

Urban Transportation Policies for Governing Hanoi City

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Abstract

Mega-Cities, such as Hanoi in Vietnam, are coping with many issues related to the complex challenges that govern in areas of unplanned urban sprawl. This article aims to address questions regarding urban transportation policies should be implemented towards Hanoi's Greener and Livable City. Specific policies will dramatically improve the likelihoods for all citizens in Hanoi by reducing money and time and providing more urban public services access to opportunities.

Keywords: Data Sciences; Transportation; Policy; Hanoi.

I. INTRODUCTION

Hanoi city, bounded by the Red river in the East, the ToLich river in the West, the KimNguu river in the South and West lake in the North, contains many other lakes and water ponds. Hanoi lasts 1013 year-history since Thang Long-Hanoi originally was predominantly political, cultural and religious center, and secondarily socio-economic center today. Such old Hanoi's transportation roads were designed to serve as the need of the authority and their family and were planned with narrow roads in and connect to the old center. Thus, Hanoi authorities are coping with many issues related to the complex challenges that govern in areas of unplanned urban sprawl, congestion of different kinds that emerge almost on a daily basic that become more stress for traffic participants.

We can all agree that the COVID-19 pandemic has demonstrated in a very undoubtful way that economics and societies have to go digital. On June 3rd, 2020, Vietnam's National Digital Transformation Program through 2025 and orientation towards 2030 was approved. On June 15th, 2021 the Prime Minister signed a Decision No. 942/QD-TTG approving the e-government development strategy towards digital government in the period of 2021-2025, orientation to 2030. The strategy sets out 04 goals: (i). providing high-quality public services for the people; (ii). mobilizing the board participant of people and business; (iii). Optimal operation of state agencies based on digital technology; (iv). Effectively solve major problems in socio-economic development such as health, education, and traffic. The e-government development strategy towards digital government also set out 06 key tasks: improving the legal environment; developing the national digital infrastructure; developing the national digital platform; developing the national data; develop national applications and ensure national network safety and security.

The article focuses on the important of digitalization in building digital government and delivering public services by considering Hanoi's transportation infrastructure. On the basis of synthesizing and analyzing Hanoi' transportation data, the article proposes a number of implications for governing traffic order and safety in Hanoi.

II. THE EMERGENCE OF DIGITALIZATION AS THE URBAN PUBLIC SERVICES AND GOVERNANCE

E-government and digital government place their centrum focus on users. The Vietnam government has achieved many results in delivering public services to people and business.

2.1 The Vietnam government is actively promoting digitalization

As of February 2023, 97.3% of eligible public services are offered online at level 4. The rate of online public services that generate dossiers has increased to 67.8%, which is twice as high as in the same period in 2021. The rate of online processing has also improved to 43.2%, which is an increase of 14.57% compared to the same period in 2021. The United Nations has evaluated Vietnam's online service index (OSI) and placed the country at 76th out of 193 countries in the world, marking a rise of 5 places compared to 2020.

In the effort to implement digital platforms for digital transformation, over 50 digital technology platforms have been launched to support the national digital transformation across the three pillars of digital government, digital economy, and digital society. The Ministry of Information and Communications regularly updates the list of national digital platforms and publishes them on the National Digital Transformation Portal. The implementation and promotion of national-scale information systems and databases have been prioritized. The national population database has become operational and the infrastructure for connecting, integrating, and sharing data on a national level is gradually being completed and effectively promoted. Currently, more than 90 ministries, departments, localities, organizations, and businesses are connected to the National Data Sharing and Integration Platform (NDXP). There are 8 databases (including 3 national databases that have been prioritized for deployment) and 12 connected information systems, which provide data sharing services on the NDXP, laying the foundation for the development of e-government, towards a digital government, digital economy, and digital society.

On December 9th, 2019, the National Public Services Portal has been provided citizens and business with a single point to access online public services of state agencies. From the launching date with the initial 08 public services to March 8th, 2021, more than 2,800 public services have been integrated; nearly 6,700 administrative procedures have been provided at level 4, with more than 116 million visits, 467 thousand registered accounts; more than 42.5 million dossiers in a synchronic manner; over 930 thousand dossiers implemented online, and more than 46 thousand electronic payment transaction made on the Portal; over 53 thousand calls, more than 10 thousand complaints and recommendations have been supported and received [3] .

