

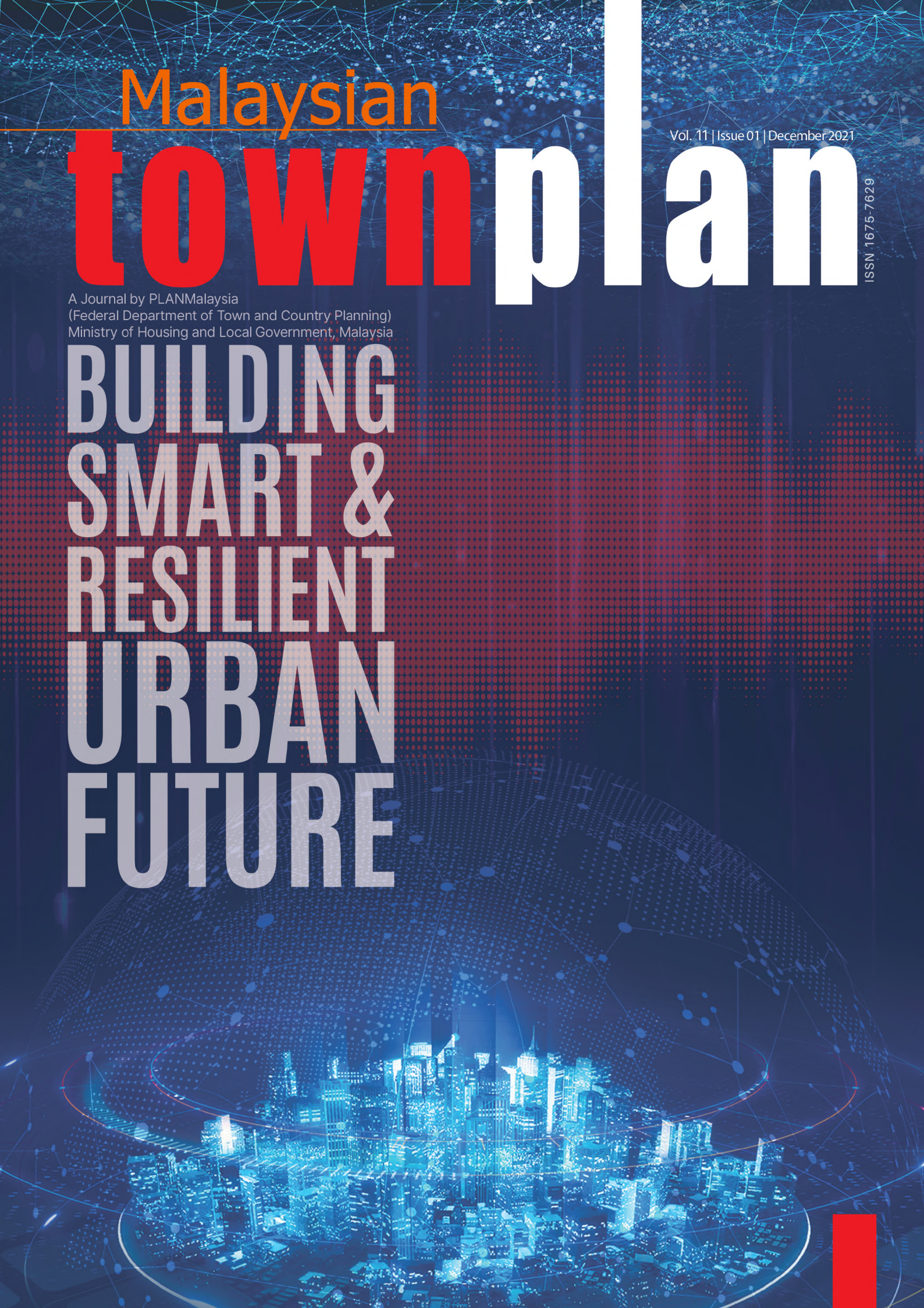
Malaysian **town**plan

Vol. 11 | Issue 01 | December 2021

ISSN 1675-7629

A Journal by PLANMalaysia
(Federal Department of Town and Country Planning)
Ministry of Housing and Local Government, Malaysia

**BUILDING
SMART &
RESILIENT
URBAN
FUTURE**



Malaysian townplan

PLANMalaysia

Perancangan Melangkaui Kelaziman
Planning : Beyond Conventional

Federal Department of Town and Country Planning
Ministry of Housing and Local Government, Malaysia



Malaysian townplan

11

MALAYSIAN TOWNPLAN

This journal is a publication of PLANMalaysia (Federal Department of Town and Country Planning), Ministry of Housing and Local Government, Malaysia. Presint 1, 62000 Putrajaya.
Tel : 603 - 8091 0000
Fax : 603 - 8091 0455
Webpage : <http://www.planmalaysia.gov.my>

ADVISOR

TPR Gs Dr. Shamsaini Shamsuddin

CHIEF EDITOR

TPR Dr. Alias Rameli

COORDINATOR

TPR Dr. Chee Ping Ngang

EDITORIAL BOARD

TPR Dr. Dzul Khaimi Khailani
TPR Abdulhan Abdul Lamit
Dr. Chua Rhan See
TPR Dr. Yong Chee Kong
TPR Dr. Wong Seng Fatt
Datin Paduka TPR Dr. Dahlia Rosly
Prof. Dato' Dr. Ahmad Nazri Ludin
Dr. Soheil Sabri

EDITORIAL STAFF

Pn. Suraya Badaruddin
En. Abd Talip Abd Rahman
Pn. Lilian Tai Yee Chi
Cik Nor Nadiyah Najib
Pn. Fauziah Abd. Jalil
Cik Tuminah Paiman
En. Hamdan Sapri
En. Muhamad Faizal Abdul Aziz
En. Khairul Redza Kalip@Khalid
Cik Siti Sarah Hanim Basri

EDITORIAL POLICY

The contents of this journal do not necessarily reflect the views of PLANMalaysia nor are they official records. Manuscript or articles submitted which do not conform to the conventions of the journal may be returned to the authors for revision. The Editorial Board will not take any responsibility for any information published in this journal for their authenticity.

**MALAYSIAN TOWNPLAN
DECEMBER 2021**

Contents

Editor's Jotting 04

City and Planning 05

Features 09

- 1) Post Covid-19 Pandemic : 10 Potential Focus Areas to Reshape Cities 11
- 2) Smart City Planning : Why is it so important? 23
- 3) Key Benefits of Enterprise Architecture in Managing Smart Cities – Focus on IoT and Digital Twins 35
- 4) Implementing Smart City Concept in Malaysia : Contemporary Challenges, Strategies, and Opportunities in the Covid-19 Era 43
- 5) New Norms : Reviving the Heritage Shop House Facades at Batu Gajah, Perak 57
- 6) Geospatial Enablement to Facilitate Urban Planning Commitments on Resilient Cities in Malaysia 65

Book Review 77

Programmes/Updates 87

Blast from the Past 97

EDITOR'S JOTTING

This year Malaysian Townplan Journal is filled with articles on smart city initiatives and COVID-19 challenges that leave an impression and relatable in urban planning context. Smart City Initiatives promoting digitalization of our cities draw attention among city planners in the country. Digital, the way it scales, transpires and immerses in our lives, will potentially benefit and challenge our existing urban governance system. However, we should not view emerging technologies as the only tools that are completely under our conscious control, neither as external forces that cannot be guided, instead we should seek to understand how and where human values are embedded within new technologies, and how these can be shaped to enhance the common good, protect the environment and social well-being.

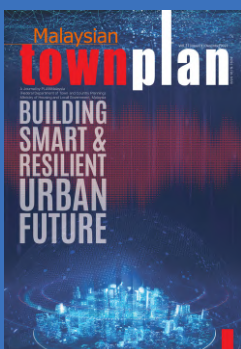
The ways in which technologies are changing the systems that surround us and impacting the lives of everyone especially in urban areas are evident. The articles present challenges and principles critical to realizing a human centered future through smart city initiatives, discuss ways in which urban planning and technologies are inter-connected, offer a framework for understanding and deepening the role of urban planning in emerging technological era especially during the Covid-19 pandemic and how we pave our ways through the next Fourth Industrial Revolution that promotes technology in our future cities.

Covid-19 introduces us to the new normal paradigm where technology has become part of our daily lifestyle. It manifests how emerging technologies interact with one another and co-evolve as our relationship with data is transformed, our cities are reformed and human beings are enhanced. Thus, the interpretation through spatial planning using current system needs further enhancement.

Integration of spatial land use and technology needs to be enhanced together with good planning principles and values. It must be designed in such a way to meet our future urban challenges. Nevertheless, the provision for the right infrastructure to cope with such changes is inevitable and forthcoming. The journal closes with critical urban planning issues that everyone must tackle together to create an inclusive sustainable urban planning future. We hope you gain benefits from the articles published and enjoy the updates we've made to this edition and please tell us what do you think!!.



TPr Dr. ALIAS BIN RAMELI
alias@planmalaysia.gov.my



Cover Design

Building resilience in the age of
COVID-19 by urban digitalization

Designed by : En. Khairul Redza Kalip@Khalid

An aerial photograph of the Kuala Lumpur skyline at sunset. The Petronas Twin Towers and the Kuala Lumpur Tower are prominent. The city is densely packed with skyscrapers and residential buildings. The sky is filled with soft, golden light from the setting sun, and the mountains in the background are silhouetted against the horizon. The title 'City & Planning' is written in a large, white, cursive font across the lower half of the image.

City & Planning

Tuminah Paiman
Siti Sarah Hanim Basri

1 PUTRAJAYA

01

CITY & PLANNING

The creation of Putrajaya marked a new milestone in Malaysian urban planning. The planning and development of Putrajaya are special because it involves mainly the local professionals in the planning, design, and construction process. It was a great challenge to the team to embark on a project representing Malaysian value and culture. Putrajaya Masterplan stemmed from five alternative conceptual ideas namely - Build with Nature, Garden City, The Crescent, Sub-urban, and Elevated Linear City. These ideas were presented to the government and subsequently, Garden City Concept was chosen. Putrajaya masterplan is highly commendable because of the quintessential green and blue linkages, made up from green open spaces, man-made lakes and wetlands. The city is divided into core area, with precincts dedicated for government and commercial buildings, and peripheral precincts act as residential neighborhoods. Putrajaya is planned with urban quality of life in mind with a clear identity and character rooted in local culture and tradition supported by timeless architecture and urban design. It is the country's largest urban development project on a Greenfield site set to be a model city of sustainable development.



2 PETALING JAYA

When Petaling Jaya was first introduced in the early 1950s, it was basically to resettle the squatters of Kuala Lumpur. However, good planning based on residential neighbourhood units, supported by a wide range of commercial, financial, and administrative benefits, as well as recreational parks and gardens, soon began to attract the affluent. Its strategic location, coupled with good accessibility, also attracted a wide range of industries. Subsequently, the objective of resettling squatters was superseded by the growing demand for better

quality housing from a rapidly emerging middle class that has significantly transformed the city to what it is today. In the 1920s, the land routes from Klang to Kuala Lumpur was divided into two paths which are one towards the north along Damansara Road and the other towards the south along Old Klang Road, following the river and railway line. It is between these two old historic and strategic routes that Petaling Jaya has risen as the first new town of Malaysia, a town which today is a modern suburban-styled city.



3 RIVER OF LIFE

Kuala Lumpur River of Life goal is to transform Klang and Gombak Rivers into a vibrant and liveable waterfront with high economic value. In order to achieve this goal, Kuala Lumpur City Hall has divided the project into three main segments which are River Cleaning, River Beautification and Land Development. River cleaning programs improved the water quality in total of 110 km stretch along the Klang River basin.

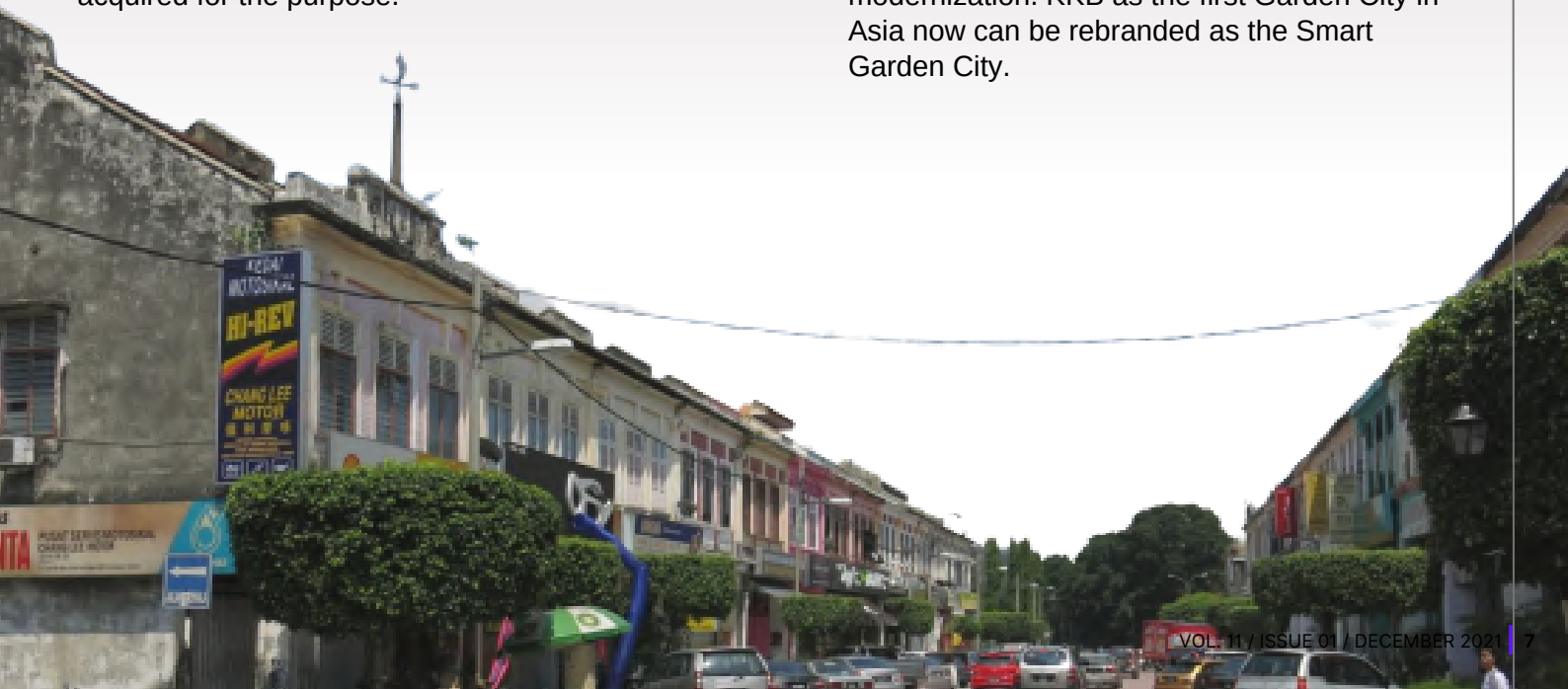


The idea of river beautification is to transform the Klang and Gombak Rivers into a vibrant and liveable waterfront with high economic value through revitalisation of public realm along the rivers and provide a consistent design signature, a brand for the city riverfront, in planning, architectural, functional, and economic terms. Beautification works will be carried out along 10.7 km stretch of Klang and Gombak River corridor where significant landmarks are located such as Dataran Merdeka, Bangunan Sultan Abdul Samad and Masjid Jamek. Finally, land development aims to stimulate economic investments into the surrounding river corridor areas. Apart from that, potential government lands have been identified and will be tendered out to private developers through competitive bidding to encourage economic activities along the river corridors.

4 KUALA KUBU BHARU

Historically, Kuala Kubu was well-known due to the Selangor Wars in 1870 and destruction of the dam at Ampang Pecah. In 1924, Charles Reade, the first Government Town Planner of the Federated Malay States designed the town based on Garden City Principles. The first approved town plan for Kuala Kubu Bharu (KKB) covered an area of approximately 333 acres of state and private lands acquired for the purpose.

Garden City design elements were translated and applied in KKB, such as green belts, enhance natural landscape view, low density houses, town vista and views, topography preservation, separation of land use and many more. At present, KKB development tries to retain its invaluable town planning heritage and embraces smart city initiatives to suit modernization. KKB as the first Garden City in Asia now can be rebranded as the Smart Garden City.

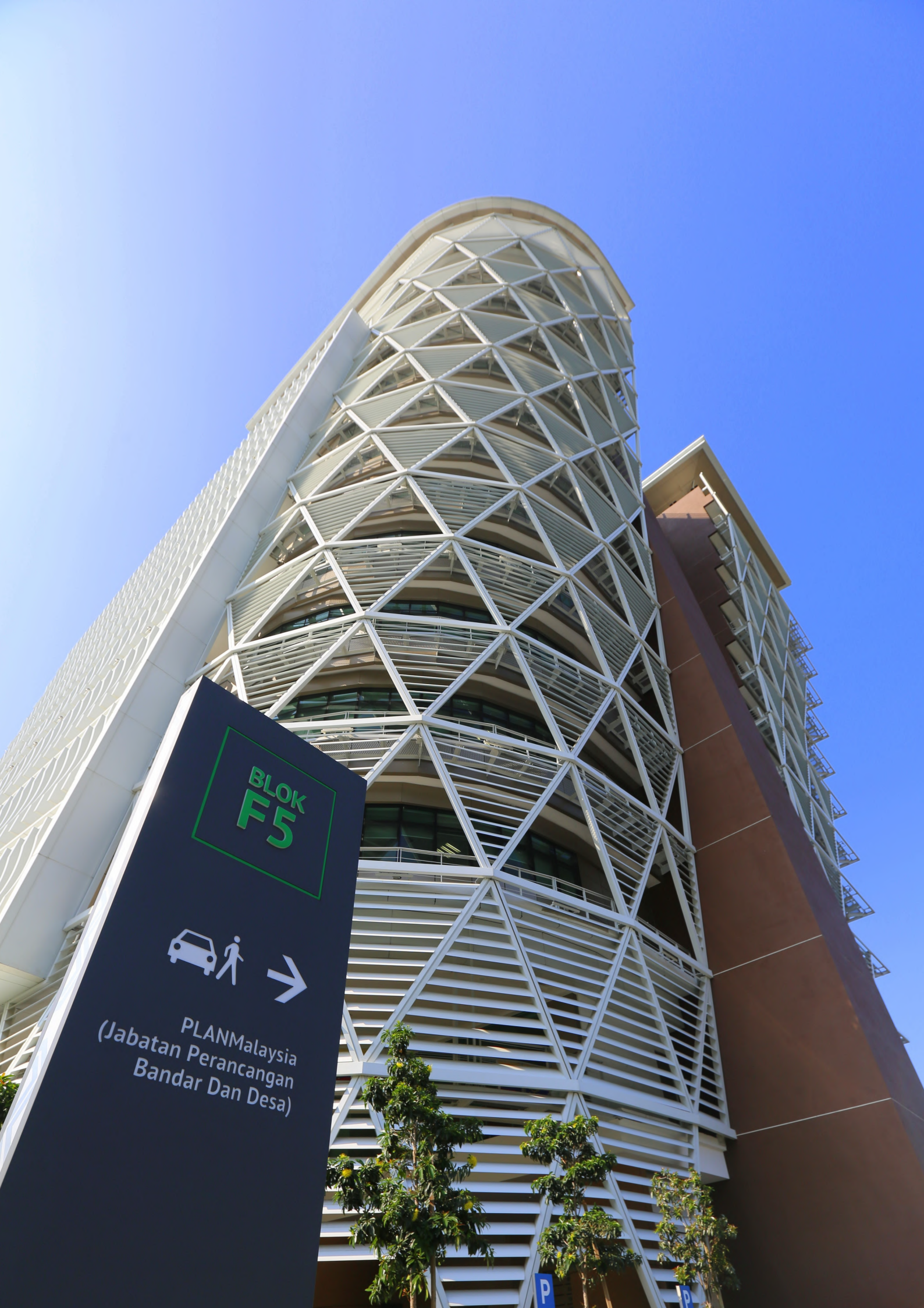




An aerial night photograph of a city skyline. In the foreground, there is a large construction site with cranes and illuminated structures, and a park area with trees and a winding path. The middle ground is filled with numerous high-rise buildings, some of which are under construction. The background shows a hazy mountain range under a twilight sky with soft pink and blue clouds.

Features

Abd Talip Abd Rahman
Muhamad Faizal Abdul Aziz



BLOK
F5



PLANMalaysia
(Jabatan Perancangan
Bandar Dan Desa)





TPr Dr. Alias bin Rameli

Director

*Research and Development Division, PLANMalaysia
Ministry of Housing and Local Government*



TPr Dr. Chee Ping Ngang

Deputy Director

*Research and Development Division, PLANMalaysia
Ministry of Housing and Local Government*

POST COVID-19 PANDEMIC: 10 POTENTIAL FOCUS AREAS TO RESHAPE CITIES



ABSTRACT

Cities are hotspots for COVID-19 infections due to high concentration of populations and immense economic activities. The pandemic has inevitably affected our urban life, both spatially and socially. Human mobility has become more restricted and limited to mostly homes and neighbourhoods. As working from home has become a feasible option for most citizens, the demand for affordable yet spacious housing with integrated public spaces is getting intensely crucial.

While these new changes and needs pose challenges to planners, it should be seen as unique opportunities to reset and reshape urban planning. Manifested throughout history, pandemics had shaped the elements of cities that we are all familiar with today. Actions, guidelines and policies related to sanitation, housing, infrastructures were made as measures to cope with the effects of past pandemics, both revolutionarily and transformatively. This paper aims to firstly, understand and highlight the impacts of COVID-19 on urban planning, and then propose 10 recommendations, focusing on making cities more resilient and sustainable.

INTRODUCTION

Covid-19 pandemic has ravaged the globe and brought unprecedented disruptions across the world. In the face of adverse impacts, the world is now experiencing not only a public health crisis, but also encompassing severely adverse social and economic impacts, making the systems more vulnerable than ever (Cheshmehzangi, 2021). As a containment measure to the virus, many countries shut national borders, declared emergencies and enforced movement restrictions both people and goods. In fact, what has emerged as a health crisis in the short term may well have far reaching impacts on education, food security, inclusive and economic development in the long term (United Nations, 2021). The pandemic has further exposed the vulnerability of developing and third world countries in terms of limited domestic financial resources, high debt levels, fragile health systems and weak governance, thereby exacerbating the already fragile system, and widening the divide between the rich and poor, and the inequalities between developed and under-developed countries.

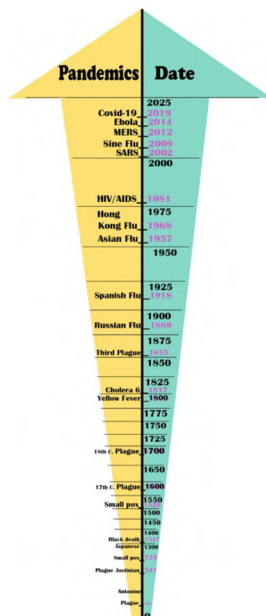


Figure 1: History of Deadliest Pandemics
(Source: Sara & Dalia, 2020)

PAST PANDEMICS AND URBAN PLANNING

Throughout history, starting with the Athenian plague in 430 B.C. until the Spanish Flu in the 20th century (Figure 1), pandemics and epidemics had acted as catalysts in transforming the way cities were planned with health issues reflected in architecture and urban planning (Sara & Dalia 2020). In the early 19th century, a series of global Cholera epidemic outbreaks was found to be the consequences of poor urban deplorable living conditions where clean drinking water was contaminated by wastewater (WHO 2020). The disease had a major impact on improved waste management on the streets which supported a strong demand for adequate ventilation to access higher levels of daylight at open spaces (Sara & Dalia 2020).

The Spanish Flu pandemic (Figures 2 and 3), the deadliest respiratory virus pandemic in history that took place during World War I between 1918 and 1919 and killed more than 50 million people worldwide, its widespread was believed to be also caused by the unhealthy crowded living conditions at the army camps and urban squalid living spaces with bad ventilation. As a result of the pandemic, measures were taken to slow down urban growth, public transportation usage was replaced with walking on uncrowded streets, most of the population stayed at home, and sidewalks at night were unusually clear, masking and social distancing was introduced, which is similar to the current pandemic situation (Michigan 2020).



Figure 2: Spanish Flu 1918 - 1919

On the other hand, Tuberculosis had significantly influenced architecture and urban planning from the beginning of 20th century until the 1960s, especially in modern public housing development. Furthermore, public parks had also become popular during the widespread Tuberculosis in the United States. Scientists at that time found both air and sunlight were very curative to Tuberculosis. The landscape architect and public health officer Frederick Law Olmsted at that time started designing public parks, such as the Emerald Necklace in Boston and Central Park in New York City (Sara 2021).

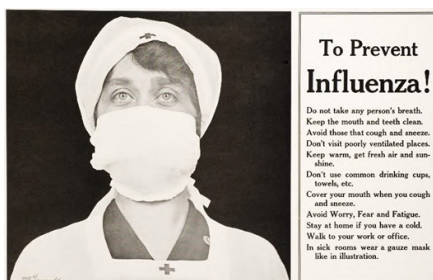


Figure 3: Standard of Procedures Imposed During Spanish Flu (1918 – 1919)

The 2003 Severe Acute Respiratory (SARS) epidemic in the Asian countries accelerated the upgrading of medical infrastructure, database and mapping of diseases. Disease mapping, which provides a visual representation of the geographical distribution of a disease within a population, has become a valuable tool in determining the source of an outbreak, and suggesting a targeting approach to contain the disease (Boulos 2004). The aim of these mapping services is to educate the public and assist public health authorities in analysing the spatial and temporal trends and patterns of SARS and assessing as well as revising the current control measures.

Since the outbreak of the COVID-19 crisis in 2019, scientists have been constantly identifying factors driving the spread of the virus, its subsequent environmental and socio-economic impacts, and necessary recovery and adaptation plans and policies. Given the high concentration of population and economic activities, cities are often hotspots of COVID-19 infections (Sharifi & Garmsir 2020).

COVID-19 PANDEMIC : AN OPPORTUNITY TO RESHAPE CITIES

Professionals and scientists around the world have suggested public health to be the fundamental of city planning in post COVID-19 pandemic, where cities must promote people's well-being while reducing the risk of disease contraction. Cities should take lessons from the crisis to emerge stronger. As a discipline that provides geographical expression to the economic, social, cultural and environmental policies of society, spatial and urban planning must take this opportunity to rethink the current approach for a more just, resilient and sustainable environment.

In April 2020, over 40 million health professionals from 90 countries urged the G20 leaders to put public health at the centre of national economic recovery packages to help avoid future crises and make the world more resilient. All countries shall take this opportunity for a green recovery from the pandemic. Later in June 2020, the World Economic Forum launched "The Great Reset initiative" responding to the urgent need required for the global stakeholders to cooperate simultaneously and manage the

direct consequences of the COVID-19 crisis while seeing this situation as an opportunity to improve the state of the world.

COVID-19 IN MALAYSIA

COVID-19 has brought immense impacts to the Malaysian economy (Figure 4). In 2020, the GDP plunged a record of -17.1% in the 2nd quarter as a result of the first nationwide lockdown with slight recovery at -2.6% growth in the 3rd quarter. In 2021, while the 2nd quarter indicated a huge improvement of GDP by 16.1%, the impact of another total lockdown (from 1 June to 28 June 2021) has once again caused a gloomy situation with -4.5% growth in the 3rd quarter. The unemployment rate in Malaysia stood at 4.8% in July 2021, slightly improved from 5.3% in May 2020.

As a measure to contain the spread of the virus, social/physical distancing was introduced, and people's movement has been controlled since March 2020. The unprecedented new normal emerges as a substitute to the normal lifestyle, navigating us through the COVID-19 pandemic. The virus has pushed our workforce into massive remote working experience with working from home arrangement. Virtual platforms such as zoom, webex and skype for business quickly replace traditional physical meetings. Schools are closed more than 6 months in a year and students are forced to embrace online learning. The already robust online shopping is accelerated by the pandemic and the subsequent movement controls. More than two-thirds or 73% of Malaysians polled in a new survey by Standard Chartered (StanChart) revealed that the outbreak of the COVID-19 pandemic has made them more positive about online shopping.

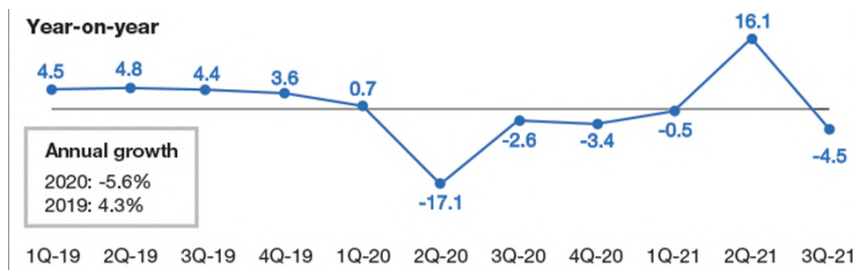


Figure 4: Malaysia's Quarterly GDP Growth
(Source: Department of Statistic Malaysia, 2021)

COVID-19 AND URBAN PLANNING

As urban planners, we shall observe and contemplate, would the new normal such as work from home, virtual classroom, virtual meeting and on-line shopping stay and prevail in the post pandemic era? Should we prepare our future to accommodate these new normal as long-term measures or merely short-term Standard Operating Procedure (SOP)?

PLANMalaysia, as the federal agency spearheading spatial planning and sustainable development agenda in Malaysia is currently looking at 10 potential areas which shall serve as opportunities to transform our cities, by lessons learnt from the current COVID-19 pandemic as follows:

- Density and Urban Form
- Reduced Crowding in Public Transportation and Active Mobility
- Neighbourhood Based Planning
- New Trend of Commercial Development
- Space and Design of Housing
- Farming in the City
- Planning for Digital Infrastructures
- Planning for Migrant Workers
- Adaptive Reuse of Building and Land and Flexible Design
- Smart Cities Development

DENSITY AND URBAN FORM

In the early phase of the pandemic, where the rule of physical distancing was imposed, density was targeted as the source of virus spread and vulnerability due to most infections taking place in cities. However, later evidence revealed that there is no correlation between density and infection rates (Fang and Wahba, 2020). Shanghai and Zhuhai with population density nearly 20,000 per square kilometres recorded lower infection rate compared to Wenzhou and Xinyang which have a population density less than 10,000 per square kilometres (Figure 5).





Figure 5: Infection Rates of Coronavirus and Population Density of Chinese Cities
(Source: Fang and Wahba, 2020)

A quick comparison of cities globally in relation to COVID-19 infection rates does not reveal any direct relationship between COVID-19 infection rates and population density. The study by UN Habitat suggests that cities with lower population densities, such as Los Angeles and Brasília, have had much higher infection rates per 100,000 than cities with much higher population density such as Mumbai, Dhaka and Hong Kong (Figure 6) (UN Habitat, 2021).

