Routes to prosperity

How smart transport infrastructure can help cities to thrive

Government & Public Sector Insights
The concept of a smart city is well-entrenched in everyday vocabulary, with enthusiasm for smart projects at the center of any discussion on the future of cities or urban development. At a high level, a smart city means using digital technology for smarter urban transport networks, upgraded utilities and more efficient use of resources. It also refers to more interactive and responsive city administration, in which a city meets the needs of its people better and offers greater public safety.1

This is a broad-ranging concept with ambitious policy goals. And while there are a multitude of technologies being developed and implemented to address these challenges, they are not always integrated. As a result, at this stage of the digital agenda for cities, policymakers should ask more fundamental questions on how smart policy can change a city, particularly to clarify how technology-enabled transport infrastructure ultimately affects the livelihoods of residents, the operations of businesses and efforts to attract investment. How can an information platform be a competitive differentiator for a given city?

Answers to these fundamental questions should drive smart strategy on transport infrastructure. Cities need to deploy such strategies in a structured way to drive real change and generate cost savings, with the very foundations for urban design and development at the center. In other words, governments should focus on the fundamentals of urban design, and use smart transport infrastructure much like the initial advancements in information and communications technology (ICT) that preceded it, as a means to fulfill their livability goals and be competitive.

Transport infrastructure: the route to smarter cities

Transport infrastructure is a major driver of economic growth and competitiveness. Therefore, it is the backbone to any effective smart city strategy. In fact, IMF estimates suggest that for every dollar of investment in infrastructure, output increases by nearly three.2 This is no more apparent than at the city level, where growth and development challenges mean urban transport infrastructure will need to support increasing demand for mobility and drive competitiveness. Half the world’s population now lives in cities, and forecasts from the United Nations suggest that by 2050, this proportion will rise to three-quarters.3

This suggests substantial growth in infrastructure demands. According to the World Bank, 75% of cities’ infrastructure that will be in place by 2050 does not exist today.4 And for transport infrastructure, the needs look particularly high. For example, the number of vehicles in the world’s transport networks exceeded 1.1 billion in 2011, and is expected to reach 2.5 billion by 2050, with freight volumes forecast to grow fourfold over the period. This vehicle growth has been particularly explosive in cities; for example, Beijing adds close to 1,500 vehicles to its roads each day.5

Smart transport infrastructure and enablement of smart mobility are top of the growth and competitiveness agenda. Technology-enabled assets and systems offer governments significant economic leverage through outsized gains in productivity and economic activity, reflecting network effects and other boosts to competitiveness.6

Smart transport infrastructure can also help address the need for sustainability and inclusiveness in urban design and development as populations increase, inequality persists and environmental pressures build. The economic cost of business-as-usual policies is substantial: by 2050, transport-related fuel use and CO2 emissions are expected to more than double globally, delay hours due to congestion are estimated to almost double and urban traffic fatalities are expected to increase to around 650,000 per annum.7 Smart infrastructure considers environmental impacts, economic efficiency and quality of life. It can make a positive contribution to mobility, accessibility and equality in an urban area.8

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Smart transport infrastructure is technology-enabled and demonstrates interconnectivity, with assets in a network that can communicate as well as respond to and shape demand and economic behavior. For example, smart utilities and intelligent transport systems that use real-time traffic information to adjust traffic signal timings demonstrate these capabilities. Transport infrastructure that leverages big data analytics and data mining of user patterns is also smart. In fact, smart is not necessarily entirely about using cutting-edge technologies; it can be an innovative, networked way of bringing together existing technology and resources to optimize their use.

In the context of smart transport infrastructure and smart cities, smart mobility leverages interconnected transport systems to transform urban mobility for more competitive, sustainable and inclusive municipalities. The core objective is to connect and integrate transport and other infrastructure into an interactive Internet of Things (IoT) and services, ultimately aiming to use these digital technologies to solve the demographic, social, economic or environmental challenges of a city.

