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### Smart Urban Governance for Sustainable Development: International Experience and Lessons for Vietnam

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#### Abstract

Smart urban governance has moved from a technology-centred agenda toward a public-value, sustainability-oriented and people-centred model of urban transformation. This paper examines international experience in managing smart cities for sustainable development and derives policy lessons for Viet Nam. Using a qualitative comparative policy analysis, the study reviews academic literature, international standards, global reports and selected city cases, including Singapore, Seoul, Amsterdam, Barcelona, Copenhagen and Curitiba. The findings show that effective smart urban governance depends less on isolated technologies than on integrated institutions, interoperable data infrastructure, measurable sustainability outcomes,

citizen participation, resilient finance and safeguards for privacy and inclusion. International experience also indicates that smart-city programmes fail when they are reduced to fragmented pilot projects, vendor-driven platforms or surveillance-heavy urban dashboards. For Viet Nam, where national strategies on sustainable smart cities, digital transformation, green growth and urban development already provide a policy foundation, the central challenge is implementation coherence. The paper proposes a transition from project-based smart-city deployment to mission-oriented urban governance anchored in national standards, local accountability, open data, climate resilience, inclusive service design and diversified urban finance.

**Keywords:** Digital Governance, Smart City, Sustainable Development, Urban Management, Viet Nam

#### 1. Introduction

Urbanization and digital transformation are now two mutually reinforcing forces shaping the future of development. Cities concentrate people, capital, infrastructure, data, innovation and risk. They are also where climate change, environmental degradation, social inequality, public service overload and infrastructure deficits become most visible. The United Nations estimates that 55 per cent of the world population lived in urban areas in 2018 and that the figure will reach approximately 68 per cent by 2050 (United Nations Department of Economic and Social Affairs [UN DESA], 2019) <sup>[24]</sup>. This structural transition makes urban governance a decisive arena for achieving the Sustainable Development Goals, particularly SDG 11 on sustainable cities and communities, but also the goals on climate action, innovation, energy, inequality and institutional effectiveness.

The idea of the smart city emerged as one response to these pressures. In its early formulation, a smart city was often associated with broadband infrastructure, sensors, data platforms, e-government portals, intelligent transport systems and automated service management. Over time, however, the concept has become broader and more contested. Scholars have repeatedly warned that a city cannot be considered smart merely because it adopts digital devices or builds a control centre. Smartness must be evaluated by whether technology improves the quality of life, expands public value, strengthens urban sustainability and enables citizens to participate meaningfully in decisions that affect their daily lives (Caragliu *et al.*, 2011; Meijer & Rodríguez Bolívar, 2016; Nam & Pardo, 2011) <sup>[5, 18, 19]</sup>.

This change in understanding is important because many cities around the world have experienced a gap between smart-city aspiration and actual urban outcomes. Technology-led projects may produce visible infrastructure, but they do not automatically reduce congestion, carbon emissions, flooding risk, housing inequality or administrative fragmentation. Urban dashboards may improve situational awareness, but they can also create dependence on proprietary vendors, reinforce unequal access to data, or intensify surveillance if governance safeguards are weak (Kitchin, 2014, 2016) <sup>[16, 17]</sup>. The main policy issue is therefore not whether cities should use technology; rather, it is how cities should govern technology in ways that are

democratic, sustainable, inclusive and institutionally coherent.

The international policy discourse increasingly reflects this shift. The OECD emphasizes that smart cities should be connected to inclusive growth objectives rather than treated as a narrow digital modernization programme (OECD, 2020) [20]. UN-Habitat frames people-centred smart cities as a way to ensure that digital innovation supports sustainability, inclusion, human rights and public value. The ISO 37120, ISO 37122 and ISO 37123 family of standards moves the debate from rhetoric to measurable indicators for city services, quality of life, smart-city development and resilience planning (International Organization for Standardization [ISO], 2018, 2019, 2024) [11, 12, 13]. Similarly, the United for Smart Sustainable Cities (U4SSC) initiative provides indicators and methodologies for assessing how information and communication technologies contribute to smart sustainable cities (International Telecommunication Union [ITU], 2024; ITU & UNECE, 2017) [14, 15].

For Viet Nam, the topic is both timely and strategic. Rapid urbanization has created large development opportunities but also pressure on land, transport, housing, drainage, waste management, energy use and public service delivery. The country has already established important policy foundations, including the Scheme for development of smart sustainable cities during 2018-2025 with orientations to 2030 under Decision No. 950/QĐ-TTg, the National Digital Transformation Programme under Decision No. 749/QĐ-TTg, the National Green Growth Strategy under Decision No. 1658/QĐ-TTg, and the Government's programme of action for implementing Resolution No. 06-NQ/TW on planning, construction, management and sustainable development of Vietnamese urban centres to 2030 with a vision to 2045 (Government of Viet Nam, 2018, 2020, 2021, 2022) [7, 8, 9, 10]. These instruments demonstrate that smart urban development is not a marginal agenda but part of national modernization.

Nevertheless, Viet Nam's implementation challenge remains significant. Many local smart-city initiatives are still dominated by pilot applications, command centres, administrative digitalization, traffic cameras and sectoral platforms. These are necessary building blocks, but they are insufficient unless they are linked to integrated planning, data interoperability, fiscal capacity, local institutional reform, public procurement discipline, citizen trust and measurable sustainability results. In some cases, smart-city investments risk becoming fragmented technology projects that are not fully embedded in urban plans, climate strategies or service-quality standards. This paper therefore addresses a practical research problem: how can Viet Nam learn from international smart-city experience while avoiding technology determinism and adapting lessons to its own institutional, fiscal and urban conditions?

The objective of the paper is threefold. First, it clarifies the conceptual and theoretical basis of smart urban governance oriented toward sustainable development. Second, it synthesizes international experiences from selected countries and cities to identify common patterns of success, limitations and governance mechanisms. Third, it derives policy implications for Viet Nam, focusing on institutional architecture, data governance, standards, financing, inclusion, environmental sustainability and implementation sequencing. The paper contributes to the literature by

connecting smart-city governance with sustainable urban development and by translating international experience into an actionable policy framework for a developing, rapidly urbanizing country.

The paper is structured as follows. Section 2 reviews the relevant literature, develops the analytical framework and explains the qualitative comparative method. Section 3 presents the results of the international synthesis and the assessment of implications for Viet Nam. Section 4 discusses policy implications, limitations and conclusions. The analysis is intentionally policy-oriented: it does not rank smart cities, nor does it evaluate a single technology. Instead, it examines the governance conditions under which digital technology can support sustainable urban transformation.