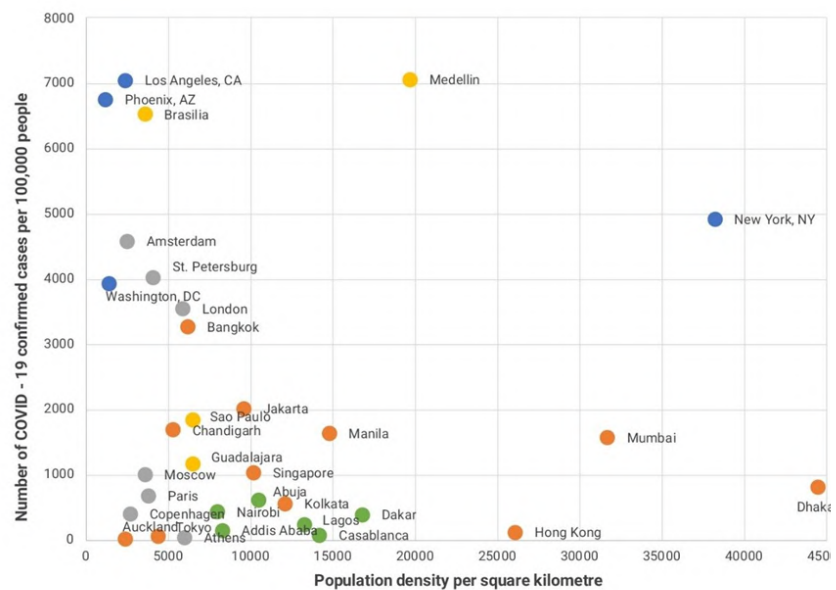


Figure 6: Infection Rates of Coronavirus and Population Density of Global Cities, December 2020
(Source: UN-Habitat, 2021)

These studies show that well-planned, densely populated cities with mixed use development often have better economic performance and more resources for an emergency response and may stay relevant even after pandemic COVID-19. When supported with good design and adequate service provision, density can enable connectedness and emergency response. Apart from reducing the need to travel and promoting accessibility to major land uses, mixed use development is also supporting low carbon cities development for climate change mitigation. However, overcrowding and places with poor connectivity are found to be vulnerable.

REDUCED CROWDING IN PUBLIC TRANSPORTATION AND ACTIVE MOBILITY

Across the globe, public transport services have been significantly interrupted during the COVID-19 pandemic mainly due to the movement restrictions and perceived safety risk by the travellers. On the other hand, the service frequency was reduced by transit service operators due to the reduced demand and revenue generation. People avoided taking crowded public transport to reduce the virus transmission.

In Malaysia, the public transportation system equally suffered during the Movement Control Order (MCO). Ridership dropped approximately 80% for KTMB and 66% for RapidKL buses due to the SOP such as halving maximum passenger numbers and seating capacity, and of the public's fear of contracting the virus (The Centre, 2020).



Figure 7: Cyclists are Given Priority over Motorists in UK

In many developed countries across Europe and America, the pandemic has acted as a catalyst for the commuters switching to active transport modes. Cities such as New York and Philadelphia reported a substantial increase in number of cyclists (more than double) during the beginning of the pandemic, closely associated with the unusually empty streets and better air quality. The UK's Association of Cycle Traders reported a boom in mending as people retrieved old bicycles from their sheds, while one of the largest bike suppliers in the United States ran out of stock on some of its top selling models as sales surged.

In Wuhan, where the Covid-19 outbreak first emerged, bike-sharing services have increased up to tenfold in ride orders since the lockdown was lifted as compared to pre-crisis levels (Sung & Monschauer, 2020).

As a result, many cities around the world have announced their plans to convert streets permanently for pedestrians and cyclists. The pandemic has given an opportunity for urban planners to redesign cities, giving priority to favour pedestrians and cyclists.

PLANMalaysia is preparing Planning Guidelines for Active Mobility, as a guide to the state and local authorities in drawing out plans and infrastructures to support a range of active mobility including walking, cycling and usage of other light weight motor-assisted transportation. Cities shall give priority to improve active mobility and improve first and last mile connectivity to public transport. Active mobility is also considered as one of the best initiatives to reduce carbon emission.

NEIGHBOURHOOD BASED PLANNING

If all of us may recall, the first phase of MCO in Malaysia has set a travel restriction to all of us within 10km from our dwellings. Travels are limited to only essential services. The allowable travelling distance is actually corresponding to the classic concept of Perry's Neighbourhood Unit (Figure 8).

This concept of neighbourhood unit, is an early diagrammatic planning model for residential development in metropolitan areas. It was designed by Perry in the early 1900s to serve as a framework for urban planners attempting to design functional, self-contained, and desirable neighbourhoods in the industrialised cities. The model has since then been utilised as a mean of ordering and organising new residential communities in a way which satisfies contemporary "social, administrative and service requirements for satisfactory urban existence".



Figure 8: Clearance Perry's Neighbourhood Unit, 1900s

A self-sustained neighbourhood is a land use model with all essential services such as public facilities, recreation, grocery shopping and working places located within 15 minutes travelling time from home. If all our cities are planned to uphold the principle, the spread of diseases may be easily contained, and the travel restriction may be easily imposed. Many countries have also started to reintroduce the planning model using different terms, such as i) 15-Minute City in Paris (Figure 9); ii) Every One Every Day in London; iii) 20-Minute Neighbourhood in Melbourne, and iv) Superblock Planning in Barcelona.

Malaysia shall anticipate the growing interest in this land use model with greater emphasis on local living: placing essential services within 15 minutes walking distance, giving weight to public service accessibility preferable connecting to public transport system, promoting decentralisation of services and commercial activities, reducing development of big scale commercial premises, and unnecessary travelling beyond neighbourhood unit using private transport. This can bring a variety of health and economic benefits including **supporting smaller businesses and minimising the need for lengthy journeys by private or public transport.**



Figure 9 : 15-Minute City in Paris

NEW TREND IN COMMERCIAL DEVELOPMENT

Unprecedented lockdown since March 2020 witnesses global disruption of businesses, economies, and livelihoods. New consumer behaviour emerges alongside new trends in businesses which are anticipated to survive post COVID-19.

The COVID-19 pandemic has speeded up non-physical shopping during and after MCO in March 2020, the closure of physical stores and the imposed social distancing measures led consumers to ramp up online shopping, which in turn accelerated the e-commerce market growth in Malaysia. According to the Department of Statistic Malaysia (DOSM), the national e-commerce income by establishments recorded a total of RM279.0 billion, a year-on-year increase of 17.1 percent in the third quarter of 2021, with a positive indication of 4.3 percent for the quarter-on-quarter growth. From January to September, e-commerce revenue totaled RM801.2 billion, which is a 23.1 percent year-on-year increase. The scenario is in line with the global trend, of which Alibaba's online platform recorded a 41% increase of online sales from 2011 to 2021 during the pandemic.



Beside the changing trend in retail shopping, many major companies across the globe had announced their plan of working from home for their employees. For example: Twitter made a drastic move by announcing staff are allowed to work from home 'forever', Facebook expects half of employees to work remotely over the next 5 to 10 years, and JPMorgan's staff will continue to work from home even after COVID-19 ends. Businesses such as Grab Food and Food Panda take the centre stage when physical restaurants are shut down with people shunning away from dining in (Figure 10). New business models emerge where commercial activities do not necessarily take up huge spaces. The trend of working from home will also potentially be permanent for businesses of which the operations do not require face to face contact.



Figure 10 : New Trend : Food Delivery Business

Additionally, we witness new trends of commercial development such as i) co-working space, with reduced individual office space requirement but shared space; ii) multi-distribution centres which support growing logistic demand, iii) home-based businesses; and iv) cloud/ghost kitchen to optimise the efficiency in food delivery. The kitchens are located in areas with a high concentration of delivery demand.

Whether as a short term scenario or new normal of post COVID-19 pandemic, these new trends have certainly posed challenges to urban planners with rethinking the planning and provision of future commercial spaces is required. Hybrid usage of properties and mixed-use development will potentially be well sought after in the near future.



SPACE AND DESIGN OF HOUSING

As all employers across the world have “work from home” practice since the beginning of the COVID-19 pandemic, the perspective on how we view our home has subsequently changed. Home has become a multifunctional space for us not only to live, but also to work, study and play.

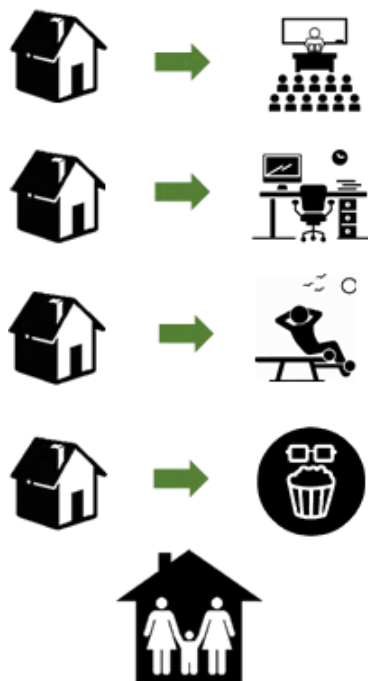


Figure 11: Home Becomes Multi-Functional Spaces During Pandemic

However, a decent housing condition is not universally provided for all especially the under privileged groups. The Economist on the 26th of March 2020 highlighted the concern over the devastating impacts of COVID-19 on low income countries. The lower income group and daily wagers will suffer the most as their dilapidated living conditions make social distancing impossible, lack of clean water stops them from frequent hand washing, and poor financial status deprives them from possessing hand sanitizer. Locally, research by Universiti Kebangsaan Malaysia in April 2020 revealed that dwellers in low-cost housing in Malaysia experienced higher stress levels as a result of their less conducive living environment.

Therefore, revisiting the planning and space design for future housing is a must to make sure the poor deserves a conducive shelter, and to focus on space per person and number of rooms available rather than merely a space allocated within

walls. All houses should be equipped with adequate public facilities and have easy access to basic services as well as recreation areas, internet services and public transport. The pandemic makes inclusive development more relevant than ever. A sustainable future city shall be a city of equality that will benefit all city dwellers.

Alongside basic planning for the vulnerable, new housing concepts have also emerged and are expected to stay beyond the pandemic era. The Edge on the 9th August 2021 highlighted a list of key trends for post-pandemic housing design which include:

- Flexible spaces for living and working (Figure 12);
- Divisible rooms;
- Designing for cleanliness;
- Indoor ventilation quality;
- Access to outdoor space, and
- Space for community interaction.



Figure 12: Flexible Spaces for Living and Working

FARMING IN THE CITY

During the COVID-19 pandemic, disturbances in food supply chains, shock in food production and a decline in incomes and remittances have created tension about food insecurity in countries (World Bank, 2020). This has directly impacted the cost of essential goods thereby high inflation on food products. The Food and Agriculture Organisation's (FAO) Food Price Index (FFPI) found that global food prices in November 2021 hit 134.4 points, the highest in 10 years.



Figure 13: Urban Farming Gaining Its Popularity During Lockdowns

Locally, Malaysia has not reached the level of self-sufficiency for basic food. As reported in the Agrofood Statistics 2019 by the Ministry of Agriculture and Food Industries (MAFI), Malaysia's self-sufficiency level of major food commodities for 2019 including rice, vegetables, fruits, beef and liquid milk stood at 63 percent, 44.4 percent, 78.2 percent, 22.3 percent and 63 percent respectively. The total imports of foodstuff in 2019 amounted to RM51.4 billion as compared to RM50.14 billion in 2018. As a result, the world has started to recognize the importance of decentralising the food system and creating food self-sufficiency by encouraging urban agriculture and through high tech farming.

Urban agriculture is growing food in urban spaces. It comes in many forms, but the most popular ones are urban farms, community gardens, and hydroponics or aquaponics programs. Urban agriculture can stimulate the local economy and provide local communities with easy access to food. It is not a new concept but shall be reemphasized during and after the pandemic. The Ministry of Housing and Local Government has developed a Policy for Urban Farming to ensure continuous and uninterrupted food supply after the pandemic, and to boost cities' local economy. PLANMalaysia is committed to the planning and implementation of community farming by coordinating the Green Neighbourhood Award annually to encourage local communities undertaking community farming to reduce carbon emission. The future Local Plans shall identify areas suitable for urban agriculture, either for short term or long-term usage. Focus shall be given on utilising government reserved land, reuse of old buildings, structures and sites for vertical planting and promoting high technology farming close to densely populated areas.

PLANNING FOR DIGITAL INFRASTRUCTURE

Pandemic COVID-19 shuts down schools, businesses, work places, and forces millions to stay at home for extended lengths of time. Massive workforce is put into a great “work from home” experiment, and students have been forced to e-learning for more than 6 months in a year. COVID-19 has changed our lives, making internet access a necessity and an essential good.

Nevertheless, COVID-19 has also exposed the digital divide between regions and countries. Despite the global growth of digital technologies, a 2021 United Nations report noted that nearly half of the world’s population, 3.7 billion people, lack internet access. As a result of the digital divide, under developed countries lag in terms of digital economy, public health and vaccine distribution, and online education. These growing digital divide and economic disparities in the COVID-19 era highlight the fact that technological revolution on its own cannot bring inclusive economic growth or distributional justice (Li, 2021).

In Malaysia, digital divide between urban and rural areas is pertinent whereby the challenging geographical terrain in rural areas has constrained efforts in ensuring coverage of digital infrastructure and services. Lack of digital accessibility has aggravated inequality in economic opportunities and widened the rich-poor gap. The 12th Malaysia Plan outlines strategy to strengthen provision of digital infrastructure and services with the rolling out of the National Digital Network (Jendela), which aims to provide 100 percent 4G network in populated areas and 5G network and fibre optics network to more than nine million premises by 2025.

As urbanisation continues, it is necessary to take stock of how digital access may exacerbate the already ingrained inequalities and differences within cities which have dampened the efforts for sustainable urbanisation. Spatial plans, policies and guidelines shall be realigned to facilitate the planning and provision of digital infrastructure, both at the early stage for new development planning sites and later stage for the already developed areas.



Figure 14: The JENDELA Plan is formulated to provide wider coverage and better quality of broadband experience for all Malaysians

PLANNING FOR MIGRANT WORKERS

In many countries, such as Singapore, Malaysia, Kuwait, United Arab Emirates (UAE) and Bahrain, migrant workers’ living and working places have become the epicentre of COVID-19 pandemic. The migrant workers have become one of the most vulnerable populations amidst the pandemic. Existing reports and studies indicate that poor living and working conditions, including cramped dormitories and unsanitary conditions, had led to the rapid transmission of COVID-19 among migrant workers (World Bank, 2020).

Malaysia receives at least two million migrant workers mostly from Indonesia and Bangladesh, comprising 15% of the total employed persons (DOSM 2020). Migrant workers provide a vital contribution to Malaysia’s economy, mostly employed

in agriculture, construction and manufacturing sectors. According to the Ministry of Health Malaysia, most of the Covid-19 positive cases in Selangor, Kedah, Negeri Sembilan and Johor are made up of migrant workers. Immigration detention centres, construction sites and factories have become the Covid-19 hotspots. Crowded living conditions and poor hygienic practises are among the factors that lead to the high infection rate.

As the nation is responding to Sustainable Development Goals and inclusive growth, the planning to fulfil the basic needs, welfare, and the living standard of the migrant should not be overlooked. In July 2019, the Workers’ Minimum Standards of Housing and Amenities Act 2019 (Act 446) was amended by the Parliament to extend the mandatory provision of decent accommodation for migrant workers in the construction sector, apart from the existing plantation and mining sectors. PLANMalaysia has taken a further step to develop Application Procedures for Temporary Labour Quarters (TLQ) and Planning Guidelines for Centralised Labour Quarters (CLQ) to translate Act 446 into spatial planning and implementation procedures. The list of criteria contains minimum standards of accommodation, basic amenities, hygiene, and safety provisions for migrant workers.



Figure 15: Act 446, Application Procedure for TLQ and Planning Guidelines for CLQ

ADAPTIVE REUSE OF BUILDING AND LAND AND FLEXIBLE DESIGN

Adaptive reuse is any redesign, renovation or reuse of existing built space originally dedicated to one use but then repurposed for another. As demand for the types of spaces we use shifts and evolves, adaptive reuse enables us to enlist already developed land and buildings to satisfy new demand and uses (UN Habitat 2021).

In response to the sudden surge of COVID-19 cases, quick and short-term measures focusing on repurposing land and building usage for pandemic recovery have been implemented in many countries. For examples, public spaces have been converted to medical purposes (quarantine centre, screening spaces); hotels are repurposed to quarantine centre; housing, commercial, and industrial spaces are converted to temporary labour quarters; and under-utilised lands are converted to agriculture usage to encourage shorter supply chain during crisis and source of income for the urban poor.

Moving forward, cities should identify multipurpose buildings and spaces which can be easily repurposed for emergency usages in the face of future crises. Building and zoning codes must be reviewed to ensure the adequacy and well distribution of these buildings and spaces across cities. Modification of zoning shall be considered for areas with a great and prolonged surplus of commercial spaces, either by converting this surplus into housing, or suggesting hybrid land uses (mixed usage of commercial and residential activities).

SMART DEVELOPMENT

CITIES

Smart city is defined as a city that uses ICT, technology, and innovation advances to address urban issues and aims to improve the quality of life, promote economic growth, as well as develop a sustainable and safe environment to encourage efficient urban management practises. In Malaysia, Smart City aims at addressing urban issues and challenges towards achieving three main pillars of competitive economy, sustainable environment, and enhanced quality of life through Malaysia Smart City Framework (2018).

Pandemic COVID-19 has provided additional momentum for smart city development, whereby smart cities are considered as an important tool for pandemic prevention and control without having to enforce strict lockdown policy due to the roles contributing to urban management, travel reduction and information sharing (Yang & Chong 2021). Smart technology provides solutions in terms of identifying infected individuals, predicting diffusion dynamics, minimising human to human contact, enabling enforcement, as well as tracking social distancing and quarantine rules. Many smart cities have used urban observatory to collect and store real time data such as mobility, patterns of human activity and changes of behaviour that support data-driven and evidence-based responses made by the authorities during pandemic.



Source: Berita harian online 2020



Figure 16: Countries Around the World Set Up Field Hospitals to Combat Pandemic COVID-19

(Source: London Evening Standard, 20 March 2020)



Figure 17: Malaysia Smart City Framework and Malaysia Urban Observatory

Malaysia is committed to implement the Malaysia Smart City Framework by mainstreaming its strategies into development plans and development control. So far, seven cities in Malaysia have developed Smart City Blueprint as a guide to navigate the respective development pathway towards smart city.

CONCLUSION

This article highlights the impacts COVID-19 pandemic have created globally, causing sequential effects to economy, social and environment sectors. While past pandemics caused detrimental global and societal impacts, they have also brought silver lining to the transformation of urban planning practices. These practices have since then not only served as best practices but also stay relevant until today. COVID-19 pandemic should be seen as an opportunity for urban planners to transform cities. This article suggests 10 potential development changes because of COVID-19 pandemic. COVID-19 shall be a wake-up call to all of us, especially the urban planners to prioritise health-centric space design, and accelerate the sustainable development agendas. In fact, COVID-19 has made the implementation of Sustainable Development Goals 2030 more relevant. Lessons learnt from COVID-19 are valuable for Malaysia to advance into a much greener, smarter, and inclusive nation.

References:

- Boulos, M.N.K. (2004) Descriptive review of geographic mapping of severe acute respiratory syndrome (SARS) on the Internet. *International Journal of Health Geographics* 2004; 3: 2.
- Cheshmehzangi, A. (2021). Revisiting the built environment: 10 potential development changes and paradigm shifts due to COVID-19. *Journal of Urban Management* 10 (2021), 166–175.
- Editors, A&E (2020). *Pandemics That Changed History*. February 27, 2019, February 5, 2020 May 7, 2020; Available from <https://www.history.com/topics/middle-ages/pandemics-timeline>.
- Knobler S, Mahmoud A, Lemon S (Eds) (2004). *Learning from SARS: Preparing for the Next Disease Outbreak: Workshop Summary*. Institute of Medicine (US) Forum on Microbial Threats; Washington D.C.: National Academies Press (US).
- Li Cheng (2021). Order From Chaos: Worsening Global Divide as US and China Continue Zero-Sums Competition. <https://www.brookings.edu/blog/order-from-chaos/2021/10/11/worsening-global-digital-divide-as-the-us-and-china-continue-zero-sum-competitions/>.
- Michigan, U.o.M.C.f.t.H.o.M.a. (2020). The American influenza epidemic of 1918-1919, in *Influenza Encyclopaedia*; A Digital Encyclopaedia Reviewed May 4, 2020, Michigan Publishing, University of Michigan Library: A Digital Encyclopaedia.
- Sara El Tarabily, Dalia El Shenawy. (2020). Post-Pandemic Cities - The Impact of COVID-19 on Cities and Urban Design. *Architecture Research* 2020, 10(3): 75-84.
- Sara Jensen Carr (2021) *The Topography of Wellness: How Health and Disease Shaped the American Landscape*. The University of Virginia Press.
- Sung & Monschauer (2020) Changes in transport behaviour during the Covid-19 crisis: What can we learn from the lessons of the past? *International Energy Agency* 2020.
- S. Yang, & Z. Chong (2021). Smart City Projects Against COVID-19: Quantitative Evidence from China. *Sustainable Cities and Society* 70 (2021).
- The Centre (2020). What Is the Plan For Public Transportation In A COVID-19 World? Available from <https://www.centre.my/post/post-covid-19-public-transportation-plan-malaysia-government>.
- UN Habitat (2021). *Cities and Pandemic: Towards a More Just, Green and Healthy Future*. Nairobi: UN Habitat.
- W. Fang, & S. Wahba (2020). Sustainable Cities. *World Bank Blog*. Available from <https://blogs.worldbank.org/sustainablecities/urban-density-not-enemy-coronavirus-fight-evidence-china>.
- World Health Organisation (WHO). Health-topics, Cholera Reviewed May 4, 2020; Available from: https://www.who.int/health-topics/cholera#tab=tab_1.
- World Bank, 2020. Food Security and COVID-19. *World Bank Brief*. New York: The World Bank Group.
- World Bank, 2020. Potential responses to the COVID-19 outbreak in support of migrant workers. New York: The World Bank Group. Available from <https://openknowledge.worldbank.org/bitstream/handle/10986/33625/Potential-Responses-to-the-COVID-19-Outbreak-in-Support-of-Migrant-Workers-June-19-2020.pdf?sequence=7&isAllowed=y>.



TPr Gs Dr. Shamsaini Shamsuddin

Former Director General

PLANMalaysia (Department of Town and Country Planning)

Ministry of Housing and Local Government



Mr. Md Farabi Yussoff

Head of Smart City Unit

PLANMalaysia (Department of Town and Country Planning)

Ministry of Housing and Local Government

Smart City Planning : Why is it so important?



Government Efficiency
Governance effectiveness and ease of doing business



Sustainability
Environmental, energy, water and air quality management



Health and Wellness
Mental, physical and social care and well being



Mobility
Transportation, transit and traffic management



Economic Development
Business, employment and productivity



Public Safety
Welfare and protection from crime, hazards and disasters



Quality of life
Standard of living, satisfaction and happiness

INTRODUCTION TO SMART CITY

Globally, technology is found to be a common element in various definitions of a smart city. For example, TechTarget.com defines a smart city as “a municipality that uses information and communication technologies to increase operational efficiency, share information with the public and improve both the quality of government services and citizen welfare”. The Institute of Electrical and Electronics Engineers (IEEE) envisions a smart city as one that brings together technology, government and society to enable the following characteristics: a smart economy, smart mobility, a smart environment, smart people, smart living, and smart governance.

Smart city is seen as a new approach in urban management and development to make Malaysian cities more sustainable and liveable. At the same time, technological advancement and the usage of information technology (IT) applications make smart cities more practical and convenient for urban population and city managers. But what does a smart city really do? The common element among smart city projects worldwide proves that whatever technology or advancement being used, the similarities are the OUTCOMES - Smarter Smart Cities should be beneficial to the people (People Centric). The era of globalization without limitation has resulted in a shift of planning towards modern urban planning in line with technological advancement. This includes moving towards smart city planning in all dimensions of a city ecosystem such as governance, economic development, mobility, health, public safety and others.

MALAYSIA SMART CITY FRAMEWORK 2019 - 2025

The Malaysia Smart City Framework (MSCF) is a national level framework that serves as a guide and reference to Local Authorities as city manager, State Governments, Federal Ministries and agencies, industry players, academician and other stakeholders to holistically plan and develop smart cities in Malaysia in line with the current development agendas. The document includes a smart city definition in the context of Malaysia, seven (7) key components of smart city and policy directions. It outlines the proposed strategies and initiatives for each component to those who are interested in implementing smart city initiatives. In order to achieve this, MySmartCity 2025 vision has been set with a clear definition of Malaysia Smart Cities as 'Cities that Use Information and Communications Technology (ICT) and Technological Advances to Address Urban Issues and Increase Living Standards, Economic Growth, Sustainable Environmental And Urban Management' to achieve three main pillars of development, i.e., Competitive Economy, Sustainable Environment and Enhanced the Quality of Life for the benefit of Rakyat.

WHY DO WE NEED A SMART CITY?

The United Nations' Report on World Population Prospects 2019 stated that by 2050, the global population is expected to grow up to 9.7 billion, and two-thirds of that population will reside in cities. Today, cities are home to just over half of the nearly eight-billion world population. Intensive urban growth can lead to several pressing problems facing the world today such as:

01 | Waste Management



Malaysia's waste : 37,890 tonnes per day or 1.17 kg person / day (2019) compared average 0.74kg person / day by World Bank.

02 | Traffic Congestion



More traffic congestion due to hike of car ownership. At global level, it is estimated 1 billion cars will be in 2050 by World Bank. Meanwhile, 31.2 million vehicles were registered in Malaysia in 2019.

03 | Scarcity of Resources



Scarcity of resources either in the forms of land, natural resources, or capital. Global Population Demand by 2030: Food 30%, Water 40%, Energy 50%

04 | Deteriorating and Ageing Infrastructures



The American Society of Civil Engineers estimates that by 2020, "ageing and unreliable" infrastructure will cost American businesses \$1.2 trillion

Rapid urbanization, which strains basic infrastructure, coupled with more frequent and extreme weather events linked to global climate change is exacerbating the impact of environmental threats.

Making cities more resilient against these environmental threats is one of the biggest challenges faced by city managers and it requires urgent attention.

BENEFITS OF SMART CITY

Smart city technology can help cities to operate more efficiently and improve services delivered to citizens and businesses, among many other benefits. Smart city technology makes cities more effective and efficient, which is necessary given the projected growth of urban populations over the next few decades.

TEN (10) BENEFITS IN ENGAGING WITH THE SMART TECHNOLOGIES:

01 | More Effective, Data-driven Decision-Making

Advancements in "big data" and connected devices have allowed cities to access information that was not available before. When a city can monitor desired metrics in real-time, the level of services increases quickly. Big data and the Internet of Things (IoT) offer endless possibilities to enable better decision-making. This in turn, enhances the urban quality of lives through cost cutting and public service improvement.

02 | Enhanced Citizen and Government Engagement

Citizens today expect their cities to deliver robust and user-friendly digital services. Expanding digital services at community level makes smart cities a more attractive place for citizens to live by promoting a connected citizen experience.

03 | Safer Communities

Leveraging technology advances such as smart surveillance, improving emergency response and pursuing private/public partnerships help to reduce criminal activities and create safer communities in general.

04 | Reduced Environmental Footprint

Deploying air quality sensors around a city, for instance, can provide data to track peak times of low air quality, identify pollution causes, and deliver data analytics of which officials need to develop action plans. These sensors can help in laying a foundation for reducing air pollution in even the most populated cities, something that is sure to save lives since medical problems related to pollution have claimed millions of lives each year.

05 | Improved Transportation and Mobility

Connected transportation systems have some of the greatest potential to drastically enhance the efficiencies throughout a city. Technologies such as intelligent traffic signals optimize traffic flow and relieve congestion during peak travel times. Other smart transportation technologies, such as smart parking management, allows cities to capitalize on additional revenue streams.

06 | Increased Digital Equity

Smart city technology has the ability to create a more equitable environment for citizens. To ensure digital equity, individuals must have access to high-speed internet services and affordable devices. The adoption of public Wi-Fi hotspots strategically placed throughout a city offers reliable internet services to all citizens. The broader the digital connectivity, the more the public can enjoy city digital services.

07 | New Economic Development Opportunities

Providing an open access platform to city information will facilitate better decision-making in businesses through data analytics made available from integrated smart city technologies.

08 | Efficient Public Utilities

With a limited availability of natural resources to meet human demand, smart technologies are giving cities the tools needed to effectively conserve the natural resources while reducing the inadvertent waste of water and electricity consumption.

09 | Improved Infrastructure

Aging roads, bridges, and buildings are often costly to maintain and repair over their service lives. Smart technology equips cities with predictive analytics to identify and conduct preventive and corrective measures before failure occurs.

10 | Increased Workforce Engagement

Highly efficient workforce is essential for a fully functional smart city. Deploying smart technologies helps alleviate the burden of manual tasks that many city employees face daily.

Why is Smart Cities Planning Important ?

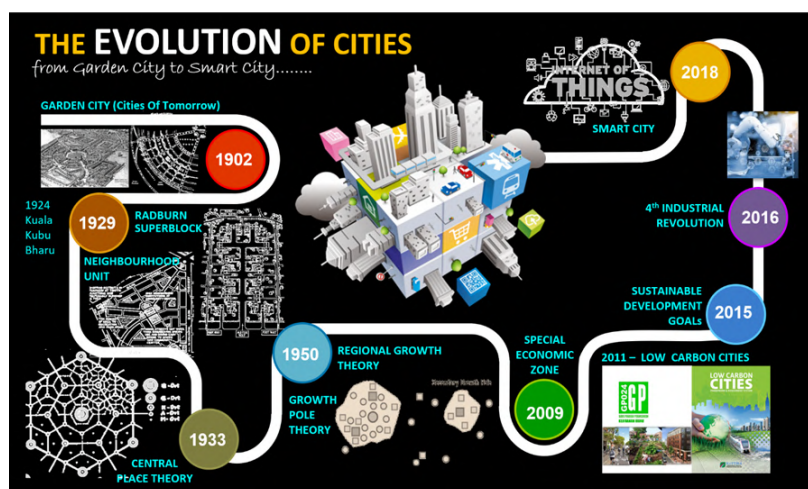
Why is Smart City Planning Important? It's not an overnight dream to become a smarty city. It needs proper planning. Integrating smartness into urban development and infrastructure projects offer cities the strategic clarity they need about the role of smart urban planning and design contributing to the better functioning of cities as a whole. Before we dive deep into the guides, let's have a look at the modern history of urban planning in Malaysia and its evolutionary development since the emergence of the garden city until the popularized smart city concept.