Mobility: a smart investment

The economic benefits of smart transport infrastructure investment are long-term competitiveness, productivity, innovation, lower prices and higher incomes. Smart investment also has significant job creation potential in the near term. More specifically, the key payoffs for smart mobility investment include reduced congestion; more streamlined logistics, trade and production; higher land values and local economic development; job creation in direct industries; and employment and activity multipliers in the broader economy. Lower household and business costs and improved quality of life through reduced pollution and greater efficiencies are also important.

11. Ibid.
Advanced and emerging economies both stand to benefit from smart transport infrastructure. For advanced economies, the need to physically expand the infrastructure stock is relatively small, given the base level already in place, while the demand to physically expand infrastructure systems is typically higher. Smart investments enable such transformation, including additions to capacity through new technology, without adding to the capital stock itself. The advantages include lower costs for the life cycle of a transport infrastructure system, an extended system service life, and increased effective capacity of the system. In emerging economies, the infrastructure capital stock is typically less developed, and smart transport infrastructure enables productive capacity to be rapidly scaled up. It also offers a means to address challenges of rapid urbanization, including quick gains in population density, traffic congestion, environmental pollution and public safety concerns. At the same time, the need to support innovation and economic development suggests that governments in emerging economies will need to leverage smart technologies through their transport infrastructure investment plans to support longer-term economic objectives.

Reflecting these prospective boosts to growth, the economic multipliers on smart transport infrastructure investment are expected to be significant. For investment in traditional infrastructure assets, the payoff is already large: the IMF estimates a 3-to-1 return for public capital invested. The effect on short-run GDP is expected to be the highest of any fiscal interventions. For smart infrastructure investment, even larger payoffs are expected. For example, recent estimates for a proposed toll road project in Australia suggested that every dollar of the initiative’s smart technology investment would return AUS$5.20 to the economy, a considerably higher return than the 3-to-1 for standard infrastructure investment.

Outsized expected returns are due to a network multiplier effect for smart transport infrastructure. This refers to the network effect generated from connected and ICT-enabled infrastructure assets, which enable new consumer and business behaviors, functionalities, and downstream industries. This then leads to an additional employment growth multiplier. As a result, investment in intelligent transport systems and other smart mobility drivers can be expected to generate significant growth in productivity, employment and economic output. This is through reduced congestion, improved mobility and other efficiencies. Greater integration across smart transport infrastructure systems accordingly offers a substantially higher reward for the assumption of higher risk.

Figure 1: EY Urban Mobility Blueprint – smart, integrated mobility strategies offer substantial economic reward

The five mobility business strategy variants identified are based on the level of integration of mobility end-services elements, including real-time information, one-stop payment system and connected transport modes. These strategies are at varied levels of complexity within the value chain and consequently, bring different risks and rewards to the participants.

<table>
<thead>
<tr>
<th>Business strategy variants</th>
<th>Real-time information</th>
<th>One-stop payment system</th>
<th>Private transport modes</th>
<th>Public transport modes</th>
<th>Risk</th>
<th>Reward</th>
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<tbody>
<tr>
<td>Transport navigator</td>
<td>A provider of real-time transport information on mobile and other devices</td>
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<tr>
<td>Mobility platform manager</td>
<td>A developer of mobility management interface and applications</td>
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<tr>
<td>On-demand personal mobility provider</td>
<td>A provider of personalized, shared transport solutions</td>
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<tr>
<td>Multi-modal public transporter</td>
<td>A facilitator for integration of the multi-modal passenger transport network</td>
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<tr>
<td>Mobility integrator</td>
<td>A catalyst for end-to-end journey solutions combining public and private transport modes</td>
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Transport infrastructure must be aligned to the city’s purpose and structure

The promise of greater connectivity and capacity through smart transport infrastructure is a clear and well-trodden path in policy rhetoric. For smart transport infrastructure investment and policy administration to drive a substantive and positive impact on cities, policymakers need to ensure they are focused on the right questions for their smart strategies. Only intelligent questions will yield intelligent answers.

