How technology will shape transportation in smart cities

In the coming decade, several converging trends will amount to the most transformative change to impact global cities and public transportation since the automobile, says Adam Cohen, University of California, Berkeley.

Mobility as we know it is undergoing notable change that will transform cities, businesses and society.

In recent years, socio-economic forces – coupled with advancements in technology, social networking, location-based services, wireless services and cloud technologies – are contributing to the growth of shared and on-demand mobility.

Increasingly consumers are turning to on-demand and app-based mobility services for an array of transportation choices.

A recent global **study from BAI Communications** revealed that transportation plays a vital role in creating smart, world-class cities. Eighty-three per cent of respondents said that innovative transportation is a key feature of a smart city and almost half (45 per cent) believe a city can't be considered world-class unless it has good digital connectivity.

The mobility ecosystem is on the verge of a transformation that will be enabled by connected technologies. Digital connectivity will enable travellers and our transportation systems to be fully connected at all times, not just to the Internet itself, but also to each other.

Trends driving mobility innovation

Increased environmental awareness, advancements in technology, rising life expectancies, households working longer, and Millennials entering the workforce are contributing to fundamental changes impacting mobility. These changes are contributing to five converging mobility innovations:

- **Shared mobility:** Shared mobility enables users to gain short-term access to transportation modes on an 'as-needed' basis. The ecosystem of shared transportation services continues to grow and includes an array of services, such as car-sharing, microtransit, shared micromobility (e.g., bike-sharing and scooter-sharing), transportation network companies and public transportation.
- **Digital information and fare payment integration:** These services can help bridge information gaps, make multimodal travel and public transit more convenient, and enhance decision-making with dynamic and real-time information throughout an entire journey
- **The commodification of transportation:** Consumers are assigning economic values to modes and engaging in multimodal decision-making processes based on a variety of

factors such as cost, journey time, wait time, number of connections, convenience and other attributes. Rather than making decisions between modes, mobility consumers can make decisions among modes, in essence 'modal chaining' to optimise the route, travel time, and cost.

- **Automation:** Vehicle automation also has the potential to create new and exciting opportunities for both the public and private sectors, such as cost savings; automated pick-up, drop-off and charging; and more economical and convenient demand-responsive services.
- **Electrification:** Electric drive vehicles that use one or more electric or traction motors for propulsion can reduce GHGs and other emissions, mitigating many of the transportation-related impacts associated with increased urbanisation in cities.

Technology reshaping cities

Technology is changing the way we travel and reshaping cities and society. BAI's study found that 81 per cent of rail users believe advances in transportation technology are either changing the way they use public transportation or increasing its use.

As technology has evolved, it is enabling a new generation of connected travellers or "digital natives" who are more attuned to real-time transportation information and increasingly demand continuous data connectivity throughout their journey.

In the coming decade, these converging trends are likely to be the most transformative change to impact global cities and public transportation since the automobile.

In particular, vehicle automation will likely result in fundamental changes to cities by altering the built environment, costs, commute patterns and modal choice.

Vehicle automation will likely change the nature of longstanding modal relationships that have existing in transportation for years and presents several potential opportunities for smart cities and public transportation.

Opportunities for public transportation and smart cities

Technology can serve as a transportation "multi-modal multiplier" for smart cities and improve the effectiveness of public transportation. The digitisation of public transportation with real-time information, mobile applications, and other technologies can enhance the customer experience and allow travellers to make more informed and efficient mobility decisions.

Public transit providers have the potential to leverage data and predictive analytics to reduce inefficiencies and pre-position equipment and personnel to better meet rider demand, reduce wait times and increase ridership by targeting customer needs.

BAI's study of rail users found that advances in transportation technologies are changing the way riders use public transportation. Two-thirds of respondents said that

real-time traveller information simplifies planning and booking, done typically through a mobile app.

What is clear is that public transportation, cities and society are on the cusp of changing rapidly as advancements in mobility and technology converge in the marketplace.

Increased urbanisation in our cities will continue to impact and be impacted by these mobility innovations. The convergence of digital information and fare payment; the commodification of transportation; vehicle automation and electrification; coupled with shared mobility will cause a fundamental change in how people live, work, and travel every day.

Adam Cohen is a mobility futures consultant and transportation researcher at the Transportation Sustainability Research Center at the University of California, Berkeley. His work has focused on shared mobility, automated vehicles, urban air mobility, smartphone apps, and emerging technologies. He has co-authored numerous articles and reports in peer-reviewed journals and conference proceedings. His academic background is in city and regional planning and international affairs.