THE EVOLUTION OF MALAYSIAN CITIES

Urbanisation in Malaysia has experienced long-term evolution that shapes the cities today. It has been a century since the Garden Cities concept was first introduced in Kuala Kubu Bharu being the first planned township in 1924. At that time, it can be regarded as smart planning because it provides proportionate areas of business and residences, emphasising the urban landscape and beautification as well as security and accessibility. Eventually, new development concepts such as Radburn Superblock, Neighbourhood Unit, Central Place Theory and Regional Growth Theory were introduced, which influenced the urban development in Malaysia through the formation of urban hierarchy today.

The concept of smart cities has been around for almost three decades. It is not something new because it changes according to the age of technology. Although many cities worldwide have become smarter, most projects still tend to deal with only partial 'smartification'.

Fourth Industrial Revolution (4IR) has ushered smart cities to rely on most recent technological innovation such as, Internet of Things (IoT), Artificial Intelligence (AI), Virtual Reality (VR), Mixed Reality (MR as a combination of AR and VR), big data, Geographic Information System (GIS) and automation. These innovations will embed within our society and change the way we live, work and relate to each other. Smart city is seen as a new approach that integrates ICT in urban management and development to optimise the level of efficiency a city operates and provides its urban services to its citizens for better quality of life, thereby making a city more sustainable and livable.



PUTRAJAYA AS A SMART CITY

The planning and development of Putrajaya started all the way from 1995. It is another example of Smart City Planning set to meet the goal as an Intelligent Garden City.

What is 'Intelligent Garden City'?

When the government of Malaysia unveiled the Putrajaya project, it was referred to as "The World's First Intelligent Garden City". The underlying goal of developing Putrajaya was to create a 'model of intelligent (smart) city' that would set a new standard for Southeast Asian cities and would serve as a template for other cities to emulate. The intention was for it to become a city with sophisticated information networks based on multimedia technologies which serve as the digital backbone to support interactive government, community, commerce and society.

Putrajaya was referred to as 'garden city' to indicate the intended integration between 'garden' and 'intelligence' of which, parks and gardens become the centre of the city's development with 38% of the city being 'green'. A huge man-made water network was created to allow flooding valleys and small streams merged into one of the largest man-made lakes in the country. Hills and ridges formed some of the most stunning parks in the country while boulevards and roads were lined with trees and covered with generous landscaping.

The Newly Prepared Smart City Blueprint in Malaysia

The Putrajaya Smart City Blueprint was prepared and launched in 2017. The document serves as a guidance for all citizens, agencies and developers in Putrajaya towards a sustainable Smart City.

Today, state-of-the-art technology is found everywhere in Putrajaya, ranging from modern buildings to sophisticated infrastructure and facilities. The fact that Putrajaya was planned in tandem with the Multimedia Super Corridor and Cyberjaya has guaranteed the installation of the latest IT infrastructure in most offices, thus setting it much more advanced from other planned cities.

How is Putrajaya related to Cyberjaya?

CYBERJAYA SILICON VALLEY

Cyberjaya is adjacent to and developed along with Putrajaya. This town aspires to be known as the Silicon Valley of Malaysia. The launching of Cyberjaya was officiated by the former Prime Minister in May 1997.

Why Silicon Valley?

Silicon Valley refers to a region in Northern California, located southwards of the San Francisco Bay Area that is renowned as the global centre of high technology and innovation and is home to some of the world's largest technology corporations and thousands of technology-related start-up companies.

Cyberjaya Silicon Valley is part and parcel of the Malaysia Multimedia Super Corridor (MSC) development. It covered an area measuring 15km by 50km stretching from the Petronas Twin Tower at Kuala Lumpur City Centre to the Kuala Lumpur International Airport in Sepang, Selangor, including the new administrative capital of Putrajaya and the planned tech city in Cyberjaya. Cyberjaya is the core of MSC development, a designated Silicon Valley for technology entrepreneurs and global multinational businesses.

Cyberjaya today

Cyberjaya aspires to be a Smart and Low Carbon City by the year 2025, where 'smart' is defined as leveraging ICT infrastructure to improve the urban quality of life and well-being while 'low carbon' aims at applying environmentally responsible and sustainable approach to development.

Launched in November 2017, the vision set a clear guidance at high level to the formulation of action plans which are vital to guide the local authorities and its strategic partners, and/or other key stakeholders in its implementation.

The city currently has a population of approximately 90,000 people with a well-rounded eco-system for its citizens to 'Work, Live, Study and Play'. In 2016, Cyberjaya was developed into a city with a sizable population who would call Cyberjaya their home. The collective investment totalling more than RM20 billion made by more than 25 developers into various development projects has gradually transformed the city from merely an intelligent city, to also a liveable one.

ACCELERATING YOUR SMART CITY

Looking at the planning until the implementation stage of Putrajaya and Cyberjaya as smart cities, a learning curve of about 25 years was experienced by both cities to become what they are now. Other cities could leapfrog some of the process to becoming a smart city based on the experience of Putrajaya and Cyberjaya. How can we accelerate the process?

- **Standard on Smart City** – Smart City is the 'the thing' now, being the new trend in development. Standard serves as guidance and reference to its implementation, and puts any smart township on an international platform by sharing the similar school of thought and development direction.
- **Development Plan** – Be it a normal 4-tier planning development process (Act 172) or 4 levels of Smart City Planning, development plan is the key towards a better master planning for a long term project goal. It will act as the main reference for all stakeholders i.e., agencies, developers and the public to participate and collectively plan a better future.
- **Smart Initiatives at Project Level** – It is important for any project to already incorporate small scale projects to kick-off during the development planning stages which include the preparation for planning approval, building plan or engineering plan. For instance, projects to install the LED Street Lighting with sensor, smart traffic light, smart metre, waste management, CCTV and fibre optic telecommunication in the context of smart infrastructure.
- **Telecommunication Infra Stability** - Strengthening the core ICT infrastructure, and facilitating the development of an ecosystem to support the key technologies involved in digital infrastructure advancement is necessary to enable a smart city to efficiently operate according to its specific needs.

SMARTER CITY FRAMEWORK

Smart City Planning requires a strategic and comprehensive approach with several considerations and actions which need to be taken care are listed below :

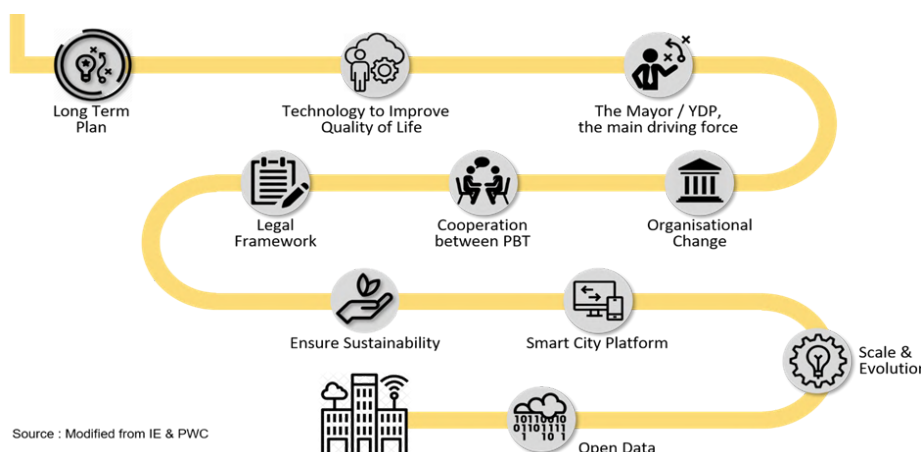
01 LONG TERM PLAN

Involving All Stakeholders | Ensuring Public Engagement | With Consensus and Communication

Goals to make a smart city need a long-term plan. The outcome is more important, and it must be people-centric rather than technological driven. Planning for a smart city needs the commitment from all stakeholders and engagement is vital. With proper planning, the resources either in human capital, financial, hardware and others will be used at an optimum level.

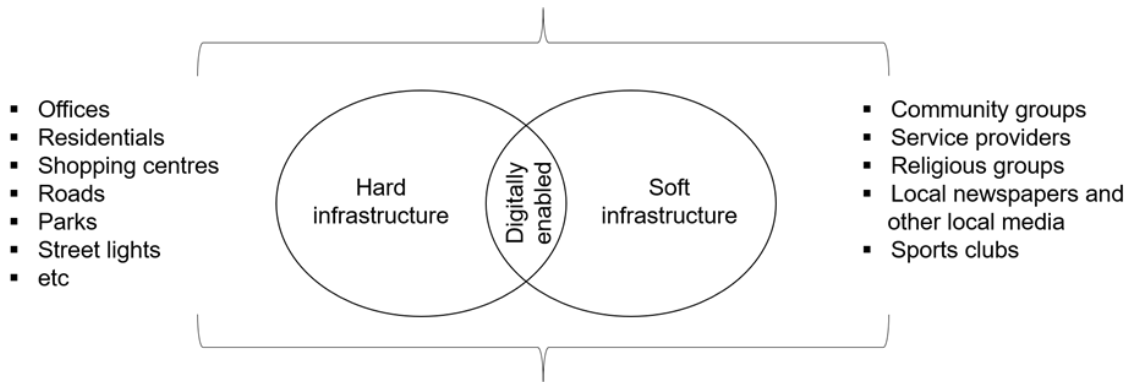
Short-term perspectives often result in solutions that are not innovative. Furthermore, many urban problems develop incrementally over a long time period. Therefore, it is important for the government to employ a long-term perspective of change.

We also need to take a synoptic perspective of urban change, particularly the dynamics and the importance of inter-sectoral coordination and integration for better public service delivery as a whole. Both our data analytics and data intelligence need to be better; we need to develop scenarios to look at 'what if' situations caused by extreme environmental and economic uncertainties, major demographic change such as ageing, and migration across national borders. These are the issues that would create shocks to the country and cities. While we can't stop them from happening, we can always be better prepared for them.



Place-making

Designing all aspects of the physical neighborhood. In partnership with community organisations and service providers, so that it works well for the people who will live in it and use it.



Smart city

"Effective integration of physical, digital and human systems in the built environment"
(PAS 180 definition)

Source: The British Standards Institution 2014 -

Urban Planning And Design in the Context of a Smart City

The concept of place-making has been a key part of urban planning and design for several decades. Place-making recognizes the importance of physical design of a neighbourhood to facilitate positive interaction between people and make it easy for them to navigate through it.

Smart city approach brings a step change to this by adding in the digital dimension.

The potential offered by digital technologies and communication to improve infrastructure will enhance and support better place-making processes and its agenda. These include:

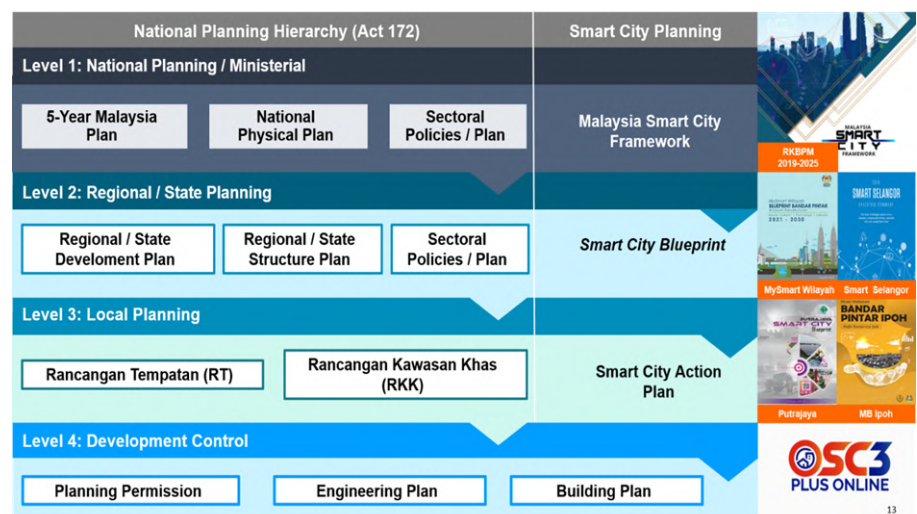
1) Utilising digital modelling, so that the engagement with residents, users and citizens are possible in undertaking any new infrastructure or development project for a more attractive neighbourhood design;

2) Utilising the ability to provide people with relevant information on transportation options which influence the overall travel patterns and habits (e.g., shared transport, public transport, bikes and walking). Subsequently, this could contribute to reduce the need for further investment in road infrastructure;

3) Enabling greater amount of data for urban management and service delivery. These include real-time data, to be collected, integrated and used to support neighbourhood management and service delivery, for the benefit of residents and visitors;

4) Utilising communications/social media to assist in making a community more cohesive and safer for its residents, support local initiatives for intended behavioural change, e.g., in terms of waste generation and energy consumption, which will then be reduced or without adding further demand on existing services.

SMART CITY PLANNING AND DEVELOPMENT PROCESS



Level 1: National Planning

At this level, planning policy makers set the overall goals, standards and management systems related to smart city aspirations which are clear and certain to the developers. Statements of planning policies and aspirations are listed to inspire developers to plan for developments which are smart city ready by identifying potential smart measures in their broadest sense at an early stage.

Level 2: Regional/ State Planning

At this level, consideration of smart city solutions should be taken. This is to ensure the potential benefits of emerging smart city solutions are already being considered in designing the key development areas of the city.

Level 3: Local Planning

At the local planning level, potential smart city solutions need to be identified. Clear goals which trickle down to comprehensive technical design criteria for citywide implementation of smart city services are necessary to set in a relevant context as well as strengthening the business case for implementation. In-depth measures and solutions should be provided to increase the smart capabilities in all developments and infrastructure projects.

For example, the national aspiration has set a few objectives including to achieve a 100% coverage with capacity up to 100mbps by 2025 in responding to the call for improving the digital connectivity outlined in the Pelan Jalinan Digital Negara (JENDELA) which was introduced by the Malaysian Communications and Multimedia Commission (MCMC). This aspiration needs to be trickled down based on the planning hierarchy.

02 TECHNOLOGY TO IMPROVE QUALITY OF LIFE

- Connectivity (digital infra), emergencies, public services, environment, transportation, lighting, telecare & open education

More Than Just Technology

Turning the Smart city notion into reality requires much more than just installing cutting edge technological solutions. While technology may not be a total solution for a city, it is definitely a crucial enabler towards smart cities development.

The vision of the 'Internet of Things'(IoT) and 'machine-to-machine' (M2M) interactions can only be materialised with the presence of high-speed internet (enabled by far-reaching broadband, fibre optic, wireless and mobile networks), sensor networks, RFID technology and more. At the local authority level, digital infrastructure needs to be prioritised, from its planning until implementation stage and its maintenance aspects. The local plans should integrate the initial aspect of digital infrastructure in the zoning and use class order in line with the projected growth of the city and its population.

In addition, strong leadership is crucial to create a vision as to how technology will be harnessed to improve the functions of cities and a collaborative mind-set is necessary to realise the vision. Without both, those elements, even the best technology will not ensure success.

Panic Button



Provides for an emergency response system in times of emergencies or natural disasters
Source: <https://www.wilayahku.com.my/>

E-wallets



Electronic wallets (e-wallets) are one of the best inventions of the 21st century. They're quick and easy, allowing people to make payments with a single tap.

Connectivity (Improving Digital Infra)



Digital infrastructures are foundational services that are necessary to the information technology capabilities of a nation, region, city or organization. By extension, digital infrastructure is necessary to the economy and quality of life of a modern nation

Integrated Transportation Information System



The system is used for traffic monitoring, accident, construction and other situations that happen on the roads and highways

03 THE MAYOR/ LOCAL AUTHORITIES LEADER

- The Main Driving Force to Ensure Resources Sufficiency and Consensus Building

LEADERSHIP: Mayor /Local Authorities Leader as the Main Driver

Smart cities require leaders who can drive a vision forward through to implementation. Leaders do not have to necessarily come from local governments. A city's 'smartness' begins at the planning stage. It is important to conduct a self-assessment to identify the existing strengths and weaknesses and ultimately decide on an overarching economic vision and the way forward.

It is also important to note here that there is no one-size-fits-all approach. The formulation of visions and policies for any city should not resemble those of successful cities without being tailored to its specific strengths and local conditions. Setting of vision, and the formulation of policies and strategies set a clear guidance at high level, which would have to be cascaded to local level to ensure overall cohesiveness and alignment.



04 ORGANISATIONAL CHANGE

- From horizontal to cross-functional Smart Cities is about De-Siloed

Smart Cities is about De-Soloed !

When you're trying to implement a large-scale change of any type, people can get territorial. Each agency has its own unique way of operating. Teams are understandably sensitive to any changes that might disrupt their routine. The problem that many digital transformation projects run into is a different division within the same organisation that is trying to solve the same problem in different ways. This makes collaboration harder, not easier. Any smart city initiative needs to make de-siloing a priority. Agencies or departments must share data and agree upon formatting standards and procedures so everyone can get the most out of it. This goes double for any new equipment or other infrastructure. For example, it makes sense to pair a traffic sensor with an air quality monitor. However, that can only happen with effective interdepartmental communication. 'Think big, and get everyone involved' is regarded as one of the critical success factors for a smart city's attainment.

'Full potential of smart city solutions can only be truly realised through scale and cross-party collaborations'

Most Smart city investments begin with the need to lower operational cost or to address isolated problems in a city. Often, departments within cities deploy these solutions in silos, independent of other authorities. However, the full potential of smart city solutions can only be realised through scale and cross-division collaborations.

For instance, complaints about commuting time or parking availability may result in investments in real-time traffic information systems and smart parking metres, which in turn, would help the police and emergency services to better monitor violations, traffic volumes and demand. In deploying these solutions, collaborations among the transport authorities, IT department, public safety unit, and offices in charge of customer service are required.



05 COOPERATION BETWEEN LOCAL GOVERNMENTS - Regardless of Scale



Cooperation Between Local Governments

Networking is a crucial factor for a city to become a smart city. Experience sharing on the individual learning curve among each other is crucial. The establishment of Smart City Network at regional and global levels has proven to be a good platform. Within the context of ASEAN, the ASEAN Smart City Network where YBhg. Datuk Dr Mary Wong (Deputy Secretary General of Policy and

Development), Ministry of Housing and Local Government serves as the National representative for Malaysia, has provided a platform to learn about the smart city initiatives and challenges. Within Malaysia, Perbadanan Putrajaya and Majlis Bandaraya Petaling Jaya are able and willing to share experience and knowledge with other local authorities.

06 LEGAL FRAMEWORK

Innovation public procurement models	Objectives-based procurement	That enables investment and longer contract terms
--------------------------------------	------------------------------	---

Smart city legislative framework is one of the major obstacles for a wider adoption of smart city concept at implementation level. Some procurement systems become challenging in implementation. While data sharing is inevitable in smart cities and for city surveillance, it is generally still not mandatory and without data, smart city initiatives are siloed. While finding the 'ideal' data sharing framework may be a challenge, consensus building among agencies and divisions is necessary for the collective benefits.



Source:
<https://bmilab.com/blog/2019/9/13/smart-cities-and-digital-innovation-a-guide-to-the-future>

07 ENSURE SUSTAINABILITY

Public-Private Partnerships | Development of New Business Models

The development and implementation of smart city projects require considerable investments that are difficult to source with the traditional public finance. Governments and municipalities are urged to invest for the development of smart city initiatives in the period of economic downturn where financial resources are limited. Public funding is no longer sufficient to sustain the projects and traditional models for financing utility and facility projects are often inadequate because of the high risk profile and intangibility of smart city innovative projects. In this context, Public-Private-Partnerships (PPP) appear to be a suitable solutions to address the shortage issues of public finance and the call for cuts on public spending. PPP is a financing and contractual mechanism to establish a long-term relationship between the public and the private sectors for the purpose of developing a capital investment project and providing the associated public service (Mario Calderini et al.2013). For that, the design of innovative PPP financial models must become an integral part of the overall planning of the smart city projects.



08 SMART CITY PLATFORM - Horizontal Integration of Services Cross - Functional Interconnection



Leveraging the Smart City Ecosystem Framework

Smart city is a complex ecosystem of people, processes, policies, technology and other enablers working together to deliver a set of desired outcomes. The smart city is not "owned" exclusively by the city. Other value creators are also involved, either working in collaboration or through independent initiatives. Successful implementation of a sustainable smart city must take a programmatic approach to engage its stakeholders across the ecosystem.

Study findings reveal that many cities are not taking an ecosystem approach to their smart city projects. This is due partly to smart city projects being managed by the Information Technology (IT) organisation where their charter is on systems development and deployment. In contrast, more experienced smart cities manage their smart city programs through internal cross functional 'Transformation' or 'Innovation' organisations.

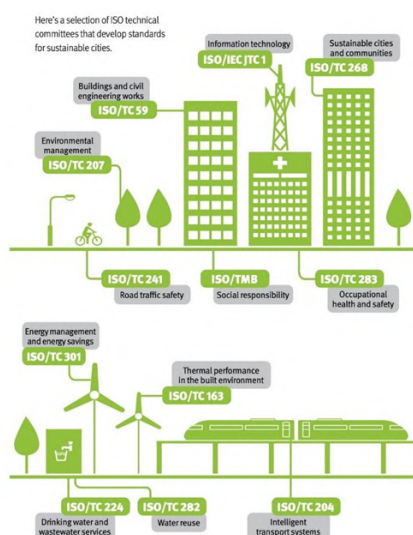
Regardless of the progress in implementing smart city concepts, cities must set a 'broader ecosystem building' to the forefront of its smart city agenda in order to create a sustainable and scalable smart city.

09 SCALE AND EVOLUTION

- With a Standard, Interoperable Open Platform Creation of an Innovation Ecosystem

Standards provide cities with an overall framework for defining what 'being smart' means for them and how to get there. For example, ISO 37122, which outlines the basic requirements for the management of smart cities and is directly aimed at city leaders, covers all aspects a city must address to become smarter, which include responsible resource use, environmental management, citizens' health and well-being, governance, mobility etc.

At national level, under the supervision of Standards Malaysia, Sustainable Cities and Communities Technical Committee or better known as TC/D/4 is established by PLANMalaysia to coordinate the formulation of standards relevant to smart cities development. We have embarked with the adoption of ISO 37122 which will be further studied which will lead to more standards being established under this committee.



10 OPEN DATA

- For better service implementation & value generation

The key benefit of open data is its role as an enabler. It places key information into the hands of people who face problems – the citizens of smart cities – and those with the ideas and technical knowledge required to provide solutions. Therefore, open data projects hold a great potential to provide citizen-centric solutions and optimise the provision of smart city services according to different needs and preferences of its citizens.

Open data has the advantage of being cost-free with unlimited usage rights. It can lead to new innovations driven by big data analytics and provides:

- greater transparency and integrity of public sector;
- the ability to recognize, respond to, or predict changes in real time;
- impact estimation resulted by different types of change through modelling and simulation, and the ability to test those predictions with a high accuracy depending on the amount of data available, and
- tailored solutions which allow problems being addressed despite different legal frameworks and demographics.

At a city level, open data can be utilised to directly improve its planning and job creation, modernization of education and healthcare systems, as well as ability to help pinpointing inefficiencies and inequalities in the delivery of basic services and facilities.

Location-based open data contributes to the formulation of sustainable solutions in addressing the problems of ageing population, urban migration and climate change

CONCLUSION

Smart city planning can be considered as the first 'baby steps' that city leadership should take in pathing the journey towards sustainable development.

Its approach provides opportunities to address conventional challenges a city faces in new ways, e.g., it recognizes the importance of ICT in supporting soft infrastructure. In many cases, smart approaches can be significantly cheaper than conventional ones. Even where smart city approaches might involve some extra upfront expenses, savings are gained when considering the overall costs of a lifecycle. Therefore, it is vital to review the potential implications of smart city approaches in the early planning stage of a development to ensure these opportunities are not missed.

Smart city applications are beneficial as they offer the citizens to play an active role and make it easier for other stakeholders to participate in the planning and development process. A smart city is one that uses digital technology to facilitate the engagement of its citizens and other stakeholders in its operations.

This aspect should be taken and integrated in our existing planning platforms including development plans, public policies, planning standards and guidelines, and the development control exercise. In conclusion, more thoughts and actions are certainly required to embrace and mainstream the smart city planning and implementation in the overall development framework process.

Pengantar Utama
Main Organiser :

PLANMalaysia
(DEPARTMENT OF TOWN AND COUNTRY PLANNING)

Pengantar Strategik Bersama
Strategic Co-Organisers :

MiGHT
Malaysia Institute of Government Technology
Tech Hub Developer

18-19 November 2020
9.00 pagi – 1.00 tengah hari
Webex Link
Hari Pertama | DAY 1
<https://bit.ly/2JQFoU>
Hari Kedua | Day 2
<https://bit.ly/3eGyXWo>

'Live Streaming':

- KPKT Malaysia
- PLANMalaysia
- Perbadanan Putrajaya
- MiGHT
- Cyberview

Sila imbas kod QR untuk PENDAFTARAN
Please scan for REGISTRATION

SMART CITY RAP
SR20
CR20
VIRTUAL EVENT

Kolaborator
Collaborator:

esri, STS, YES, Boost, Grob Pay, JomParking, iCYCLE

Note:

Most of the content of this article was taken from the paper delivered by PLANMalaysia's Director-General in Smart City RAP 2020 organised by KPKT, PLANMalaysia, Putrajaya Corporation, MiGHT and Cyberview Sdn Bhd on 18-19 November 2020.

For any further information on this article, please contact us at Smart City Unit, Project Office of the Central Zone, PLANMalaysia



Dr. Soheil Sabri

Digital Delivery Lead - Digital Twin
Urban Analytics and Planning Support Systems
Research Lead
MPIA, MSSSI
Centre for SDIs and Land Administration
Department of Infrastructure Engineering The
University of Melbourne
Victoria 3010, Australia

Email:
soheil.sabri@unimelb.edu.au

KEY BENEFITS OF ENTERPRISE ARCHITECTURE IN MANAGING SMART CITIES - FOCUS ON IOT AND DIGITAL TWINS



ABSTRACT

With proliferation of digital technologies, state and local governments developed and implemented several smart platforms to improve the quality of their services. Adding to that, integrating new and innovative types of data collection and analytic methods such as Internet of Things (IoT), big data, and Digital Twin technologies enabled governments to address several challenges including climate change mitigation, disaster management, and improvement of urban quality of life. However, most of the technical solutions have been implemented in silos and there is a lack of coordination among agencies and stakeholders.

Recent literature suggested the adoption of enterprise architecture (EA) to address the complexity of smart city systems, and coordinate the inter-connection of information, business, and technology managements. Nonetheless, the studies related to Smart City EA remained at generic level. To address this gap, the current study maps the tangible smart city services and applications to the potential benefits of EA through literature review.

The study uses five generic benefits of EA, i.e., "Operational", "Managerial", "Strategic", "IT Infrastructure", and "Organisational" and synthesises twenty recent studies on smart cities development (years 2015 – 2021) to validate the benefits of EA through practical cases. The paper then investigates the Malaysian's Digital Transformation Plan in delivering citizen-centric public services through 1GovEA.

Next, the paper evaluates the Malaysian Smart City Framework and outlines the extent to which it has adopted the 1GovEA principles. The findings show that while the 1GovEA provides a great opportunity to assist in implementing smart city framework, there is little connection between two frameworks. It is essential for the urban and regional policy makers to better understand the value of adopting an EA in an improved and successful management of smart cities.

INTRODUCTION

Over the last three decades, there has been a significant growth in adopting digital technologies by cities worldwide to provide services and offer new products to their citizens. For instance, the City of Melbourne adopted several smart platforms and digital technologies including 3D geospatial platform for city planning (Agius et al., 2018), sensors for pedestrian count, environmental conditions, and parking status to streamline smart services in its Central Business District. In the UAE, the Dubai municipality has adopted the Internet of Things (IoT) concept to measure the happiness of citizens, investors, and visitors (Sabri, 2021a). Meanwhile, Japan adopted the concept of Society 5.0 to leverage digital technologies (e.g., IoT, AI, fifth-generation mobile communications (5G)) in addressing the United Nation's Sustainable Development Goals (SDGs) (Barrett et al., 2021). However, the existing body of research on smart cities highlights the challenges of data integration, lack of coordination in different services, and complexity of systems in the smart cities initiatives (Prasetyo and Lubis, 2020).

Several studies indicated the important role of Enterprise Architecture (EA) in addressing the challenges of digital transformation of smart cities (Anthony Jnr, 2021). Yet, the literature remained in general level, and little is known about the specific applications and technologies including IoT, big data analysis, and urban digital twin in an EA framework for a productive, sustainable, and liveable city development. Despite the importance of emerging technologies, there is a lack of initiatives in designing and implementing the overarching architecture to realise the benefits of multi-disciplinary data and analytics integration in the context of smart cities (Prasetyo and Lubis, 2020). There is also a lack of clear understanding on how EA would support the state and local governments to deliver smart and citizen-centric public services.

ITU (2019) suggested eight building blocks for citizen-centric digital transformation, in which digital EA is at the centre (**Figure 1**). It also proposed that citizen-insight, as one of building blocks, was at the heart of digital transformation. While this framework provided an opportunity for a bottom-up smart city implementation, it required further investigation on how such a holistic framework in information and communication technology (ICT) could be adopted and integrated in a larger framework of smart city development.

This paper intends to provide a novel review and analysis on the interconnection of EA benefits, technological and social innovation, and potential application of emerging technologies in the context of digital transformation for smart cities. The paper conceptualises digital transformation and smart city policy in the context of Malaysia to identify the opportunities and gaps for a more productive, sustainable, and liveable smart city development.

The paper is divided into four sections. A critical analysis is conducted on literature relevant to smart cities, digital transformation, and enterprise architecture in the next section. The outcome of literature review which involves a thematic analysis of 20 peer reviewed papers published between 2015 and 2021 is aggregated in the form of a conceptual framework in section three. The final section will discuss the implications of findings and set an agenda for future research and practice around design and implementation of an effective and citizen-centric EA.

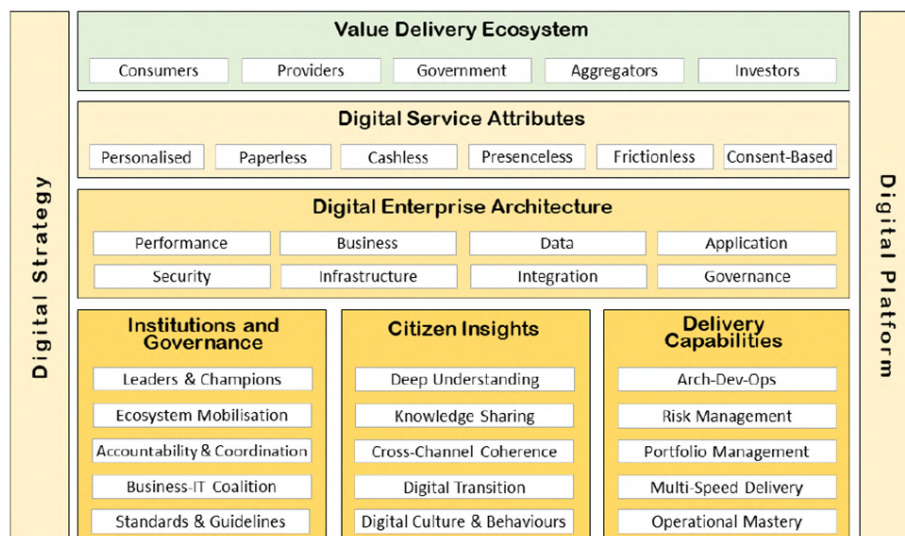


Figure 1 Citizen-centric digital transformation building blocks. Source:(ITU, 2019)

LITERATURE REVIEW

According to Kim et al. (2021), smart city is a platform for technological and social innovation. By leveraging the ICT, it facilitates the cities' productivity, sustainability, and liveability. The state and local governments experience challenges in terms of managing data in silos where there is a lack of coordination to integrate smart initiatives in various disciplines and business processes.

