Securing the Vertical Space of Cities

By Muhammad Faizal Bin Abdul Rahman

Synopsis

Cities are increasingly exploring vertical spaces as a viable and smart approach to address the physical challenges from growing urbanisation. Given that urbanisation could shape the nature of crime and security threats, the approach should involve forward planning for homeland security strategies.

Commentary

A PASSENGER drone (UAV) - EHang 184 - was unveiled in February 2017 at the World Government Summit held in Dubai where the Road and Transportation Agency of the United Arab Emirates then announced its plans to commence regular flights (flying taxis) by July 2017. In Singapore, researchers at the Nanyang Technological University are designing an air traffic management system for drones. In London, the new mixed-use *Canaletto* tower was designed to create vertical communities.

Such developments not only underscore the practical utility of new technologies and architectural ideas but more profoundly how growing urbanisation and the advent of smart cities herald the increasing territorialisation of the vertical space. The foreseeable mixed use of the vertical space in cities – vertical urbanism - would have strategic implications on homeland security.

Rise of the Vertical Space

To sustain long-term economic vibrancy and livability, cities and city-states are grappling with the complex challenges of accommodating increasing population density and economic activities amid land constraints. With innovation and the use of disruptive technologies, the optimisation of the urban space could expand radically

beyond existing concepts of land use zoning and high-rise residential and commercial buildings to include the mixed use of the vertical space.

Socio-economic activities and infrastructure could develop in novel ways in the vertical space as the ground would be less horizontal. Futurists have envisioned the proliferation of vertical communities in cities as more, taller and smarter buildings sprout in each precinct, with amenities such as parks and schools at the upper levels. High-rise farms could feed the growing population of land-scarce cities while minimising the risks of droughts and diseases. Integrated road-rail viaducts such as the Tuas West Extension in Singapore could enhance transport connectivity while reducing road congestions. As the technology and regulations on the use of drones improve, the lower airspace could function as streets in the sky for certain public and commercial activities.

Indeed, the scale of vertical urbanism could potentially broaden as communities, corporations and governments discover novel applications from high-rise, high-density infrastructures and drone technology.

Strategic Considerations

Besides safety and privacy concerns, vertical urbanism could have deep policy implications as it entails the vertical expansion of public space and therefore introduces strategic considerations for governance, including homeland security. These considerations could include delineation between privately-owned and navigable lower airspace; circumstances where the aerial vantage point of drone traffic or high-rise activities could encroach into private space; enforcement of drone traffic; and monitoring of vertical space for law enforcement and security.

Vertical urbanism could expand the operating terrain and scope in the policing of public space, and create new points and lines of vulnerabilities that could complicate policing and emergency response efforts. The vertical space, in addition to the streets, could present additional vectors for evolving crime and security threats.

For example, the proliferation of drones in increasingly high-rise cities could inspire new criminal tactics of home invasion that evade the surveillance gaze of street-level police CCTVs. A terrorist drone attack on a high-rise communal space could generate an alarming spectacle and panic comparable to an attack on a crowded ground. Cyber threats arising from the use of drones for "rooftop packet sniffing" could become more substantial as more essential services in buildings, including homes and businesses, are connected to the smart infrastructure.

The security agencies' resources would be stretched and their current operational tactics and procedures would be challenged. There would be implications on surveillance, and performance in terms of police presence and incident response.

Effective Vertical Policing

Securing the vertical space of cities of tomorrow would fundamentally entail more than traditional strategies for vertical patrols and neighbourhood watch. Strategies for intelligence, operational capabilities and community vigilance would need to

adapt to meet the challenges. Intelligence-led policing would require a three-dimensional appreciation of the operating terrain as crime hotspots, persons of interest and anomalous activities including hostile drones might not be horizontally limited to the streets. This approach could also help ascertain whether any vertical space is optically or/and physically inaccessible to security forces, thus creating a vacuum in security.

Operational capabilities need to adapt by tailoring tactics, procedures and training to suit the vertical terrain, including in the interception of hostile drones. Leveraging new technologies - police drones, high-rise CCTVs, IoT sensors in buildings and etc. - could enable better mobility and reach in order to surveil and respond to incidents at vertical locations; as stated in a paper on "SMART policing for smart cities" commissioned by the Indian Police Foundation Community vigilance would be crucial in supporting security agencies to monitor and deter threats in the vertical space but this requires the elements of the security awareness and sense of guardianship in the community. These elements could be fostered through regular social interactions as indicated in a paper on "Planning for Vertical Community Safety" by the Australian Criminology Research Advisory Council. However, challenges abound as factors such as the physical features of high-rise buildings and socio-cultural differences arising from migration from within and outside the country could potentially hamper social interactions.

Given the need to develop effective vertical policing strategies, security agencies would have to participate in the planning and development of vertical space in cities. This should begin with close coordination with the public, private and community stakeholders from the outset.

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