Therefore, city administrators need to bring the fundamental purpose of smart transport infrastructure squarely into focus. This is often the foundation of urban planning and development for a city. For example, high-level objectives, such as a city that is highly mobile and livable, should be front and center of any policy dialogue on smart transport infrastructure. Earlier iterations of smart models were about ICT; this has now transformed into ICT-enabled systems and assets. These should not be the focus of smart transport infrastructure strategies, but rather the means to achieve the fundamental objectives that the city is looking to drive through smart transformation.

Policymakers need this focus on the purpose and structure of the city for smart transport infrastructure to actually “change the game” for the operability of assets and economic potential of new investment. For example, if the ultimate goal for a city is to be livable, sustainable and a hub for innovative industry, piecemeal investments in cost-saving, interconnected, smart technologies are not likely to be an effective route to achieving these goals. In fact, deploying a big data analytics approach to transport demand and supply optimization in the city could support better demand management while driving compromise on user cost, privacy and customer experience.

Rather, the defined goals and purpose for the city should shape critical evaluation and investment decisions on the quality of the smart transport infrastructure information platform; depth of integration across transport modes and interfaces; and the extent of top-down, bottom-up information sharing. This may also mean that innovation does not always mean high technology; instead, it could be fundamentally about using existing infrastructure and assets in a different way, per the spectrum of mobility strategies presented in the EY Urban Mobility Blueprint (figure 1). The EY Urban Mobility Indicator (figure 2) is also one illustration of how city administrators need to assess the intersecting demands of citizen, corporate, infrastructure and other drivers to establish the ultimate purpose of the city. This can then help policymakers to clarify what would be a game-changing outcome, using smart transport infrastructure to get there.

The city’s purpose must be at the heart of smart transport infrastructure policymaking. With this in mind, leading-practice strategies and smart transport infrastructure have several core characteristics.

EY Urban Mobility Indicator

Based on a comprehensive analysis of cities, the EY Urban Mobility Indicator (UMI) helps policymakers to assess and define the ultimate purpose of mobility in a city. It combines qualitative and quantitative information, enabling comparative analysis on current framework conditions and prospective future conditions. Cities can be examined across the macro- and socioeconomic factors likely to influence mobility solutions. Furthermore, the UMI leverages qualitative information, including interviews with city representatives and with citizens. Qualitative data covers infrastructure, social and citizen strategy, corporate focus and energy management and helps to understand the needed mobility service in that particular city. City results are then classified accordingly to four major mobility strategy profiles that help develop strategies for optimizing the city’s infrastructure.

Figure 2: EY Urban Mobility Indicator

<table>
<thead>
<tr>
<th>Improve</th>
<th>Envision</th>
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<tbody>
<tr>
<td>Let’s put our city on the map!</td>
<td>Let’s make our city a dynamic incubator!</td>
</tr>
<tr>
<td>1. Build a traffic management infrastructure/extend infrastructure</td>
<td>1. Promote multimodal transportation</td>
</tr>
<tr>
<td>2. Attract talent</td>
<td>2. Protect citizens’ high quality of life</td>
</tr>
<tr>
<td>3. Attract new corporates/jobs</td>
<td>3. Encourage corporates to contribute to social responsibility toward the city</td>
</tr>
<tr>
<td>4. Avoid energy waste</td>
<td>4. Promote innovative energy concepts</td>
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</table>

**Focus zone: Growth management**

<table>
<thead>
<tr>
<th>Maintain</th>
<th>Sustain</th>
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<tbody>
<tr>
<td>Let’s secure our city as a major hub!</td>
<td>Let’s make our city even more green and clean!</td>
</tr>
<tr>
<td>1. Develop a traffic management system/improve capacity of existing infrastructure</td>
<td>1. Favor car independence</td>
</tr>
<tr>
<td>2. Retain talent</td>
<td>2. Promote ecological behavior</td>
</tr>
<tr>
<td>3. Retain corporates/jobs</td>
<td>3. Require corporates to comply with sustainability objectives</td>
</tr>
<tr>
<td>4. Secure energy supply</td>
<td>4. Maximize use of renewable energy systems</td>
</tr>
</tbody>
</table>

**Focus zone: Protect quality of life**

**Innovation/Imagination**

**Practitioner/Conventional**

Source: EY

1. **Infrastructure strategy**
   - How can the focus of the city’s infrastructure initiative be described?

