Resilient Urban Mobility

A Case Study of Integrated Transport in Ho Chi Minh City

A research project carried out by Arup and Siemens
Ho Chi Minh City
Executive Summary

Transport is linked to all aspects of urban life: leisure, education and business. Ensuring a comprehensive, accessible and integrated transportation system is essential to sustain social and economic development. The central role of transport networks in urban life means that any reduction in performance may compromise the city’s operations across a number of sectors, causing large and costly disruptions. A resilient system is essential to avoid such events. Recent evidence suggest that the frequency, extent and severity of extreme weather events is increasing around the world exposing transport infrastructure to more severe stresses and sudden (shock) events. Anticipating and preparing for the impacts of these stresses and shocks on the transportation systems is key to achieving and sustaining resilient urban mobility.

**Increased demand for transportation services**

Rising populations, especially in emerging city economies, imply densification and urban sprawl, trends which are already creating new demand for mobility as well as increasing pressure on existing urban transportation systems. Changing weather patterns will compound these challenges as the frequency and severity of damaging weather events increases over time. Cities will need more effective systems to forecast, respond to and recover from these events to ensure that periods of disruption are minimised and long-term economic sustainability is not undermined. In Ho Chi Minh City, for example, the number of delay minutes is forecast to increase by 620% over the next 30 years.

**Integrated Transportation Solutions**

Management practices and software-based solutions that make better use of capital intensive infrastructure and generate reliable revenue streams will be necessary to address the transportation challenge.

Integrated systems offer greater flexibility, coordination and redundancy, allowing users to be distributed across a diverse portfolio of transport options and to transfer easily from one mode to another when required. Better integrated systems provide a smoother, more efficient and user-friendly day-to-day service which is also better able to cope with the stresses associated with peak demand and strains of infrequent shocks or unforeseen events. The Ho Chi Minh City case study included in this report demonstrates that the net benefits the city can expect by investing in a selection of intelligent transportation technologies exceeds $1.6 billion and clearly justifies the investment. The economic appraisal to support this study suggests that the proposed solutions offer excellent value for money, with the city receiving $3.30 in economic benefit for every $1 invested. This report showcases a number of technologies currently deployed globally that – by generating, processing, analysing and distributing data – can improve the efficiency, capacity and flexibility of transportation systems.

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1 Assuming no investments are made in transportation infrastructure.

2 All figures quoted in the text are in 2012 prices and discounted, unless otherwise stated.
Case Study: Ho Chi Minh City

Ho Chi Minh City (HCMC) is witnessing a dynamic phase of economic growth, industrial expansion and land use change which is raising the city’s fortunes and attracting business opportunities. However, at such a rapid pace of transformation, the city is also facing a host of challenges from lack of housing and inadequate infrastructure, to poor air quality and severe transport congestion.

HCMC’s traffic congestion is estimated to have a direct cost to the economy of approximately $97 billion between 2015 and 2045. Around 45% of HCMC is less than a meter above sea level, rendering the city and in particular, the transport system highly exposed to flooding, especially during the rainy season. Regular flooding in parts of the network compounds the challenges of congestion by reducing the total capacity of the network and diverting traffic on to alternative routes. Routine upgrades and new investments in HCMC’s transportation system represent a unique opportunity to improve resilience on all of the city’s future services and create a more inclusive environment in which economic and social demands can be met. In short, the resilience of the network and, in turn, the city can be improved.

A first step to increase resilience could be to establish an integrated traffic control center and associated street-based technologies, which incorporate the infrastructure and equipment required to effectively manage traffic flows and the city’s transport system remotely and in real-time.

In addition, an Inter-operator Fare Collection (IFC) solution that functions across public transport modes may reduce delay time resulting from passenger payments, while also making it easier to access. This would also stimulate mode shift away from private vehicles and contribute to increasing resilience by providing flexibility, redundancy and an alternative means of travel to the motorcycle.

45% of the city is less than a meter above sea level
Economic Benefits of Investing in Technology

An economic appraisal was undertaken to demonstrate the business case for investing in transport technologies. The appraisal demonstrates that these would bring enormous benefits to a city like HCMC, not only to road users in terms of reduced delays and improved air quality, but also through the wider economic benefits that result from a well-functioning transport system.

An Integrated Traffic Management System (ITMS) would take only eight years to become net positive in terms of costs and benefits and represent a net benefit of $1.4 billion over the next 30 years. Based on the forecast number of trips on the transport system, an Inter-operator Fare Collection (IFC) system is expected to generate a total net benefit of $0.2 billion.

Economic analysis of the annual discounted costs and benefits for a combined ITMS and IFC solution, between 2015 and 2045.
Accessing Finance for Infrastructure Improvements

Despite the clear benefits of investing in transportation technologies, access to finance is often the major barrier for investments in infrastructure. Ideally, funding would be drawn from transport revenues in order to ensure that the beneficiaries of the systems were the same groups that contribute to their funding (i.e. the ‘user pays’ principle). For example an increase in fuel duty of $0.03 per liter could lead to initial revenues of $145 million in 2015, generating revenue of $3.4 billion over the 2015-45 period. This revenue stream alone would adequately fund both an Integrated Traffic Management System and Inter-operator Fare Collection.

Revenues from these sources may be used by cities either to finance a project in its entirety, or to seed fund new initiatives and open up opportunities to access funding from development bank loans or private finance mechanisms, among other sources.

How to Make it Happen

In addition to finance, a series of other enabling actions are required to support the implementation of transport technology solutions in cities. An enabling framework for HCMC would include effective cooperation between stakeholders at various levels of city administration, ensuring the development and delivery of an integrated multi-modal transport plan. This may require the implementation of updated policies to guide the development of urban planning, the evolution of new bodies to coordinate cross-sector activities, the training of staff to operate new equipment and analyse the output data and trends, and the pursuit of new approaches to secure alternative sources of financing.

The results from this report are not unique to Ho Chi Minh City and may be applicable within the context of any city, regardless of infrastructure age or scale of operation. They are particularly pertinent however, to cities like HCMC that are facing significant weather related risks and severe road traffic congestion. For these cities, technology solutions and an integrated framework for their implementation would help not only to improve the functionality and efficiency of the future system, but also to enhance the characteristics of resilience by creating redundancy, responsiveness, coordination and flexibility.
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