As an example, there are many potential big data such as crowd source and voluntary geographic information (VGI) (Dembski et al., 2020; Sabri et al., 2016) that can be harvested and used for smart transport as part of the urban public services planning. An effective management of such data and analytics can benefit a wide range of applications including public safety and security, environmental protection, transportation, and urban planning functions as demonstrated in Figure 2. The enterprise framework for smart cities shown in **Figure 2** was developed by Open Geospatial Consortium (OGC). It provided important instances from technological, business, and application layers.

According to Kim et al., (2021) the main stakeholders in smart cities are the central and local governments, ICT firms, city planners/designers and decision makers, the residents as well as the end-users (**Figure 3**).

Building on the framework presented in Figure 3, Lim et al., (2021) demonstrated the role of a geospatial platform in coordinating the multi-agency collaboration and decision making process in Singapore. The platform integrated an intelligent decision support system (IDSS) and a quantitative urban environment simulation tool (QUEST). Using such a platform, different datasets and analytic tools (e.g., 3D data, population, walkability analysis) (Sabri et al., 2019) were integrated then shared across government agencies to satisfy the increasing needs of government and agencies in smart operation, risk management, and policy making (Lim et al., 2021).

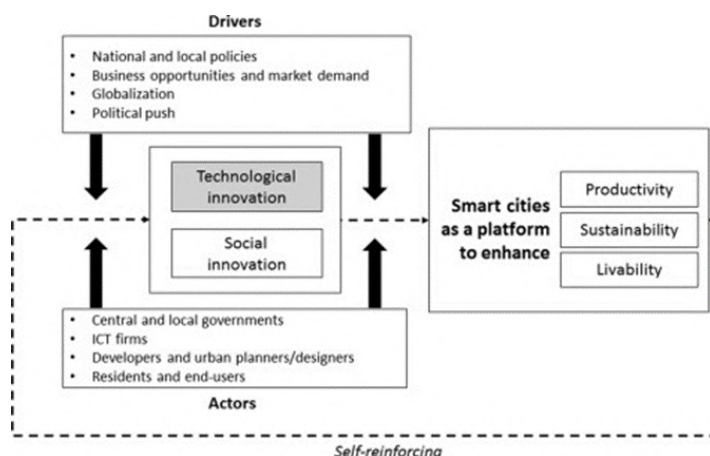


Figure 3 The framework of smart cities as a platform for technological and social innovation. Source: (Kim et al., 2021)



Figure 2 Enterprise Smart City, Modified and adopted from (Percivall et al., 2015).

Most recent research highlighted the role of IoT, big data analysis and urban digital twin to harness innovations for smart city developments (Ham and Kim, 2020; Shirowzhan et al., 2020). Literature suggested that the VGI and urban digital twin can engage the citizens for the process of decision making, which will improve the level of success and quality of stakeholder engagement (Dembski et al., 2020; Sabri et al., 2016). Other practical applications included adaptation through environmental measures (Talebkah et al., 2021) and integration of real-time data and analytics to model risks and create situational awareness in urban digital twin platforms (Deren et al., 2021). Considering all this evidence, it is obvious that there was a challenge in heterogeneity of solutions, technologies and information management systems, which limited the effectiveness of smart city platforms (Bastidas et al., 2018; 2017).

Scholars suggested adopting a standardised enterprise framework for smart cities to support its key challenges (Pourzolfaghar et al., 2020). EA played an important role to translate the vision and strategy of a smart city into an effective process (i.e., formulating, communicating, and enhancing the key requirements, principles, and models) to achieve the expected transformative outcomes (Gartner, 2008). The current EA literature is extensive and focuses particularly on its role as an enabler for organisations to be agile, dynamic and responsive to any changes (Ross et al., 2006). EA provides logics for organising the business processes and IT infrastructure, supporting the organisation's operating model with reflection on requirements for integration and standardisation.

According to Ross et al. (2006), EA, together with the operation model and IT engagement model, create three key components for organisations to build an effective foundation for execution. In the context of smart cities, the operation model determines the required level of business process integration and standardisation of public services delivery. For instance, different departments can share data and put in place a standard delivery process and create an end-to-end processing system through a single point of access for the citizens.

The IT management model coordinates the IT and business performances to align them with the government objectives at different levels (e.g., whole-of-government, departments, business units, projects). With its influence on project decisions, the IT management model supports EA to guide individual solutions. As an example, in delivery of government's smart solutions (e.g., smart bins in residential and tourist areas), the IT engagement model specifies how each solution should be prioritised to leverage from and contribute to the entire system. Literatures also suggested that this business-IT alignment, is a critical enabler in dynamic EA capabilities which is able to align the organisation services with the demands of their key stakeholders, thereby providing a platform for innovation (van de Wetering et al., 2020).

The roles of EA can only be beneficial when the operations of organisation are in compliance with EA and architectural insights (Foorthuis et al., 2016). According to Lankhorst et al. (2017), a well-defined EA plays an important role as a management instrument to analyse the performance of business processes based on operational metrics.

Furthermore, other studies demonstrated the important roles of EA in supporting the business innovation and IT services interoperability (Winter et al., 2014), business transformation (Tamm et al., 2015), business acquisition (Toppenberg et al., 2015), and technology standards management (Boh and Yellin, 2006). More recent literature asserted the critical roles of EA in mapping out and orchestrating the business and IT assets and process towards digital transformation (van de Wetering et al., 2021). This is motivated by the proliferation of technologies, including migration to the cloud, emerging analytic capabilities through artificial intelligence (AI) and machine learning (ML), and new types of data capturing via Internet of Things (IoT) and crowdsourcing.

Collectively, these studies outline critical roles of EA in several aspects. These include business-IT alignment, interoperability to increase shared IT services and data, standardisation to reduce the technologies and complexity, governance for a well-planned and integrated system, business management, stability and flexibility, projects prioritisation for change and business innovation, and most importantly, an EA supports the execution of business or IT strategy.

Following the identification of EA roles, scholars outlined its benefits. Ross et al. (2006) categorised the benefits into five areas which comprise of management satisfaction, strategic business outcomes, risk management, IT costs, and IT responsiveness. Meanwhile, Tamm et al. (2011) categorized the benefits of EA into organisational, business, and IT. More recently, Jusuf and Kurnia, (2017) adopted Shang and Seddon's (2002) benefit framework for enterprise systems and conducted a study to develop a study on EA success factor and benefit model (EA-SFBM).

Their findings suggested 37 validated benefits categorised in five domains, i.e., operational, managerial, strategic, IT infrastructure, and organisational. The details of most relevant benefits and their relation to an effective smart city framework are explained in the next section.

From theoretical perspective, there were three schools of thoughts in EA as categorized by Lapalme (2012):

1. Enterprise IT Architecture:

According to this school of thought, strategy, design, and management of EA focuses on IT strategic planning and business enablement.

2. Enterprise integration:

The priority of this school of thought is the linkage between strategy and execution through maximising the overall coherency between IT capabilities, work design, organisation's governance structure, and so on. EA is considered as a socio-cultural and techno-economic system.

3. Enterprise ecological adaptation:

This school prioritises organisational innovation and sustainability in its design. The assumption is that the environment can change, and system design should co-evolve with this change.

Bastidas et al. (2017) considered the city as an urban enterprise, of which the adoption of an EA enables the alignment of urban strategic development with smart city service solutions. According to Pourzolfaghar et al. (2020), an integration and use of common data entities across disciplines and agencies would benefit all stakeholders. The data and application integration had also been explained in spatial data infrastructures (SDIs) such as urban analytics data infrastructure (UADI) (Rajabifard et al., 2019). EA provides a holistic framework to meet the city service requirements and an insight to the better planning and decision-making process.

Bastidas et al. (2017) utilised EA specifications developed by The Open Group Framework Architecture (TOGAF, 2018) to evaluate the smart city frameworks according to three interrelated domains, i.e., business architecture, information architecture and technology architecture.

Deren et al., (2021) proposed a smart city operation brain (SCOB) management architecture, where the digital twin played an important role to coordinate the smart services, IT, and data centres. Through a number of cases such as smart grid and flood monitoring, Deren et al., (2021) demonstrated the value of EA contributing to an effective smart city management and operation. The scholars demonstrated that EA covered three major components of smart cities, i.e., technologies, people, and data. As such, there is a potential to achieve sustainability, productivity, and liveability through such architecture.

As demonstrated in Figure 1, a national digital transformation can be conceptualised in eight building blocks known as digital strategy, value delivery ecosystem, digital service attributes, digital enterprise architecture, digital platform, institutional and governance, citizen insights, and delivery capabilities (ITU, 2019). The digital enterprise architecture is proposed to play a coordination role in the whole-of-government approach to ensure the efficiency and equitable delivery of public services. This idea has always been acknowledged in the smart cities literature (Sabri, 2021b). Having the citizen-insights as a building block for deep understanding of citizen requirements and improving the citizen-government experiences which will eventually lead to social innovation, is well supported by recent research about smart cities development (Kim et al., 2021; Sabri et al., 2015).

While many governments have already implemented both smart city and digital transformation strategies, it is still not clear how both strategies are interconnected in policy and practice. As an example, in ITU's (2019) brief explanation about the Malaysian government's digital transformation journey, it was indicated that Malaysia has started to embed EA in its public service delivery. The Public Sector ICT Strategic Plan (2011-2015) provided a framework known as 1GovEA to improve the service delivery while avoiding the fragmented activities in the whole-of-government applications. Moreover, the Public Sector ICT Strategic Plan (2016-2020) further provided guidelines and tools for all agencies to implement the services and applications based on the digital government principles. The detailed methodology and digital transformation journey are provided in section after the next. From a smart city's point of view, it is important to know how 1GovEA has responded to the citizen-centric dimension. In addition, further investigation is necessary to understand how the policy and components of 1GovEA can be beneficial to the National Smart City Framework (Ministry of Housing and Local Government, 2018). Subsequently, the author maps the smart city components to the EA benefits which is presented in the next section.

CONCEPTUAL FRAMEWORK

This section synthesises the key concepts of smart cities and maps them to the five categories of EA benefits which were developed by Jusuf and Kurnia (2017). Given the consideration role of managerial and operational along with IT infrastructure and strategies, these benefits are expected to well-align with an effective smart city implementation.

- Operational benefits: Increasing the effectiveness and efficiency of business operations.
- Managerial benefits: Reducing the complexities and enhancing the improvements in resource allocation, while compliance with regulations and standards.
- Strategic benefits: Increasing the quality of delivery, better IT-business alignment, and improvements in organisation's investment in innovation and new opportunities.
- IT infrastructure benefits: Improving the interoperability of IT services and data and increased the reusability of assets.
- Organisational benefits: Improving the organisation's common vision, communication, collaboration and supporting the culture of sharing and documentation.

Benefit	Instance	Related concepts
Operational	Increased efficiency and effectiveness	Integration of flood monitoring and situational awareness (Deren et al., 2021); Integrating multi-agency government departments for environmental impact assessment (Lim et al., 2021)
	Improved business operations, processes and performance	Use of IoT for measuring level of satisfaction in delivery of services (Sabri, 2021a); developing a 3D rule-based city modelling using geospatial standards to runs a data driven decision making (Agius et al., 2018)
Managerial	Reduced complexity	Smart city operation brain using Digital Twin for complex urban services such as flood impact, traffic, etc (Deren et al., 2021);
	Improved risk and asset management	A standard geospatial platform and single point of truth to reduce the risk and improve the asset management (Lim et al., 2021); standardisation to reduce the risks and manage overlapping activities (Percivall et al., 2015)
	Improved portfolio management, capability mapping and capability optimization	Service-oriented architecture for smart city (Prasetyo and Lubis, 2020); participatory sensing in digital twin (Ham and Kim, 2020)
	Improved staff/skill management and knowledge	Integration of services in a smart city operation brain based on digital twins (Deren et al., 2021); adopting new technologies including AI, Big Data analytics, and Digital Twin (Shirowzhan et al., 2020) in management and services (Deren et al., 2021)
	Improved compliance with regulations/standards and auditability	Use of the geospatial tools and technologies to address city development compliance with regulations (Agius et al., 2018);
Strategic	Increased quality	An address of the productivity, liveability, sustainability (Kim et al., 2021), and quality of life in cities (Bastidas et al., 2018, 2017)
	Improved innovation and new opportunities	An architecture to integrate different services: smart city public epidemic services; smart city traffic brain (Deren et al., 2021);
	Improved business-IT alignment and relationships	Integration of policy making and big data analytics in a digital platform (Shirowzhan et al., 2020)
	Improved innovation and new opportunities	Integration of technological and social innovations (Kim et al., 2021); adopting UN's SDGs in an innovative platform to address society gaps (Barrett et al., 2021)
IT infrastructure	Improved interoperability and integration	Integration of different city services in a platform (Lim et al., 2021); Integrating policy making with big data analytics in a digital platform (Shirowzhan et al., 2020)
	Increased standardisation	Employment of smart city reference architecture (Bastidas et al., 2018); implement TOGAF methodology (TOGAF, 2018); Data and geospatial technology standards (Percivall et al., 2015).
	Reduced waste and redundancy	Critical infrastructure management through digital twin (Deren et al., 2021)
	Improved utilisation and benefits realisation of IT	Smart city deployment framework, leveraging IoT and big data analytics (Talebkah et al., 2021)

Table 1 Mapping the smart city applications with EA benefits

MALAYSIAN GOVERNMENT'S ICT STRATEGIC PLAN AND SMART CITY FRAMEWORK

Malaysia started its digital transformation journey in the 1970s with a focus on computerisation and data processing. A decade later, information system management became the national priority to improve the efficiency of specific public service processes (ITU, 2019). This had then led to the e-business and e-government initiatives, such as the flagships of Multimedia Super Corridor (MSC) in 1996.

These initiatives covered three types of services including government to citizen (G2C), government to business (G2B), and government to government (G2G) (ITU, 2019; Ramli, 2017). Despite this initiative, there have been considerable challenges faced in the implementation. These include insufficient infrastructure, low usage of e-services (MyKad, I-Kad), lack of partnership and collaboration between stakeholders, specifically citizens, low rate of e-government implementation due to weak service and data integration, and failure of some e-services due to management issues and the adoption of unreliable business model (e.g., telehealth) (El-Ebiary et al., 2019).

These challenges were also highlighted in the Malaysia's Smart City Framework (Ministry of Housing and Local Government, 2018). As an example, the e-payment application (smart economy) revealed the weakness of innovative business and enterprise development as well as limited financial and business services. Responding to this, promoting digitalisation in enterprise operations to accelerate productivity was suggested (Ministry of Housing and Local Government, 2018. p 42). This strategy suggested the application of digital technology in core business activities such as sales and marketing, customer service, communications, and banking. However, it was also recognised that the technology adoption in many service sectors was still limited.

This issue had disclosed the issues of critical demand on integration of services and the challenges of fragmented service deliveries of which a clearly defined, integrated and connected governmental service platform was required. In response to this, the government adopted EA in their Public Sector ICT Strategic Plan (2011-2015) and introduced the concept of 1GovEA (one government enterprise architecture). Consequently, the public sector ICT Plan (2016-2020) identified the enabling ecosystems to implement EA as a core element (ITU, 2019).

Considering the challenges in the intergovernmental agency collaboration, services, data sharing and integration, and citizen participation, the 1GovEA has outlined the following design principles and aspirations (Malaysian Government, 2015):

- Provision of consistency, timely, and cost-effective public service delivery;
- Strategic and holistic consolidation of ICT capabilities;
- Delivery of citizen-centric services that promote public participation;
- Greater cross agencies collaboration and data sharing, and
- Consolidation of duplicate services and enable re-usable and shared services across agencies.

Figure 4 demonstrates the 1GovEA design principles, in which flexibility, scalability, and practicality are core elements. 1GovEA uses TOGAF 9.2 Framework to help transform the public sectors and set its vision as : "1GovEA will establish unified enterprise architecture to accelerate public sector service delivery transformation" (Malaysian Government, 2015).

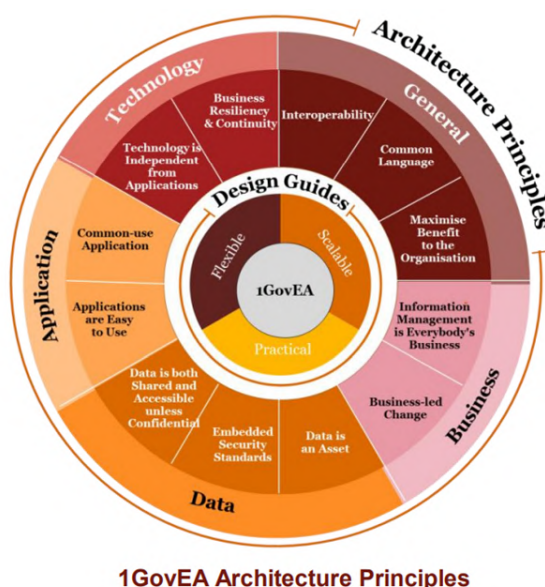


Figure 4 1GovEA design principles. Source: (Malaysian Government, 2015)

While EA plays a critical role in addressing the smart city challenges, there has been limited research on the adoption of EA in Malaysian smart industries. Jayakrishnan et al. (2019) suggested that the Malaysian transportation industry may leverage EA to deliver smart services. Specifically, a conceptual framework for railway supply chain 4.0 leveraging the EA capabilities and benefits was proposed. However, it is believed that the role and benefits of EA, particularly its five benefit categories as explained earlier in this paper have been overlooked in broader smart city applications.

MSCF formulated the policies, strategies, and initiatives of the smart city, of which one of the key objectives was to meet national and global agendas (Ministry of Housing and Local Government, 2018). The framework explicitly recognised the strategic focus of Eleventh Malaysia Plan (11MP) on improving the coverage, quality, and affordability of digital infrastructure. In addition, the thrust set by the National Physical Plan 3 (NPP3), related to developing and improving digital infrastructure was well-noted in the smart city framework. However, the opportunities that 1GovEA offered in terms of data, technology, application and business were not acknowledged.

In addition, seven smart city components and characteristics suggested in the MSCF could have been mapped using the 1GovEA methodology and architecture domains (i.e., business, data, application, and technology). As an example, in the smart economy domain, one potential enabler for digital economy strategy is to leverage the IT infrastructure benefits of 1GovEA and adopt its architecture domains. This also applied to the smart government strategy, of which e-government required an IT-business alignment to improve the quality of e-government service (EA's strategic benefit) and increase the scope of e-government services (EA's managerial benefits). Moreover, given that the smart government strategy encouraged the development of a data sharing platform across government agencies, the role of 1GovEA was even highly critical.

From the perspective of monitoring, benchmarking, and progress evaluation, it is also important to consider the emerging technologies including IoT, AI, and Digital Twins. One of the main requirements for deriving indicators and measuring the success factors is the use of real-time analytics through the digital platforms. This will improve the decision makers' understanding of the performances in real-time through streamlined data. Having such a capability will improve the process of decision making and increase the reliability of policies through data-driven and evidence-based analytics.

DISCUSSION AND CONCLUSION

This study sets out to examine the key benefits of EA in the context of smart cities development. Through literature review, it focuses on emerging technologies including IoT, big data analytics and digital twin to understand the benefits of EA in addressing the requirements of productivity, liveability, and sustainability in cities. This paper maps related concepts extracted from 20 smart city literature with five key benefits of EA and their instances, which were introduced by Shang and Seddon, (2002) and Jusuf and Kurnia, (2017).

The study also conceptualises the digital transformation and smart city policy in the context of Malaysia and subsequently identifies the opportunities and gaps. The findings highlight that 1GovEA principles offer vast opportunities from the managerial and strategic perspectives. Nonetheless, the role of 1GovEA in IT-business alignment requires further investigation to increase the quality of public services in e-government. As highlighted by Sabri (2021a), using IoT to understand the level of residents' satisfaction can promote social innovation and improve the quality of life through e-government services. In addition, developing a smart city operation, brain management architecture and leveraging digital twins can improve the quality of services through big data processing (Deren et al., 2021).

While many studies have conceptualised the smart city in the framework of EA (Anthony Jnr, 2021; Pourzolfaghar et al., 2020), the findings demonstrate that the MSCF has yet to leverage 1GovEA in addressing the interdependencies and complexities of business, information and technology. Similarly, the value of such a framework is not fully acknowledged by the practitioners and governments despite the literature justifies the importance of standardisation of services. As a result, most of the smart city solutions have been implemented in silos, which could have reduced the level of effectiveness and increased the complexities (Bastidas et al., 2017).

Although this study is conducted based on a small sample of literature, mapping the key benefits of EA with fragmented implementations demonstrates how smart city performance can be improved from operational, managerial, strategic, IT infrastructure and organisational perspectives. This is important from the sense that a set of tangible smart service implementations can be utilised to validate the key benefits of EA in a city management level.

It is recommended that further research on the artifacts of EA in the context of smart cities and a development of an effective framework for Malaysian smart city architecture can be conducted. While several technological and social innovations are discussed in this study, the focus remained on technical benefits of using IoT, big data analytics, and digital twin. The organisational, strategic, and managerial parts of such a study require further elaboration. Specifically, a gap analysis is necessary to demonstrate tangible benefits of adopting an EA for smart cities through identifying the explicit services and detailing the business processes.

REFERENCES

Agius, T., Sabri, S., Kalantari, M., 2018. Three-Dimensional Rule-Based City Modelling to Support Urban Redevelopment Process. *ISPRS Int. J. Geo-Information* 7, 413.

Anthony Jnr, B., 2021. Managing digital transformation of smart cities through enterprise architecture—a review and research agenda. *Enterp. Inf. Syst.*

Barrett, B.F.D., DeWit, A., Yarime, M., 2021. Japanese smart cities and communities: Integrating technological and institutional innovation for Society 5.0. In: *Smart Cities for Technological and Social Innovation*. Elsevier, pp. 73–94.

Bastidas, V., Bezbradica, M., Helfert, M., 2017. Cities as enterprises: A comparison of smart city frameworks based on enterprise architecture requirements. In: *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. Springer Verlag, pp. 20–28.

Bastidas, V., Helfert, M., Bezbradica, M., 2018. A Requirements Framework for the Design of Smart City Reference Architectures. In: *Proceedings of the 51st Hawaii International Conference on System Sciences*. University of Hawai'i at Manoa, Manoa, pp. 2516–2523.

Beck, A., 2020. Smart Cities Council | How are you looking at the Digital Twin? [WWW Document]. *Smart Cities Council*. Aust. New Zeal. URL <https://anz.smartcitiescouncil.com/article/how-are-you-looking-digital-twin> (accessed 1.23.21).

Boh, W.F., Yellin, D., 2006. Using enterprise architecture standards in managing information technology. *J. Manag. Inf. Syst.* 23, 163–207.

Dembski, F., Wössner, U., Letzgus, M., Ruddat, M., Yamu, C., 2020. Urban Digital Twins for Smart Cities and Citizens: The Case Study of Herrenberg, Germany. *Sustainability* 12, 2307.

Deren, L., Wenbo, Y., Zhenfeng, S., 2021. Smart city based on digital twins. *Comput. Urban Sci.* 1, 1–11.

El-Ebiary, Y.A.B., Al-Sammarraie, N.A., Shukur, B.S., Almandeel, S., Alshamasi, A., 2019. E-Business and E-Government between Challenges and Opportunities-Case Study Malaysia. *Int. J. Innov. Technol. Explor. Eng.* 8.

Foorthuis, R., van Steenberg, M., Brinkkemper, S., Bruls, W.A.G., 2016. A theory building study of enterprise architecture practices and benefits. *Inf. Syst. Front.* 18, 541–564.

Gartner, 2008. Gartner Clarifies the Definition of the Term 'Enterprise Architecture'. Gartner.

Ham, Y., Kim, J., 2020. Participatory Sensing and Digital Twin City: Updating Virtual City Models for Enhanced Risk-Informed Decision-Making. *J. Manag. Eng.* 36, 04020005.

ITU, 2019. Digital transformation and the role of enterprise architecture. Geneva.

Jayakrishnan, M., Karim BIN Mohamad, A., Abu, A., 2019. Journey of an Enterprise Architecture Development Approach in Malaysian Transportation Industry, *International Journal of Engineering and Advanced Technology (IJEAT)*. Jayakrishnan, M., Mohamad, A.K., Yusof, M.M., 2020. Digitalization railway supply chain 4.0: Enterprise architecture perspective. *Int. J. Adv. Trends Comput. Sci. Eng.* 9, 9056–9063.

Jusuf, M.B., Kurnia, S., 2017. Understanding the Benefits and Success Factors of Enterprise Architecture. In: *Proceedings of the 50th Hawaii International Conference on System Sciences*. pp. 4887–4896.

Kim, H.M., Sabri, S., Kent, A., 2021. Smart cities as a platform for technological and social innovation in productivity, sustainability, and livability: A conceptual framework. In: *Smart Cities for Technological and Social Innovation*. Elsevier, pp. 9–28.

Lankhorst, M., Iacob, M.-E., Jonkers, H., 2017. *Enterprise Architecture at Work, The Enterprise Engineering*, 4th ed. Springer-Verlag, Berlin Heidelberg.

Lapalme, J., 2012. Three schools of thought on enterprise architecture. *IT Prof.* 14, 37–43.

Lim, T.K., Rajabifard, A., Khoo, V., Sabri, S., Chen, Y., 2021. The smart city in Singapore: How environmental and geospatial innovation lead to urban livability and environmental sustainability. In: *Smart Cities for Technological and Social Innovation*. Academic Press, pp. 29–49.

Malaysian Government, 2015. *Blueprint for 1Government Enterprise Architecture (1GovEA) A Quick Guide to*. Kuala Lumpur. Ministry of Housing and Local Government, 2018. *Malaysia Smart City Framework*. Putrajaya.

Percivall, G., Rönndorf, C., Liang, S., McKenzie, D., McKee, L., 2015. Open Geospatial Consortium OGC Smart Cities Spatial Information Framework. *OGC Doc. No.* 14-115.

Pourzolfaghar, Z., Bastidas, V., Helfert, M., 2020. Standardisation of enterprise architecture development for smart cities. *J. Knowl. Econ.* 11, 1336–1357.

Prasetyo, Y.A., Lubis, M., 2020. Smart City Architecture Development Methodology (SCADM): A Meta-Analysis Using SOA-EA and SoS Approach. *SAGE Open*.

Rajabifard, A., Sabri, S., Chen, Y., Agunbiade, M., Kalantari, M., 2019. Urban Analytics Data Infrastructure: Critical SDI for Measuring and Monitoring The National and Local Progress of SDGs. *Sustain. Dev. Goals Connect. Dilemma L. Geospatial Inf. Urban Rural Resil.* 243.

Ramli, R.M., 2017. E-government implementation challenges in malaysia and south korea: A comparative study. *Electron. J. Inf. Syst. Dev. Ctries.* 80, 1–26.

Ross, J.W., Weill, P., Robertson, D.C., 2006. *Enterprise Architecture as Strategy Creating a Foundation for Business Execution*. Harvard Business School Press, Boston.

Sabri, S., 2021b. Introduction: Being smarter for productivity, livability, and sustainability. In: *Smart Cities for Technological and Social Innovation*. Elsevier, pp. 1–8.

Sabri, S., Chen, Y., Rajabifard, A., Lim, T.K., Khoo, V., Kalantari, M., 2019. A multi-dimensional analytics platform to support planning and design for liveable and sustainable urban environment. In: *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives*. pp. 75–80.

Sabri, S., Rajabifard, A., Ho, S., Amirebrahimi, S., Bishop, I., 2016. Leveraging vgi integrated with 3d spatial technology to support urban intensification in melbourne, australia. *Urban Plan.* 1.

Sabri, S., Rajabifard, A., Ho, S., Namazi-Rad, M.-R., Pettit, C., 2015. Alternative Planning and Land Administration for Future Smart Cities [Leading Edge]. *IEEE Technol. Soc. Mag.* 34.

Shang, S., Seddon, P.B., 2002. Assessing and managing the benefits of enterprise systems: The business manager's perspective. *Inf. Syst. J.* 12, 271–299.

Shirowzhan, S., Tan, W., Sepasgozar, S.M.E., 2020. Digital Twin and CyberGIS for Improving Connectivity and Measuring the Impact of Infrastructure Construction Planning in Smart Cities. *ISPRS Int. J. Geo-Information* 9, 240.

Talebkhan, M., Sali, A., Marjani, M., Gordan, M., Hashim, S.J., Rokhani, F.Z., 2021. IoT and Big Data Applications in Smart Cities: Recent Advances, Challenges, and Critical Issues. *IEEE Access* 9, 55465–55484.

Tamm, T., Seddon, P.B., Shanks, G., Reynolds, P., 2011. How does enterprise architecture add value to organisations? *Commun. Assoc. Inf. Syst.* 28, 141–168.

Tamm, T., Seddon, P.B., Shanks, G., Reynolds, P., Frampton, K.M., 2015. How an Australian retailer enabled business transformation through enterprise architecture. *MIS Q. Exec.* 14, 181–193.

TOGAF, 2018. The TOGAF® Standard, Version 9.2. Open Gr.

Toppenberg, G., Henningsson, S., Shanks, G., 2015. How cisco systems used enterprise architecture capability to sustain acquisition-based growth. *MIS Q. Exec.* 14, 151–168.

van de Wetering, R., Kurnia, S., Kotusev, S., 2020. The effect of enterprise architecture deployment practices on organizational benefits: A dynamic capability perspective. *Sustain.* 12, 1–21.

van de Wetering, R., Kurnia, S., Kotusev, S., 2021. The Role of Enterprise Architecture for Digital Transformations. *Sustainability* 13, 2237.