2. **Social and citizen strategy**
   - How can the city’s major social issues and goals be described? What does the city want to achieve with respect to its citizens?

3. **Corporate focus**
   - How can the city retain and attract corporates? How can the relation/preference of the city with the local and potential future companies be described?

4. **Energy management**
   - How can the city’s attempt toward energy sustainability, cost management and supply security be described?
Global leading-practice examples demonstrate a high level of integrated city transport policymaking around smart transport infrastructure. These governance approaches help align plans with the city’s ultimate purpose and desired structure and drive efficiency gains. This model is particularly pertinent for smart investment, given the added complexity and potential risk of smart mobility projects and the integration and interconnectivity challenges that smart technologies address.

Integrated policymaking supports the development of integrated transport policies and strategic plans, covering all relevant sectors. The ultimate objective is to optimize coordination between new and existing infrastructure investment initiatives. Integrated policymaking also supports intermodality and stronger coordination with other sectors, promoting lower development costs through more effective planning of infrastructure and services. It also allows the centralized government body to best choose projects that fit with the existing infrastructure quality/framework and level of government, social and market readiness. Such a governance structure is crucial in optimizing smart mobility in a given city.

London exemplifies this integrated model. Here, the Mayor has policy-setting capability, with Transport for London acting as the client and integrator of services (and direct provider in some instances). This has enabled clear investment decisions and a strong client function to set standards and approaches in relation to smart technologies and integration across the network through the use of the Oyster card scheme.

Hamburg, in Germany, also provides an example of successful integration for innovative mobility solutions. The city introduced Switchh, a pilot project of the Hamburg Public Transport Association together with car-sharing company car2go and car rental company Europcar. It is designed to link mobility in the urban environment. With the help of a card and an app, customers can switch from bus or tram to car sharing or bike sharing at certain hubs across the city. Switchh acts as a catalyst for end-to-end journey solutions, combining public and private transport modes to target a larger customer base and realize potential synergies. It provides not only a mobile application for door-to-door journey planning and access to multiple transport options but also the physical hub where customers can switch between different modes of transport (for example, train and car sharing). It is a great example of effective coordination between different providers of transport solutions. This example demonstrates strategic, technical and operational alignment and integrates public and private stakeholders through a smart mobility system.19 Berlin is another German example of federal/city coordination and showcases effective public-private coordination at multiple levels of governments. The city has a joint mobility initiative with Daimler and RWE, and also the German federal government, to provide electric vehicles for the city. The companies provide the cars and charging infrastructure, while the government encourages private sector investment and focuses on consolidating the policy framework.20

Smart city initiatives in China offer an example of coordinated sector policies and planning, incorporating smart mobility. In 2013, federal-level agencies, including the National Development and Reform Commission, the Ministry of Industry and Information Technology, and the Department of Housing and Urban Construction, launched joint draft guidelines on the development of China’s smart cities. This focuses on interministerial coordination for smart city development, including a national strategic vision and purpose for smart cities in China. Technical and operation aspects of smart cities are the focus, including intelligent transport, intelligent water, smart grids, intelligent environmental protection, smart medical and others. The guidelines also focus on greater collaboration across all levels of smart city development to increase efficiencies in ICT and other investments. However, cities are given a degree of freedom within the coordinated plan to drive their own funding and implementation plans.21

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Smart infrastructure: the economic gains

The alignment of smart mobility investment with a city’s economic, social and other objectives is crucial to its impact on competitiveness and economic growth. The significant economic multipliers on infrastructure investment, and smart infrastructure in particular, suggest that effective policymaking takes a long-term, macroeconomic view of smart mobility design and deployment.

