Smarter Cities 2025

Building a Sustainable Business and Financing Plan

Executive Summary

The convergence of digitization, globalization, and demographic shifts are redefining the urban landscape and how people shop, work, travel, and live. It is also is causing businesses to adopt new innovative strategies solutions to meet the new realities of urban life and digital commerce. To stay relevant, cities need a fresh way of thinking.

In today's digital age, becoming a smart city is vital for attracting business, residents, tourists, and talent. By making their cities smarter—not just in using technology but in all that they do—government leaders hope to drive competitiveness and growth, while making massive social, business, and environmental improvements. Cities that undergo smart transformation unlock benefits that can be then reinvested into additional development, creating a virtuous cycle of economic growth.
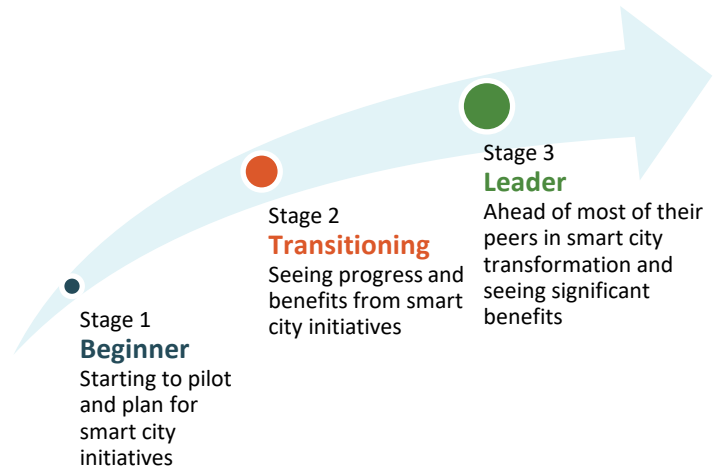
But the path to a smart city future is often unclear to urban leaders; many are looking for help in developing a roadmap that will drive the best results. To provide this needed decision support, ESI ThoughtLab teamed up with a coalition of organizations with urban and technology expertise to conduct ground-breaking research into the impact of smart city solutions on urban performance. Our analysis enabled us to answer three crucial questions facing today's city governments:

- What are the characteristics of successful smart cities, and how do they create value for residents, businesses, and local government?

- What is the most effective path to becoming a smart city, and how do you need to adjust it for your city's unique economic and social footprint?

- What are the quantifiable direct, indirect, and catalytic benefits of smart city investments? Which approaches will have the biggest impact on economic competitiveness, business growth, and living standards?
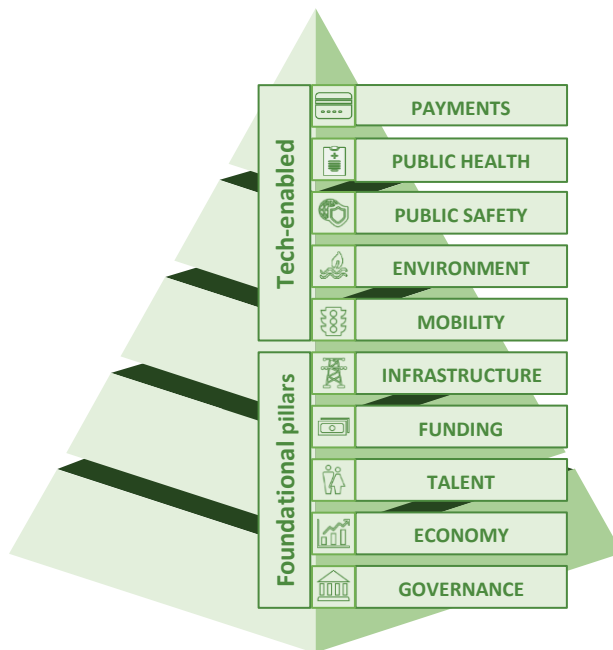
Research approach

ESI ThoughtLab conducted an in-depth benchmarking survey of government leaders in 136 cities around the world to understand their smart city perspectives, practices, and performance results. As part of our benchmarking analysis, we calculated a "smart city maturity score" for each of the 136 cities, based on the responses of government officials to detailed questions in the survey about their progress in 10 smart city "pillars" that we identified. Based on the overall derived maturity score, we stratified the cities into three categories: **beginner**, **transitioning**, and **leader.**

Journey to smart city maturity

Stage 3
Leader
Ahead of most of their peers in smart city transformation and seeing significant benefits

Stage 2
Transitioning
Seeing progress and benefits from smart city initiatives

Stage 1
Beginner
Starting to pilot and plan for smart city initiatives

Across 10 pillars of smart city success

Tech-enabled
- PAYMENTS
- PUBLIC HEALTH
- PUBLIC SAFETY
- ENVIRONMENT
- MOBILITY

Foundational pillars
- INFRASTRUCTURE
- FUNDING
- TALENT
- ECONOMY
- GOVERNANCE

These categories helped us to select 11 "proxy" cities across the maturity continuum for deeper analysis. We conducted surveys of 750 business leaders and 2,000 residents in those 11 cities, which are at varying levels of economic development, technology adoption, and demographic diversity. These surveys helped us to gauge how well-aligned these different stakeholders are in the ways they think about smart city solutions.