Winter, R., Legner, C., Fischbach, K., 2014. Introduction to the special issue on enterprise architecture management. *Inf. Syst. E-bus. Manag.*



Dr. Lim Seng Boon

*Center of Studies for Town and Regional Planning
Faculty of Architecture, Planning and Surveying
Universiti Teknologi MARA (Perak)
limsengboonn@gmail.com*



Assoc. Prof. Dr. Jalaluddin Abdul Malek

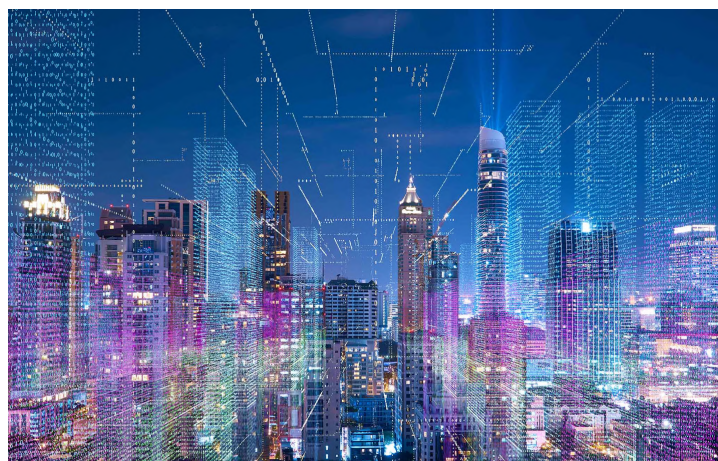
*Center for Research in Development, Social and
Environment
Faculty of Social Sciences and Humanities
Universiti Kebangsaan Malaysia
lims@ukm.edu.my; jbam@ukm.edu.my*



TPr Norliza Hashim

*Urbanice Malaysia
Centre of Excellence for Sustainable Cities and
Community Wellbeing
Ministry of Housing and Local Government
lizahashim@gmail.com*

IMPLEMENTING SMART CITY CONCEPT IN MALAYSIA: CONTEMPORARY CHALLENGES, STRATEGIES AND OPPORTUNITIES IN THE COVID-19 ERA



ABSTRACT

As 2021 onwards is set to witness the nationwide implementation of smart city initiatives, the issues faced by local authorities in the implementation critically require guidance. The level of challenges has been exacerbated by the impact of COVID-19, and Malaysian cities urgently need to establish a new normality in which technological solutions must be adopted to address urban issues. Thus, the objectives of this article are (1) to identify the implementation challenges and (2) to suggest strategies and opportunities to the decision makers and administrators. This article applies the participatory observation method in a smart city webinar in general with a case study of Putrajaya. Verbal data are transcribed and analysed using thematic analysis. The results show that smart city implementation is facing major challenges in terms of stakeholder partnerships, funding, and infrastructure. The authors recommend the necessity to review the focus of a smart city whether to be technological-led or citizen-centric through co-creation. This paper is timely to provide practical knowledge and suggestions to smart city planning, governance, and management bodies. It is likely to be applicable to other parts of the world that intend to implement smart city initiatives.

Keywords: Co-creation with citizens, Putrajaya, resourcing and talent planning, smart cities, smart governance, urban planning, and management.

INTRODUCTION

The development of smart cities has gained popularity across the world in the 21st century. North America has been promoting the top-down governance approach in cooperation with the corporate ICT sector (Lim, Jalaluddin, Mohd Yusof & Zurinah, 2020b). Corporate giants have introduced their own schemes. For example, IBM has launched the IBM Smart Cities Challenge and successfully attracted 135 participating cities worldwide (Alizadeh, 2021). On the other hand, European smart urbanism focuses on holistic implementation strategies, which encourages the wider adoption of bottom-up governance practises. For example, the multi-award-winning Amsterdam smart city adopts a quadruple-helix model, in which the government, corporates, academics and civil societies work together as co-partners (Macpherson, 2017; Mora, Deakin & Reid, 2019). Meanwhile, Asian countries such as China, India, South Korea and Malaysia are discursively learning and applying smart city ideas and governance practises from North America and Europe.

In 2019, the Malaysian federal government launched the Malaysia Smart City Framework (MSCF) and defined a smart city as one which “uses ICT and technological advancement to address urban issues, including to improve quality of life, promote economic growth, develop a sustainable and safe environment and encourage efficient urban management practices” (Ministry of Housing and Local Government, 2019). The MSCF consists of seven domains, i.e., smart economy, living, environment, people, government, mobility, and digital infrastructure. Within this context, the key national urban challenges are identified and a total of 16 top-down policies are formulated and translated into the proposed 36 strategies and 112 initiatives to address these challenges (Table 1).

Table 1. An overview of the Malaysia Smart City Framework

Domains	National Key Urban Challenges	Strategies	Initiatives
Smart Economy	1) Low productivity in the current economy 2) Inadequate creation of high value-added jobs 3) Low level of readiness to transition to high value-added industries 4) Weak development of innovative business and enterprises	3	7
Smart Living	1) Relatively high crime index 2) Increasing demand for healthcare services	5	17
Smart Environment	1) Loss of green areas 2) Improper solid waste management 3) Air pollution 4) Water pollution 5) Flash food 6) Landslide 7) High rate of non-revenue water (NRW) 8) High usage of non-renewable energy	8	24
Smart People	1) Low moral intelligence and low social integrity 2) Low skilled manpower and lack of talented human capital 3) Lack of harmonious public interactions and community empowerment 4) Lack of gender-friendly environment and inclusivity of vulnerable groups 5) Low adaptability to emerging technologies	6	23
Smart Government	1) Lack of public information sharing from government 2) Low quality of e-government services 3) Lack of information and data sharing between government agencies	4	11
Smart Mobility	1) Traffic congestion 2) Low rail ridership and high private vehicle ownership 3) Poor first-and-last-mile connectivity and accessibility 4) Low service quality and facility provision in public transportation 5) High carbon footprint	7	19
Smart Digital Infrastructure	1) Low internet speed and connectivity 2) Unsatisfactory indoor and outdoor mobile network coverage 3) Cybersecurity threats	3	11
Total		36	112

Source: Ministry of Housing and Local Government (2019)

While 2021 has been set as the kick-off year of the nationwide implementation of smart cities (Ministry of Housing and Local Government, 2019, p. 168), the direction for local implementation has remained ambiguous. Currently, there are 154 local authorities (LAs) in Malaysia, namely 17 City Councils, representing 11% of the total; 39 or 25% Municipal Councils; 94 or 61% District Councils; and the other 4 or 3% are modified LAs (Ministry of Housing and Local Government, 2020). To date, smart city blueprints are only initiated and prepared by city councils such as Putrajaya, Kuala Lumpur and Ipoh. Other smart city blueprints are found at state level (e.g., Selangor and Penang) and regional level (e.g., Iskandar Malaysia and MySmart Wilayah 2030). Cities at different hierarchies and geographical settings, due to the uniqueness of demographic and socio-economic profiles, require a targeted administrative approach in addressing its specific problems and issues. Clearly, there is a lack of references at local level (i.e., the municipal and district council levels). Thus, this article aims to firstly, identify the challenges of implementation faced by the LAs and secondly, suggest strategies and opportunities to overcome such challenges.

To garner the broader global perspective, the following section reviews factors determining smart city government, examples of actions worldwide and critics from scholars. This review provides a baseline of knowledge to examine the potential extent to which such initiatives could be implemented. The subsequent section explains the methodology utilised in this study, i.e., the participatory observation through the smart city implementation webinar. Findings from the thematic analysis are presented. The discussion section examines several obstacles to implementing smart cities at local levels. Finally, this article concludes with a summary of its limitations and contribution.

CONSIDERING SMART CITY GOVERNMENT

Smart government is a topic of heated debate in the context of smart city. Thus, the decision makers and administrators need to understand the factors that determine an effectively functioning smart government. Eden Strategy Institute (2018) published a report of 50 top smart city governments worldwide of which London, Singapore and Seoul were ranked as the top three cities. Other Southeast Asian cities on the list include Jakarta (ranked 47th) and Phuket (ranked 49th). None of the Malaysian cities were included. This indicates that there is an urgent need for Malaysian cities to perform better according to the thematic assessment which include vision setting, leadership, budget, technology, learning, co-creating, people-centricity, an innovative ecosystem, an open data policy, and knowledge sharing, as well as self-reflections and strategies formulation to benchmark their future performance (Table 2).

Besides the guiding themes, the next part covers more practical items of the taxonomy of smart city actions, which are designed by Alexopoulos et al. (2019); Alexopoulos, et al.(2021); Charalabidis et al. (2019). This taxonomy is divided into ten categories, namely ICT infrastructure, environment and agriculture, mobility, health, waste management and water resources, energy, tourism and culture, economy, security, and environment. These categories can be related to the MSCF domains, and they provide directions for the LAs to develop methodologies for data collection, based on the perceptions of the municipalities and citizens concerning a wide range of possible smart city actions.

Each action suggested is placed on a Likert scale of 1 to 5 for respondents to rate. The design of such smart city actions, as shown in Table 3, is mostly based on the experiences of global cities and has been tested in Greece. If it is to apply in the Malaysian context, modifications would be necessary to ensure its appropriateness and suitability in the local context. In particular, the category of tourism and culture in this taxonomy is worth being paid attention to for its potential to help the industry recover from the severe implications due to the COVID-19 pandemic.

Table 2. Themes, self-reflections, and strategies of a for determining smart city government

Themes	Self-Reflections for Local Authorities	Strategies
1) Vision - A clear and well-defined strategy to develop a smart city	<ul style="list-style-type: none"> What should be our city's own definition of smart city? Which forms of stakeholder engagement are most suitable for our various constituents? Are we fully using our citizens as a resource when designing smart city solutions? 	<ul style="list-style-type: none"> Anchoring a vision on natural strengths Building on citizen ambitions Encouraging private sector involvement Identifying smart city focus areas Prioritising opportunities Planning, sequencing and validating initiatives
2) Leadership - Dedicated city leadership that steers smart city projects	<ul style="list-style-type: none"> Do we need to appoint a dedicated lead to coordinate and drive our smart city initiatives? As our city matures, what would a decentralised smart city leadership look like? How can we align our interests with the private sectors, so they can help to steer our strategy in the best interest of the city? 	<ul style="list-style-type: none"> Having a dedicated office Distributing responsibility across department Establishing public-private partnership
3) Budget - Sufficient funding for smart projects; financial incentives to effectively encourage private sector participation (e.g., grants, rebates, subsidies, competitions)	<ul style="list-style-type: none"> What are some projects that our city is funding, which could have a national-level interest? How can we facilitate greater private sector participation in developing our city? Does our public procurement encourage creativity and participation from start-ups? 	<ul style="list-style-type: none"> Sourcing the national and state funding Facilitating private-sector participation Encouraging hackathons and competitions Promoting smart procurement
4) Technology solutions - Beyond affordability and efficiency	<ul style="list-style-type: none"> Are we intimately familiar with the patterns and challenges faced when real people and local businesses interact with the city? Could the drive for affordability and efficiency sometimes overshadow equity, sustainability, and our social impact? 	<ul style="list-style-type: none"> Diverging priorities Focusing on people-centred design Building resilience Setting sustainability as a goal Understanding our citizens
5) Learning programmes - Preparing a smart workforce; 's role of higher education providers	<ul style="list-style-type: none"> Which are the current and future learning needs of our city's various population groups? What other non-traditional learning resources can we leverage on? As we scale our learning initiatives, are we truly helping citizens acquire skills that will secure their future livelihoods? 	<ul style="list-style-type: none"> Learning digital, digitally Introducing formal degree programmes Promoting industry immersion Developing a holistic smart workforce strategy
6) Co-creating the smart city - Talent readiness; programmes to equip the city's talent with smart skills	<ul style="list-style-type: none"> How can we ensure that all government officials truly listen to their constituents? What do we do to help our citizens volunteer high-quality feedback? How do we tap into the collective talent of its citizenry, to co-create our smart city? 	<ul style="list-style-type: none"> Promoting two-way engagement Promoting online discussions Deepening involvement
7) People-centricity and digital inclusivity - A sincere, people-first design of the digital inclusion in future smart city	<ul style="list-style-type: none"> Are there certain groups of citizens that we may have underserved, in our journey to become a smart city? How should our digital inclusion program balance considerations of affordability, devices, infrastructure, and digital literacy? How effectively has our digital inclusive strategy built confidence among all citizens? 	<ul style="list-style-type: none"> Accounting for every group Setting devices as a starting point Setting Internet Access from every device Growing IT Literacy
8) Innovation ecosystems - A comprehensive range of engaged stakeholders to sustain innovation (e.g., smart clusters and innovation district, incubators, events, networks)	<ul style="list-style-type: none"> Would developing a smart district help to accelerate our smart city ambitions? How should a smart district best synthesise its roles as a testbed and a knowledge hub? How much private sector involvement is considered optimal to test our smart city deployments? 	<ul style="list-style-type: none"> Identifying smart district models as innovation testbeds Tailoring smart cities to local needs Diversifying stakeholder base to share best-of-breed partners
9) Smart policies and the promise of open data - A conducive policy environment for smart city development (e.g., data governance, IP protection, urban design)	<ul style="list-style-type: none"> How can we realise the value of open data in our city context? How should we establish boundaries in our open data strategy? What should a data governance policy for our smart city address? 	<ul style="list-style-type: none"> Promoting data sharing and usage Identifying data formats and functionalities Identifying the need for data skills Setting the importance of data policy Acknowledging the benefits of open data
10) Sharing knowledge across cities and track record - The government's experience in catalysing successful smart city initiatives	<ul style="list-style-type: none"> Which other cities are facing similar issues that we are working on? How can we best institutionalise learning from our smart city journey? What creative cross-border knowledge partnerships can we develop? 	<ul style="list-style-type: none"> Learning networks and facilities Promoting shared campaigns Promoting joint projects

Source: Adapted from Eden Strategy Institute (2018)

Table 3. Smart city actions' taxonomy

Categories	No.	Actions	Implementing cities
1) ICT Infrastructure	1.1	Implementation of free Wi-Fi in municipal buildings and public areas	New Taipei City, Taiwan, Brasilia
	1.2	Implementation of optical fibre network (MAN)	Midtown Manhattan, New York City
	1.3	Data centre infrastructure for collecting and storing data from Internet of Things (IoT) sensors	Taiwan, Trikala
	1.4	Hardware and software upgrade in the municipal offices for a highly efficient back-office	Heraklion
	1.5	Electronic document flow management system for municipal offices	Athens
	1.6	Info-kiosks installation for providing information to citizens and visitors	Tepebaşı, Trikala, Barcelona
	1.7	Installation of electronic boards providing information in real time (such as weather, local news, events and duty pharmacies)	Sydney
2) Environment and Agriculture	2.1	Installation of electromagnetic radiation measurement sensors	New York
	2.2	Installation of noise measurement sensors	Barcelona
	2.3	Installation of air pollution (CO ₂ emissions) measurement sensors	Malaga, Amsterdam, Tallinn
	2.4	Installation of atmospheric microparticles measurement sensors	Malaga, Amsterdam, Tallinn
	2.5	Installation of rain level measurement sensors	Chicago, Amsterdam, Genoa
	2.6	Installation of light level measurement sensors	Rotterdam, Amsterdam
	2.7	Installation of Seismographs	Redmond, USA
	2.8	Urban Agriculture Consulting	New York
3) Transportation – Mobility	3.1	Actions for monitoring and improvement of traffic management in real time (Smart traffic Lights)	Thessaloniki, Singapore, La Rinconada
	3.2	Use of intelligent systems at pedestrian crossings for safe movement (Zero Vision Org)	Redmond, WA, USA
	3.3	Smart bus stops (e.g., with online bus arrival information) for better public transportation	Athens
	3.4	Installation of sensors on transportation vehicles or roads for traffic flow monitoring	Singapore
	3.5	Smart traffic information signs for traffic management	Barcelona
	3.6	Car parking spaces' sensors providing information and guidance to drivers for parking availability	Amsterdam, Singapore
	3.7	Application for route tracking of cyclists and reports submission	Amsterdam
4) Health	4.1	Implementation of health care tele-monitoring system to support vulnerable groups (such as disabled, suffering from Alzheimer's disease)	Singapore
	4.2	Implementation of telemedicine system for measurements of key health indicators (such as pressure, blood sugar) of citizens, and medical records archive	Singapore
	4.3	Implementation of patient progress remote monitoring systems in isolated areas	Trikala
5) Waste Management and Water Resources	5.1	Online quality measurement system of drinking water	Breda
	5.2	Online monitoring system with appropriate sensors for detecting possible water leaks in the water network	Nottingham
	5.3	Online monitoring system for immediate detection of possible water leaks in closed irrigation channels or irrigation tanks	Nottingham, Petaluma
	5.4	Actions encouraging and informing citizens about recycling through tele-education	Paphos
	5.5	Online monitoring and management system of pumping and boring stations	Aveiro
	5.6	End-to-end irrigation management system with dam operation control, pumping stations control, and water flow control in piping	Almare, Petaluma
	5.7	Online waste containers' management system (with occupancy sensors) and waste collection fleet management (using GPS)	Cambridge
	5.10	Online data collection from hydrometers	Genoa
	6.1	Installation of photovoltaics in municipal buildings	Amsterdam, La Rinconada
	6.2	Construction of wind farms (Ship-to-grid)	Amsterdam
6) Energy – Sustainable development	6.3	Energy savings in municipal buildings by upgrading exterior wall with insulation cladding and integrated interventions in cooling and heating systems – energy consumption monitoring and management system	Singapore
	6.4	Energy saving in the lighting of municipal streets and public spaces (e.g., by replacing existent lamps with led type ones, or by using a remote-control system) – smart lighting	Barcelona
	6.5	Actions for citizen information and awareness about energy saving	Amsterdam
	6.6	Optimal routing and fuel consumption monitoring of municipal transportation vehicles, and fleet management systems	Heraklion, Trikala
	6.7	Smart metres for energy consumption	Amsterdam
	7.1	Development of a system for advertising and promoting local cultural ICT infrastructure and events through the municipal website	Thessaloniki
	7.2	Development of electronic local tourist guide	Barcelona
7) Tourism - Culture	7.3	Development of tourist content applications for mobiles	Barcelona, Trikala
	7.4	Protection, promotion, and enhancement of museums, galleries, monuments, caves, archaeological and historical sites through virtual tours	Barcelona
	7.5	Digitization of museum content for creating digital cultural footprint	Paris, London, Rome
	7.6	Digital Museum for cultural and natural exhibits of the municipality	Thessaloniki, Trikala
	8.1	Actions for promoting entrepreneurship in municipal websites	Thessaloniki, Amsterdam
	8.2	Actions for the promotion and sale of local products via municipal websites	Samos, Hamilton
8) Economy-Sustainable Development	8.3	Employment actions via municipal websites	Thessaloniki
	8.4	Innovative actions for supporting high technology farming (e.g., precision farming)	Thessaloniki
	8.5	Promotion of innovative technological activities via municipal websites	Thessaloniki
	8.6	Interactive consulting services for young entrepreneurs in municipal web platforms	Thessaloniki
	8.7	Crowdsourcing competitions platform	Thessaloniki
	9.1	Fires early warning and response system	Seville, Petropolis
9) Security	9.2	Systems for citizens' protection in emergencies (such as earthquakes and floods)	Seville
	9.3	Using ICT for security and surveillance of public buildings and facilities	Seville
	9.4	Weather conditions monitoring and forecast systems for agriculture production	Amsterdam, Genoa

10) E-Government	10.1	Electronic voting application (e-voting) for municipal issues	Heraklion
	10.2	Electronic consultation on important municipal decisions and plans	Thessaloniki, Trikala, Lublin
	10.3	Collection of electronic signatures on important municipal issues (e-petitions)	Thessaloniki, Trikala
	10.4	Electronic (online) provision of the municipal services through the municipal website	Thessaloniki
	10.5	Development of applications enabling citizens to submit request-problems through electronic channels	Heraklion, Trikala
	10.6	Online monitoring system for collective bodies (e.g., city council meetings)	Heraklion
	10.7	Free access to open data for use by individuals or other public agencies	Barcelona, Thessaloniki
	10.8	Geographic information system (GIS) applications for urban planning purposes (such as land use information and objective property values)	Barcelona, Thessaloniki, Heraklion
	10.9	Implementation of e-government services provision framework	New York, Panama City

Source: Adapted from Alexopoulos et. al. (2019); Alexopoulos et. al. (2021); Charalabidis et. al. (2019)

The guiding themes and taxonomy described above appear holistic, with practical cases referred worldwide. However, Lim et al. (2020b) observed that a major trend in Asian practises is that the top-down governance is prioritised within ICT-related infrastructure development, such as in Songdo and Masdar and in smart cities in Japan, India, China and Malaysia. Moreover, there is also a shift from technology-driven to human-driven methods by adopting bottom-up governance practises, such as the case of Singapore. In terms of implementation strategies, the double-helix model of public-private partnership is dominant but there are indicators that the quadruple-helix model is increasingly being promoted through the engagement of and partnership with civil society. In fact, co-creating with civil societies as well as local academia are considered as an important factor in fostering partnerships among multi-stakeholders (Gutiérrez et al., 2016; Leading Cities, 2013; Preston, Mazhar, & Bull, 2020).

Besides, concerns have been established about the use of a technology-led vision in building future smart cities, which include infringements of data privacy, geosurveillance, social divide and anticipatory governance, instrumental and paternalistic practises and democratic deficiency (Araya, 2015; Cardullo et al. 2019; Foth et al. 2015; Hollands, 2016; Tan & Taeihagh, 2020). In terms of high technology application, Kummitha (2018) warned that over-reliance on corporate visions and technological solutions will incur high maintenance and high city service operational costs in the long term. Thus, low-tech city solutions should be considered alongside promoting partnership with civil societies. Low-tech solutions refers to technology that has long existed, that engages in fewer research and development (R&D) activities, and that have been designed to be cost-effective and simple in form (Bathija, 2019).

Jimenez (2015) shared four examples of low-tech solutions for communications in emergencies, i.e., 1) the FM (Frequency Modulation) radio for critical communication during category-5 Haiyan typhoons attacking the Philippines; 2) SMS (short message services) short code to report emergency messages during the magnitude 7.0 earthquake that hit Haiti; 3) level sensors (one example of a low-tech sensor) combined with SMS, which serve as an early-warning system for floods and to save lives in the monsoon rains in Indonesia; and 4) shortwave (a type of amplified modulation (AM)) radio for critical communication in remote areas of Somalia case.

Other than the above, for monitoring community air quality, the low-tech Smart Citizen Kit (SCK) was applied in Amsterdam (Zandbergen & Uitermark, 2020). SCK was designed as an open platform consisting of a small computer with sensors that measure toxic substances in the air (e.g., carbon monoxide (CO) and nitrogen dioxide (NO₂)), temperature and sound (Fab Lab, n.d.). Environmental data collected by residents is channelled to an online platform and plotted on a map, which then assists decision-making. Zandbergen and Uitermark (2020) reported that, although the results of the data collection were less desirable, the project generated excitement about the technology and the community's role as pioneers and project initiators. It also encouraged the community to further experiment with DIY measuring kits.

Since the outbreak of COVID-19, many countries, and cities experienced serious economic downturns and budget restrictions to implement smart city initiatives. Thus, the low-tech application ideas discussed above could be considered as alternatives and innovations of bottom-up smart solutions.

METHODOLOGY

This study applies the participatory observation method (Kawulich, 2005; Merriam & Tisdell, 2016). The observed subject is the smart city online webinar co-organised by the Malaysian Industry-Government Group for High Technology (MIGHT) and Institut Latihan Perumahan dan Kerajaan Tempatan (I-KPKT) from 15 to 16 March 2021. The webinar was entitled "How to accelerate the implementation of smart cities in Malaysia". This title served as an appropriate research question for this study to observe the implementation of smart city in a local context. This webinar consisted of seven modules and covered a range of topics.

This study focuses on Module One (the implementation of smart city initiatives towards national aspiration), Module Five (the smart city as a tool to accommodate new norms in the COVID-19 era), and Module Seven (budget application) to analyse the national aspiration and actions for the COVID-19 implementation of smart cities at the local authority level.

The invited panelists (both moderators and speakers) of this webinar are from different backgrounds with a wide range of expertise. Data collection is made through participatory observation as the inputs of the panelists are valuable for analysis purposes. Although the name of panelists are public, due to research ethics, representative codes are used in this paper (Table 4). For example, G1 represents the first government informant. To answer the research question accurately, the authors selected relevant panelists as informants in this study. Opinions from the seven informants are deemed as representing their organisation, and less so the individual participant.

Table 4. Informant's information

Sector	Informant	Organisation	Post
Government	G1	Ministry of Housing and Local Government (KPKT)	Deputy Secretary-General (Policy)
	G2	Ministry of Housing and Local Government (KPKT)	Secretary (Policy and Inspectorate)
	G3	Ministry of Domestic Trade and Consumer Affairs (KPDNHEP)	Secretary-General
	G4	Putrajaya Corporation (PPJ)	Director, Division of Smart City
Government Agency	GA1	Royal Police Malaysia (PDRM)	Deputy Head of the Johor Crime Prevention and Community Safety Department
Non-profit technology think tank	TT1	Malaysian Industry-Government Group for High Technology (MIGHT)	Senior Vice President
Private	P1	Veritas Design Group	Vice President cum Architect

The first author participated in this two-day webinar and was actively engaged in the question and answer sessions. Verbal data were transcribed through the recorded videos posted by the PLANMalaysia Facebook page (PLANMalaysia, 2021b, 2021a) and analysed through thematic analysis assisted by Atlas.ti and Mendeley software. Two major themes were derived from the text coding and category, namely the challenges and strategies facing the implementation of smart cities at the local level. The findings are presented in figures and in matrix tables in the following section.

FINDINGS

This section is divided into two parts. The first part presents the opinions of informants on the general challenges and strategies facing the implementation of smart cities in the Malaysian context. As this article aims to provide insights to the LAs into the implementation of smart cities locally, the case of the Putrajaya smart city experience is presented in the second part.

Challenges and Strategies in Implementing Smart Cities in the Malaysian Context

Various challenges and strategies are faced in the implementation of smart city agenda in Malaysia. Distinctive and specific perspectives of informants from different organisations and backgrounds were observed. From the federal government perspective, informant G1 mentioned that the challenges faced by the LAs include the capacity to identify what they need and to submit comprehensive proposals to the Ministry of Housing and Local Government (KPKT) for assistance. Furthermore, in explaining the challenges in budget applications for smart city projects, informant G2 pointed out that the proposals submitted to KPKT had to demonstrate the urgency of community's needs and the potential benefits of a project. The proposals must be creative. For example, the LAs should not merely propose to build smart LED lights or install sensors, but must be able to demonstrate how these proposals involve the community and how the data would be collected. This would lead to better predictions in the planning of smart communities. The impacts on the community must be clearly highlighted. The authors observe that KPKT has the strategies prepared; for example, they have published the MSCF, and established a smart city team to assist budgeting and proposal applications. The team's role includes updating LAs profiles and aligning them with the expertise required. The authors observe that KPKT has laid good foundations and is committed to assist the LAs with localised solutions and connecting them with suitable partners and technologies.

On the other hand, government informant G3 raised the issue about the deficiency of digital infrastructure in many parts of the country, especially in remote and rural areas. Without a stable and strong digital infrastructure, internet connections will be interrupted and online commercial activities will be affected. This has led to the slow adoption of e-wallets in current Malaysian society. Nevertheless, G3 was optimistic and pointed out the opportunity created by the COVID-19 pandemic to accelerate the demand for online transactions and digital platforms adoption in future smart living. The strategies formulated by the Ministry of Domestic Trade and Consumer Affairs (KPDNHEP) include partnering with e-wallet providers and helping the LAs to locally promote the usage of e-wallets and the practice of digital lifestyles. G3 argued that with the convenience of e-payment, people would benefit from a wider choice of e-commerce platforms, greater bargaining power and higher savings on delivery costs as compared to offline buying behaviour. The authors observe that the roles of KPDNHEP are to propagate a smart society with better e-spending habits and to ensure its efforts are aligned with the development of a smart society and to provide assistance to the LAs.

In terms of safety and security issues, informant GA1 explained that the Royal Police Malaysia (PDRM) has cooperated with the LAs to install cameras with algorithms, and drone surveillance. To reduce crime, the PDRM requires the public to report suspicious vehicles and criminal activities and lock their back doors properly. Furthermore, better lighting and wider walkway designs are needed in neighbourhood areas. GA1 mentioned that the PDRM is sensitive to the spread of COVID-19 and has four basic

procedures to consider, including 1) the readiness of automated hospital and medical staff, 2) smart transportation for contagious diseases, 3) isolation provision if COVID-19 cases are detected, and 4) notifications and alert messages sent through smartphones. The PDRM has also formulated Smart Police strategies, namely 1) smart policing CCTV systems set up to monitor illegal immigrants, 2) propagating community policing and awareness of 'e-aduan', 3) conducting traffic and vehicle analysis, 4) setting up a centralised command centre, especially for response and patrol systems, 5) conducting social media analysis, 6) observing e-platforms such as MySejahtera and other contact detection apps, and 7) setting up a COVID-19 access centre. The authors observe that PDRM officers are frontliners in the COVID-19 pandemic and have performed their duties diligently to protect the public. They strive for faster responses through the adoption of technological solutions.

A member of a government think tank, informant TT1 identified the critical challenge to building smart cities was that the LAs need alternative sources of funding instead of relying on conventional funding models. TT1 revealed that most funders or financial institutions are profit-motivated and prioritise short-term gains, and they must ensure their investments provide returns. However, intangible benefits for community building projects are difficult to measure in the short term. Other challenges include weak partnerships, lack of communication among stakeholders, insufficient infrastructure, inconsistent regulations, talent shortages and ineffective technology selections. To meet these challenges, TT1 emphasised that fostering partnerships among stakeholders is their key strategy, and the Malaysian Industry-Government Group for High

Technology (MIGHT) has customised its formulas to take smart city development to the next level. The first formula is “3C” – Coordination, Collaboration, and Communication (Figure 1).

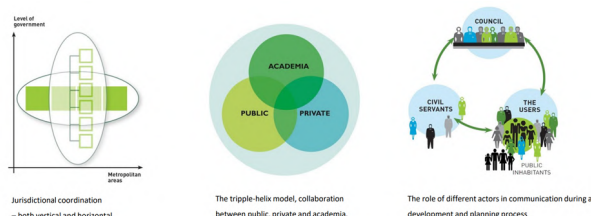


Figure 1. The “3C” formula to foster partnership

Source: Presentation slide from the MIGHT representative in Module 1, Smart City Webinar, 15 Mac 2021

Jurisdictional collaboration among all levels of government (i.e., city, municipal and district councils) across all areas (i.e., metropolitan, city and rural areas) would be cost-effective. The triple-helix model – collaboration between the public, private and academic sectors – is considered crucial to allow the LAs to formulate smart city solutions. Besides, effective communication should involve the council, civil servants, and public inhabitants especially the affected residents during the development and planning processes.

The second formula is “F.I.R.S.T.”:

F-Funding, refers to the necessity of seeking alternative funding models by the LAs and stakeholders.

I- Infrastructure, acknowledges the building of efficient digital infrastructure to enable an innovative ecosystem.

R-Regulations, refers to the necessity of having government regulatory frameworks in place to lead and adopt the stages of development.

S- Skills and Talent, whereby stakeholders should continuously upskill existing talents and produce those of the future.

T- Technology, as the access to technological solutions in smart cities is often unproven and the adoption costs must be considered.