This means that effective smart transport infrastructure initiatives are evaluated in terms of the broader purpose of the city itself and incorporated into long-term budget plans and economic strategies. This can be formalized in a high-level economic development plan. For example, China’s smart cities plan is closely integrated with national urbanization planning, with urban agglomeration planning as the guiding framework for smart city initiatives.22 There are also several specific channels where smart mobility is in use to drive economic gains. Manchester offers another example. In this UK city, the overarching objective of all investment decisions is economic growth, with integrated transport as a key enabler. This has driven investment decisions through governmental loans in the form of a “Transport Investment Fund.” Part of this is funding the rollout of a smart card scheme across the city, an extension of tram networks and further work to better integrate the commercially operated bus network.

One way smart transport infrastructure can make an impact is as a targeted and significant source of economic stimulus. There are several leading-practice examples of how city transport planning and management can do this. One avenue is to improve intermodal transport for greater efficiencies and economic activity. For example, in Osaka, Japan, high-speed rail is combined with connections to local public transport networks to encourage public transport use and drive down the demand for roads. This cuts congestion, reduces travel times and supports greater productivity. In another case, the efficient, integrated intelligent transport system in Medellin, Colombia, is reducing travel time into the city from many hours to 30 minutes, linking residents to jobs and education and driving economic gains.23

City leaders can also focus on smart mobility initiatives to optimize logistics for greater competitiveness. Collaboration between the government and businesses, and between cities, is an important application for smart transport infrastructure. For example, in Ningbo, China, the city has a logistics master plan that involves a consortium of private companies alongside government bodies. Key tenets of the plan include founding smart consolidation centers at the city’s periphery to increase efficiency and smart scheduling for off-peak transport hours. Smart vehicles and the use of open data are also important elements of the plan.

Capacity building is another avenue. The Barcelona Urban Lab is one such example, simultaneously supporting urban mobility and technical capabilities in the city. Called 22@Barcelona, the Urban Lab Initiative has been a testing ground for small and medium enterprises (SMEs) to run trials on new technologies. Innovative projects that address unmet needs for the city can be submitted for testing through the lab, with the City Council working through the lab to solve its challenges, support entrepreneurship and minimize public spending. Successful projects have included parking management and traffic control, leveraging Wi-Fi infrastructure and real-time monitoring technologies.24 The smart cities initiative in China is also another example of a strategy to leverage smart infrastructure for economic stimulus. The Ministry of Industry and Information Technology is using the promotion of smart cities to drive overall reforms in China’s IT industry, with smart connectivity objectives for the country’s broadband infrastructure and domestic information consumption. To further these objectives, the Ministry has announced 68 pilot cities to focus on effective information consumption ecosystems.25 Furthermore, in Europe, the European Union Horizon 2020 economic strategy includes a “Mobility for Growth” initiative, which includes a smart, green and integrated transport program. This includes a keen focus on innovative solutions, through research and innovation and international technology transfer.26 Furthermore, the program fosters open innovation by actively encouraging SMEs to participate.

Public investment, private capital

The capital-intensive nature of infrastructure investment means private capital is a critical complement to public funds in scaling “smart investment.” At the same time, the associated risk profile, particularly for investment in new technologies, can drive a prohibitive risk-return structure for private investors. As a result, leading practices in smart infrastructure policy focus on optimizing the investment value proposition for private sector investors.

Private capital will follow attractive returns, with limited or redundant existing infrastructure a key restraint on the potential upside to private investment. Leading-practice strategies focus on providing the foundational infrastructure necessary to accelerate implementation, take-up and payoff to private smart investments. Amsterdam is one example where policymakers are working to provide the infrastructure foundations to enable stronger private investment in smart infrastructure.27 Here, the city focuses on complementarity — for example, with the planned rollout of electric vehicle charging stations — designed to stimulate private sector activity in the space.