## 2. Literature Review, Theoretical Framework and Method

### 2.1 Conceptual Evolution of Smart Urban Governance

The smart-city concept has evolved through several overlapping waves. The first wave emphasized digital infrastructure and urban efficiency. Cities invested in broadband networks, sensors, integrated operations centres, electronic service portals and real-time monitoring systems. This wave was shaped by the belief that urban problems could be made more manageable if they were converted into data flows. Such an approach was attractive because it promised faster decision-making, better coordination, lower transaction costs and more responsive public services. However, critics noted that this view often underestimated the political, social and institutional nature of urban problems. Congestion, pollution, informality, housing affordability or vulnerability to floods cannot be solved only by information systems; they require rules, incentives, investment, behavioural change and collective action.

A second wave of literature broadened the concept by linking smartness to human capital, social capital and institutions. Caragliu *et al.* (2011) [5] define smart cities in relation to investments in human and social capital, traditional and modern infrastructure, sustainable economic growth and participatory governance. Nam and Pardo (2011) [19] similarly conceptualize smart cities through the interaction of technology, people and institutions. This perspective is critical because it treats technology as an enabler rather than as the essence of smartness. A city becomes smart when digital systems are embedded in capable institutions, used by skilled people and aligned with public goals.

A third wave focuses on smart governance. Meijer and Rodríguez Bolívar (2016) [18] argue that smart-city governance should be understood as a complex process of institutional change and human collaboration supported by information and communication technologies. In this view, the governance challenge is not simply to install platforms but to redesign inter-agency coordination, citizen participation, data-sharing rules, accountability mechanisms and public-private relationships. Smart governance involves choices about who controls data, who defines urban problems, who benefits from innovation and who is protected from potential harms. It is therefore inherently political, not merely technical.

A fourth wave connects smart cities to sustainability and resilience. ISO 37120 provides indicators for city services and quality of life, ISO 37122 establishes indicators for

smart cities, and ISO 37123 focuses on resilient cities. ISO 37124 provides guidance on using these indicator systems together, explicitly linking smart-city development and resilience planning to sustainable development. The U4SSC framework also treats ICTs and digital technologies as instruments for facilitating the transition to smart sustainable cities, with a strong emphasis on measurement, benchmarking and policy learning. These frameworks help shift attention from isolated applications to citywide performance.

A fifth and more recent wave emphasizes people-centred smart cities, digital rights and ethical governance. This wave responds to concerns about privacy, algorithmic bias, surveillance, cybersecurity, exclusion of low-income groups, and the concentration of urban data in private platforms. Kitchin (2016) <sup>[17]</sup> argues that smart-city systems raise ethical concerns because they can normalize instrumental rationality, predictive governance and dataveillance. For developing countries, Tan and Taeihagh (2020) <sup>[23]</sup> show that smart-city governance must be accompanied by legal, socioeconomic, human-capital and regulatory reforms. These findings are directly relevant to Viet Nam because smart urban development must be adapted to uneven local capacity, varying levels of digital inclusion and diverse urban forms.

The literature therefore suggests that smart urban governance should be evaluated through multiple dimensions. These include digital infrastructure, institutional integration, data governance, citizen participation, sustainability outcomes, financing, regulatory safeguards and learning capacity. A narrow technology-centred definition is inadequate; a city that deploys sensors but lacks transparency, inclusion, interoperability or sustainability metrics may be technologically advanced but not genuinely smart in the public-value sense. Conversely, a city with modest technological infrastructure can still advance smart governance if it uses data strategically, mobilizes citizens, integrates urban services and measures progress toward sustainability goals.

## 2.2 Theoretical Framework

This paper uses an integrated theoretical framework combining socio-technical systems theory, public-value governance and sustainability transitions. Socio-technical systems theory is useful because smart cities are not only technological arrangements; they are systems of interaction among infrastructure, institutions, users, markets, regulations and cultural norms. Digital tools can change the way transport, energy, waste, water or administrative services operate, but their effectiveness depends on organizational routines, legal authority, budget processes, procurement rules and citizen behaviour. A data platform

that is not connected to decision rights or service workflows becomes a display layer rather than a governance instrument.

The public-value perspective adds a normative dimension. Smart-city programmes should be assessed not by the number of applications launched but by the public value they create: better services, reduced emissions, safer streets, more equitable access, higher trust, greater transparency and stronger resilience. Public value also requires accountability. Citizens should understand what data are collected, how algorithms affect service provision, what rights they have, and how public agencies evaluate results. This perspective helps prevent the smart-city agenda from being captured by vendors or by purely administrative efficiency goals.

Sustainability transitions theory further highlights the need for long-term, mission-oriented change. Sustainable urban transformation is not a one-off project but a transition involving multiple regimes: mobility, land use, energy, buildings, water, waste, emergency management and public finance. Digital technologies can accelerate transitions when they help cities coordinate across sectors, test innovations, scale successful models and monitor environmental outcomes. However, transitions also create conflicts because they redistribute costs and benefits. Smart parking, congestion pricing, low-emission zones, waste tracking or energy-efficient building systems may produce aggregate benefits but can burden specific groups if social safeguards are absent.

Based on these perspectives, the paper defines smart urban governance for sustainable development as the institutional capacity to use data, digital technologies and collaborative mechanisms to improve urban services, strengthen sustainability, protect rights and enhance public accountability across the urban system. This definition has five core elements. First, it is governance-centred rather than technology-centred. Second, it treats sustainability as the ultimate outcome, not an optional add-on. Third, it requires integration across sectors and administrative levels. Fourth, it embeds citizens as users, data subjects and co-producers of urban value. Fifth, it requires measurable indicators and adaptive learning.

The analytical framework used in this paper includes six dimensions: (1) strategic governance and institutional coordination; (2) data infrastructure, interoperability and standards; (3) sectoral integration for sustainability and resilience; (4) citizen participation, inclusion and digital rights; (5) financing, procurement and public-private partnership design; and (6) monitoring, evaluation and adaptive learning. These dimensions are used to compare international experiences and to derive lessons for Viet Nam.