2.2 Increase the demand for public services of people

Vietnam has a lot of potential for e-payments to succeed because it has one of the fastest developing economies in the area. With an anticipated annual growth rate of 15.7% in 2025, the total value of online payment transactions in Vietnam is predicted to reach \$15 billion in 2021. The Vietnam mobile payment market is predicted to develop at a CAGR of 22.8%, reaching \$27.6 billion in 2025, according to PayNXT360's Vietnam Mobile Wallet and Payment Market Opportunities. Between 2018 and 2025, the value of mobile wallet payments is expected to increase at a CAGR of 23%. The overall transaction value in the digital payments market is anticipated to reach 20.8 billion USD by 2022, according to Statista's Digital Payments Report 2021. The whole transaction value will increase annually.

2.3 Integrate the platform for data sharing

Trung [4] reported the integrated platforms for sharing data play a central role in connecting and sharing data among state agencies. By the end of 2020, a system of data sharing and integrated platforms has been formed on a national scale according to the Vietnam e-government Architecture Framework. The current status of platform development is as follow:

- National data sharing and integrated platform: the platform has connected with all integrated platforms, data sharing of ministries, sectors, and localities, forming a connection and data sharing environment on a national scale. The platform has supported the connection and sharing of connected data with more than 200 information systems of more than 85 ministries, sectors, localities, and businesses; connected to 05 national databases, and 07 information systems from central to local levels. From 2019 to 2022, there have been more than 12 million transactions made through the National Data Sharing and Integrated Platform.

- Data sharing and Integrated Platforms at ministerial/provincial level have been developed rapidly, meeting the need of connecting and sharing data within ministries and provinces and connecting externally.

- + In 2018: three ministries, agencies, and localities have local government service platforms (LGSP), reaching the rate of 3.2%.

- + In 2019: four ministries, ministerial-level agencies, governmental agencies, 21 provinces/centrally-run cities have LGSP, reaching the rate of 27.17%.

- + In 2020: all ministries, ministerial-level agencies, governmental agencies, provinces/centrally-run cities have LGSP that are connected to the National Data Sharing and Integrated Platform, reaching the rate of 100 % [5].

Since December 23th, 2020, the Ministry of Transport has been actively directing the connection of two systems, allowing vehicles with ePass cards or VETC cards to travel through toll stations and expressways nationwide. After over 1.5 years of implementation, the rate of connection has reached 75%. Currently, there are 4.8 million vehicles in the country, and 3.5 million of these vehicles have been tagged with either an ePass card or a VETC card, which represents 75% of the total number of vehicles nationwide.

III. CHARACTERISTICS OF TRANSPORTATION INFRASTRUCTURE OF HANOI

Son [6] studied the main problems and difficulties with transportation in and around Hanoi in 2005. Six major problems were identified: inadequate transportation infrastructure, escalating traffic congestion, a lack of investment capital for the development of transportation infrastructure, an inadequate traffic and transport master plan in terms of both building and implementing steps, traffic accidents, and traffic-related environmental pollution.

Currently, the transportation infrastructure of Hanoi has some major different shift.

3.1 The transportation's demand is high.

Since then, Hanoi has experienced significant growth over the period from 2005 to 2022. Approximately 8.4 million people live in Hanoi in 2022, with a projected population growth rate of 1.4%. The population density in 2022 is 2.398/km² on average. Despite the increase in total length of roads, the road density has decreased from 1.09 km/km² in 2005 to 0.69 km/km² in 2022, which means the rate of growth in road infrastructure has not kept pace with the growth in the area.