Innovative financing mechanisms are also important for stimulating private appetite for smart infrastructure investments. This can include the use of public-private partnerships (PPPs), through investment structures to make initiatives attractive to private capital. For example, in the case of the Changsha and Sichuan highways in China, this included “build, operate, transfer” arrangements where highway construction was bundled with other potentially profitable businesses, such as service stations and land development rights.

Leading practices also include a municipal focus to build public sector capabilities and better enable private sector investment. For example, in Europe, the Horizon 2020 program has identified smart governance, network resilience and streamlined delivery of infrastructure innovation as a specific challenge. This focuses on capacity building to raise the productivity, quality and timeliness of projects. New initiatives are focused on streamlined procurement and infrastructure competence building, in particular in public sector planning, delivery and operations.28 Furthermore, to engage private sector participants, leading-practice cities provide transparent, high-quality data. This enables investors to make informed investment decisions in smart mobility systems. For example, in Taipei, Taiwan, the city’s Transport Authority has a real-time transport information service built on open data. The authority has built capacity in data analytics and develops publicly available data sets from multiple sources.

Smart ways to gather and analyze feedback

Leading-practice smart transport infrastructure systems engage administrators and the general public in providing data and solutions to urban mobility demands. This is critical to keep investment in and implementation of new technologies aligned with the ultimate purpose and value proposition for the city.

For example, if a core part of a city’s proposition is livability and high quality of life, the changing nature of the urban transport ecosystem means citizen engagement is crucial. In fact, in many markets, commuters’ habits are evolving, with individuals highly connected through personal and business devices and applications. Commuters demand time savings, high flexibility, affordability and convenience. This means city administrations need to partner

with citizens to collect real-time information on mobility, including through smartphones. Policymakers then need to leverage this data, along with top-down information on traffic patterns and other figures, to effectively plan and operate integrated transport systems. Providing open data and adopting open-source software are also important for supporting rapid innovation and reducing costs of ownership. For example, in Germany, Daimler’s moovel, the US start-up RideScout or Qixxit owned by the German state-owned train operator Deutsche Bahn launched cloud-based apps to provide ease-of-use access to personalized real-time travel planning and online invoicing to improve the convenience of urban traveling. In return, these companies use raw and processed data to generate individual travel patterns of urban dwellers and aggregate this data for traffic monitoring and prediction purposes.

### Eight routes to success

**The leading practices discussed are the building blocks for an integrated, strategic approach to smart transport infrastructure. This has citizens at the core and the fundamental purpose and value proposition for the city as the ultimate objective.**

To support the effective use of smart transport infrastructure, governments must drive tight integration in planning, investment and regulation and effectively align new investment with the existing infrastructure environment. As a result, we see eight key drivers for change. These are presented in the table below and are the foundation for our four key strategic recommendations to policymakers.

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**Figure 3: Eight key drivers for effective, integrated smart infrastructure planning and delivery**

<table>
<thead>
<tr>
<th>Strategy levers</th>
<th>Delivery levers</th>
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<td></td>
<td>Organizational effectiveness</td>
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<tr>
<td>Planning integration</td>
<td>Asset delivery</td>
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<td>Policy setting</td>
<td>Asset management</td>
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<td>Regulatory role</td>
<td>Customer experience</td>
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<td>Operational role</td>
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Policymakers need to take a long-term view of smart transport infrastructure investment to properly align investment plans with the ultimate purpose and value proposition of the city, as well as to balance spending needs with fiscal priorities and constraints. This means working to optimize the gains in economic competitiveness, productivity and output for the city. It also involves taking a smart community view of infrastructures with the social and environmental implications deserving important consideration.

The ultimate value proposition and purpose for a city should drive the decisions around smart infrastructure investment. To put this into practice, city administrations should shape their city vision for smart infrastructure on their broader economic development plan, first establishing the key sectors of the economy for growth and investment, as well as clear socioeconomic goals. They should then use international benchmarks to identify areas of strength and weakness in supporting transport infrastructure around these goals.