We then combined the statistical input from these surveys with data from respected secondary sources to create micro- and macro-economic models to quantify direct, indirect, and catalytic benefits of smart city investments in those 11 proxy cities. Our economists extrapolated these results to 125 other cities with similar characteristics.

Key findings

Our study offers unique, evidence-based insights into smart city innovations and their impact on different cities around the world. These insights provide urban leaders with a valuable compass to guide their city's journey to a smart future.

1. **Smart investments trigger a virtuous cycle of economic growth by generating capital for new smart city investments and attracting businesses, residents, tourists, and talent.** On average the catalytic impacts associated with becoming a smarter city have the potential to increase GDP per capita by as much as 21% and population growth by 13% over the next five years in beginner cities, if they can achieve their stated smart city plans. Transitioning and leader cities can potentially see additional GDP per capita and population increases as well, albeit at a slower rate.
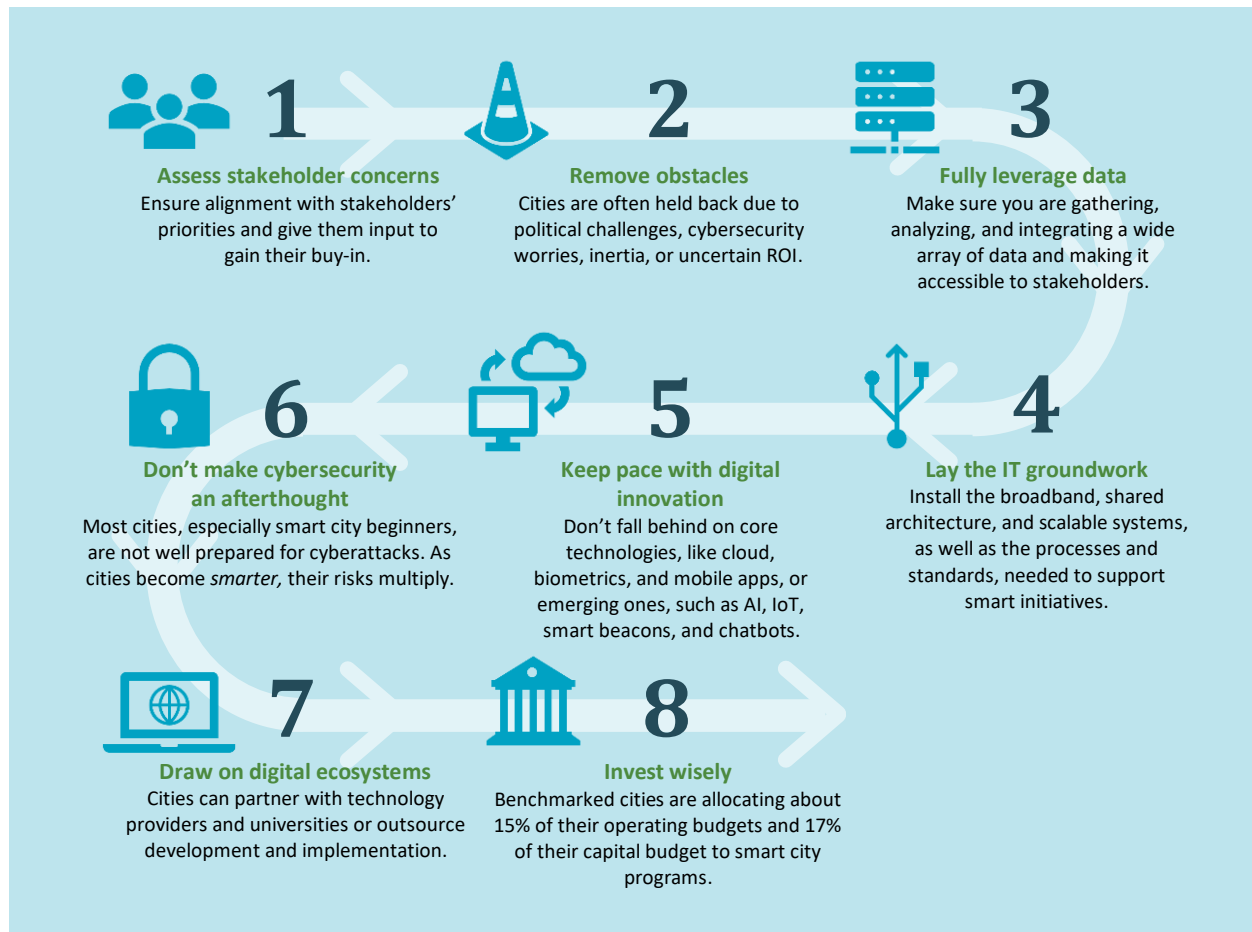
2. **To achieve those catalytic impacts, cities need to build a clear path to a smart city future.** Without the right vision, plans, and resources in place, smart city transformation programs will not reach their full potential. Working together with business and academic leaders, the most successful cities first put in place a sound footing by building five foundational pillars—governance, infrastructure, economy, talent, and funding. These cities can then develop tech-enabled solutions for five other smart city pillars: the environment, mobility, public safety, public health, and payment systems pillars. These 10 pillars work together synergistically to drive value to all stakeholders.

