THE ROLE OF REAL ESTATE IN SMART CITY DEVELOPMENT

INTRODUCTION

Throughout history, technology has played a critical role in the evolution of cities. Urban sanitation can be traced to the Indus Valley Civilisation, the remnants of which were found to incorporate early waste and drainage systems, making streets and waterways more hygienic. Underground railways introduced in London in the 19th Century alleviated congestion on busy urban streets and enhanced the movement of residents and workers. Elevators, first trialed in the U.S. in the mid 1800’s, transformed city skylines and redefined urban life.

As in the past, the next era of urban innovation will be based on advances in technology. This time, however,
progress will be in the digital realm, where emerging technology such as artificial intelligence, cloud computing and the Internet of Things (IoT) is facilitating the emergence of Smart Cities featuring advanced information and communication technology, helping drive sustainable development and improving the quality of life.

This ViewPoint by CBRE Research explains how real estate has a key role to play in Smart City development and is also set to be one of the major beneficiaries of this new technology. It also includes a summary of several major Smart City initiatives currently underway in Asia Pacific.

WHAT IS A SMART CITY?
Definitions of Smart Cities vary from broad descriptions such as the Smart City Council’s “a city that has digital technology embedded across all city functions” to more data-driven explanations such as IBM’s “a city that makes optimal use of all the interconnected information available today to better understand and control its operations and optimise the use of limited resources”.

Frost & Sullivan define Smart Cities as those that are built on smart and intelligent solutions and technology that will lead to the adoption of at least five of the eight smart parameters displayed in Figure 1. Smart Cities

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1 Reframing Smart Technology for the Smart City, Frost & Sullivan, 2017
are usually led by metropolitan authorities in collaboration with the private sector, especially leading technology companies, along with local tertiary education organisations.

Practical examples of Smart City technology include transportation management systems (“Smart Mobility”), energy efficient buildings (“Smart Buildings”) and advanced water monitoring systems (“Smart Infrastructure”). In the future, Smart City technologies are likely to expand in scope and revolutionise areas such as healthcare, education and policing, while also supporting the growth and development of engaged residents capable of understanding and utilising digital solutions and services (“Smart Citizens”).

Smart City development is being hastened by the emergence of the Internet of Things (IoT), the interconnection via the Internet of computing devices embedded in everyday objects, enabling them to send and receive data; and Big Data, which refers to the huge volume of information generated by the relentless improvement in computer processing, storage and machine learning.

Together, these two elements enable the real-time collection and analysis of data related to the functioning of a city, bringing with it myriad benefits including more informed decision-making and city planning and the more effective utilisation of infrastructure. This improves efficiency and enables cities to function far better than they do at present.

WHAT DO SMART CITIES MEAN FOR REAL ESTATE?

The integration of Smart Buildings with the components listed in Figure 1 will bring a multitude of benefits for the real estate industry, while redefining several long-standing trends and fundamentals. CBRE Research expects to see the following impacts:

**Data-driven real estate development:** The increased availability of data will enable stakeholders to better understand a property or site, its surroundings and its residents. This can be used to guide site selection, the planning process and building design. Examples include an investor using foot traffic data generated by embedded sensors to inform its selection of sites to construct new retail premises, or a tenant doing the same to lease a property. However, given privacy concerns, this could be challenging unless such data is provided by the government as open source.

**Smart buildings’ competitive advantage:** Smart buildings, which use automated processes to control a variety of operations such as tracking and managing energy, environment, security and other key features, are expected to see stronger demand in the coming years (Figure 2). The main drivers of smart buildings are energy saving and lower carbon dioxide emissions. Energy management systems can help landlords achieve higher cost savings while the IoT enables them to collect real time data and act before problems arise. Some smart buildings have already advanced from energy management to renewable energy generation.

Most landlord respondents (84%) to CBRE Research’s recent technology survey believe that technological innovation will drive stronger demand for smart buildings². Smart buildings are expected to command a premium as they will be more attractive to potential tenants due to their prestige and comparatively lower operating costs. In turn, this will drive stronger investor demand for such properties.

However, the development of smart buildings in Asia Pacific is still at a nascent stage. Installation and development costs are key concerns among landlords, particularly as many tenants are unwilling to pay a premium for such space. CBRE Research believes it will be essential for landlords to partner closely with tenants when developing smart buildings, and to engage with tenants at the planning stage to ascertain the features and technology they require. Although the
development of smart buildings in Asia Pacific has been slower than that in North America and Europe, CBRE Research foresees that Asian corporates, especially Asian-based tech companies, will drive the next wave of smart building development.

**Asset flexibility:** Advances in technology are transforming the traditional process of companies deciding on a location where they would like to do business; buying or leasing an office; fitting it out to their specifications; and installing it with technology for their staff to perform their jobs. The digital age is reversing this process; individuals are in the driving seat and companies’ decisions are being informed by connectivity and accessibility as well as talent attraction and retention. While location will remain important, this will require buildings and workspaces to be far more flexible and adaptable than before. New developments will therefore have to be constructed with flexibility in mind.