With this framework in place, governments should then determine, assess and evaluate potential smart projects using a standardized approach. Extensive consultation with citizens, the ultimate user and arbiter of the value of these investments, will be critical through the process. Long-term smart investment plans should also include periodic reviews of outlays and outcomes. Finally, governments need to ensure their fiscal framework is conducive to smart and other infrastructure investment. Medium-term expenditure frameworks for fiscal budgeting, as well as the use of capital budgeting concepts in fiscal reviews, will be important.

Coordination is king

An integrated infrastructure policymaking function is critical for optimal investment in smart transport infrastructure. This enables governments to evaluate and design projects as part of the broader infrastructure ecosystem and support the overarching city vision. In particular, this structure helps governments effectively integrate smart technology into new investment, leverage existing infrastructure investments, manage divestment and substitution options, and implement effective regulation for coordination.

As leading-practice examples have shown, this function can be structured either as coordinated sector policies and planning or through centralized sector policies and planning. It could also be integrated with a chief technology officer function in the central administration. The appropriate level of decentralization depends on the level of institutional, infrastructure and social readiness. Nonetheless, we suggest that governments err on the side of greater centralization, to support overall effectiveness of investment and management and also greater interconnectedness. The centralized management framework should include a clear structure for leadership and accountability, guidelines for the role of the regulator in smart transport infrastructure, and guiding principles for collaboration and coordination on new smart technologies. The centralized infrastructure entity should also make capacity building and continuous learning a focus, to ensure sufficient expertise for selecting, managing and operating smart projects.

Invest in scalable and integrated systems

Complementarity should be a guiding principle for smart transport infrastructure strategy. That is, governments should invest in smart transport infrastructure that can be integrated on a large scale across the public and private sectors. This enables a degree of flexibility in investment plans to accommodate new technologies and user trends, and it also supports the implementation of smart technologies at scale. Governments also need to invest in internal capacity to procure smart technologies, including the specific knowledge of relevant technologies.

To achieve these objectives, governments should design long-term investment strategies in a modular way where possible. Furthermore, trial investments should apply to both new and existing infrastructure assets, with the expansion of infrastructure stock through smart investment also an important outcome to test, before large-scale deployment. Finally, in terms of capacity building, governments should actively engage in international forums to leverage existing technologies/integration systems.

Provide an effective framework for private sector engagement

With private capital necessary to drive smart investment at scale, and private sector expertise in smart technologies also critical to driving innovation and competitiveness, governments must provide a regulatory and financial framework to support this investment and expertise. In particular, policymakers need to address the often-prohibitive risk-reward payoff for private sector investors in public infrastructure projects. Regulatory certainty to encourage public-private collaboration and support effective development and scaling of new investment should also be a focus. Further, public investment in some enablers that have a longer-term payback can also support an integrated public-private approach.

Policymakers can undertake several key steps to better entice private sector engagement. Firstly, the public sector can increase the bankability of projects for private capital through direct public investment, credit guarantees and the use of innovative financing instruments, including special-purpose infrastructure bonds and innovative revenue structures for PPPs. Secondly, governments can ensure regulatory certainty through clear smart transport infrastructure investment policies and commit to local administration funds to smart investment. Administrations should also provide transparency on project implementation, including procurement, value-for-money testing and the impact on public interests. City administrators should also advocate for state and federal governments to introduce tax and other incentives to promote R&D, innovation and trade in smart transport infrastructure technologies.
Routes to prosperity: how smart transport infrastructure can help cities to thrive
Cities need a quality information platform to be competitive, and nowhere is this better exemplified than in the case for smart transport infrastructure. To optimize the impact of this technology on transport systems, and economic and social development for a city overall, city administrations need to keep focused on the fundamentals – the ultimate purpose and value proposition of the city and the experience for its citizens.

In keeping the city’s ultimate goals at the core, policymakers can clearly define their smart transport infrastructure strategy, which should be well-integrated with these goals and tightly coordinated. No city can fully realize the value of smart investment without this framework.