**Table 1:** Analytical framework for smart urban governance oriented toward sustainable development

Dimension	Core question	Key governance instruments	Expected sustainability value
Strategic governance	Who sets priorities and coordinates implementation?	National strategy, city master plan, inter-agency steering body, legal mandates	Coherent urban transformation rather than fragmented pilots
Data and standards	How are data collected, shared, protected and measured?	Open data policy, interoperability architecture, ISO/U4SSC indicators, cybersecurity rules	Reliable evidence, comparability, transparency and lower vendor lock-in
Sectoral integration	How do smart tools improve mobility, energy, water, waste, housing and risk management?	Integrated urban platforms, digital twins, service workflows, climate-risk analytics	Lower emissions, better service quality and stronger resilience
Inclusion and rights	Who benefits and who may be excluded or harmed?	Citizen engagement, digital inclusion, privacy safeguards, accessibility standards	Trust, fairness, legitimacy and wider adoption
Finance and procurement	How are projects funded and contracted?	Outcome-based procurement, PPP discipline, municipal finance, green bonds, lifecycle costing	Scalable investments and fiscal sustainability
Monitoring and learning	How is performance evaluated and adjusted?	KPIs, audits, public dashboards, independent evaluation, policy experimentation	Adaptive implementation and evidence-based policy correction

**Source:** Author synthesis from the literature and policy documents reviewed.

**2.3 Method**

The study adopts a qualitative comparative policy-analysis method. This method is appropriate because the research objective is not to test a causal model statistically but to identify governance mechanisms, institutional patterns and transferable lessons from international experience. The analysis draws on three types of sources: peer-reviewed academic literature on smart cities and smart governance; international standards and policy frameworks from organizations such as ISO, ITU, OECD, UN-Habitat and UN DESA; and official policy documents from Viet Nam and selected international city cases.

The case selection follows a purposive logic. Singapore is selected because it represents a national-scale smart governance model with strong state coordination and a renewed Smart Nation 2.0 vision. Seoul is selected because it combines advanced digital infrastructure with participatory and citizen-oriented governance. Amsterdam is selected because it links smart-city development to circular economy and climate-neutral missions. Barcelona is selected because of its emphasis on digital rights, platform governance and citizen participation. Copenhagen is selected because it demonstrates how smart urban tools can support low-carbon mobility and climate goals. Curitiba is included as a reminder that sustainable urban management does not depend exclusively on high-end digital technology; integrated planning, bus rapid transit and environmental governance can also produce smart sustainability outcomes.

The analysis proceeded in four steps. First, the literature was reviewed to establish a conceptual framework and identify recurring governance dimensions. Second, international cases were coded according to the six analytical dimensions shown in Table 1. Third, Viet Nam's policy landscape was assessed against the same dimensions, focusing on strategic coherence, implementation gaps and institutional readiness. Fourth, lessons were synthesized into policy implications. The method is comparative and interpretive; it is designed to generate policy learning rather than universal prescriptions.

A limitation of the method is that it relies on secondary sources and policy documents rather than primary interviews or city-level datasets. However, the use of multiple source categories reduces the risk of relying on a single narrative. The paper also avoids treating international models as directly transplantable. Instead, it identifies principles that can be adapted to Viet Nam's context: clear mandates, interoperable data, measurable sustainability

outcomes, inclusion safeguards, lifecycle financing and staged implementation.

**3. Results**

**3.1 Global pattern: From technology-led projects to mission-oriented urban governance**

The first result is that leading smart-city programmes increasingly move from technology-led projects to mission-oriented urban governance. In the technology-led model, cities often start with visible systems such as surveillance cameras, traffic control rooms, administrative portals and sensor networks. These tools may improve operational efficiency, but they do not necessarily change the trajectory of urban development. Mission-oriented governance begins with a public problem: reducing emissions, improving mobility access, adapting to floods, lowering waste, improving public health, reducing service inequality or increasing trust. Technology is then selected and governed as part of a broader policy package.

Singapore illustrates the importance of national coordination. Its Smart Nation 2.0 report frames digital transformation as a whole-of-society effort for a thriving digital future, building on earlier initiatives in health, transport, education, finance, infrastructure and environment (Smart Nation and Digital Government Group, 2024) [22]. The core lesson is not simply that Singapore has advanced technology. It is that digital identity, e-payments, data governance, cybersecurity, public-sector capability and citizen-facing services are organized as national infrastructure. This reduces duplication and allows digital systems to scale across agencies and sectors. For Viet Nam, where provinces and cities often adopt different platforms, the lesson is that national architecture and local experimentation must be connected.

Seoul represents a city-level model where digital transformation is connected to quality of life and global competitiveness. The Seoul Metropolitan Government's Smart City and Digitization Master Plan for 2021-2025 includes strategies for innovative smart-city infrastructure, inclusive smart-city leadership and public-benefit urban services. Its stated core values include sustainability, human-centricity, citizen orientation, safety and reliability (Seoul Metropolitan Government, n.d.) [21]. The lesson is that smart governance is not limited to hardware; it involves administrative innovation, open data, citizen services and participatory governance. This is especially relevant to large

Vietnamese cities such as Ha Noi, Ho Chi Minh City and Da Nang, where digital tools must support complex metropolitan governance.

Amsterdam demonstrates how smart-city initiatives can be linked to circular economy and climate neutrality. The city has been widely recognized for using collaborative platforms, living labs and circular-economy strategies to connect municipal government, businesses, knowledge institutions and citizens. Its smart-city orientation is not merely to digitize services but to support a transition toward sustainable consumption, material reuse, low-carbon neighbourhoods and climate-neutral urban systems. The lesson for Viet Nam is that smart-city programmes should be aligned with green growth, circular economy and climate adaptation policies rather than treated as separate digital investments.

Barcelona is important because it shows the democratic dimension of smart governance. The city has been associated with open data, digital commons, citizen participation and debates about technological sovereignty. Its experience indicates that smart-city strategies must

address who owns urban data, how platforms are governed, and how citizens can influence digital policies. For Viet Nam, this lesson is crucial because public trust will determine whether residents accept digital services, data sharing and algorithmic decision-making. Without clear privacy rules, accountability and communication, smart-city systems may face resistance or passive non-use.

Copenhagen and Curitiba show that sustainability outcomes matter more than technological spectacle. Copenhagen has used smart mobility, energy planning and climate strategies to support low-carbon urban development. Curitiba, despite being less technologically intensive, is internationally known for integrated transport and urban planning. Together, these cases show that sustainable urban management can be smart even when the technological layer is modest, provided that planning, service design and public behaviour are well aligned. This is an important corrective for developing countries: the goal is not to buy the most sophisticated technologies but to design the most effective governance package for local problems.