The government of Hanoi has an ambitious plan to push forward the transportation infrastructure. The general planning on construction of Hanoi capital by 2030 is ensure that the ratio of traffic land to urban construction land achieves 20-26% for the major urban region, reaching 18-23% for satellite towns, and reaching 16-20% for towns, develop a transportation infrastructure

network in sync with other plans, especially urban construction planning, wherein 3-4% of the land surface must be dedicated to static traffic. The goal for road network density in urban areas is 0.25 to 0.4 km/km² for urban freeways, 0.5 to 0.83 km/km² for urban main roads, 1.0 to 1.5 km/km² for urban trunk roads, 2.0 to 3.3 km/km² for interregional roads, and 4.0 to 6.5 km/km² for regional main roads. The center urban area's density should be between 2 and 3.0 km/km² and the satellite urban area's density should be between 2 and 2.5 km/km². In terms of market share, the central metropolitan region will account for 30–35% of all travel demand by 2020, 50–55% by 2030, and 65–70% by 2030. By contrast, satellite cities will account for 15% by 2020, around 40% by 2030, and at most 50% by 2030. Road travel accounts for 75–80% of interprovincial passenger transit, followed by rail travel at 15% and air travel at 7–10%. Transport of interprovincial freight: 65–70% by road, 3–5% by rail, and 25–30% by water.

3.2 The transportation is divided into five zones which the concentration on Zone 1 and Zone 2.

The local government is creating plans for zoning based on the infrastructure's capacity. Hanoi's transportation system consists of four zones, which are surrounded by four ring roads.

The plan is to construct urban highways (on embankments or high bridges in the middle) on Ring Road 3, with the exception of the Quang Minh-Tien Duong-Duc Tu section, which is the main urban trunk road. The following are the details of the urban ring roads: (1) Ring 2, with a cross-sectional width of 8 to 10 lanes and an overhead line; (2) Ring 3, with a cross-sectional width of 8 to 10 lanes and an elevated road. There will also be urban axes (main axes) with a total length of approximately 336 km, including urban axes (minor main axes) with a total length of about 131 km, and inter-regional roads with a total length of about 456 km.

The radial expressways are counted from Ring Road 3 and out. They are 4 to 8 lanes wide and run parallel to high-traffic national highways, in the following directions: Hanoi-Lang Son Expressway, Hanoi-Ho Chi Minh City Expressway, Hanoi-Lao Cai Expressway, Hanoi-Thai Nguyen Expressway, Hanoi-Hai Phong Expressway, Noi Bai-Ha Long Expressway, Hanoi-Hoa Binh Expressway, Northwest Expressway-National Highway 5, and Ho Chi Minh Road. Additionally, Thang Long and Phap Van-Gie Boulevards are planned as urban highways.

The plan is to construct new roads connecting the central urban area with satellite towns with a total length of approximately 90 kilometers. The roads will have a cross-sectional width of 40 to 60 meters and will accommodate at least 6 lanes for motor vehicles. The following are the axes being considered: (1) the West Thang Long axis, with a length of 20 km from Ring 4 to the Son Tay satellite urban area; (2) the West Lake-Ba Vi axis, with a length of 25 km from Ring 4 to the Hoa Lac satellite town; (3) the Ha Dong-Xuan Mai axis, with a length of 20 km from Ring 4 to the Xuan Mai satellite town; and (4) the Ngoc Hoi-Phu Xuyen axis, with a length of 25 km from Ring 4 to the Phu Xuyen satellite town.

The creation of Hanoi Ring Road No. 4 is expected to be completed by June 2026 and will be put into use in 2027. Zones 1 and 2 are congested with several points of traffic congestion. The HaNoi government plans to implement a fee for personal vehicles entering Zones 1 and 2.

3.3 The personal vehical is growth faster than the public transportation. Moreover, the electric vehical growth fasted

In the lead up to 2020, buses are expected to continue to play a significant role in Hanoi's public transportation system. The number of buses/passenger vehicles increased from 1,508 in 2016 to 11,141 in 2021, which is an increase of 636%. And The number of freight vehicles increased from 16,508 in 2016 to 42,217 in 2021, which is an increase of 156%. The city has plans for

the long-term implementation of rapid bus services on 8 routes and 3 transit routes, which may be converted to urban railway or monorail when traffic volume is high. Based on the actual traffic conditions, there may be consideration for adding a rapid bus route on some roads with adequate infrastructure. The city also plans to extend the urban railway lines connecting the central urban area to satellite cities, including lines 2, 3, 5, and 2A, to facilitate convenient and efficient connections between these areas. So far, only one line has been put into operation. Additionally, the city is considering the option of using monorail systems on roads with high traffic volume, narrow cross-sections, and many curves.