Above all, the last formula is “Trust: 3W, 2R and 1A”. Building trust among all parties to work closely must be based on the 2Rs – Reward- and Risk-sharing. TT1 believed that the LAs will be unable to gain trust and rewards without taking risks to explore and execute ideas. With the trust of all parties, the 3W will be the result: a win for the public sector, a win for the private sector, and a financial win for all. All parties need to discuss and formulate

the right business and financing models to accommodate different project requirements. Hence, to offer benefits to all parties, 1A – a common agenda for all - is the key to fostering greater collaborations and communication.

From the perspectives of the private sector, informant P1 acknowledged informant TT1’s concern and further noted securing funding approval is the challenge for the LAs. Normally, financial institutions focus on short-term profit returns rather than long-term returns to the community. P1 stated,

“I do hope your (informant TT1) message also goes to the financial institutions in the Risk Assessment Unit. They don’t go by the business-as-usual assessment, and they factor in the significance of the impact of smart city initiatives to the community. These have intangible values and bring intangible returns to the community in terms of well-being, liveability for societies, and their contribution to the integration and connectivity of the population.”

The authors argue that P1’s suggestion is valid. The LAs and related stakeholders may make extensive attempts to submit funding proposals, but the approval-granting party may have to restructure their risk assessment to consider the intangible values and returns to the society which is currently not in place. The findings of all the above analysis are summarised in Table 5 below.

Table 2. Themes, self-reflections, and strategies of a for determining smart city government

Informants	Challenges	Strategies	Observations
G1 (KPKT)	-The LAs must be able to identify what they need. -Submit good proposals to KPKT for assistance.	-The KPKT have arranged subject matter (smart city) experts. They have 15 members in their team. They will examine the proposals given by the LAs and evaluate the areas in which they can provide assistance.	The KPKT is serious in helping the LAs to implement smart city initiatives aligned with the national agenda. They seem ready to connect the right partners to the LAs. This is aligned with the supportive administrative
G2 (KPKT)	-Budget proposals must demonstrate the urgency of a community’s needs, outline the benefits and be creative. For example, they should not just propose smart LED lights, sensors but involve the community, data collection, prediction and smart community planning. -Budget proposals must show the impact on the community.	-Updating LAs profiling and aligning them with the requirements and expertise needed.	practice in most of the world, such as the Government of the Netherlands, which supports the Amsterdam City Council in its smart city initiatives.
G3 (KPDNHEP)	-Strong infrastructure is missing. -Adoption of e-wallet is still slow. -Optimistic that COVID-19 will change people’s mindsets to embark on online behaviour in many aspects of life, including electronic transactions.	-Partnering with e-wallet providers and the LAs to encourage the use of e-wallet platforms. -E-payment will increase consumer choices, allow more bargaining power and enable transport cost savings.	The KPDNHEP’s concern is to propagate a smart society with better e-spending habits and for its efforts to align with the development of smart cities and assistance to the LAs.
GA1 (PDRM)	-Camera combined with an algorithm, and drone surveillance for intelligent city design. -PDRM needs more public participation in detecting suspicious vehicles, and residents should lock their backdoors properly. -Needs of better lighting, and wider walkways.	Four basic procedures to be utilised during COVID-19: 1. Automated hospital and medical staff 2. Smart transportation for contagious diseases 3. Provision of isolation if COVID-19 cases are detected 4. Alert messages sent through smartphones Smart Police strategies: 1. Smart policing CCTV 2. Community policing 3. Traffic analysis 4. Centralised command centre 5. Social media analysis 6. Observing MySejahtera and other contact detection apps	PDRM are frontliners in the COVID-19 pandemic and have carried their duties diligently to protect the public. They strive for faster responses and to adopt technological solutions.
TT1 (MIGHT)	-The most critical challenge is that stakeholders need alternative funding and must not rely only on conventional funding. -Other challenges include weak partnerships, lack of communication among stakeholders, insufficient infrastructure, inconsistent regulations, talent shortages, and ineffective technology selections.	-First formula, 3C: Coordination (among all level of governments), Collaboration (between public sector, private sector, and academia), and Communication (with people) -Second formula, F.I.R.S.T.: Funding (current and alternative models), Infrastructure (enabling the ecosystem), Regulations (regulatory framework), Skills and Talent (upskilling current talent and producing future talent), and Technology (access to solutions). -Third formula, Trust, 3W, 2R and 1A: Trust building, 3W (Win for the public sector, private sector, and people), 2R (Reward and Risk), and 1A (common Agenda for all).	The customised formulae are easy to remember and will simplify both the understanding and realisation of smart cities. However, the focus of MIGHT is on the triple-helix not the quadruple-helix model. Thus, the fourth set of players – the residents – seem to have been side-lined at the decision-making stage and their involvement limited to the consultation/communication stage. Also, the authors noticed that low-tech solutions were silenced by MIGHT.
P1 (Veritas)	-The LAs face challenges in gaining proposal approval.	-Financial institutions need to consider long-term returns to the community and not just short-term profit returns.	P1 observed and concerned about the current shortfalls that the LAs may face in implementing smart cities.

Source: The authors

The Putrajaya Experience: Lessons for the LAs

Putrajaya is a greenfield city, built from scratch during the formation of the Multimedia Super Corridor in the mid-1990s (Yigitcanlar & Sarimin, 2015). It was planned as an intelligent green city, with fibre optic infrastructure underground and in buildings being generally ready at its inception. This was a privilege of Putrajaya as the federal administrative centre, as it received funding support from the federal government that other existing brownfield cities did not. Thus, according to informant Putrajaya G4, the Putrajaya Corporation (PPJ) currently spends only on upgrading the endpoint technology without spending extensively on infrastructure development.

In pioneering smart city planning, the PPJ published its Putrajaya Smart City Blueprint (PSCB) in 2019. This was the first lesson to be learned by the LAs. The PSCB blueprint was led by city planners from their internal town planning department. G4 added that the process of developing the blueprint took about a year and cost around RM80,000. Prior to that, a series of focus group discussions and

engagements were carried out (Putrajaya Corporation, 2019). To garner stakeholder input was crucially important as the city was planned for all than merely to suit the legitimacy of government procedure.

The second lesson learnt from the case of Putrajaya is about its detailed planning and execution of initiatives identified. The PSCB was designed to be compatible with the MSCF, and planned under the seven domains, with 92 initiatives. These initiatives were further divided into four types, namely quick win (less than 1 year; 2018), short-term (1-2 years; 2018-2020); medium-term (3-4 years; 2018-2022) and long-term projects (more than 5 years; 2018-2025).

“LAS need to understand what they need, what they are going to do, and which initiatives they prioritise, and categorise more quick victories at the beginning to broaden stakeholder acceptance.” (Informant G4).

According to informant G4, the criteria of quick win and short-term projects included those which did not ask for an internal budget, but required collaboration with agencies and private sectors such as smart metres, mobile connectivity and

cashless society projects. Other criteria of quick win and short-term projects were those initiatives that could tap on to an existing infrastructure, such as using existing sensors and connecting to the main system. As safety and security are the top priorities for Putrajaya, some early completed projects included the installation of smart CCTVs, the establishment of the Putrajaya Command Centre and the panic button project.

The third lesson is regarding the shared responsibility within the internal management team. Informant G4 explained that besides the city planning team developing the PSCB Blueprint, the execution role is dedicated to the Smart City Division and the IT Division. Currently, the IT Division consists of six people, mostly with IT training and should recruit staff with engineering and financial backgrounds in the future. On the other hand, the PPJ hires new staff for the round-the-clock operational tasks in the Putrajaya Command Centre; those staffs are under the Smart City Division. The authors analyse the distribution of work under the PSCB initiative (Figure 2).

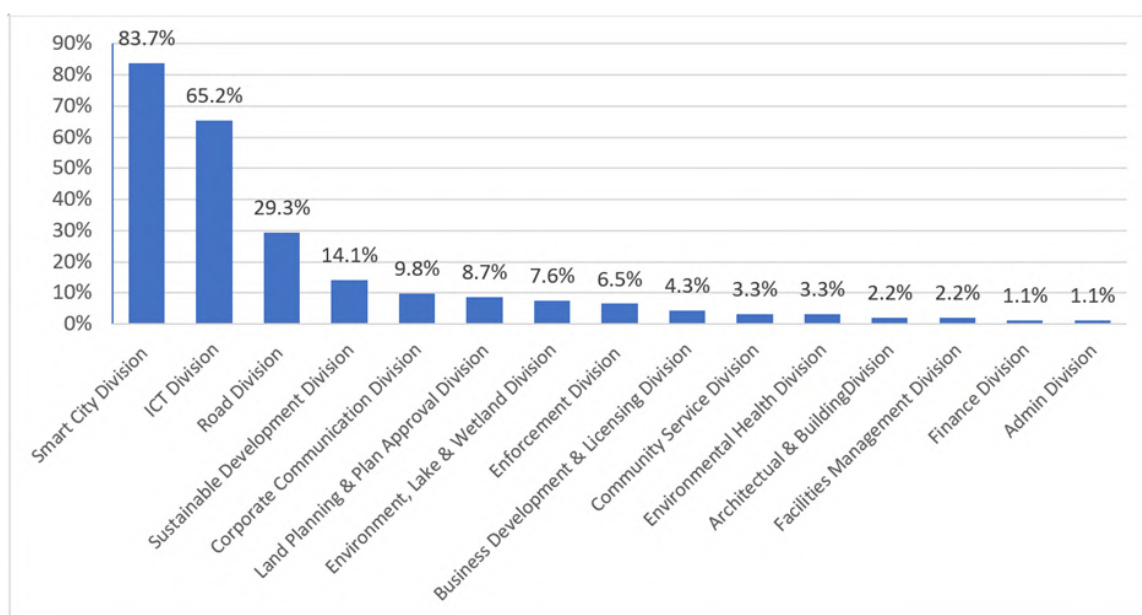


Figure 2. Distribution of the internal of internal department of Putrajaya Corporation among responsibilities responsibility in 92 planned smart initiatives. Source: The authors

Note: Detail analysis on the Putrajaya Smart City Blueprint, from page 24 to 122 showed that the total initiative is 92 instead of 93 initiatives as shown on page 14.

Figure 2 suggests that the Smart City Division plays the most important role in implementing the 92 planned smart initiatives, contributing up to 83.7% of the workload. G4 added that the PPJ has a dedicated smart city team. The team's responsibilities include the creation of action plans for each initiative, the responsibility for coordination within internal departments and agencies, the identification of strategic private partners and networking with them, studying and comparing technological solutions (that must be durable and easy to maintain) and implementation approaches that best suit the city, and the promotion of initiatives to the public.

The fourth lesson is regarding the cost, selection, and maintainability of the technology. Among the initiatives currently being considered by the PPJ are those related to smartphones for telecommunication infrastructure, city mobile apps, and outdoor digital bill boxes. Although technology is considered a new solution for city management bodies, the LAs must choose the right technology and not overspend in introducing unnecessary technology that burdens the LAs cost management system. All selections of technology must be implemented with caution because this factor entails high maintenance costs in the long-term and could lead to municipal bankruptcy (Kummitha, 2018).

"Smart technologies cannot exist without a strong foundation and ongoing maintenance. These technologies are investments just like any others. The LAs need to assess their environment and be sure that key responsibilities are assigned and that they have adequate resources to maintain the initiatives." (Informant G4).

Closely related to the above points, the fifth lesson for the LAs is pertaining to pilot projects launching. These smaller-scale projects help to determine problems and subsequently improve the process, technology, and user experience. Based on these pilot results, the LAs can define solutions before full deployment. G4 continued by advising that, in the organisation's experience, the best way to implement smart cities is to seek local technology partners and select sandboxing and pilot projects.

"In our experience, when we choose technology, we need to choose wisely. It is advisable to look for fair and common solutions so that we don't get stuck with any brands. We should also give opportunities to local products. We should know that there are an increasing number of local manufacturers that produce quality IoT devices locally." (Informant G4).

The sixth lesson for LAs is on creating multiple funding sources. The PPJ has the potential to use various models. The traditional model involves internal budgets from revenue through assessment and applying for budget through the Malaysia Five Year Plan (RMK). Meanwhile, the alternative method is through collaborations with the private sector. Grants from the federal government, agencies and public service partners can help finance LAs initiatives. G4 mentioned that more than 50% of the PPJ initiatives managed to receive money from RMK-11 (11th National Plan) and RMK-12 (12th National Plan), an estimated RM1-2 million to spend on maintenance.

"Based on what we have received, I can say that yearly we have managed to get at least RM10 to 20 million from the federal agencies for us to implement smart city projects. In terms of the funding amount we get, roughly about 5 to 10% is for maintaining the city. We don't use so much from our internal budget, so it is more likely to be the budget we get from the federal government via collaboration with other agencies and the private sector." (Informant G4).

G4 advised that the most successful approach to receiving budget funding is to devise a documented long-term plan for a smart city. G4 explained,

"We need to put more effort into getting the RMK budget. The best approach for us to get this budget is to have a documented long-term plan for our smart city. I highly recommend that the LAs develop a comprehensive smart city blueprint for your cities. Whenever you apply for the federal budget, they would see that you already have the plan documented."

Planning the scale of the spending allocation is the seventh lesson for the LAs. Informant G4 disclosed that the initial spending was used for building extra miles of fibre optics, installing CCTVs and establishing a command centre. When these basic infrastructures had been put in place, the expenditure on installing IoT devices later was costly. At all times, cost maintenance over the following years must be planned accordingly to avoid overspending, the wastage of resources and the deferment of projects.

"We have laid down 60km of fibre optics in the city instead of the 128km that we had previously. Also, we spent more on building infrastructure and security. For example, we do spend quite a high amount of money on CCTV. The outdoor CCTV is not something like the internet of things, so the cost for this is quite high. Other than that, the biggest cost is establishing our Putrajaya Command Centre. Inside this command centre, we must get better hardware and screens, and to pull all the data from the sensors, CCTVs and from any other input back into one single location." (Informant G4).

Finally, the eighth lesson is that the LAs must establish good relationships, cooperation, and partnership networks with stakeholders. G4 stated that a successful smart city plan relies on the involvement of citizens, businesses, and other stakeholders. Based on the themes that emerged from the eight lessons shared, the authors further categorise the lessons into four main categories, namely the blueprint, responsibility and partnership, technology, and funding and spending (Figure 3).

DISCUSSIONS

Using the above findings, the discussion is divided into three parts, namely the major challenges, strategies, and opportunities for the LAs in implementing smart cities locally.

Urgency to Identify Smart City Challenges in Local Contexts

Based on the MSCF and analysis findings, the key national urban issues (refer to Table 1) and general potential challenges the LAs face (refer to Table 5) are summarised. The LAs do not lack general references but must be aware that these examples may not suit every local context. For example, in the COVID-19 era, the issues of security or traffic congestion may not be critical to district councils in rural areas. Instead, due to the COVID-19's effects on the economy, income level among the B40 (the lowest 40 per cent) group has dropped. Furthermore, this group has then further expanded to cover the 50 per cent of the society (known as B50) (MSN News, 2021). Thus, rural area LAs might face lower revenue collected from assessments, much smaller budget for implementation

and a lack of talented manpower. Thus, if district councils are to propose their smart city initiatives, the domains of smart security or mobility might not be their priorities. Instead, they should ask critical questions (refer to Table 2 and 3) and propose projects that can improve residents' income level, train and retain local talents and obtain support from residents to co-create low-tech solutions. The examples of low-tech solutions explained by Bathija (2019) and Jimenez (2015) and the Smart Citizen Kit applied in Amsterdam (Zandbergen & Uitermark, 2020) warrant the consideration of decision-makers and administrators.

In terms of talent shortage, the LAs should adopt the advice to share the workload with stakeholders. For example, LA can co-produce the preparation of a smart city blueprint with consultants and residents. Alternatively, they can co-build a smaller scale command centre with the PDRM and co-manage it with police staff. Importantly, as advised by the informants in this study, most LAs should avoid overstretching their resources by spending on too many high-technology solutions. They must be mindful of budget spending management in the COVID-19 era. The bankruptcy of a local government can be the worst-case scenario if there is over-reliance on corporate visions and technological solutions while the actual needs of the people are ignored (Kummitha, 2018).

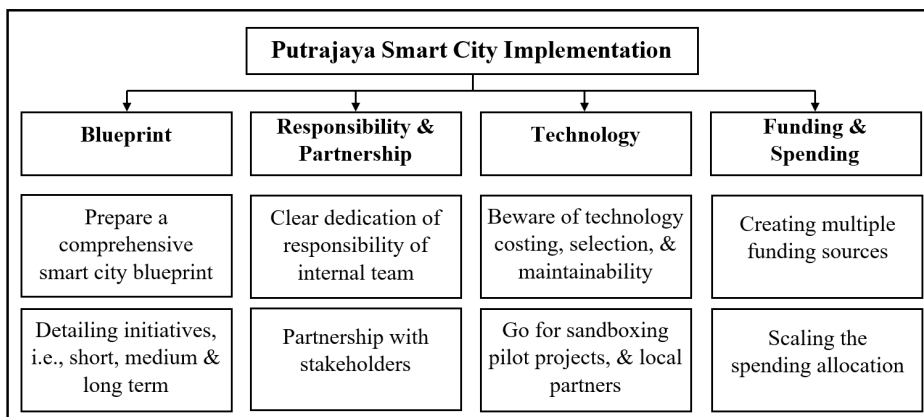


Figure 3. Lessons for leaders and administrators to learn from Putrajaya Smart City Implementation. Source: The authors

Reprioritise Strategies to Co-create with Academic and Citizen Stakeholders

Literature review shows that the strategies and self-reflection questions of international city cases as summarised in Tables 2 and 3 are good checklists for LAs. According to the findings, the most critical strategy is that of the multi-stakeholder partnership. As identified in Figure 1 and the tenth theme in Table 2, collaboration and sharing experience among different levels of the LAs are crucial for them to leverage others' experiences and to network. For example, district or municipal councils can take the initiative and learn from city councils by visiting their smart infrastructure setting such as the Petaling Jaya City Council Smart Command Centre.

Noticeably, there is a mismatch between the ideal planning of smart cities and in reality. For example, many informants involved in this study mentioned the role of academia and the community. Nonetheless, these stakeholders were not present in the sharing session. Furthermore, some mentioned they supported technological practises and held non-technical points of view. However, relevant representatives who might had introduced low-tech solutions to the LAs were not selected as panelists in the webinar. Such scenarios can mislead the LAs to perceive that academia and the community are less important and may be ignored. In fact, the opposite is the case: giving more opportunities and exposure to academia and community associations to showcase and share their low-tech urban solutions are a mutually beneficial situation. Academia uses research evidence and is less profit-driven in nature, so it could provide more objective suggestions and alternative perspectives to the LAs.

Furthermore, local academics and residents know the real problems the communities face and this advantage allows them to participate in co-drafting smart city blueprints which will help the LAs to identify the right problems and avoid overspending. Furthermore, the solutions should come initially from local academics and residents themselves at the most appropriate level. Only if issues are beyond the capability of the locals should the LAs engage the private sector. These issues may involve sophisticated technological solutions, such as promoting e-wallet apps and digital payment systems in the COVID-19 era through private sector providers and in collaboration with KPDNHEP. This action will definitely contribute to the raising of confidence in grassroots innovation and to recognise the capacity and potential of local education institutions and residents as co-producers of smart city initiatives.

In short, the authors argue that the LAs should reprioritise their partners and focus on co-creating with local academics and residents instead of solely with the corporate sector (Gutiérrez et al., 2016; Leading Cities, 2013; Preston et al., 2020).

Rethink Technology-led or Citizen-Centric Vision

Although the smart city aims to utilise technology for urban solutions, the LAs should rethink this definition because many scholars have warned about this technology-led vision in building future smart cities (Araya, 2015; Cardullo et al., 2019; Foth et al., 2015; Hollands, 2016; Tan & Taeihagh, 2020). It is argued that the LAs should attempt to avoid building a technology- or corporate-led smart city that would inevitably lead to the subjugation of both residents and the LAs by technology corporations (Vanolo, 2016) in the long-term

running of smart city initiatives. Instead, the LAs are urged to consider an alternative model of a citizen-centric smart city that involves co-creating with residents, and cultivating smart citizenship, local champions and co-producers (Cardullo et al., 2019; Lim et al., 2020a; Malek et al., 2021).

In the citizen-centric concept, the needs and responsibilities (or contributions) of residents are crucial for successful implementation. A smart solution is not always one that is manipulated in a one-way communication of providers' supplies to fulfil the citizens' demands or needs. As problems continue to appear in the urbanisation process, the need for better quality urban living seems an endless challenge. Therefore, the authors argue that smart solutions should be developed with bilateral communication, such as asking citizens to define problems and local community capacities, contribute ideas and efforts, and make joint decisions to ensure the optimum community solutions. For example, Toronto's openness to a process of early co-creation with citizens is unique and unlike the traditional approach of forming partnerships only after the smart city plan has been decided, which entails the risk of solution misalignment or lack of support. The City of Hamburg invited residents to their Smart Citizen CoLab (Eden Strategy Institute, 2018) to develop the most effective community solutions.

Opportunities to Learn from Putrajaya and be Aware of Own Limitations

The case of Putrajaya implementing its smart city seems promising, according to the authors' analysis. The LAs should learn from these experiences and be aware of their own limitations. The eight lessons from Putrajaya's experience (refer to Figure 3) can serve as key rules for the LAs to successfully implement smart cities in their local contexts. While some may regard Putrajaya as a utopian reference case for all, the authors would like to stress that, the majority of the LAs do not possess the privileged status Putrajaya enjoyed as the federal administrative centre. It gained substantial support from federal government funding and laid approximately 188km of fibre optic connections underground and citywide.

To date, there are 154 LAs in Malaysia and for them to receive funding priority from the KPKT is challenging because they must design innovative proposals and solutions that rightly impact the community. Thus, they must secure alternative funding and develop different business models, such as applying for grants made available by the international institutions (e.g., the World Bank, UN-Habitat or UNESCO) or state governments. They should also seek cooperation with private partners and promote grassroots and low-tech solutions to reduce the funding burden. In addition, the installation of digital infrastructure, such as fibre optics underground and as links between buildings, is another limitation facing existing brownfield cities. Thus, the LAs must seek collaboration with the Malaysian Communications and Multimedia Commission (MCMC) and telecommunication infrastructure providers, such as Telekom, to seek technical support in the installation of

digital infrastructure. Without ready and stable digital infrastructure, implementing smart cities would become infeasible, and certainly difficult to achieve within the planned implementation period of 2021 to 2022, as stated under MSCF.

In harnessing citizen input to formulate visions and initiatives for smart city blueprints, the LAs have a wide range of innovative channels to engage with stakeholders than solely conducting focus group discussions and workshops as employed in the case of Putrajaya. For example, the Indian city of Pune engaged stakeholders in multiple ways including organising mini-labs, signature campaigns, support letters and MOUs (Eden Strategy Institute, 2018).

Meanwhile, the development of the Smart District (Table 2) is not mentioned in the MSCF and does not appear in the case of Putrajaya. The authors find this a useful opportunity, and it is worth exploring the components of a Smart District besides building conventional business or industrial districts. Smart districts are well-connected, with shared spaces and events designed to facilitate spontaneous encounters and flexible meetings (Eden Strategy Institute, 2018). Valuable relationships arise through co-working locations, regular district-level meetings for professionals, and conferences. Such settings regularly result in formal collaborations between local members of innovation community groups. Examples for the LAs to learn from include the Boston Waterfront Innovation District, Berlin's Moabit West Smart District, Singapore's Punggol Digital District, and the 22@Barcelona (Eden Strategy Institute, 2018).

CONCLUSION

In conclusion, this article analyse the challenges, strategies and opportunities for Malaysian LAs considering smart city implementation. It provides guidance to the decision makers and administrators that are interested in initiating smart city projects, setting up the team, applying for funding, and identifying suitable pilot projects which can be suited through modification for the local context. The contribution of this article is timely, as 2021 and 2022 are scheduled as a golden period to implement smart city initiatives. International case studies, government advice, smart city experts and the case of Putrajaya are analysed and discussed in detail. Some takeaway points to highlight are (1) the need to rethink the collaboration partnership models, (2) whether the vision is to create a technology-led or citizen-centric smart city, (3) seek multiple funding and business models, (4) remain mindful in choosing the right technologies and avoiding over-burdening long-term operations, and (5) view citizens as co-producers and co-creators rather than beneficiaries of, or burdens to, future smart city projects.

REFERENCES

- Alexopoulos, C., Charalabidis, Y., Pereira, G. V., & Madrid, L. (2019). A taxonomy of smart cities initiatives. *Proceedings of the 12th International Conference on Theory and Practice of Electronic Governance ICEGOV '19*, February 20-22, 2019, Melbourne, Australia, 281-290. Melbourne: ACM. <https://dl.acm.org/doi/10.1145/3326365.3326402>
- Alexopoulos, C., Euripidis, L., & Charalabidis, Y. (2021). A methodology for participatory planning of smart city interventions. In E. Estevez, T. A. Pardo, & H. J. Scholl (Eds.), *Smart Cities and Smart Governance: Towards the 22nd Century Sustainable City*. Cham, Switzerland: Springer. https://doi.org/10.1007/978-3-030-61033-3_8
- Alizadeh, T. (2021). *Global Trends of Smart Cities: A Comparative Analysis of Geography, City Size, Governance, and Urban Planning*. Amsterdam, Netherlands: Elsevier. <https://doi.org/10.1016/b978-0-12-819886-5.01001-x>
- Araya, D. (Ed.). (2015). *Smart Cities as Democratic Ecologies*. New York & London: Palgrave Macmillan.
- Bathija, P. (2019). Don't overlook the low-tech solutions that can promote value in your organisations. Retrieved April 9, 2021, from <https://www.aha.org/news/blog/2019-04-30-dont-overlook-low-tech-solutions-can-promote-value%02your-organizations>
- Cardullo, P., Felicianantonio, C. Di, & Kitchin, R. (Eds.). (2019). *The Right to the Smart City*. Bingley, UK: Emerald. <https://doi.org/10.1108/9781787691391>
- Charalabidis, Y., Alexopoulos, C., Vogiatzis, N., & Kolokotronis, D. E. (2019). A 360-degree model for prioritising smart cities initiatives, with the participation of municipality officials, citizens and experts. In M. P. R. Bolívar & L. A. Muñoz (Eds.), *E-Participation in Smart Cities: Technologies and Models of Governance for Citizen Engagement* (pp. 123-153). Cham, Switzerland: Springer. <https://doi.org/10.1007/978-3-319-89474-4>
- Eden Strategy Institute. (2018). *Top 50 Smart City Governments*. Singapore: Eden Strategy Institute and Ong&Ong Pte Ltd.
- Fab Lab. (n.d.). *Smart Citizen Kit*. Retrieved October 1, 2019, from <https://smartcitizen.me/>
- Foth, M., Brynskov, M., & Ojala, T. (Eds.). (2015). *Citizen's Right to the Digital City: Urban Interfaces, Activism, and Placemaking*. Singapore: Springer.
- Gutiérrez, V., Theodoridis, E., Mylonas, G., Shi, F., Adeel, U., Diez, L., ... Muñoz, L. (2016). Co-creating the cities of the future. *Sensors*, 16, 1971. <https://doi.org/10.3390/s16111971>
- Hollands, R. G. (2016). Beyond the corporate smart city? Glimpses of other possibilities of smartness. In S. Marvin, A. Luque-Ayala, & C. McFarlane (Eds.), *Smart Urbanism: Utopian Vision or False Dawn?* (pp. 168-184). London: Routledge.
- Jimenez, R. M. (2015). 4 low-tech solutions for communications in emergencies. Retrieved April 9, 2021, from <https://www.unhcr.org/innovation/4-low-tech-solutions-for-communications-in-emergencies/>
- Kawulich, B. B. (2005). Participant observation as a data collection method. *Forum: Qualitative Social Research*, 6(2), 43.
- Kummitha, R. K. R. (2018). Entrepreneurial urbanism and technological panacea: Why smart city planning needs to go beyond corporate visioning? *Technological Forecasting and Social Change*, 137(July), 330-339. <https://doi.org/10.1016/j.techfore.2018.07.010>
- Leading Cities. (2013). *Co-Creating Cities: Defining Co-Creation as a Means of Citizen Engagement*. Boston: Northeastern University. <https://doi.org/10.13140/RG.2.1.3684.5849>
- Lim, S. B., Jalaluddin, A. M., Mohd Yusof, H., & Zurinah, T. (2020a). Malaysia Smart City Framework: A trusted framework for shaping smart Malaysian citizenship? In J. C. Augusto (Ed.), *Handbook of Smart Cities* (pp. 1-24). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-15145-4_34-1
- Lim, S. B., Jalaluddin, A. M., Mohd Yusof, H., & Zurinah, T. (2020b). Understanding the trends and characteristics of smart urbanism across continents. *Smart Cities and Regional Development Journal*, 4(1), 23-35. Retrieved from <http://www.scrd.eu/index.php/scr/article/view/61>
- Macpherson, L. (2017). 8 years on, Amsterdam is still leading the way as a smart city. Retrieved May 5, 2021, from <https://towardsdatascience.com/8-years-on-amsterdam-is-still-leading-the-way-as-a-smart-city-79bd91c7ac13>
- Malek, J. A., Lim, S. B., & Yigitcanlar, T. (2021). Social inclusion indicators for building citizen-centric smart cities: A systematic literature review. *Sustainability*, 13(1), 376. <https://doi.org/10.3390/su1301037>
- Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative Research: A Guide to Design and Implementation* (4th ed.). San Francisco: Jossey-Bass.
- Ministry of Housing and Local Government. (2019). *Malaysia Smart City Framework*. Putrajaya: Ministry of Housing and Local Government.
- Ministry of Housing and Local Government. (2020). *Senarai Pihak Berkuasa Tempatan (PBT) di Malaysia*. Retrieved February 20, 2020, from [http://jkt.kpkt.gov.my/sites/default/files/2020-07/Senarai 150 PBT sehingga 1 Julai 2020_1.pdf](http://jkt.kpkt.gov.my/sites/default/files/2020-07/Senarai%20150%20PBT%20sehingga%201%20Julai%202020_1.pdf)
- Mora, L., Deakin, M., & Reid, A. (2019). Strategic principles for smart city development: A multiple case study analysis of European best practises. *Technological Forecasting and Social Change*, 142, 70-97. <https://doi.org/10.1016/j.techfore.2018.07.035>
- MSN News. (2021). It's B50 now, not B40, this is a very serious matter, says Muhyiddin. Retrieved March 27, 2020, from <https://www.msn.com/en-my/news/news-viral/its-b50-now-not-b40-this-is-a-very-serious-matter-says-muhyiddin/vp-BB1ePexP>
- PLANMalaysia. (2021a). Knowledge sharing and training session: How to accelerate the implementation of smart cities in Malaysia", Day 1. Retrieved March 17, 2021, from <https://fb.watch/4rHkie8FMh/>

REFERENCES

PLANMalaysia. (2021b). Knowledge sharing and training session: How to accelerate the implementation of smart cities in Malaysia", Day 2. Retrieved March 17, 2021, from <https://fb.watch/4rHpQuqD4i/>

Preston, S., Mazhar, M. U., & Bull, R. (2020). Citizen engagement for co-creating low carbon smart cities: Practical lessons from Nottingham City Council in the UK. *Energies*, 13(24), 6615. <https://doi.org/10.3390/en13246615>

Putrajaya Corporation. (2019). Putrajaya Smart City Blueprint. Putrajaya: Putrajaya Corporation.