**Table 2:** International experience in smart urban governance for sustainable development

Case	Dominant governance logic	Relevant practices	Lessons for Viet Nam
Singapore	National platform and whole-of-government coordination	Digital identity, e-payments, cross-sector digital public infrastructure, cybersecurity, Smart Nation 2.0	Build common national architecture while allowing local innovation; avoid isolated provincial platforms
Seoul	Citizen-oriented metropolitan digital governance	Smart City & Digitization Master Plan, open data, public-benefit services, participatory governance	Connect command centres with service workflows, citizen feedback and public-value indicators
Amsterdam	Smart-city ecosystem linked to circular economy and climate neutrality	Living labs, circular-economy projects, innovation platforms, climate-neutral mission	Integrate smart-city plans with green growth, circular economy and climate adaptation
Barcelona	Digital rights and democratic platform governance	Open data, participatory platforms, technological sovereignty, civic innovation	Adopt privacy, transparency and citizen-participation safeguards before scaling urban data systems
Copenhagen	Low-carbon urban systems and smart mobility	Bicycle infrastructure, energy planning, climate solutions, mobility data	Use technology to support modal shift, energy efficiency and emissions reduction
Curitiba	Integrated planning and sustainable public service design	Bus rapid transit, land-use coordination, environmental management	Do not equate smartness with expensive technology; prioritize integrated planning and service outcomes

**Source:** Author synthesis from the literature and policy documents reviewed.

### 3.2 Strategic governance and institutional coordination

The second result is that effective smart-city management requires a clear institutional architecture. Fragmented administrative structures are among the most common causes of weak implementation. Urban systems are inherently cross-sectoral: transport affects land use, energy affects air quality, drainage affects housing safety, data affects administrative reform, and climate risk affects infrastructure finance. If each department develops its own platform, the city may accumulate applications without achieving system-level intelligence. The international cases suggest that smart-city governance needs an authorized steering mechanism that can coordinate across departments, resolve data-sharing barriers and link digital projects to urban planning.

National governments have a crucial role in setting standards, legal frameworks and digital public infrastructure. Singapore's experience shows the value of national platforms and common digital services. South Korea's smart-city policy also demonstrates how national ministries can support local innovation while maintaining a policy portal, pilot programmes and knowledge sharing.

However, excessive centralization can suppress local adaptation. The best model is not a single uniform solution but a layered architecture: national standards and platforms for interoperability, provincial and city-level strategies for local priorities, and neighbourhood-scale pilots for user-centred experimentation.

For Viet Nam, this means that the existing policy framework should be converted into a clearer governance chain. Decision No. 950/QD-TTg provides the foundation for sustainable smart-city development, while Resolution No. 148/NQ-CP and Resolution No. 06-NQ/TW emphasize sustainable urban planning and the formation of smart urban centres connected with the region and the world. The National Digital Transformation Programme provides digital government, digital economy and digital society objectives, and the Green Growth Strategy provides environmental direction. The challenge is not the absence of policy but the integration of these policies into city-level implementation plans with budgets, indicators and accountability.

A practical implication is that each city should develop a Smart Sustainable Urban Governance Plan as part of its urban master plan and medium-term public investment plan.

This plan should identify priority missions, such as flood-resilient drainage, low-emission mobility, efficient public lighting, waste reduction, transparent land-use information, or integrated administrative services. It should then specify which data systems, digital tools, agencies, funding sources and legal instruments are needed. This approach reverses the common sequence: instead of purchasing technologies and searching for use cases later, cities define public missions first and select technologies afterward.

Institutional coordination also requires human capacity. Smart-city implementation demands urban planners who understand data, ICT specialists who understand urban policy, financial officers who understand lifecycle costing, and local leaders who can manage public-private partnerships. International experience shows that cities with strong technical units or digital transformation offices are better able to negotiate with vendors, protect public interests and maintain continuity across political or administrative cycles. Viet Nam should therefore invest in urban digital governance capacity at both national and local levels, including training, professional standards and peer-learning networks among cities.

### 3.3 Data governance, interoperability and standards

The third result is that data governance is the backbone of smart urban management. Smart-city systems depend on data about population, land, buildings, transport, energy, water, waste, climate risk, administrative procedures and citizen feedback. Yet data only create value when they are accurate, shareable, secure, legally governed and connected to decision-making. Many cities collect large volumes of data without a coherent data architecture. The result is duplication, inconsistent definitions, limited interoperability and high dependence on vendors. ISO and U4SSC frameworks are important because they encourage cities to adopt common definitions and measurable indicators rather than invent disconnected metrics.

ISO 37120 establishes methodologies for measuring city services and quality of life, while ISO 37122 provides indicators for smart cities. ISO 37124 clarifies how ISO 37120, ISO 37122 and ISO 37123 can be used together to measure city service performance, smart-city development and resilience planning. These standards are not merely technical documents; they are governance tools. They allow cities to compare performance, set targets, conduct audits and communicate progress to citizens and investors. For Viet Nam, adopting a national version of a smart sustainable city indicator system aligned with ISO and U4SSC would help reduce fragmentation across provinces.

Interoperability is particularly important. A city may have separate platforms for traffic, public security, administrative procedures, land management, construction permits, flood monitoring and environmental quality. If these systems cannot exchange data, the city remains digitally fragmented. Interoperability requires technical standards, but it also requires legal authority and institutional agreements. Agencies must know what data they are required to share, under what conditions, with what safeguards, and for what purposes. Without such rules, data sharing depends on informal relationships and is vulnerable to administrative turnover.

Data governance must also include privacy, cybersecurity and ethical safeguards. The more a city becomes data-driven, the greater the risk of surveillance, discriminatory

profiling, data breaches and misuse of personal information. Kitchin (2016) <sup>[17]</sup> emphasizes that smart cities raise ethical questions about dataveillance and algorithmic governance. This does not mean that cities should avoid data systems; it means that they need privacy-by-design, cybersecurity-by-design, data minimization, independent audits and clear accountability. For Viet Nam, the development of urban data platforms should proceed together with legal compliance, public communication and institutional safeguards.

Open data is another key lesson. International cases show that public data can stimulate innovation by enabling researchers, start-ups, civil society and citizens to create new services, monitor public performance and contribute ideas. However, open data should not be interpreted as unrestricted disclosure of sensitive information. Cities need data classification systems distinguishing open data, shared government data, restricted operational data and personal data. A mature smart-city data strategy should specify the owner, steward, quality standard, update frequency, access rules and security level for each major dataset.