Between 2016 and 2021, the number of motorcycles in Hanoi saw an increase from 5,233,644 to 6,360,490, a rise of 21.5%. The number of electric motorcycles saw an even greater increase, rising from 110,029 in 2016 to 175,125 in 2021, a 59% increase. Meanwhile, the number of cars in Hanoi increased significantly, from 604,086 in 2016 to 996,224 in 2021, a rise of 65%. This figure encompasses personal cars with less than 10 seats, contract cars with less than 10 seats, and other types of vehicles. Despite the limited availability of centralized public parking spaces, the city government is making efforts to address this issue. They have set aside a reasonable amount of land in new urban areas to create centralized public parking spots and prioritize the development of underground or multi-storey parking lots. The total area dedicated to parking in the central city is estimated to be around 1,706 hectares.

Hanoi's urban railway network consists of five routes that are a combined 100 kilometers long. The urban railway system in Hanoi includes five routes with total 100 kilometers long. Route No. 1 (Ngoc Hoi - Yen Vien, Nhu Quynh): This route, with a length of approximately 38.7 km, travels through the heart of the city to serve the suburbs northeast and south of Hanoi; The backbone of the current and future urban area is Line 2 (Noi Bai - city center - Thuong Dinh), which is approximately 35.2 km long. Starting at the Cat Linh neighborhood (where line 3 intersects), urban railway Hanoi-Ha Dong connects to line 2. The urban railway between Hanoi and Ha Dong is about 14 km long, and after 2020, it will be extended to Xuan Mai. Line 3 (Nhon - Hanoi station - Hoang Mai): Line 3 connects the western and southern parts of the city over a distance of 21 km. Line 3 will be expanded up to Son Tay after 2020, when its total length is anticipated to be 48 km. Line 4 has a circle shape, connecting with lines 1, 2, 3 and No. 5, diversifying traffic demand and linking with urban development projects. In the immediate future, line 4 will be built as a rapid bus route, and in the future, it will develop into a complete urban railway. The whole route No. 4 has a length of about 53.1 km. Route 5 connects the urban areas along the Lang - Hoa Lac corridor with the city center of Hanoi. Line 5 is about 34.5 kilometers long.

3.4 The increasing of cars and traffic jams

These changes in the number of vehicles managed by the government highlight the need for transportation planning and management strategies that can ensure the sustainability and quality of transportation services for the growing population and vehicles. Digitalization can play a key role in supporting these efforts by providing real-time data, insights, and tools to help transportation planners and managers make informed decisions and respond effectively to changing needs and demands.

The mentioned characteristic transportation leads to following challenging. First, the pressure of reducing personal vehicle. Second, the challenge of reducing time for people from their home to workplace. Third, the need of a green solution for the infrastructure. Finally, reducing the risk of developing such a complex system within the constraint of time and budgets.

These challenges highlight the need for transportation planning and management strategies that can keep pace with the rapid growth of the area and ensure the sustainability and quality of transportation services for the growing population. Digitalization can play a key role in supporting these efforts by providing real-time data, insights, and tools to help transportation planners and managers make informed decisions and respond effectively to changing needs and demands.

IV. DIGITALIZATION IN A THINKING AND ACTING MANAGEMENT SYSTEM OF TRANSPORTATION

A robust governance framework for urban transportation laws should encompass the adoption of digitalization, which can be achieved through several actions, such as collaborative planning, data-driven decision-making, citizen engagement, flexible and adaptive policies, implementation and enforcement, promoting transparency and accountability, and continuous improvement. To ensure that transportation policies align with the needs and interests of the city and its residents, cooperation among various stakeholders, including government organizations, private sector businesses, and community organizations, is crucial. Transparency and accountability of data, information, and public services also play a pivotal role in achieving this objective. Policies should encourage citizen participation, feedback, and input, using digital channels to educate them about available transportation options and policies. Additionally, policies should be adaptable to changing requirements and objectives, and accommodate emerging technologies and innovations. They should be regularly reviewed, evaluated, and modified as needed to ensure effectiveness. Finally, transportation policies should be enforced rigorously, including taking measures to uphold laws, promote compliance, and safeguard the safety and well-being of all road users.