**Real estate as a service:** Technology is enabling employees to work offsite while fostering a more creative and sharing culture within companies, business units and individual teams. This, together with increased transparency in real estate performance and access, is supporting a shift from traditional fixed-term leases to service-based models currently provided by co-working operators and, increasingly, by similar offerings from landlords. Technology is also enhancing mobility within companies’ own workplaces, which emphasise user experience and brand recognition, something that co-working cannot provide.
Data centre demand: Data centres are set to play a leading role in Smart Cities as repositories for the massive volume of data required to be collected, stored, analysed and archived (Figure 3). Data centres are already becoming as important a part of business operations as office, retail and industrial assets, supported by the increasingly digital world, IT development and the importance enterprise IT strategy plays in business delivery. This will drive demand for state-of-the-art data centre development in and around Smart Cities.

Related trends include the application of edge computing, which optimises cloud computing by processing analytics as close to the source as possible (“the edge” of the network), thereby reducing latency and increasing efficiency. CBRE Research expects to see buildings in the Smart Cities of the future process data on-premises in small purpose built facilities similar to current machine rooms. Modern smart buildings are already taking on many of the characteristics of data centres, such as providing access to rich fibre networks.

**FIGURE 3: DATA GENERATED BY A SMART CITY**

- **CONNECTED FACTORY**
  - 1PB per day
  - (0.2% transmitted)

- **SMART GRID**
  - 5GB per day
  - (1% transmitted)

- **SMART HOSPITAL**
  - 5TB per day
  - (0.1% transmitted)

- **SMART CAR**
  - 70GB per day
  - (0.1% transmitted)

- **CONNECTED PLANE**
  - 40TB per day
  - (0.1% transmitted)

**INTELLIGENT BUILDING**
- 275GB per day
- (1% transmitted)

Source: Cisco Global Cloud Index, 2015-2020
SMART CITY INITIATIVES IN ASIA PACIFIC

CHINA: China’s central government began promoting Smart Cities in the early 2010s as part of an overall national strategy. More than 500 cities in China have since launched Smart City projects. Among these is Hangzhou, which since 2016 has been partly administered by a local government collaboration with Alibaba and Foxconn known as “City Brain”. This artificial intelligence system gathers data on residents’ movements, activity on social networks, shopping habits and other aspects of urban life, and uses it to make real-time decisions. City Brain notifies authorities of emergencies and provides residents with information such as weather reports and road works via text message to their mobile phones. The project has been hailed a success, with traffic congestion, road accidents and crime all reported to have declined in the first year of operation.

KOREA: In January 2018 the Korean Ministry of Land, Infrastructure, and Transport unveiled its Smart City Promotion Strategy, under which Smart Cities will be constructed in Sejong and Busan City within the next five years. Plans to revitalise existing cities with Smart City features are also well underway. Areas of focus include renewable energy; intelligent transportation systems that provide real-time road information; CCTV control systems; smart farms; disaster monitoring; and facial recognition payment systems.

INDIA: In 2015 the government unveiled its “Smart Cities Mission” - an urban renewal and retrofitting programme with the aim of making designated areas within 100 cities across the country more citizen-friendly and sustainable. In February 2018 it was announced that HPE had been selected to create India’s first cloud-based integrated command and control centre. The centre will monitor and administer multiple city civic utilities and citizen services through a central cloud.

SINGAPORE: Singapore launched its “Smart Nation” initiative in 2014 to expand and integrate its digital, physical and data infrastructures with the objective of improving the country’s efficiency and quality of life. Smart initiatives revolve around health, living, mobility and public services. Trial projects include mobility on demand, a real-time demand driven transport system accessed via an app; integrating smart technology into public housing; and a mobile app providing members of the public with environmental news updates and enabling them to report municipal issues.

AUSTRALIA: In 2017 the Australian government announced 52 projects across the nation had been awarded funding under the first round of its Smart Cities and Suburbs Programme announced a year previously. The initiative aims to encourage local government to partner with tech experts to make cities and suburbs more liveable, sustainable, and productive. Projects include app-based infrastructure upkeep detection platforms and those that enable the automatic dispatch of maintenance crews, along with digital platforms that support city services.
CONCLUSION

The real estate sector is set to play a significant role in the movement towards Smart Cities. Investors, owners and occupiers are advised to identify the impact of Smart Cities and formulate strategies to capitalise on this change.

While the real estate industry is making rapid progress in the development and innovation of Smart Buildings, it is critical that they gain a thorough understanding of how these developments will fit into and align with the broader Smart City ecosystem.

CBRE GLOBAL RESEARCH

This report was prepared by the CBRE Asia Pacific Research Team, which forms part of CBRE Global Research – a network of preeminent researchers who collaborate to provide real estate market research and econometric forecasting to real estate investors and occupiers around the globe. For more information regarding this research report, please contact:

RESEARCH

Jonathan Hills
Senior Director, Research, Asia Pacific
Jonathan.Hills@cbre.com.hk

Tom Duncan
Executive Director, Data Centres, Asia Pacific
Tom.Duncan@cbre.com.sg

As technology exerts a greater influence on all aspects of our lives, this report series examines the various dimensions and impacts of technological change in the workplace.