### 3.4 Sectoral integration for sustainability and resilience

The fourth result is that smart-city technologies generate the greatest value when applied to integrated urban systems. Mobility is a clear example. Intelligent transport systems can improve traffic flow, but sustainability requires more than smoother car movement. A smart mobility strategy should support public transport reliability, walking, cycling, transit-oriented development, traffic safety, parking management and emissions reduction. If smart mobility is measured only by vehicle speed, it may reinforce car dependence. If it is measured by accessibility, affordability, modal shift and emissions, it can support sustainable development.

Energy and buildings are another priority. Cities consume large amounts of energy through lighting, buildings, transport, water pumping and industrial activity. Smart meters, building-management systems, public-lighting control, district energy systems and renewable integration can reduce energy use and emissions. However, these tools require regulatory incentives, building codes, financing mechanisms and technical standards. Viet Nam's fast-growing urban housing and commercial building stock creates an opportunity to embed smart energy management early, but this requires coordination among construction authorities, electricity providers, developers and residents.

Water, drainage and climate resilience are especially relevant to Viet Nam. Many Vietnamese cities face flooding, sea-level rise, heat stress and drainage pressure. Smart sensors can monitor rainfall, water levels, pumping stations, drainage capacity and flood hotspots. Geographic information systems and digital twins can support scenario planning and emergency response. However, flood resilience cannot be achieved by sensors alone. It requires land-use control, protection of natural drainage, investment in green and blue infrastructure, maintenance of canals and sewers, and coordination between urban planning and climate adaptation. Digital tools should therefore be integrated into climate-resilient urban planning rather than used as stand-alone monitoring devices.

Waste management and circular economy provide another area for smart sustainable governance. Digital tracking of waste flows, route optimization for collection, smart bins,

recycling platforms and material-flow analysis can improve efficiency. Yet the larger goal is to reduce waste generation, increase reuse and recycling, and create circular business models. Amsterdam's experience is relevant because it connects digital innovation to circular economy rather than treating waste technology as an isolated service. Viet Nam can apply this lesson by linking urban waste data with circular economy policies, extended producer responsibility, industrial symbiosis and community-level sorting.

Public health and safety also benefit from smart urban systems when properly governed. Air-quality sensors, heat-risk maps, emergency response platforms, telehealth integration and public-space analytics can help cities protect vulnerable groups. The COVID-19 pandemic demonstrated the importance of digital government continuity and urban resilience. However, emergency technologies must be balanced with privacy and proportionality. The governance question is not only whether data can help manage risks, but how long data are retained, who can access them, and how exceptional emergency measures are scaled back after a crisis.

### 3.5 Citizen participation, inclusion and digital rights

The fifth result is that citizen participation and digital inclusion are not secondary issues; they are conditions for smart-city legitimacy. A smart city that improves services only for digitally connected middle-income residents can deepen inequality. Low-income households, elderly people, migrants, informal workers and people with disabilities may be excluded if services become digital-only or if platforms are designed without accessibility considerations. International experience suggests that smart-city governance should combine digital service channels with assisted access, community engagement and feedback mechanisms.

Citizen participation has several forms. At the simplest level, residents can report problems such as broken streetlights, flooding, waste accumulation or traffic hazards through mobile applications. At a deeper level, citizens can participate in planning decisions, budget priorities, data-governance debates and evaluation of public services. Barcelona's experience with participatory platforms demonstrates that digital tools can widen participation when they are designed as civic infrastructure rather than as one-way communication channels. Seoul's participatory governance also shows how citizen orientation can be embedded into smart-city master planning.

Digital rights are increasingly central to people-centred smart-city governance. Citizens are not only users of services; they are also data subjects. Their movements, transactions, complaints, utility consumption and service interactions may generate data. This creates responsibilities for government: transparency about data collection, informed consent where appropriate, proportionality, security, correction rights and grievance mechanisms. Trust is therefore an asset. If citizens believe that smart-city systems are opaque or intrusive, adoption may be weak even when the technology is functional.

For Viet Nam, digital inclusion should be treated as a core component of smart sustainable urban development. This includes affordable broadband, public Wi-Fi in selected spaces, digital skills training, accessible e-government services, multilingual or simple-language communication where needed, and offline support for vulnerable groups.

Smart-city performance indicators should include inclusion metrics, such as the share of residents able to access digital public services, satisfaction among vulnerable groups, complaint resolution time, and the availability of non-digital alternatives for essential services.

A participatory approach also improves technical quality. Residents often know micro-level urban problems that are invisible in official datasets: informal flooding points, unsafe intersections, unreliable bus stops, waste hotspots, sidewalk barriers or local pollution sources. Combining sensor data with citizen-generated data can improve planning accuracy. However, citizen data must be verified and protected. Cities should develop protocols for crowdsourced data, public feedback and participatory monitoring so that citizen input becomes part of service workflows rather than an unprocessed complaint archive.

### 3.6 Financing, procurement and public-private partnership design

The sixth result concerns finance. Smart-city systems require not only initial investment but also lifecycle funding for operation, maintenance, data storage, software updates, cybersecurity, staff training and system renewal. Many cities underestimate these recurrent costs. A command centre may be inaugurated as a capital project, but its value declines quickly if data feeds are not maintained, software is not updated, or agencies do not use the outputs. Sustainable smart-city finance must therefore consider total cost of ownership, not only procurement price.

Procurement is equally important. Vendor-driven smart-city projects can lead to proprietary systems, data lock-in and limited competition. International best practice increasingly favours open standards, modular architecture, outcome-based procurement and clear public ownership or stewardship of critical data. Contracts should define interoperability obligations, cybersecurity requirements, data portability, maintenance responsibilities and performance indicators. They should also avoid technology specifications that lock cities into a single supplier when equivalent open or modular solutions are available.

Public-private partnerships can be useful but require strong public capacity. Private firms often bring technology, finance and innovation, while government provides legitimacy, regulatory authority and public-service mandates. However, PPPs can fail if risks are poorly allocated or if public agencies cannot evaluate technology proposals. For Viet Nam, smart-city PPPs should be linked to urban service outcomes and environmental targets, not only infrastructure delivery. For example, a smart lighting PPP should measure energy savings, service reliability and maintenance quality; a smart parking project should measure congestion reduction, public-space management and revenue transparency.

Green finance and climate finance are increasingly relevant. Smart urban projects that reduce emissions, improve energy efficiency, manage floods or support public transport can potentially access green bonds, climate funds or concessional finance. However, investors require credible project pipelines, measurable outcomes and transparent reporting. ISO and U4SSC indicators can help cities demonstrate performance. Viet Nam's cities should develop bankable project portfolios combining digital and green infrastructure, such as smart public lighting, flood

monitoring integrated with drainage upgrades, bus priority systems, building energy management and waste-to-resource platforms.

