How to save €300bn a year

Does your city’s transport infrastructure need upgrading? Are you looking to grow your city’s economy and create new transport-related jobs? Hussein Dia might just be the man to help...

As part of an increasingly connected and interconnected world, our cities are playing an equally increasingly active role in the global economy. According to the McKinsey Global Institute (MGI), just 100 cities currently account for 30 per cent of the world’s economy. New York City and London, together, represent 40 per cent of the global market capitalisation. In 2025, 600 cities are projected to generate 58 per cent of the global Gross Domestic Product (GDP) and accommodate 25 per cent of the world’s population. The MGI also expects that 136 new cities, driven by faster growth in GDP per capita, will make it into the top 600 by 2025, all from the developing world, 100 of them from China alone.

The 21st century appears more likely to be dominated by these global cities that will become the magnets of economy and engines of globalisation.

THE CHALLENGES

Whilst this urban growth will be largely driven by economic development and the search for a better quality of life, the resulting success will dramatically change the scale and nature of our communities, and put a tremendous strain on the infrastructure that delivers vital services like transport, electricity, water and communications. Today, more than half the world’s population lives in towns and cities and the percentage is growing. By 2050, 70 per cent of the world is expected to live in cities and urban areas. Already, ageing infrastructures in many cities around the world are at a breaking point with governments’ budgets for major infrastructure projects under increasing pressure.

Take for example the reform of urban mobility that remains one of the biggest challenges confronting policy makers around the globe. According to the United Nations, it is estimated that 1.3m people are killed on the world’s roads each year. If left unchecked, this number could reach 1.9m fatalities worldwide by 2020. The human cost is profound – unimaginable suffering and grief. The economic cost is also a staggering US$100 billion a year in developing countries alone. The World Health Organisation has described road casualty figures as being of ‘epidemic’ proportions, with road-related trauma being the biggest single killer of those aged between 15 and 29. It has also been estimated that the social, economic and environmental costs of avoidable congestion account for more than 1 per cent of the GDP across the European Union, and currently cost the United States more than US$115 billion each year. In addition, road traffic continues to account for around 80 per cent of transport CO₂ emissions and is expected to reach 9,000 Megaton per year by 2030 if the current mobility trends are not curbed.

THE OPPORTUNITIES

Decision makers and leaders who run our complex cities are increasingly recognising the role of smart technologies in improving the efficiency of existing infrastructure and easing the pressure on assets through better utilisation of available infrastructure. These systems can significantly improve operations, reliability, safety, and meet consumer demand for better services with relatively small levels of investment.

Cities are essentially made up of a complex network of systems that are increasingly being instrumented and interconnected, providing an opportunity for a smarter infrastructure management. An “Internet of Things,” comprising sensors, monitors, video surveillance and radio frequency identification (RFID) tags, all communicating with each other to enhance infrastructure capability and resilience, and capturing volumes of data. Through data mining, artificial intelligence and predictive analytics tools, smart infrastructure systems can help city managers to monitor the performance of vital infrastructure, identify key areas where city services are lagging, and inform decision makers on how to manage city growth and make our cities more liveable.

NEW PARADIGM: TECHNOLOGY-DRIVEN URBAN INFRASTRUCTURE

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infrastructure faults. Vital infrastructure downtimes will be cut using sensors that monitor the health of critical infrastructure, collect data on system functioning, alert operators inside an integrated urban control centre to the need for predictive maintenance, and identify potential breakdowns before they occur. In transport, smarter vehicles, trains and public transport systems are increasingly sensing their surrounding environments and enhancing safety in situations where driver error is most common.

On-board public transport, a range of GPS, position fixing, video surveillance, and communications equipment are increasingly providing more accurate and reliable multi-modal real-time passenger information, resulting in better informed travellers and ensuring a smoother, safer and more reliable experience for customers. Back-office systems that leverage sensors, web, mobile, and GPS technologies will utilise smarter algorithms, data mining and predictive modelling tools to reduce delays to passengers by optimising schedules and capacities in real time. Near railroad level crossings, a range of train-to-infrastructure and train-to-vehicle technologies will also improve passenger safety by better detection of fast approaching vehicles and providing warnings to avoid collisions. Electric vehicle charging infrastructure will also increasingly being integrated into smart grid networks, providing consumers with access to sustainable and equitable forms of connected mobility. A combination of technologies and sensors will also improve safety and security by permitting operators to remotely disable or enable a public transport service in the event of a security threat (eg an unauthorised driver).