Tan, S. Y., & Taeihagh, A. (2020). Smart city governance in developing countries: A systematic literature review. *Sustainability*, 12(899). <https://doi.org/10.3390/su12030899>

Vanolo, A. (2016). Is there anybody out there? The place and role of citizens in tomorrow's smart cities. *Futures*, 82, 26–36.

Yigitcanlar, T., & Sarimin, M. (2015). Multimedia super corridor, Malaysia: Knowledge-based urban development lessons from an emerging economy. *Vine*, 45(1), 126–147. <https://doi.org/10.1179/str.2009.56.4.005>

Zandbergen, D., & Uitermark, J. (2020). In search of the smart citizen: Republican and cybernetic citizenship in the smart city. *Urban Studies*, 57(8), 1733–1748. <https://doi.org/10.1177/0042098019847410>





Wan Nordiana Wan Ali

*School of Housing, Building and Planning,
UNIVERSITI SAINS MALAYSIA, MALAYSIA*

*Department of Building, Planning and Surveying,
Faculty of Architecture,
UNIVERSITI TEKNOLOGI MARA PERAK,
MALAYSIA*



Prof. Dr. A Ghafar Ahmad

*School of Housing, Building and Planning,
UNIVERSITI SAINS MALAYSIA, MALAYSIA*

NEW NORMS : REVIVING THE HERITAGE SHOP HOUSE FACADES AT BATU GAJAH, PERAK



ABSTRACT

The Coronavirus Disease 2019 which was officially declared a pandemic in March 2020 has severely interrupted human daily lives globally. The pandemic forces Malaysia to declare the Movement Control Order, MCO1.0 and MCO2.0, by shutting down the operations of nearly all sectors except the essential ones and enforcing new norms such as physical distancing, self-isolation and quarantine practice, hand sanitising and facemask wearing. As a result, various economic sectors have been affected, especially the retails and hospitality industry, which has extended the implications to historical towns such as Batu Gajah, Perak. Multiple platforms have been provided to revive the industry including town rebranding. This paper discusses the Batu Gajah's rebranding plan and focuses specifically on the heritage shophouse facades' revivment. To revive the facades, a taxonomy of six main architectural styles and characters of façade that includes Transitional, Eclectic, Neoclassical, Art Deco, Early Modern and Modern is outlined. Restoration or redesign are suggested for the rebranding approaches. It is recommended that reference should be made to the designs outlined to maintain the consistency of the façades. Data was collected through desktop study and field survey. The paper concludes that the concise data of architectural characters is significant to differentiate the styles. Further research should be conducted to develop an heritage shop house façade evaluation tool for inventory purposes.

Keyword: Heritage shop house, façade, architectural styles, conservation approaches.

INTRODUCTION

The COVID-19 Pandemic has caused many difficulties and disruptions globally. Various sectors are affected by the pandemic, including construction, tourism, business, health, education, and many more. In Malaysia, it is estimated that over 237,500 small and medium entrepreneurs (SMEs) throughout the country have been suffering since the Covid-19 Pandemic hit the country in March 2020. The SMEs were unable to survive when the Movement Control Order (MCO) took place nationwide to curb the virus outbreak (Zulkifli, 2021). Specifically, the hotel industry was severely affected with the hotel occupancy dropping to approximately 20% and even lower in most areas. Perak, for instance, recorded a loss of RM1,022,289 due to a total of 2,403 room cancellations for the period between 11 January to 16 March 2020. It was estimated that out of a total of 1,653 workers, 245 workers were laid off, 91 workers faced a pay cut, while 595 workers were forced to take unpaid leave. Md. Ashraful and Haslinda (2020) suggested rebranding as an approach to rebuild and transform the tourism and hospitality industry in the post-COVID 19 era.

City branding helps to improve a city's expression of its distinctive strengths, which would attract tourists and new investments. Heritage tourism has become one of the popular forms of tourism. Countries worldwide have perceived it as an instrument for economic development, as well as cultural and local heritage advocacy (Eko, 2013). According to Norhasimah et al. (2014), cultural heritage is manifested in many forms including buildings, areas, dance, food, dresses, events, values, lifestyles and handicrafts. Despite the value of cultural property, the loss of heritage is generally on the rise. These losses include the damage or loss of buildings of historical importance, archaeological sites, monuments, and objects. Orbasli (2008) stated that tourism often presents greater incentives to improve the external appearance of buildings in a historic town, since most visitors will experience the historic character in the public realm.



At present, Batu Gajah's development, by referring to Batu Gajah Local Plan 2025 (2018), has entered the third phase of implementation. With the challenges caused by the COVID-19 pandemic, it is obvious that the efforts to achieve the targets are still ongoing. While development and modernisation are necessary, the conservation of the heritage buildings must not be ignored. Batu Gajah and its surrounding areas have a significant historical value of which this area is one of the earliest administrative centres in Perak, traced back to the 1880s. Furthermore, Batu Gajah also has many architectural assets including the colonial administrative buildings and heritage shop houses in its town centre, Pusing, Tronoh and Papan. As stated in the Local Plan 2025, the key focus is to preserve and conserve the heritage shop houses especially when many of the traders are local residents. One of the contributions that local authorities can make is to rebrand and regenerate the heritage shop houses to attract more customers and tourists to Batu Gajah. For instance, it is important to ensure that the heritage shop house facade design can be restored by adhering to the conservation principles and according to the original or corresponding design. To comply with the design requirement, as there are currently no references of the architectural styles of façade, hence, this research is conducted to propose a taxonomy of architectural styles for heritage shop houses facade at Batu Gajah, Perak.

RESEARCH BACKGROUND

Batu Gajah town has been the main administrative centre of the Kinta District, Perak, since the 1880s. Historically, Batu Gajah was a name inspired by a big and hard stone resembling an elephant and already existed around the 1870s. The early development of Batu Gajah was closely associated with tin mining activity which began to grow in the Kinta District at the time. Initially, the early town began at the riverside of Sungai Kinta. The area was known as the old town where a row of wooden shop houses was first built. Some of the shops were owned by Malays. During this period, the river route was important as the old town became a place of loading the goods, including tin. Due to the rapid tin activity, the new transportation system was developed and has brought significant development to Batu Gajah. The first railway was built connecting Batu Gajah to Ipoh and Kota Bharu, Perak. The railway services have facilitated the export of tin ore from Ipoh to Batu Gajah and extend the journey via river route to Teluk Anson (Teluk Intan). At the end of the 1900s, shophouses began to be built in the new town area near the railway station along Jalan Pusing. Business in the new town area of Batu Gajah was then dominated by the Chinese and Indians. By 1905, Batu Gajah was known as a mining and commercial town in the Kinta district.



Figure 1. Batu Gajah Town, Perak. (Wikimedia, n.d. & Malaysia Map, n.d.)

After a century, Batu Gajah has been developed into the current stream of modernisation. To ensure the continuity of the town and conservation of its historical significance, the Local Authority has prepared Batu Gajah Local Plan 2025 (2018). There are three (3) themes in rebranding the town i.e., ; 1) Administrative Heritage Town, 2) Locomotive Industry Town, and 3) Main Business Centre. The development plan focuses on strengthening the linkages of heritage elements and the urban landscape. As stated in the Local Plan, the rows of shop houses at Jalan Pejabat Pos and Jalan Pusing which are still intact in terms of structural and design, will be preserved as the heritage shop houses. Any heritage shop houses with a unique design are encouraged to convert its function into a boutique hotel as a new attraction in the town centre. However, the interior of shop houses should retain the traditional design and concept. In order to enhance urban streetscape view quality,

Shophouses repainting are proposed, either with attractive colours or uniform colour tone and street lights are to be installed with some landscaping elements. The heritage shop houses should be preserved and conserved to maintain the competitiveness among existing retailers as long as the structure of the buildings is still safe and the business operation runs well. Therefore, the local authority is determined to revive and, at the same time, uphold the heritage image within the business centre of Batu Gajah Town by creating a continuity and balance between its new development and the existing heritage shop houses. Other places of interest in Batu Gajah include Warisan Kapal Korek, Taman Herba Negeri Perak, Taman Alam Kinta (Birds Park), Pusat Rekreasi Lubuk Timah, Perak Agrotourism Resort (PATRO), Kellie's Castle, Istana Raja Billah, Taman Eko-Rimba Papan and the latest, Silverlakes Outlet Mall.



LITERATURE REVIEW

Heritage Shophouses

A shop house is usually listed in the category of mixed-use and commercial. Due to its double functions as residential on the upper floor and business on the ground floor, a shop house is more appropriate to be categorised as mixed-used (Gurstein, 1990). Nowadays, some of the heritage shop houses are no longer occupied for residence purposes. Thus, it is categorised as commercial. This long-narrow building typically consists of a façade, commercial area, air-well, dining area, kitchen, and bedroom on the upper floor. The most significant element is the front façade as a medium to convey the design era when it was built and the building's function. The heritage shop house façade is defined as “a building element of heritage shop houses that facing the street consisting of structural, enclosure, opening, fenestration and ornamentation” (Burden, 1996, 2003; Wooi, 2015; Hopkins, 2013; Curl, 2006; Harris, 1983; Ahmad and Shaiful, 2012).

Rebranding of the Heritage Shop houses Facades

Orbasli (2008) states that urban regeneration and urban conservation are two different types of processes. The former is an economic and environmental development to improve physical and socio-economic conditions towards a more vibrant and active environment. The latter, on the other hand, is concerned with the conservation and rehabilitation of historic towns and areas and more on maintaining the historic fabric and place character.

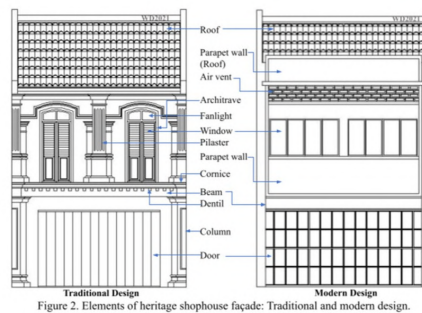


Figure 2. Elements of heritage shophouse façade: Traditional and modern design.

Rebranding is seen as relevant to achieve both urban regeneration and urban conservation concepts. By definition, rebranding is a process to change the image of a company, or an organisation, or one of its products (Hornby, 2008). As a conservation approach, restoration is considered as the most suitable method to rebrand the heritage shop house façades that have been left neglected, deteriorated or renovated. Restoration aims to revive the original concept or legibility of the object by returning a building

or parts of it to its original form. These include unifying a building, replacing a missing detail, and conducting cleaning works to return a building to its near original appearance (Fielden, 2003 & Orbasli, 2008). Another conservation approach is preservation. It is an act of regular maintenance or special work initiated to protect the structure against further damage without significant alteration to its current condition to sustain its existing form, material, structure, or condition. Another method is replacement. According to Burden (2003), replacement is defined as an action taken to renew or restore the damaged parts of a building to its former place or condition. Redesign differs slightly from the replacement, whereby this approach will change the original appearance of the building façade and the existing facade design will be altered and refreshed to a new physical scheme. Figure 4 shows the concept of rebranding for the heritage shop house façades.

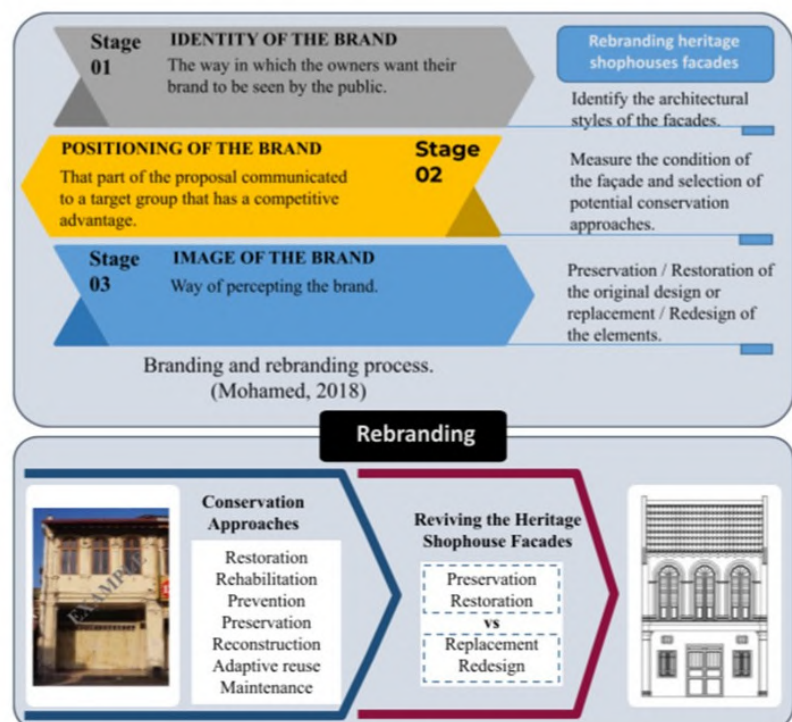





Figure 4. Rebranding concept for heritage shophouses facades.

In the context of heritage shop house research, the term “rebranding” refers to ‘restore the facade’s original design or redesign (with certain elements being replaced) that harmonise with the neighbourhood design’. As such, the adaptive reuse approach seems relevant. Adaptive reuse is a transformation of building use to a new function without affecting the heritage building’s integrity. However, the main focus of this research is the front facade of the heritage shop building. The front facade is significant as it conveys the building’s function and is able to attract customers or tourists to enjoy the uniqueness of the architecture. So any change or anonymity of the facade of the building should be avoided. Table 1 shows the examples of heritage shop houses at George Town and Ipoh that includes Sinkeh Hotel in Penang, Nest Paloh in Ipoh, and Areca Hotel in Penang (Jayne, 2018, and Travelopy, n.d.).

METHODOLOGY

The purpose of this article is to propose a taxonomy of architectural styles for heritage shop houses facades at Batu Gajah. This taxonomy can serve as a reference for any intended action regarding the rebranding of heritage shop houses at Batu Gajah. A qualitative research design is used to develop a taxonomy of architectural styles of heritage shop houses façade. The data collection for this research involves multiple methods. The preliminary stage of this research began with collecting articles, relevant documents, reports, reference books etc to extract relevant data covering architectural elements and characters of heritage shop houses in Malaysia. Then, document review was conducted to identify the appropriate terms. Sources of data are from books, dictionaries, and government reports ranging from local to international authors.

Table 1. Examples of heritage shophouses boutique hotel at George Town and Ipoh.

 <p>Sinkeh Hotel, George Town: Adaptive reuse into a guesthouse and theatre arts space. A three-storey building that contains nine rooms was attached behind the shop lot.</p>	 <p>Sarang Paloh, Ipoh: This building was formerly known as the first-ever Chinese bank in Perak called Bank of Malaya. The building was said to have withstood World War II before it was restored and turned into a boutique hotel in 2014. The buildings are made up of three buildings connected side by side.</p>	 <p>Areca Hotel, George Town: Renovated from an entire block of 12 pre-war shophouses and refurbished into a modern guesthouse. It features 48 rooms. Located opposite the hotel is The Majestic Theatre, the first cinema in Penang to screen Chinese films with sounds.</p>
--	---	---

(Jayne, 2018; and Travelopy, n.d.)

At this stage, the data of the elements that formed and diversified the architectural style were extracted. The list of the significant elements of the heritage shop house façade was obtained by setting the theme codes, i.e., beam, column, roof, external wall, door, window, air-vent, fenestration, and ornamentation. By indicating these elements, the attributes that formed the heritage shop house façade were obtained. Subsequently, the fieldwork involves 79 heritage shop houses located at Jalan Pejabat Pos, and Jalan Pusing was carried out. Then, a matrix typology matrix was drafted, and general characteristics of the architectural styles were extracted from the literature study by using content analysis and summarised to fill in the drafted typology matrix.

FINDING AND DISCUSSIONS

There are 79 units of shop houses along the Jalan Pejabat Pos and Jalan Pusing at Batu Gajah Town that fall within the research scope (refer to Figure 5). The shop houses are grouped according to the row or block of shop houses numbered as A, B, C, D, E, and F. Most of these shop houses are still in good condition and used for various business activities such as workshops, grocery stores, eateries, clock stores, pharmacies, jewellery stores and more.

Only a few shop house facades have modified the original design of the facade, which are mainly on the upper floor. The transformation is such as redesign of transitional style to modern style. The improper change is due to the decay of the timber wall on the upper floor of the shop house. An example of such a façade could be seen in Block D in Figure 6. As a result of photo analysis and observation, the architectural styles and its characters of the heritage shop house facades of the Batu Gajah Town are shown in Table 3. Block A, B, C, and D are included in the conservation plan by the local authority, while Block E and F excluded. However, for this research purpose, these two blocks are added as these rows of shop houses consist of various architectural styles that are still intact and needed to be conserved and documented for future references.



Figure 5. Heritage shophouses along Jalan Pusing and Jalan Pejabat Pos at Batu Gajah Town, Perak.



Figure 6. Heritage shophouses at Jalan Pejabat Pos and Jalan Pusing, Batu Gajah.

Table 2. Analysis of architectural styles of heritage shophouse façades at Jalan Pejabat Pos and Jalan Pusing, Batu Gajah.

Architectural Styles	Block						TOTAL	%
	A	B	C	D	E	F		
Transitional	6	0	0	7	1	8	22	28.0
Eclectic	0	0	0	0	10	1	11	14.0
Neo-Classical	1	10	13	0	1	1	26	33.0
Art Deco	1	0	0	0	0	0	1	1.0
Early Modern	1	0	0	1	0	0	2	2.5
Modern	4	0	0	5	1	7	17	21.5
TOTAL	13	10	13	13	17	17	79	
%	16.5	12.5	16.5	16.5	21.5	21.5	100	100

Table 3. Taxonomy of heritage shophouse façades in Batu Gajah, Perak.

Transitional	Eclectic	Neo-Classical	Art Deco	Early Modern	Modern
Used of timber for the upper floor beam. Engaged column at the upper façade and free-standing column below. Pitch roof with terracotta roof tiles. Wall is painted in pastel or white finishing. Some shophouses use timber wall at the upper floor. The door is two timber shutters, or vertical folding panelling. Transoms light or fanlight infilled with glass, often combined timber carved. Two or three bay windows full-length shutters at the upper floor. Top part shutters has louvres, bottom part is a flat panel. Architrave framed the window openings sometimes with a keystone at the top. Some of the façades have full-width timber louvered shutters. Timber or steel lattice above door height along the wall at the ground floor for natural ventilation. Simple design with minimal ornamentation.	Used of timber for the upper floor beam. Engaged column at the upper façade and free-standing column below. Pitch roof with terracotta roof tiles. Bright colour painted on the wall. The door is two timber shutters, or vertical folding panelling. Transoms light or fanlight infilled with glass are often combined timber carved. Two or three bay windows full-length shutters at the upper floor. Top part shutters has louvres, bottom part is a flat panel. Architrave framed the window openings. Decorative plasterworks of flora motifs with various ethnic tradition influence.	Used of timber for the upper floor beam. Engaged column at the upper façade and free-standing column below. Pitch roof with terracotta roof tiles. Cornice at the parapet, upper floor beam and column. Dentil below the beam cornice. Adaptation of Classical order such as fluted columns or pilasters. Pitch roof hidden behind parapet or a Grecian pediment. Wall is painted in pastel or white finishing. The door is vertical folding panelling. Transoms light infilled with glass. Two or three bay windows full-length shutters at the upper floor. Top part shutters has louvres and sometimes infill with glass, bottom part is a flat panel. Architrave framed the window openings with a keystone at the top.	Reinforce concrete beam. Engaged column at the upper façade and free-standing column below. Pitch roof with terracotta roof tiles sometimes hidden behind parapet wall. Painted in shade colour or white finishing. Door is metal folding panelling. Two or three bays windows, used of glass and steel framework and sometimes with glass louvres. Horizontal and vertical reinforced concrete shading fin. Various shape of concrete air vent slots at the upper floor. Relief writing date of building construction on the facade. Devoid any decoration and craftsmanship.	Reinforce concrete beam. Engaged column at the upper façade and free-standing column below. Pitch roof with terracotta roof tiles sometimes hidden behind parapet wall. Painted in shade colour or white finishing. Door is metal folding panelling. Two or three bays windows, used of glass and steel framework and sometimes with glass louvres. Horizontal and vertical reinforced concrete shading fin. Various shape of concrete air vent slots at the upper floor. Relief writing date of building construction on the facade. Devoid any decoration and craftsmanship.	Reinforce concrete for the upper floor beam. Five-foot walkway sometimes built without columns. Some building exceeds two storeys height. Flat roof is hidden behind the parapet wall. Common used of wall tiles. Metal folding panelling door for ground floor access and single-leaf door for upper floor access. Large glass window with steel frame. Front façade usually built without vent hole. Windows are arranged in group. Geometric design in cuboidal form. Devoid any decoration and craftsmanship.

CONCLUSION

Rebranding of historic areas has become a practical move for urban conservation. The local authority of Batu Gajah Town, Perak, for example, has effectively adopted this concept in the Batu Gajah Local Plan 2025 (2018). Thus, to achieve the mission, a taxonomy of main architectural styles and characters of façade is deemed necessary in reviving the heritage shop houses facade for reference purposes. 79 heritage shop house facades at Jalan Pusing and Jalan Pejabat Pos are included in the fieldwork that involved six (6) blocks of shop houses. The physical characters of the facades are identified for pattern analysis of similarities and differences with other heritage shop houses facades in Ipoh, George Town and Malacca. A total of six (6) architectural styles are identified in this research which include Transitional, Eclectic, Neoclassical, Art Deco, Early Modern and Modern.

Based on the fieldwork analysis, 28% of the samples are in Transitional styles, 14% Eclectic, 33% Neoclassical, 1% Art Deco, 2.5% Early Modern, and 21.5% are Modern style. In the presence of such information, the local authority can advise the building owners to do restoration works or redesign for rebranding purposes. Research on heritage building inventory is recommended for documentation purposes and for the classification of architectural styles period of the heritage shop houses. Moreover, conservation management should be more effective because it is a concern that improper actions against the facade will increase after the pandemic as priority that would be given to attract the customers or tourists.

ACKNOWLEDGEMENTS

The authors acknowledge with much appreciation for the financial support provided by the Ministry of Education (MOE) Malaysia, Universiti Sains Malaysia, and Universiti Teknologi MARA Perak.

REFERENCES

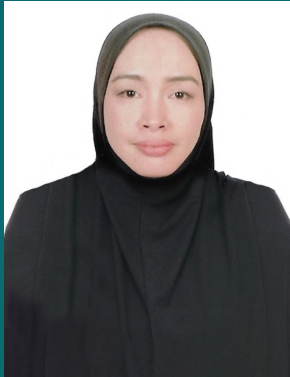
- Ahmad, S. H., & Shaiful, R. C. Y. (2012). Architecture and heritage buildings in Georgetown Penang. Pulau Pinang, Malaysia: Penerbit Universiti Sains Malaysia.
- Batu Gajah District Council (MDBG). (2018). Draf Rancangan Tempatan: Majlis Daerah Batu Gajah 2025. Jilid 1: Peta Cadangan dan Pernyataan Bertulis. Perak: Majlis Daerah Batu Gajah.
- Burden, E. (1996). Building Facades: Faces, Figures, and Ornamental Detail. London: McGraw-Hill.
- Burden, E. (2003). Illustrated Dictionary of Architectural Preservation. New York, United States: McGraw-Hill Companies.
- Eko, N. (2013). Using City Branding Strategy for Increase Heritage and Tourism to be Modern Movement Heritage in Architecture. 2nd International Conference on Urban Heritage and Sustainable Infrastructure Development (UHSID). Diponegoro University, Semarang, Indonesia.
- Fielden, B. M. (2003). Conservation of historic buildings (3rd ed.). Oxford, UK: Architectural Press.
- Foo, L. P., Chin, M. Y., Tan, K. L., & Phuah, K. T. (2020). The Impact of COVID-19 on the Tourism Industry in Malaysia. Routledge Taylor & Francis Group.
- Gurstein, P. (1990). Malaysian Architectural Heritage Survey: A Handbook. Kuala Lumpur: Badan Warisan Malaysia.
- Hopkins, O. (2014). Architectural Styles; A Visual Guide. London: Laurence King Publishing.
- Jayne, T. (2018, August 23). 9 'Old' Heritage Buildings in Malaysia That Were Transformed into Cosy Boutique Hotels. <https://says.com/my/lifestyle/boutique-hotels-in-malaysia-that-were-once-heritage-mansions>
- Malaysia Association of Hotel (MAH). (2021). Little Hope for Recovery with MCO 2.0. <https://www.hotels.org.my/press/27055-little-hope-for-recovery-with-mco-2-0-mco-2-0-serving-a-deadly-blow-to-the-tourism-industry>
- Malaysia Map. (n.d.). Malaysia Vacation Guide. <https://www.malaysiavacationguide.com/malaysiamap.html>
- Md. Ashraful, A. K., & Haslinda, H. (2020). The Effect of Covid-19 on Tourism and Hospitality Industry in Malaysia, Resurgence in the Post-Pandemic Era: A Conceptual Criterion. International Journal of Tourism & Hospitality Review, Vol 7, No 2, 2020, pp 54-62.
- Mohamed, B. K. B. A. (2018). Promoting The UNESCO Creative Cities. Unpublished Ph.D. Helwan University, Cairo.
- Norhasimah, I., Tarmiji, M., and Azizul, A. (2014). Cultural Heritage Tourism in Malaysia: Issues and Challenges. EDP Sciences. SHS Web of Conferences 12.
- Orbasli, A. (2008). Architectural conservation. Oxford, UK: Blackwell Publishing.
- Travelopy. (n.d.). Restaurants in Areca Hotel Penang. Retrieved March 20, from <https://www.travelopy.com/areca-hotel-penang/restaurants>
- Wikimedia Common. (n.d.). Districts in Perak.svg. https://commons.wikimedia.org/wiki/File:Districts_in_Perak.svg
- Xotels. (n.d.). Boutique Hotel. Retrieved March 20, from <https://www.xotels.com/en/glossary/boutique-hotel/>
- Wooi. T. Y. (2015) Penang Shophouses; A Handbook of Features and Materials. Pulau Pinang, Malaysia: George Town World Heritage Incorporated.
- Zulkifli, M. (2021, March 18). Bisnes 237,500 usahawan PKS lingkup. KOSMO, p. 9.



DRB HICOM

SARANG ABEH HUB

PASAR TANI PANTUNG MALIN
(KUALA KUALA - 200M) (KUALA KUALA - 200M)
(KUALA KUALA - 200M) (KUALA KUALA - 200M)



Assoc. Prof. Dr. Norzailawati Mohd Noor

*Urban and Regional Planning Department
Kulliyah of Architecture and Environmental Design
International Islamic University Malaysia*



Assoc. Prof. Dr. Illyani Ibrahim

*Urban and Regional Planning Department
Kulliyah of Architecture and Environmental Design
International Islamic University Malaysia*



Mdm. Marina Mohd Nor

*Urban and Regional Planning Department
Kulliyah of Architecture and Environmental Design
International Islamic University Malaysia*

GEOSPATIAL ENABLEMENT TO FACILITATE URBAN PLANNING COMMITMENT ON URBAN RESILIENCE IN MALAYSIA



ABSTRACT

Cities are vulnerable to a range of hazards and shocks. The COVID-19 has exposed the direct consequences of limited preparedness and resilience when facing a global emergency. In the face of these growing challenges, cities need the tools and knowledge to plan and mitigate the adverse impacts. The geospatial approach can play a critical role in supporting a more resilient urban planning with meaningful decision-making. Thus, this paper highlights the extent to which emerging geospatial approaches have deliberately enabled urban planning efforts to achieve urban resilience in Malaysia. To do so, we conduct a systematic literature review on different fields, and aspects of the geospatial components which consist of Geographical Information System (GIS), Remote Sensing (RS) and other relevant ones. The finding shows that moderate progress has been made on providing and exploring geospatial data usage by the relevant agencies to include geospatial data in various urban applications in Malaysia. Finally, this paper informs the industry, governmental and non-governmental and academia on geospatial enablement progress. Simultaneously, we believe that this tool to assist in urban applications is among the best promising ones for future sustainability and resiliency of cities.

INTRODUCTION

In the last decades, researchers explored the application of urban resilience concept by framing it within the context of urban planning. In general, urban resilience refers to the ability of an urban system and all its constituents including its socio-ecological and socio-technical networks across temporal and spatial scales (Ribeiro & Pena Jardim Gonçalves, 2019) which are able to purposely maintain or rapidly return to desired functions in the face of a disturbance, adapt to change, and quickly transform the systems that limit current or future adaptive capacity (Chelleri & Baravikova, 2021; Meerow et al., 2016; Moraci et al., 2018). Specifically, in urban planning, resilience aims to reduce the impacts resulting from a disturbance and ensures the city's livability. Therefore, urban resilience is crucial to ensure a city's ability to avoid or to recover from any adverse event. (Chelleri & Baravikova, 2021; Ribeiro & Pena Jardim Gonçalves, 2019). The level of resiliency is generally depending on the urban ability to adapt in the face of a change and/or risk. While many acknowledge that resilience is relevant when framing urban development and planning programmes and policies, few researchers have so far expanded the urban resilience theory. Rather, a multi-level perspective integrating bottom-up shocks such as natural disasters and top-down shocks such as world economic crises was widely explored.

Geospatial enablement is defined as the ability to include geospatial approaches and techniques to almost all existing information which unlocks a great wealth of existing knowledge pertaining to social, economic and environmental aspects. It involves

the process of which information is collected, updated, analysed, represented and communicated. It includes information on land ownership and custodianship, consistently aims to underpin.

good governance of land and its natural resources, efficiency in government activities, public safety and security towards the well-being of its citizens. It also plays a vital role in understanding and addressing challenges pertaining to achieving a resilient city goal. The recent enablement of technology and innovations in urban planning is concerned with the integration of geospatial databases in the urban planning process. Nowadays, there is an assortment of geospatial databases such as Geographical Information System (GIS), remote sensing (RS), Global Navigation Satellite system (GNSS) and other open-source databases and models. In particular, the innovation and technological advancement in GIS and RS are revolutionising the possible capacities for hazard, vulnerability and risk analysis and disaster planning (Westen, 2013). These risk analyses require a multitude of data that comes from different data sources. Issues such as data quality, scales and ownership need to be considered. Several studies have prepared susceptibility maps to capture the level of urban resilience in case disasters including landslides analysis (Kervyn et al., 2015; Pereira et al., 2019; Thongs & Griffith, 2019), multicriteria flood analysis (Ibrahim & Asmawi, 2018), and vulnerability matrix (Brunetta & Salata, 2019). The functions of GIS and RS enable a spatial representation of a city which include its people, environment and earth's surfaces.

For vector data, the information is stored in digitised format while raster data are in digital signatures and able to be manipulated to other beneficial algorithms according to the needs of such study.