Finally, financing should be equitable. Some smart-city models rely on user fees, advertising, data monetization or private service subscriptions. These models may be financially attractive but can undermine inclusion if poor households are priced out or if public data are commercialized without safeguards. A public-value approach requires cities to distinguish between revenue-generating services and essential public services. Core urban data infrastructure, emergency systems, public health information and essential administrative services should remain under strong public governance even when private actors participate in implementation.

### 3.7 Risks and failure modes

International experience also reveals common failure modes. The first is pilot fragmentation. Cities launch many small digital projects without a shared architecture, resulting in duplication and limited scalability. The second is technology determinism, where decision-makers assume that purchasing advanced systems will automatically solve urban problems. The third is vendor lock-in, where proprietary platforms limit future flexibility. The fourth is weak data governance, including unclear ownership, poor quality, privacy risks and cybersecurity vulnerabilities. The fifth is exclusion, where digital services benefit already connected groups while leaving vulnerable residents behind.

Another failure mode is the command-centre illusion. Integrated operations centres can be useful, especially for emergency management, traffic coordination and cross-agency monitoring. Yet they can also create the impression of control without addressing root causes. A city may visualize flooding in real time but still fail to prevent flooding if drainage investment, land-use enforcement and maintenance are weak. A dashboard may show traffic congestion but not shift people to public transport if bus services, sidewalks and land-use patterns are inadequate. Smart governance must therefore connect information to policy instruments.

Algorithmic opacity is a growing concern. As cities adopt AI for traffic prediction, permit processing, inspection prioritization, public safety or resource allocation, decisions may become less transparent. Even when algorithms are technically accurate, they can reproduce biased data or create unfair outcomes. This risk is particularly serious in contexts where legal safeguards, audit capacity and public understanding are still developing. Cities should require explainability, audit trails, human oversight and appeal mechanisms for algorithmic systems that affect rights, access or enforcement.

A final risk is sustainability washing. Some projects are labelled smart and green but do not provide measurable environmental benefits. For example, digital signage, mobile applications or control rooms may be presented as sustainability initiatives even when they do not reduce emissions, resource use or vulnerability. To avoid this, smart-city projects should include baseline data, target indicators and post-implementation evaluation. If a project cannot demonstrate service improvement, emissions reduction, resilience gain or inclusion benefits, it should not be considered a priority in a sustainable smart-city strategy.

### 3.8 Viet Nam: Policy foundation and implementation gaps

Viet Nam has a relatively strong policy foundation for smart sustainable urban development. Decision No. 950/QD-TTg approved the scheme for development of smart sustainable cities in the 2018-2025 period with orientations to 2030. The scheme includes priority task groups such as revising policies, developing standards, building urban databases, piloting smart-city models, promoting research and training, and strengthening cooperation. Decision No. 749/QD-TTg approved the National Digital Transformation Programme to 2025 with orientations to 2030, emphasizing digital government, digital economy and digital society. Decision No. 1658/QD-TTg approved the National Green Growth Strategy for 2021-2030 with a vision to 2050. Resolution No. 148/NQ-CP operationalizes Resolution No. 06-NQ/TW on sustainable urban development to 2030 and vision to 2045, including the formation of smart urban centres and urban chains connected regionally and globally.

This policy foundation creates an opportunity for integrated implementation. Smart-city development can support digital government, green growth, urban resilience and administrative modernization at the same time. However, integration is not automatic. Different policy streams are often managed by different ministries, departments and local agencies. The Ministry of Construction is central to urban development, the Ministry of Information and Communications is central to digital transformation, the Ministry of Natural Resources and Environment is central to climate and environmental data, the Ministry of Planning and Investment influences investment and green growth, and local governments control many implementation decisions. Without strong coordination, cities may receive multiple policy signals but lack a unified operational roadmap.

The first implementation gap is indicator fragmentation. Some localities report digital transformation indicators, others report urban development or environmental indicators, and many smart-city pilots use project-specific metrics. Viet Nam would benefit from a national smart sustainable city indicator framework aligned with ISO 37120, ISO 37122, ISO 37123 and U4SSC. Such a framework should not be used mechanically to rank cities; rather, it should support self-assessment, benchmarking, planning and public reporting. Indicators should be adjusted to city size and capacity so that smaller cities are not forced to imitate megacity models.

The second gap is data interoperability. Many local platforms are developed independently, often by different vendors. This creates risks of duplicated databases, inconsistent data formats and limited integration across sectors. A national urban data architecture should define core datasets for land, buildings, population, infrastructure, transport, environment, public services and climate risk. It should also define metadata standards, APIs, data-sharing protocols and privacy requirements. Without these foundations, smart-city systems may remain impressive at the interface level but weak at the governance level.

The third gap is linkage with spatial planning. Smart-city projects are sometimes added after urban plans have already been prepared. This creates a separation between digital applications and the physical city. In a sustainable smart-city model, digital systems should support planning decisions from the beginning: land-use scenarios, infrastructure

capacity, climate risk, transit-oriented development, social infrastructure needs, green-space planning and construction management. Digital twins and GIS platforms can be useful, but only if they are connected to statutory planning, investment appraisal and regulatory enforcement.

The fourth gap is financing and procurement capacity. Many cities want smart-city systems but face budget constraints and limited expertise in technology procurement. This can make them dependent on vendor proposals. To protect public interests, Viet Nam should develop model procurement guidelines for smart-city projects, including open standards, data portability, cybersecurity, lifecycle costing, public ownership of critical data, and outcome-based performance clauses. Central support could help smaller cities avoid costly mistakes.

The fifth gap is citizen trust and inclusion. Viet Nam has high rates of mobile connectivity in many urban areas, but digital skills, access and trust remain uneven. Smart urban services must be designed for residents, not only for

administrators. Public communication should explain what data are collected, how services improve, and how citizens can provide feedback. Essential services should not become inaccessible to residents who lack smartphones, bank accounts or digital skills. Inclusion should be measured and reported as part of smart-city performance.

The sixth gap is environmental integration. Viet Nam's cities face heat, flooding, air pollution, waste pressure and carbon-intensive mobility. Yet some smart-city initiatives remain focused on administrative convenience or surveillance infrastructure. A sustainable orientation requires prioritizing digital tools that directly support green growth and resilience: public transport management, building energy efficiency, drainage and flood monitoring, air-quality management, waste tracking, tree and green-space management, and emergency response. This would align smart-city investments with the Green Growth Strategy and climate commitments.