To fully realize the benefits, smart cities need clever strategies for private sector engagement. This includes structures for private investment, including PPPs. Importantly, it also means a high level of citizen engagement and bottom-up planning and development through open data and solutions development.
Smart transport infrastructure is a critical enabler for economic growth and competitiveness positioning cities for the 21st century. At EY, we have worked with some of the largest and most complex projects around the globe, for the public and private sector, with experience throughout the whole project lifecycle, from planning and procurement to delivery, operations and exit. EY is the most globally integrated professional services organization – in our mind-set, actions and structure. We are building a practice that will support the efficient, effective and economic delivery of smart transport infrastructure around the world.

### Smart transport infrastructure at EY

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<th>Planning</th>
<th>Economic feasibility studies</th>
<th>Financial advisory</th>
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<td>The Infrastructure Advisory business can assist in the development of long-term investment plans, as well as agency-wide programs and policy frameworks, including project management.</td>
<td>EY’s Lead Advisory teams can drive economic feasibility assessments for smart transport infrastructure, including delivery model analysis, CBA and private-public comparator models. Such analyses give policymakers a clear picture on the net economic benefits of proposed projects.</td>
<td>EY can advise governments and private sponsors on financing projects, including the financial structure and sources of financing, private finance, public funds or PPPs. We can help in the procurement and delivery phase including market sounding, funding option analysis, risk allocation, commercial &amp; financial structuring, payment mechanism structuring, contract negotiations and financial close.</td>
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<th>Location strategy</th>
<th>Tax Services</th>
<th>IT Transformation Services</th>
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<tr>
<td>EY can help government departments and investment promotion agencies in their targeting, acquisition and after-care strategy and policy formulation aimed at maximizing the volume and quality of investments. Smart cities can become a major destination for foreign direct investment (FDI).</td>
<td>Global tax teams have the broad capabilities to match the spectrum of tax issues. The teams can support transport infrastructure projects (including smart ticketing) on tax challenges including human capital management and tax regulatory changes.</td>
<td>The EY Advisory Performance Technology Services teams help clients rethink how to architect, deploy and manage technology. The teams can work with governments to accelerate business performance through technology transformation, enterprise intelligence, enabling technology and technology risk and security</td>
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<tr>
<th>Capital Project Management and Assurance</th>
<th>Climate Change and Sustainability Services</th>
<th>Transaction Advisory Services for infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>EY can assist in capital project management and provide assurance on its progress. This includes regular monitoring and evaluation throughout the project, ensuring accountability and transparency for investors and citizens.</td>
<td>Monitoring of the delivery of the project and supporting the transition to sustainability can be offered through EY’s Climate Change and Sustainability (CCaSS) teams. CCaSS can help in becoming a carbon neutral city. Next to this, CCaSS can offer expertise in social impact assessments and reporting.</td>
<td>Transaction Advisory Services (TAS) provides advisory services around the client’s capital agenda, whether this means preserving, optimizing, raising or investing capital. In particular, TAS can assist governments and private sponsors with secondary market operations, including divesting or acquiring assets, restructuring project companies, and performing due diligence and working capital analysis.</td>
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<tr>
<th>Advanced Data Analytics</th>
<th>Mobility Solutions</th>
<th>Smart Ticketing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data analytics approaches to transport demand and supply optimization in cities can be developed and deployed. Harnessing big data from customer journeys can lead to a more accurate customer demand forecast.</td>
<td>Mobility solutions can be developed and deployed. This includes strategy development for optimizing the city’s infrastructure and ITS-enabled transportation pricing systems. From concept, design, implementation to optimization.</td>
<td>EY can assist in implementing smart ticketing schemes which can help a city or commercial operator to increase patronage, reduce fraud, lower operating costs and increase accessibility to an integrated transport network. This includes identification and acquisition of funding, identification, tendering, appointing and managing technology partners, scope, design, mobilizing and delivering the program and increase probability of benefits realization.</td>
</tr>
</tbody>
</table>
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