Growth in GDP and population by maturity stage

GDP per capita	Population
+21%	+13%
+13%	+8%
+11%	+7%

Beginner ● Transitioning ● Leader ●
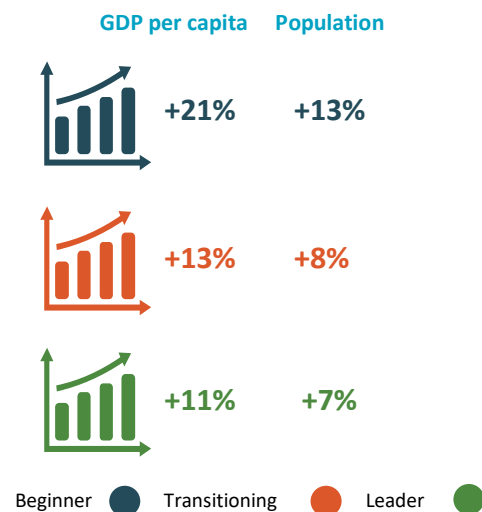
3. **With digital technologies evolving at hyper-speed, cities need to conduct ongoing reality checks on their plans and be prepared to correct course.** Beginner cities that move too slowly in adopting smart technologies may be caught in a constant cycle of catching up to stakeholder expectations. Cloud-based technology, mobile apps, citywide data platforms, IoT/sensors, biometrics recognition, and geospatial technology are now used by more than half of the surveyed cities. By 2021, these technologies will be table stakes for urban centers. While just 1 out of 10 cities (or fewer) now use more advanced technologies, their use will skyrocket over the next three years: Blockchain usage will grow by 752%, AI by 526%, drones by 298%, Vehicles to Everything (V2X) by 257%, and VR/AR by 254%. But as cities embrace digital innovation, they need to build cybersecurity into all of their plans. Unfortunately, our survey reveals that only about a third of cities are well prepared for cyberattacks. Beginner cities are particularly vulnerable; almost three-quarters described themselves as only slightly prepared.

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Roadmap for smarter cities

1 Assess stakeholder concerns
Ensure alignment with stakeholders' priorities and give them input to gain their buy-in.

2 Remove obstacles
Cities are often held back due to political challenges, cybersecurity worries, inertia, or uncertain ROI.

3 Fully leverage data
Make sure you are gathering, analyzing, and integrating a wide array of data and making it accessible to stakeholders.

6 Don't make cybersecurity an afterthought
Most cities, especially smart city beginners, are not well prepared for cyberattacks. As cities become *smarter,* their risks multiply.

5 Keep pace with digital innovation
Don't fall behind on core technologies, like cloud, biometrics, and mobile apps, or emerging ones, such as AI, IoT, smart beacons, and chatbots.

4 Lay the IT groundwork
Install the broadband, shared architecture, and scalable systems, as well as the processes and standards, needed to support smart initiatives.

7 Draw on digital ecosystems
Cities can partner with technology providers and universities or outsource development and implementation.

8 Invest wisely
Benchmarked cities are allocating about 15% of their operating budgets and 17% of their capital budget to smart city programs.

4. Data is the rocket fuel for smart city transformation, and cities need to make data management a core area of excellence. Smart cities run on data. Yet few beginner cities are doing even basic data tasks, such as collecting, extracting, integrating, and analyzing data. Transitioning cities are much more advanced in their use of data; even so, they are still at only half the level of the leaders. Since many smart solutions, from mobility to public safety, are dependent on data, it is vital for cities to make data management an area of excellence. This includes making data accessible to stakeholders and monetizing its value. By 2021, almost all cities will draw on IoT and real-time data, and the use of AI-generated data will grow fourfold. Predictive data, which about 40% of cities already use, will rise in usage by 63%. Similarly, use of both geospatial and behavioral data will rise by 54%.

