximum resources and attract investment capital from all economic sectors, including foreign investors participating in various forms of investment in developing the transport infrastructure, such as BOT, BT, BTO, PPP. Revise and supplement regulations on financial support policies, taxes, prices, fees, charges, and concession rights to increase the commercial viability of transportation projects and user contributions.

g. Complete the urban government model based on the spirit of the Law on Organizing Local Governments. Urban governments operate in an e-government environment and a smart urban platform suitable for the urbanization and socio-economic development process of each region and locality.

5. Conclusion

The benefits of digital transformation, both in general and within the context of the Comprehensive National Master Plan, are demonstrated in two fundamental aspects:

a. On the aspect of government management:

Having a complete, scientific, and accurate database system creates favorable conditions for the successful implementation of digital transformation in the Comprehensive National Master Plan.

- For citizens, digital transformation in the master plan provides opportunities to: (i) Access comprehensive database information in various sectors; (ii) Move towards "100% contactless" delivery of all planning and construction services.

- For sector management: (i) Having a comprehensive data system as a solid foundation for developing analytical systems that support decision-making; (ii) Enhancing management capacity and advisory work for leaders, minimizing the time spent on data synthesis and reporting.

- For sector leaders: (i) Obtaining a clear overview of the overall picture, achievements, shortcomings, completeness or incompleteness of information, strengths, weaknesses in the operation of various departments, and the level of citizen satisfaction; (ii) Gradually increasing the percentage of decision-making based on digital technology data.

b. On the technical aspect:

- Ensuring the connectivity between various systems (regional development planning, interlinked regions, economic-urban corridors, urban spaces, economic infrastructure systems, infrastructure with production and business sectors, urban development within the national and local scope); building a comprehensive data repository shared among multiple sectors through integrated and multi-disciplinary approaches (e.g., construction, transportation, water supply and drainage, ecology, environment, etc.), especially concerning the ability to communicate during future adjustments and the development of sustainable smart cities.

- Providing databases for various sectors in the form of services so that other systems can exploit, use, and implement data efficiently, avoiding redundant construction of information in specialized sectors. This includes: National planning database management; Integration of international standard data and services according to OGC standards; Access to and interactive use of planning maps on the web; Flexible data sharing and establishment of APIs; Providing multiple utilities supporting exploration, analysis, and spatial retrieval; Easy data transformation between different coordinate systems (WGS 84, VN2000, UTM, etc.); Convenient access to GIS systems./.

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