**Table 3:** Diagnostic comparison between international lessons and Viet Nam policy needs

Governance issue	International lesson	Current risk in Viet Nam	Recommended direction
Strategy and coordination	Smart-city programmes require mission-oriented governance and cross-sector steering.	Multiple policy streams may remain parallel rather than integrated.	Create city-level smart sustainable governance plans linked to master plans and public investment plans.
Indicators	ISO and U4SSC frameworks support measurable, comparable and verifiable progress.	Localities may use inconsistent indicators or project-specific metrics.	Adopt a national indicator framework aligned with ISO 37120/37122/37123 and U4SSC.
Data architecture	Interoperability reduces duplication and vendor dependence.	Platforms developed by different vendors may not exchange data.	Define core urban datasets, metadata standards, APIs and data-sharing protocols.
Citizen trust	People-centred models require participation, inclusion and digital rights.	Smart services may be seen as administrative tools rather than citizen value.	Build privacy safeguards, public communication and assisted digital access.
Finance	Lifecycle costing and outcome-based procurement are essential.	Cities may underestimate operating costs and become locked into proprietary systems.	Use modular procurement, open standards, total-cost assessment and performance contracts.
Sustainability	Smartness must be measured by emissions, resilience, resource efficiency and service quality.	Some projects may focus on control rooms or applications with weak environmental impact.	Prioritize smart mobility, energy, flood, waste, air-quality and green-space systems.

**Source:** Author synthesis from the literature and policy documents reviewed.

### 3.9 Lessons for Viet Nam

The first lesson is to adopt a mission-first approach. Viet Nam should define smart-city priorities around urgent public missions rather than around available technologies. For coastal cities, flood resilience and drainage may be priorities. For large metropolitan areas, public transport, congestion, air quality and land-use transparency may be central. For industrial cities, energy efficiency, worker housing, logistics and environmental monitoring may matter most. A mission-first approach allows each city to adapt smart governance to its development stage while remaining aligned with national standards.

The second lesson is to build a national urban data infrastructure. This does not mean centralizing all data in one database. It means defining common standards, core datasets, data-sharing rules and interoperability requirements so that local systems can connect. Viet Nam should consider a federated data model in which cities retain operational control over local data but comply with national standards for metadata, APIs, cybersecurity and reporting. This approach balances local autonomy with national coherence.

The third lesson is to treat smart-city standards as governance instruments. ISO and U4SSC indicators can be adapted into a Vietnamese smart sustainable city assessment framework. The framework should include indicators for digital infrastructure, public-service quality, mobility, environment, energy, water, waste, safety, inclusion, data governance and resilience. It should be phased: basic indicators for smaller cities, advanced indicators for major cities, and specialized indicators for climate-sensitive or industrial urban areas. Public reporting should focus on improvement over time rather than simple rankings.

The fourth lesson is to strengthen public-sector capability in technology procurement and data governance. Cities should not rely solely on vendor expertise to define smart-city architecture. Viet Nam can establish a national technical assistance unit or knowledge centre to support local governments in preparing terms of reference, evaluating proposals, designing data governance rules and reviewing cybersecurity requirements. This unit could also collect lessons from pilots and maintain model contracts, technical standards and implementation guidelines.

The fifth lesson is to integrate smart-city development with

green growth and climate resilience. Digital tools should be prioritized where they contribute to emissions reduction, resource efficiency, resilience and quality of life. Examples include public transport priority systems, smart energy management in public buildings, flood early-warning systems, integrated drainage monitoring, waste-flow tracking, air-quality dashboards linked to enforcement, and urban tree-management systems. These projects should include measurable environmental indicators from the beginning.

The sixth lesson is to make citizen trust a central performance objective. Viet Nam's smart-city programmes should provide transparent information about data collection, privacy, service benefits and complaint channels. Citizen-facing applications should be designed through user research and tested with different social groups. Digital inclusion programmes should accompany digital service expansion. Public dashboards should not only display administrative achievements but also show service performance, environmental conditions and response times in ways that residents can understand.

The seventh lesson is to scale through learning networks. Not every city should build every system from scratch. Viet Nam can identify leading pilot cities for specific missions and then transfer tested models to other localities. Da Nang may contribute lessons on digital government and urban platforms; Ho Chi Minh City may contribute lessons on metropolitan transport and flood-risk management; Ha Noi may contribute lessons on heritage, mobility and administrative integration; smaller cities may test low-cost models for waste, lighting or citizen feedback. A national learning network would reduce duplication and accelerate diffusion.

## 4. Discussion and Conclusion

### 4.1 Discussion

The analysis confirms that smart urban governance is best understood as an institutional transformation agenda rather than a technology procurement agenda. International cases show that successful smart-city programmes combine strategic direction, digital public infrastructure, data governance, public participation, sustainability missions and financing discipline. The cases also show that there is no single model. Singapore's national-platform approach, Seoul's citizen-oriented metropolitan model, Amsterdam's circular-economy ecosystem, Barcelona's digital-rights orientation, Copenhagen's low-carbon urban systems and Curitiba's integrated planning all provide different lessons. The common principle is that technology is governed in relation to public outcomes.

For Viet Nam, the most important implication is coherence. The country already has strategic documents covering smart sustainable cities, national digital transformation, green growth and sustainable urban development. The next stage should focus on operational integration. Smart-city initiatives should be embedded in urban master plans, climate strategies, local digital transformation plans, public investment plans and administrative reform programmes. A command centre or mobile application should not be considered a strategy. It is only a component within a larger governance architecture.

A second discussion point is the relationship between centralization and local innovation. Viet Nam's administrative system gives the central government an

important role in standards, regulations and strategic direction. This can help avoid fragmentation. However, cities differ significantly in size, geography, fiscal capacity and development challenges. A rigid national template would be counterproductive. The appropriate model is coordinated decentralization: national government defines architecture, standards and safeguards; cities define missions and implementation pathways; neighbourhoods and communities contribute local knowledge and feedback.

A third point is the need to connect smartness with sustainability metrics. Without measurable outcomes, the smart-city agenda can become symbolic. Viet Nam should require major smart-city projects to report baseline conditions, target indicators, expected public value and post-implementation results. For example, a smart traffic system should report not only the number of cameras installed but also travel-time reliability, bus speed, safety outcomes, emissions implications and user satisfaction. A flood-monitoring system should report not only sensor coverage but also warning accuracy, response time, reduced damage and integration with drainage investment.