5. Spending on smart programs rises with smart city maturity. As cities move up the smart city maturity curve, so does their spending on smart city projects as a proportion of their operating and capital budgets. For example, beginner cities allocate 15% of their capital budgets to smart programs, while leaders apportion about 20%. For some pillars (mobility environment, governance, economy, payments), the level of investment increases as cities become more mature, while in others, the level of investment decreases (infrastructure, public safety, talent).

6. Top smart city benefits vary by stakeholder. Smart city initiatives can generate a host of benefits, but views vary by stakeholder. For example, businesses first and foremost see smart programs raising productivity of city workers and their own employees, while consumers perceive the main benefits as attracting residents/tourists and providing better public services. Our research revealed five benefits that all stakeholders agree on: (1) safety and security, (2) economic competitiveness, (3) better public services, (4) increased productivity of businesses and residents, and (5) additional revenue.
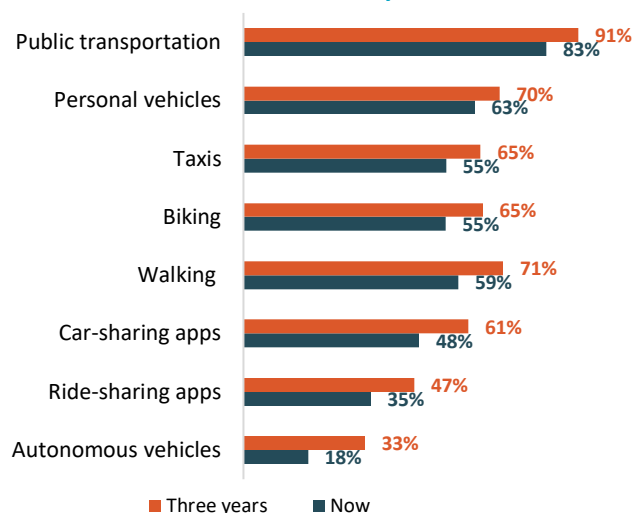
7. The future of mobility will be multi-modal transportation systems interconnected through smart technology. Our study unveiled that cities around the world are developing multiple modes of transportation to provide greater efficiencies for residents and businesses. As cities move to a tech-enabled, multi-modal mobility model, which includes bike-, car-, and ride-sharing, smart traffic signals, mobile apps, and smart public transit systems, there can be large returns in time and money. For example, in beginner cities, **mobile apps** can save riders 10.3 hours annually per capita in

The importance of different transport modes now and in three years

Transport mode	Three years	Now
Public transportation	91%	83%
Personal vehicles	70%	63%
Taxis	65%	55%
Biking	65%	55%
Walking	71%	59%
Car-sharing apps	61%	48%
Ride-sharing apps	47%	35%
Autonomous vehicles	33%	18%

■ Three years ■ Now

waiting time and increase transit ridership, while **smart traffic signals** can offer per capita annual personal time savings of 9.7 hours and fuel savings of 3.3 gallons per capita.

8. Civic leaders see the environment as the top challenge to address through smart city programs, and improved public safety and health as the main benefits of current smart initiatives. Our research found these areas are often overlapping: environmental investments not only reduce pollution and costs, they improve public health and safety. For example, environment investments in **smart grid technology** generate annual per capita savings of $229.86 and reduce C02 emissions 223 pounds per person annually in beginner cities. Pollution reduction has positive effects on health, particularly for sufferers of chronic obstructive pulmonary disease (COPD), for whom treatment with smart public health technologies such as **telemedicine** can reduce annual healthcare costs per capita by $24.83. In public safety, technologies such as **predictive policing** can reduce violent crimes by about 5% and property crimes by about 10%, leading to a potential savings of $420.33 per capita for beginner cities.

9. Funding smart city solutions is a key challenge for most cities. Urban leaders need to be creative and resourceful in finding ways to fund their futures. By 2021, public-private partnerships (65%) will be the dominant financing technique, followed by concession financing (60%), revenue share financing (60%), and department budgets (59%), which will all grow in use over current levels. While the use of philanthropic support will dip by 5% to 58% of cities, the reliance on federal and state support will soar by 71% and 58%, respectively. Smart city beginners focus on innovative approaches such as service financing, public-private partnerships, pay-for-success, and concession financing. Leaders tend to rely more than beginners on department budgets, user fees, sales/leaseback, and state and federal support.

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A leader in evidence-based research

About ESI ThoughtLab

ESI ThoughtLab is an innovative thought leadership and economic research firm providing fresh ideas and evidence-based analysis to help business and government leaders cope with transformative change. We specialize in analyzing the impact of technological, economic, and demographic shifts on industries, cities, and companies.

ESI ThoughtLab is the thought leadership arm of Econsult Solutions, a leading economic consultancy with links to the academic community.

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Visit the Smarter Cities 2025 microsite to access the full suite of products produced for this research initiative.