THE BENEFITS: MORE FOR LESS

Adoption of technology-based, customer-centric approaches have the potential to introduce substantial improvements in customer satisfaction, and create a shift in attitude to cost and value. A smarter city will mean better access to sustainable forms of transport; electricity and drinking water that can be counted on; and energy-efficient buildings resulting in enhanced standards and quality of life for today’s increasingly empowered citizens and consumers. In addition to improving asset utilisation, these systems will also improve safety and security, enhance business and operational outcomes, boost productivity and economic growth, and deliver environmental benefits.

Given the maturity levels and affordability of smart technologies, these benefits can be achieved at a fraction of the cost of investment in new infrastructure. In a study published in 2009 for the Australian Market, Access Economics reviewed the potential economic benefits from the adoption of smart technologies in transport, electricity, irrigation, health, and broadband communications. The report examined how smart systems will allow the use of vast amounts of data collected in all areas of city activity for more effectively, providing the potential to radically alter our economy and society for the better. Their research demonstrated that smart technologies would have significant benefits including a 1.5 per cent increase in GDP, and increase in the net present value (NPV) of GDP by US$5-80billion over the first 10 years. In another report prepared by The Climate Group on behalf of the Global e-Sustainability Initiative, it was estimated that a 15 per cent reduction in emissions can be realised in 2020 through smart technologies that achieve energy and resource efficiency using adaptive and proactive technologies.

Globally the benefits of investment in smart infrastructure are highlighted by recent research from the MGI that looked at how modernising our infrastructure to drive economic growth will require costly future investment in new projects. The MGI study, which looked at the projected global infrastructure investment over the next 17 years, estimated that just keeping pace with projected global GDP growth will require US$57 trillion in infrastructure investment between 2011 and 2030. That’s nearly 60 per cent more than the US$56 trillion spent over the past 18 years, and more than the estimated value of today’s infrastructure.

Given widespread fiscal constraints, even assembling the minimum investment required to meet growth predictions is going to be a challenge. So rather than investment in new projects, governments should look to address some of their infrastructure needs by getting more out of existing capacity by adoption of smart infrastructure technologies. Boosting asset utilisation and expanding the use of demand-management measures can produce a decisive difference if scaled up globally, and can result in savings of up to US$400 billion a year according to the MGI research.

The literature on smart transport technologies is abundant with case studies that demonstrate the benefits of Intelligent
Transport Systems (ITS), as demonstrated by the Figure below. In addition to reducing reliance on building additional capacity, smart infrastructure technologies also offer a much lower capital and investment cost. For example, the cost of the transport technology solution on the UK’s M42 motorway was US$150m and took two years to implement; widening the road to produce the same outcome would have taken 10 years and cost US$800m. Other studies have also suggested that using smart transport technologies for roads, rail, airports and ports can double or triple asset utilisation opportunity to modernise their infrastructure and help drive economic growth and create jobs for the 21st century.

SUMMARY
Cities around the world are anticipated to benefit from the use of smart technologies, but they must first overcome a number of challenges to improve infrastructure resilience and reliability. The deployment of these technologies, complemented by appropriate governance and regulatory changes, will deliver substantial benefits through improved city management systems, better-informed consumers and enhanced connectivity between vital infrastructure systems.

Whilst decision makers and leaders who run the world’s cities are increasingly recognising the role of smart technologies in ‘sweating of assets’, deployment at a global scale is still in its infancy. As this article shows, the benefits of investing in smart systems are compelling, particularly given the improvements that could be made in terms of providing innovative solutions to lift our economic efficiency and living standards.

To spur change programs and capture potential savings, we must move beyond a project-by-project view and upgrade systems for planning, operating, and delivering smart infrastructure. This sort of investment will give our cities an

REFERENCES