A fourth point concerns governance safeguards. As urban data systems expand, public agencies must protect privacy, cybersecurity and digital rights. This is not a barrier to innovation; it is a condition for sustainable innovation. Trust reduces adoption costs and increases the willingness of citizens to use digital services. It also protects government from reputational and legal risks. Viet Nam should therefore incorporate privacy impact assessment, cybersecurity review and data-governance requirements into smart-city project approval processes.

A fifth point is fiscal realism. Smart-city systems have recurrent costs. Software licenses, cloud services, maintenance, cybersecurity, staff, updates and evaluation all require funding. Cities should avoid overbuilding platforms that they cannot maintain. Lifecycle costing should be mandatory for major projects. Where possible, cities should use modular systems and open standards to reduce long-term dependence. Financing should prioritize projects with clear public value and measurable sustainability benefits.

### 4.2 Policy implications for Viet Nam

Policy implication 1: Establish a national framework for smart sustainable urban governance. The framework should clarify principles, institutional responsibilities, data standards, minimum safeguards, indicator systems and implementation stages. It should integrate Decision No. 950/QD-TTg, the National Digital Transformation Programme, the Green Growth Strategy and the sustainable urban development agenda under Resolution No. 06-NQ/TW and Resolution No. 148/NQ-CP. The framework should not replace local plans but provide a common architecture for them.

Policy implication 2: Develop a Vietnamese smart sustainable city indicator system. This system should be aligned with ISO 37120, ISO 37122, ISO 37123 and U4SSC but adapted to domestic conditions. It should include core indicators for all cities and optional advanced indicators for large or high-capacity cities. Indicators should cover digital infrastructure, service quality, environmental sustainability, resilience, inclusion, data governance and citizen satisfaction. The system should support planning and learning rather than superficial ranking.

Policy implication 3: Build interoperable urban data

infrastructure. Viet Nam should define core urban datasets, metadata standards, APIs, geospatial data rules, data classification and cybersecurity requirements. Cities should be encouraged to develop urban data platforms based on open standards and modular architecture. Public ownership or stewardship of critical datasets should be protected in procurement contracts. Data-sharing rules among departments should be formalized so that interoperability does not depend on informal cooperation.

Policy implication 4: Prioritize high-impact smart sustainability missions. Rather than spreading resources thinly across many applications, each city should identify a small number of priority missions. Candidate missions include low-emission mobility, flood resilience, air quality, building energy efficiency, waste circularity, public-space safety, transparent land-use information and integrated administrative services. Each mission should have a responsible agency, budget, data requirements, technology package, public engagement plan and measurable indicators. Policy implication 5: Reform procurement and financing. Smart-city procurement should require lifecycle costing, interoperability, data portability, cybersecurity, service-level agreements and outcome-based indicators. Model contracts and technical guidelines should be provided to local governments. Cities should develop bankable pipelines for

smart green infrastructure and explore green bonds, climate finance, concessional loans and PPPs where appropriate. However, essential data infrastructure and public-interest systems should remain under strong public governance.

Policy implication 6: Institutionalize citizen participation and digital inclusion. Cities should create channels for residents to report problems, evaluate services, participate in planning and understand how their data are used. Digital services should be accessible to elderly people, low-income groups and people with disabilities. Privacy notices, grievance mechanisms and feedback loops should be standard features of smart-city systems. Public dashboards should communicate service performance and environmental conditions in citizen-friendly language.

Policy implication 7: Create a national smart-city learning network. Viet Nam should document local pilots, evaluate results and disseminate lessons through a national knowledge platform. The network should include local governments, universities, research institutes, enterprises and community organizations. It should support peer learning, training, benchmarking and replication of successful models. This would help avoid repeated mistakes and accelerate the transition from pilots to scalable governance reforms.

**Table 4:** Proposed policy roadmap for Viet Nam

Phase	Time horizon	Main actions	Expected outputs
Phase 1: Foundation	2026-2027	Adopt national framework; define indicators; issue procurement and data-governance guidelines; select priority pilot missions.	Common architecture, baseline indicators, model contracts and pilot pipeline.
Phase 2: Integration	2028-2030	Integrate smart-city plans with master plans and public investment plans; build interoperable urban data platforms; scale successful pilots.	Connected data systems, mission-based investments and measurable sustainability outcomes.
Phase 3: Scaling	2031-2035	Expand learning network; mobilize green finance; apply advanced analytics and digital twins under governance safeguards.	Replicable smart sustainable city models across regions.
Phase 4: Maturity	After 2035	Institutionalize adaptive governance, independent evaluation, citizen data rights and continuous innovation.	People-centred, resilient and low-carbon urban governance system.

**Source:** Author synthesis from the literature and policy documents reviewed.

### 4.3 Conclusion

Smart urban governance is becoming a central component of sustainable development. The international experience reviewed in this paper shows that the most successful smart-city approaches are not those that deploy the most visible technologies, but those that connect technology with public missions, institutional coordination, data standards, citizen trust, financing discipline and measurable sustainability outcomes. Smartness is therefore a quality of governance before it is a quality of devices.

For Viet Nam, the strategic opportunity is substantial. The country has already adopted policies on sustainable smart cities, digital transformation, green growth and sustainable urban development. The central task now is to translate this policy foundation into coherent local implementation. This requires a shift from fragmented pilots to mission-oriented urban governance; from proprietary systems to interoperable data infrastructure; from administrative convenience to citizen-centred service design; and from symbolic smart-city branding to measurable improvements in sustainability, resilience and quality of life.

The lessons from Singapore, Seoul, Amsterdam, Barcelona, Copenhagen and Curitiba suggest that Viet Nam should avoid copying any single model. Instead, it should adapt international principles to domestic realities: strong national

standards combined with local innovation; technology procurement combined with institutional reform; data collection combined with privacy safeguards; and digital transformation combined with green, inclusive and resilient urban development. If implemented in this way, smart urban governance can become an important instrument for Viet Nam to build competitive, liveable, climate-resilient and people-centred cities in the coming decades.

Future research should move from comparative policy synthesis to empirical assessment of Vietnamese cities. Case studies of Ha Noi, Ho Chi Minh City, Da Nang, Can Tho, Hai Phong and emerging provincial cities could examine how local institutional capacity, fiscal resources, citizen participation and data infrastructure shape smart-city outcomes. Quantitative studies could also develop city-level indicators to measure whether smart-city investments actually improve service quality, reduce emissions, enhance resilience and increase citizen satisfaction. Such evidence would strengthen the policy learning process and support more accountable urban transformation.

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