The management of transportation systems can undergo a revolutionary transformation with the implementation of digitalization. This technology can facilitate the gathering, examination, and utilization of substantial amounts of data to enhance decision-making, and boost the efficiency and efficacy of transportation operations. An ideal digitalized transportation management system comprises several important components, including the collection and analysis of real-time data, predictive modeling and simulation, intelligent transportation systems (ITS), connected and automated vehicles, smart mobility services, and integrated transportation management.

Introducing digitalization into transportation management can bring about noteworthy economic benefits. Some of the ways in which digitalization can impact the economy include enhancing the efficiency of transportation operations, reducing costs, boosting productivity, and improving service quality. Moreover, it can contribute to the safety of transportation operations, minimizing the possibility of accidents and injuries. Additionally, digitalization can have a positive effect on the environment by reducing emissions, conserving energy, and promoting sustainability. These advantages could result in heightened interest and support from citizens and businesses to promote the growth of digital systems.

Implementing digitalization programs can be difficult due to various risks such as technical risks, privacy and security risks, resistance to change, budget constraints, and misalignment with goals. To mitigate the risks, it is advisable for government agencies to use different models when carrying out digitalization programs in transportation management. In HaNoi, several models have been employed in the public sector over the past year, including the Public-Private Partnership (PPP) model, Open Data model, and Government Procurement model.

V. CONCLUSION

Since the COVID-19 pandemic and its crises, Hanoi has taken important steps in restructuring of the public sector, and building digital governance, as well as the digitalization-based making decision in transportation management. Hanoi is constantly making efforts to implement administrative reforms and enhance access to public services through LGSP that is connected to National Data Sharing and Integrated Platform.

As mentioned in the 3rd section, the government of Hanoi is coping with many issues related to the complex challenges that govern in urban transportation policies. The authors make some implications for Hanoi urban governance, as follows:

The first, emphasizing the role of leaders, managers, and commitment to the implementation of the digital transformation;

The second, building a workforce that fully meets the requirement of digital capacities, and;

The last but not least, encouraging e-participant to develop digital transportation policies that are referred as *“the use of digitalization, as an urban data sharing and integrated platform, is to create new public services”*.

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REFERENCES

- [1] <https://chinhpheu.vn/default.aspx?pageid=27160&docid=71417>
- [2] <https://thuvienphapluat.vn/van-ban/Giao-thong-Van-tai/Quy- dinh-519-QD-TTg-quy-hoach-giao-thong-van-tai-thu-do-Ha-Noi-2030-2050-2016-307740.aspx>
- [3] Gia Huy (2021a). E-government contributes to improving services qualities for people and business. From the link: <https://baochinhphu.vn/chinh-phu-dien-tu-gop-phan-nang-cao-chat-luong-phuc-vu-nguoi-dan-dn-102288853.htm>
- [4] Pham Trung (2021). National Data Integration and Sharing: “Blackbone” Platform. From the link: <https://nhandan.vn/thong-tin-so-tich-hop-chia-se-du-lieu-quoc-gia-nen-tang-xuong-song-643140/>
- [5] Gia Huy (2021b). The digital government in Vietnam will be formed in 2025. From the link: <https://baochinhphu.vn/chinh-phu-so-tai-viet-nam-se-duoc-hinh-thanh-vao-nam-2025-102288891.htm>
- [6] Nguyen Ngoc Son (2005). Transportation in and around Hanoi: current issues and challenges. *Business environment and policies of Hanoi* (Chapter 3).
- [7] IC Publisher (2022). Proceeding of the international workshop “Public governance of digital transformation-Digital government policy: International experience and implications for digital governance in Vietnam”. Hanoi. OECD KPC-NAPA.

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