Asia accommodates half of the world's urban population and contributes to the rising number of cities in the world. The rise of the urban population will experience different sets of disaster threats and vulnerabilities. For example, cities in Malaysia are at risk from climate threats and vulnerabilities due to high population density, poorly designed and maintained drainage system, high rate of solid waste mismanagement, construction of large infrastructures on risky sites and uncontrolled land development (Jamaludin & Sulaiman, 2018). Furthermore, 2020 also witnessed the Covid-19 pandemic of which cities have become the epicentre of the pandemic (Miller, 2020). Concerning this, the Centre for Research on the Epidemiology of Disasters (2021) reported that disasters recorded in Malaysia for the period between 2017 and 2021 consist of floods, flash floods, storms, slide on construction, pollution and landslide, and these events took place mainly in cities such as Kuala Lumpur, Melaka (Malacca), Johor Bahru and Penang (CRED, 2021). In addition, due to the sea-level rise phenomena, it is projected that nine Malaysian cities will be submerged underwater by 2050 (Dorall, 2019).

The integration of geospatial information is crucial to provide comprehensive data collection for decision-making to achieve resiliency. Moreover, geospatial information enablement helps to support continuous planning, monitoring, and handling of urban

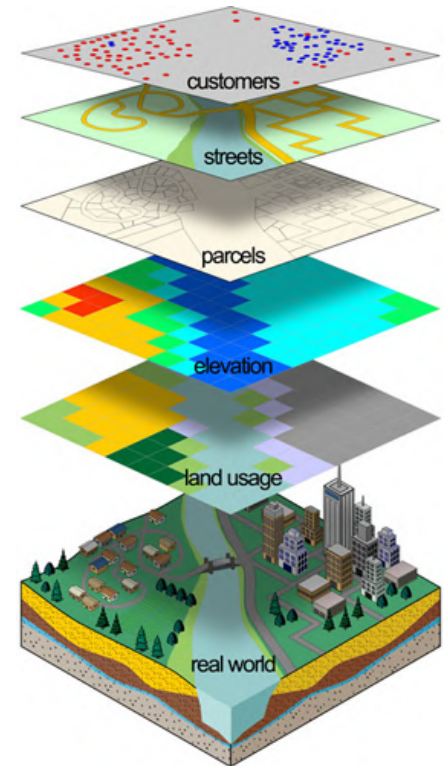
planning issues. As in the era of ubiquitous data, all related data such as cadastral, demographic, and environmental data are readily available and have become routine services for most metropolitan areas (Noor & Marina, 2020; Drummond & French, 2008; Robinson et al., 2017). In this context, urban planning has become the focus for its role to achieve efficient energy consumption and to minimise the threats caused by climate change and natural disasters (Borie et al., 2019). Due to this commitment, geospatial technology has received substantial attention for its innovation in measuring, controlling, analysing, and overcoming limitations by both developed and developing countries (Choi et al., 2016; Convergne & Snyder, 2015; Shekhar & Aryal, 2019). The future city resilience will increasingly depend on a 'big data' approach, using Internet of Things (IoT) to establish 'sensory systems' that accurately capture critical information. Therefore, this paper highlights the extent to which emerging geospatial approaches can deliberately enable the urban planning efforts to achieve city resiliency in Malaysia. The systematic review of geospatial enablement on Malaysian resilient cities based on resilient city tools will also be presented.

GEOSPATIAL THEORETICAL AND DRIVING FORCE

Geospatial data is defined as objects, events, or phenomena with a location on the earth surface that combines with attribute information (Kristin Stock, 2016; Lim et al., 2021; Sharma et al., 2021). It also refers to data with a geographic component and records in a dataset have locational information tied to them, such as

geographic data in coordinates, address, city, or ZIP code. The geospatial data can be GIS, Global Positioning System (GPS) data, RS satellite imagery, and geotagging. Information from geospatial technology are useful for research organisations, governments, utility companies including the emergency service providers. Reliable and more accessible geospatial data allow for better decision-making while functioning as an enabler for the private sector to add value to its services.

The concept of GIS has been adopted by various corporations and education since the 1970s. GIS integrates a wide range of data by organising and visualising spatial data into maps and three-dimensional data. The appeal of geographic information systems (GIS) for disaster planning and response is that a user can sit at a distant computer, receiving streams of integrated spatial data from multiple sources to see a city as a whole in making data-driven decisions. Urban resilience has recently been incorporated into city master plans which primarily focuses on physical land uses. However, it is possible to record qualitative media within a GIS (Borie et al., 2019; Taylor et al., 2020). A GIS is a computer hardware, software, data, and personnel system that makes it possible to enter, edit, analyse, and link information to a location on the earth's surface.

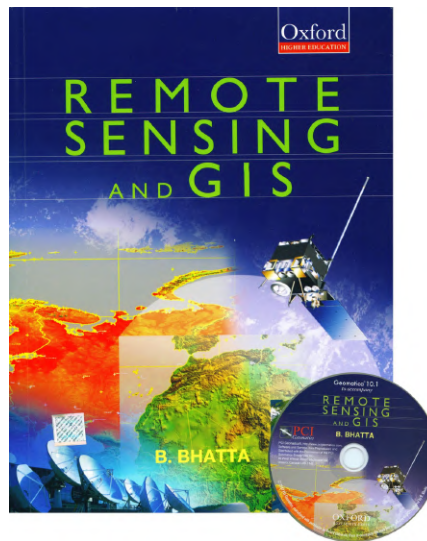


Source : Westfield State University
<https://geoawesomeness.com/knowledge-base/gis/>

Throughout these two decades, GIS and geographic information science have showed great pace in terms of the development of spatial data infrastructures and the infrastructure of data sharing, advances in the technologies of positioning, data acquisition, data dissemination, and data analysis; and the scientific passages that lies behind the technology (Dangermond & Goodchild, 2020; Taylor et al., 2020)). The paradigm shift of GIS started when its application was integrated into many fields, such as a cloud-based GIS system (Khan et al 2017), a participatory GIS by empowering community mapping and locational intelligence by using mobile phones, wearables, embedded sensors, and connected cars.

Historians of remote sensing cited various examples of the earliest attempts to obtain remote sensing images, such as cameras carried by passengers in the baskets of hot air balloons, pigeons carrying cameras, or even by people having cameras up a hillside a tower, e.g., the Eiffel Tower in Paris. In 1907, Julius Neubronner developed a miniature light camera that could be fitted to a pigeon's breast with a harness (Cracknell, 2018). Apart from imagery, civilian aerial photographs were widely used for a very long time in cartography (in photogrammetric surveys for map making, particularly as the basis for making topographic maps). The first aerial photograph was claimed to have been taken in 1858 by Felix Tournachon, known as Nadar, from a tethered balloon over the Bièvre Valley in France. The development of earth observation satellites with multiple resolutions has further encouraged the usage of geospatial data and technology in urban decision-making.

Furthermore, recent technology developments involving drones or Unmanned Aerial Vehicles (UAVs) have opened up significant new possibilities in remote sensing as drones are regarded as the third generation of platforms generating remotely sensed data of the earth surface. Considering the potential of remotely sensed data in addressing a particular problem, one has to address spatial, spectral, and temporal resolution requirements. Drone mainly addresses the questions regarding spatial and temporal resolution in the acquisition of data but it significantly reduces the field time and cost as compared to the traditional methods.



Source: *Remote Sensing and GIS* by Basudeb Bhatta

With the advancement in computing technology and the availability of open-source applications, GIS and RS are now accessible to everyone at little or no cost. As a result, government agencies, private organizations, NGOs and civil society organisations are increasingly using GIS-RS to manage their operations and to further develop the reach of their business and services. In particular, most cities around the world are integrating GIS-RS applications in their daily operations. By acquiring skills in GIS-RS, city planners and managers, emergency managers, and asset managers can keep up with the latest technological trends and possess the skill-sets required for the job expectations today and in the future. In fact, GIS-RS is the backbone technology for sustainable development and for achieving resilient communities and infrastructure. Thus, the GIS-RS skills are increasingly recognised and appreciated in many fields associated with spatial planning and development.

URBANISATION FROM THREAT TO OPPORTUNITY

City is a complex system that constantly changes and transforms depending on social, economic, and environmental factors. These factors can threaten and impact the cities' stability, especially when urbanisation continues to take place (Gao & Zhang, 2020; Zhang & Li, 2018; Zuniga-Teran et al., 2020) (Zhang & Li, 2018). Urbanisation has become the utmost priority trend today and it accelerates the momentum of global change. It drives technological innovation, economic growth, city development and prosperity as well as serving as the points of investment to developed and developing countries. According to the United Nations, more than half the world's population are now living in cities, and the total will increase to 60 percent by 2030. Specifically, 74 per cent of the population in Malaysia live in cities and it is projected that the population growth will increase and the total population residing in urban areas will be as high as 82 per cent. Based on the climate change scenario in Malaysia, cities will face further issues of sustainability, thus the focus on achieving sustainable development goals is crucial for cities. The distress in meeting demand of growing population, and the uncontrolled and unplanned land use development required an integrated and cross-cutting sustainable approach. Sustainability refers to a development that can fulfil the needs of current demand without compromising with the ability of future generations to meet their demand (M. H. Ibrahim et al., 2018; Ismail et al., 2020) (F. I. Ibrahim et al., 2015).



Urbanisation will take place with better control of land use and development planning for improved citizen well-being through adequate provision of urban services. The rapid technological development and innovation, especially in geospatial technologies, can be an excellent tool to assist any city to achieve its sustainable agendas. Geospatial information can be a monitoring tool to development planning towards systematic land use projection in meeting land use regulations as well as well-monitored urbanisation. The evolution of technology has resulted in the emergence of several planning decision methods that can contribute as decision support towards quality and optimum development (Scott & Rajabifard, 2017). Besides, geospatial tools can assist in development control as well as the preparation and review of development plans. However, a city is known for being an organism that constantly changes, meeting the sustainability agendas is always challenging. Therefore, it is crucial that the decision-making and formulation of policies and regulations concerning development planning be backed with continuous development in the field of systematic data management and analysis.

URBANISATION AND CONCEPT OF RESILIENCE

The concept of resilience is increasingly being used as a guiding principle to frame scientific research, political discourses and cities agendas addressing urban vulnerability and sustainability.

Among the global initiatives relevant to this topic include the Sustainable Development Goals (SDGs) outlined by the United Nations which was committed by a total of 193 nations, the New Urban Agenda (NUA) by UN Habitat which was adopted in 2016 to set a global mission for urban development and planning, and the Sendai Framework for Disaster Risk Reduction (Chelleri & Baravikova, 2021). In fact, the concept of resilience has been recognised both explicitly and implicitly in SDGs. Meanwhile, NUA outlines its key challenges to meet the global agendas and achieve inclusive, safe, resilient and sustainable cities. and offers a comprehensive global framework as guidance for policy makers and urban practitioners (The New Urban Agenda, 2016) (Satterthwaite, 2017).

The United Nations projected that the urban population will increase to 60 percent by the year 2030 which will lead to more challenges in meeting the subsequent rising demands on food, water, energy and other services. Urbanisation offers both opportunities and challenges to cities. The projection highlights the importance of correlating sustainable urbanisation with job creation, livelihood opportunities, and improved quality of life by integrating all sectors in the formulation of urban policies and strategies. Geospatial information can contribute to addressing the agenda by obtaining and analysing data based on earth observation. Thus, it is able to identify the gaps through monitoring and assessment of which correction actions can be proposed promptly.

A city becomes vulnerable if its subsystems fail to adapt to new changes and this would turn into an urban issue. Variables such as natural hazards, climate change, energy consumption issues, economic growth and political

stability are important aspects which influence the sustainable development of a city (Spaans & Waterhout, 2017). The approach to urban resilience is unique for each city due to the contextual differences in terms of environment, political and economic profiles, and planning systems. In general, a city needs to get prepared to absorb and recover from any shock, mainly due to rapid urbanisation and maintaining its functions and structure. Urban resilient approach is expected to reduce the vulnerability and increase the resistance of the city. While urbanisation is able to promote new and modern technologies to speed up the modernisation in urban areas, it potentially creates adverse impacts especially towards the environment instead of creating a systematic management towards natural resources and improving the coping ability (Moraci et al., 2018). In this context, resilience planning is often experimental to support the governments and stakeholders' actions to identify necessary mechanisms either at high level policies-making or local level knowledge-sharing.

Cities need both tools and knowledge to plan and mitigate the negative impacts of natural hazards and climate change thereby reducing urban vulnerability. Geospatial technologies can play an essential role to support decision-making and future scenario planning for resilient purposes. Besides, geospatial information can project and help to reduce the risk and mitigate any hazards caused by climate to which would have stressed the urban system and societies. Reducing vulnerability to shocks will subsequently lower disaster risks, increase cities' resilience and strengthen the adaptation capacity of a city (Balogun et al., 2020).

GEOSPATIAL DATA INFRASTRUCTURE ADVANCEMENT AND OPPORTUNITIES

Among the leading national organisations in Malaysia on geospatial information is Jabatan Pemetaan Malaysia (JUPEM) or Malaysia Mapping Department. They own the Malaysia Geospatial Data Infrastructure (MyGDI) program which was initiated to develop a geospatial data sharing infrastructure between data provider agencies and users. Through this infrastructure, a smart partnership on information sharing and collaboration between agencies was established to promote development of geospatial products further and target for more cost-effective and -efficient applications. National Geospatial Centre (PGN), as the coordinator for the MyGDI program, has developed various geospatial information sharing platforms to support and facilitate management planning and decision-making process by relevant sectors. Furthermore, Malaysia Space Agency (MYSA), which was established as a new setup after Malaysia Remote Sensing Agency (MRSA) merged with National Space Agency (ANGKASA) in 2019, aims to ensure the development and management of the national space sector in a strategic, organised and comprehensive manner. MRSA supplies satellite imageries for national socio-economic benefits.

Since the introduction of geographic information systems (GIS) in the 1960s, its application has gradually become part of our daily lives. GIS and geospatial information science (GSIS) have evolved and matured over the last decades. The advancement in remote sensing, information communication technology (ICT), big data, geolocation-based services, and geotagged social media have propelled GSIS into an influential field (Bieszczad, 2018; Dangermond & Goodchild, 2020; Tomaszewski et al., 2020). Geospatial information in urban planning has increasingly been applied in municipalities for land use planning, infrastructure planning and improvement of service delivery (Mohd Noor et al., 2018; Noor et al., 2020).

The concept of Spatial Data Infrastructure (SDI) emerged in the 1990s when the era of internet began, and when there was a demand to share and exchange GIS data on a new platform. As a result, many organisations began to create mechanisms for data sharing, such as National Spatial Data Infrastructure (NSDI) in the United States, the United Nations Spatial Data Infrastructure (UNSDI) And the Malaysian Geospatial Data Infrastructure (MaCGDI) by Malaysia National Geospatial Centre (NSC). An SDI consists of more than a single spatial data set or database. It hosts spatial data and attributes, provides sufficient documentation (metadata), and serves as a mean to discover, visualise, evaluate and access data. The critical capabilities of an SDI include enabling online access for data sharing and exchanging information by integrating geographically distributed spatial information between organisations. The basic SDI capabilities are interoperability.



It facilitates information sharing and allows users to find information, services, and applications independent of physical location. The users can understand and employ the discovered information and tools, regardless of platform (local or remote). Currently, there are several platforms available for data sources such as Geoportal Server, digital sensors, Internet of Things (IoT), and crowdsourcing. A geospatial infrastructure is critical for governments, communities, and agencies, as it covers all aspects and technologies. The roles of SDI have become even more significant in the age of big data today where a large volume of geospatial data and Web services are available. Currently, a 10-year transition from the existing SDI into data spaces (Kotsev et al., 2020) has been proposed as a high-level concept of a pan-European (geo) data space.

The RS tools were available in Malaysia from the end of 80s when the Malaysia Center for Remote Sensing (MACRES) was established for Research and Development (R&D) in August 1988. The establishment aimed to serve as remote sensing satellite images providers, technical advisory and technology promotion. In 2019, the centre merged with National Space Agency (ANGKASA) to become the Malaysia Space Agency (MYSA). MYSA carried the same responsibilities of MACRES, which include to expand the usage of remote sensing through collaborative projects, training, research, and publications of all the users and agencies in Malaysia. Remote sensing provides tools to gather data and solve real world problems. As technology advances, access to remotely sensed data with better quality has been made available. It has been also projected that the following trends will continue. These include the decreasing size of electronics and sensors, increase in computing power, increase in transmitting power for active systems, and increased tunability of systems. All of these will then be translated into advancements in sensors' spatial, spectral, radiometric, and temporal characteristics. As sensors become more powerful and compact, more accurate and precise data will be produced. Smaller sensors can also be mounted on a variety of platforms to allow for greater flexibility in data collection. The spatial resolution brings a good prospect for remote sensing future development. Newer satellites are capable of producing much higher resolution images. Currently, commercial satellites such as Digital Globe's Worldview-3 satellite already provide very high spatial resolution data, unfortunately the data are costly. Remote sensing is able to map and define problems related to climate change and disaster phenomena based on image analysis (Borie et al., 2019) (refer table 1). Figure 1 shows the various geospatial approaches for urban applications consisting of monitoring, analysis, mapping and modelling, which can support the requirements of a resilient city.

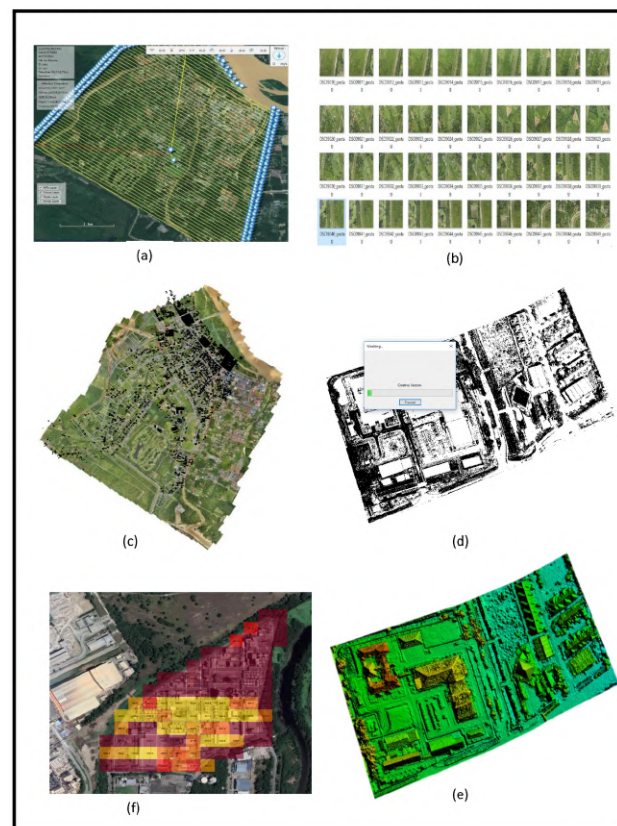


Figure 1: The various approaches of geospatial data for urban applications (a) & (b) drone flight plan for urban monitoring; (c) - (e) building footprint; (f) environmental data; that extracted by using GIS and RS imagery (Source: Authors' work, 2021)

Table 1: List of remote sensing satellite imagery available for urban areas

Name	Company and Country of Manufacturer	Resolution	Frequency (repetition) – temporal
The Rapid Eye	Planet Labs Germany GmbH, Berlin	6.5 m	5.5 days
Spot 5	CNES	5 m (panchromatic)	26 days
		2.5 m (supermode)	
		10 m (multispectral)	
Spot 6 & 7	NASA, USGS	1.5 m, 6 m	26 days
Landsat 8		15 m (panchromatic)	16 days
Landsat 7		30 m (multispectral)	
Sentinel's	European Space Agency, AIRBUS	10 m - 60 m	10 days
QuikBird	Digital Globe	0.6 m (panchromatic)	3.5 days
		2.44 m (multispectral)	
IKONOS		0.8 m (panchromatic)	2 days
		3.28 m (multispectral)	
Worldview 4	Digital Globe	0.31 m	<1 day
Worldview 3		0.31 m	5 days
Worldview 2		0.46 m	1.1 days
Worldview 1		0.5 m	1.7 days
GeoEye-1		0.41 m	2.6 days
		(panchromatic) 1.65 m (multispectral)	

Source: Authors' compilation, 2021

In recent years, drones or Unmanned Airborne Vehicles (UAVs) have become closely associated with aerial data and image acquisition for many environmental applications. It started to become popular about six years ago when Parrot, 3DR, and DJI began to market their on-the-shelf platforms to the public. Their widespread appeal soon grew as they were easier to fly and could carry small cameras. Natural disaster and climate change related challenges provide a new opportunity for researchers to explore the potentials of drones in addressing the issues of future resilience, either with or without the presence of remote sensing. Many unique applications have emerged in a short period, while some capitalise on existing demonstrations and ideas, others explore new possibilities of utilising this new geospatial information platform. Many government agencies, industry players, and universities in Malaysia have widely used UAVs and drones in their fields of practice. Another trend is exploring the potential of smaller satellites which have been launched into lower orbits. While the lower orbits compensate for the smaller sized satellite and sensors, these satellites however, are able to produce relatively high spatial resolution imagery and identify an urban issue at the micro-level.

GEOSPATIAL TO STREAMLINING URBAN RESILIENCE IN MALAYSIA

Today, Malaysia experiences rapid population growth and urbanisation. The World Bank reported that a total of 25,466,000 (77%) Malaysians now live in urban areas, and this urban population will increase to 35,411,000 (87.3%) in 2050 (World Bank, 2021). Extreme climatic events are increasingly exposing the vulnerability of communities to hazardous events. Human, economic, livelihood and ecological losses due to the climate crisis escalate. Achieving sustainable development and building urban resilience require a science-based and data-informed urban planning and management. Technological tools such as GIS and RS demonstrate great potential to strengthen the capability of cities in responding to such events, improve the delivery of critical services, optimise resources, and reduce the cost for maintenance and monitoring. GIS-RS technology also serves as the foundation for assessing and managing hazards and risks thereby reducing urban vulnerability. GIS / RS enables

the spatial representation of the demographics of a city and the relationships between its populations and the natural and built environments, livelihood sources as well as cultural and historical assets. The information is digitised and stored in databases as structured layers of information. A visualisation application can convert these layers of information into maps which are useful to the users. For example, areas subject to flooding can be visualised and overlaid with the information on water streams, population and livelihood assets. The earthquake sources can be overlaid and mapped with critical infrastructure and transportation systems to visualise and analyse potential risks more effectively. Likewise, vulnerable populations can be identified based on the hazard potential located within their neighbourhoods.

The discussion on urban resilience in Malaysia has been centered on the issues of climate change and natural disasters such as flash floods, landslides, community resiliency as well as the aspects of heritage conservation (Jamaludin & Sulaiman, 2018; Mohamad et al., 2019, 2021). It refers to the capacity of urban-based ecosystems to withstand, absorb and recover from the place and time-specific disruptions while building adaptive capabilities to cope with future threats and crises. Governments and policymakers treat urban resilience as an interface that can bring together diverse stakeholders and institutional actors without adhering to a unifying belief system. Since the resilience agenda is one of the main agendas in urban governance that addresses environment-related risks, resilience city can be analysed by integrating relevant parameters with GIS modelling which is equipped with impact assessment, design and visualisation tools.

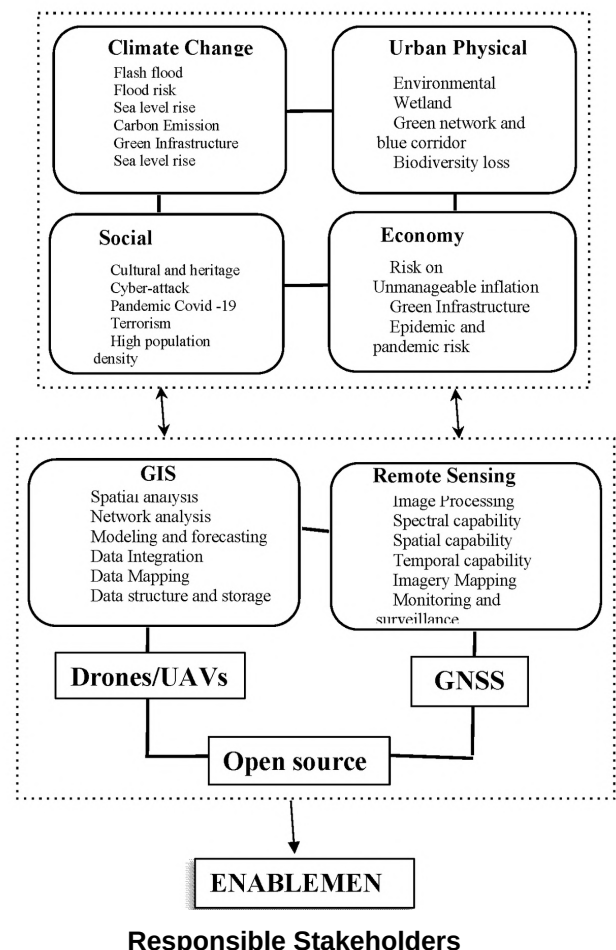
CHALLENGES AND WAY FORWARD

Geospatial technologies are known for their data richness. However, the gap of digital divide needs to be closed up to address issues faced by countries with limited access to the technology in order to respond timely to a comprehensive implementation of SGDs. Digital transformation is necessary to ensure data availability and accessibility to all countries. Steiniger and Hunter (2012) suggested that open source is able to support the documentation, publication, models sharing, algorithm, tools for analysis and visualisation for both educational and business purposes. Giuliani et al. (2020) also agreed that the low entry barrier for the providers to resources would reduce the waiting time thus reducing the chances of loss of interest among the users. Therefore, it is recommended that the capacity of geospatial technologies must be increased by 2021 in terms of making high-quality, timely, and reliable national data available. In some ways, it shows that the advancement of geospatial technology has created higher interest among the users and consumers due to the recent multidisciplinary developments and breakthroughs. Concerning the efforts to become a resilient city, the authors highlight several possible geospatial approaches in supporting different missions as reflected in Figure 2.

Big data, cloud computing, UAVs, mobile devices, and location-based services are evidence that can convince users about the importance of geospatial information. The way forward and trends of geospatial enablement can be outlined as follows:

- Earth observation technologies such as satellites, high altitude or vehicle-based sensors offer a greater variety and volume of data with to higher resolution and better temporal frequency for lower costs;
- Provision of web service infrastructures become the mainstream, has made the process of creating new technology-based products faster, more convenient and cheaper than before;
- Application of sensors, robotics, cameras, encryption, cloud computing and other software, and hardware intelligence are converging, have offered new opportunities for organisations and their equipment's to perceive and capture reality;
- Artificial Intelligence-driven applications and machine learning provide cost efficient, accurate and high-speed solutions in Global Navigation Satellite system (GNSS) and Positioning, spatial analytics and Earth observation studies, and
- Satellites, UAVs and sensor technology are invested in by leading tech giants, existing providers of sensed imagery and governments.

Technological developments, the nature of machine-led decision-making in autonomous mobility, and other applications that require multi-stakeholder partnerships are creating new challenges in a world that will become increasingly virtual. Meanwhile, cybersecurity, data privacy, ethics, trust, and licensing will be increasingly relevant as interdisciplinary collaborations are now at the forefront. Government-led geospatial infrastructures will need to adequately respond to this emerging trend. Figure 2 shows the role of the geospatial enablers in addressing the key urban issues including climate change, urban physical, social, and economic impact. The enablement of geospatial components consisting of GIS, RS, GNSS, Drone/UAVs, and other open sources will be a key contributor to support Malaysia's commitment for future resilience. A proactive government and an efficiency-driven private sector is necessary to facilitate the use and growth of geospatial technology. Vice versa, the geospatial industry must also continue to strive for innovation for technological advancement to serve its future users.



Government (MYSA, MaCGDI, PGN (NSC), Technical Agencies, JUPEM, PLANMalaysia, Local authorities etc), Private companies, Universities, Practitioner's

Figure 2: Some of the major geospatial approaches/sources and its contribution to enabling the process to achieve resilient city's goal in Malaysia

CONCLUSION

This paper highlights the extent to which emerging geospatial approaches have deliberately enabled urban planning efforts to achieve resilient cities in Malaysia. The finding shows that the framework of geospatial enablement has been well established since the 1970's starting with GIS applications and the establishment of remote sensing in the 1980s. The capability of both applications is not limited to merely produce maps, and combine and analyse the data. It is, in fact, sophisticated and has been proven to be able to provide spatial decision-making support systems in addressing urban issues pertaining to resiliency. Its ability to include location data to almost all current planning information unlocks the huge range of existing knowledge about physical, social, economic and environmental matters, thus making it vital in understanding and addressing many urban challenges today. The potential and advancement of geospatial technology enablers indicate its maturity level which allow it to become a significant contributor in providing information in any quest of multidisciplinary approach responding to SDGs.

ACKNOWLEDGEMENTS

The researchers acknowledge International Islamic University (IIUM) and Universiti Teknologi Malaysia (UTM) for the research grant on Program Translational MRUN-Rakan RU UTM-IIUM (Vote SP19-022-0441). We also gratefully acknowledge the anonymous reviewers for their valuable comments that help to considerably improve the manuscript.

REFERENCES

- Anne Dorral (2019). 9 M'sian cities will be underwater by 2050 due to rising sea levels. <https://www.therakyatpost.com/2019/11/06/9-msian-cities-will-be-underwater-by-2050-due-to-rising-sea-levels/> retrieved on 1st May 2021.
- Arthur P. Cracknell, Costas A. Varotsos. (2021) Editorial Sir John Houghton. *Remote Sensing Letters* 12:4, pages 364-376.
- Brunetta, G., & Salata, S. (2019). Mapping urban resilience for spatial planning-A first attempt to measure the vulnerability of the system. *Sustainability* (Switzerland), 11(8). <https://doi.org/10.3390/su11082331>
- Balogun, A. L., Marks, D., Sharma, R., Shekhar, H., Balmes, C., Maheng, D., Arshad, A., & Salehi, P. (2020). Assessing the Potentials of Digitalization as a Tool for Climate Change Adaptation and Sustainable Development in Urban Centres. *Sustainable Cities and Society*, 53, 101888. <https://doi.org/10.1016/j.scs.2019.101888>
- Choi, J., Hwang, M., Kim, G., Seong, J., & Ahn, J. (2016). Supporting the measurement of the United Nations' sustainable development goal 11 through the use of national urban information systems and open geospatial technologies: a case study of South Korea. *Open Geospatial Data, Software and Standards*, 1(1), 1–9. <https://doi.org/10.1186/s40965-016-0005-0>
- Coaffee, J. (2010). Protecting vulnerable cities: The UK's resilience response to defending everyday urban infrastructure. *International Affairs*, 86(4), 939–954. <https://doi.org/10.1111/j.1468-2346.2010.00921.x>
- Convergne, E., & Snyder, M. R. (2015). Making maps to make peace: geospatial technology as a tool for UN peacekeeping. *International Peacekeeping*, 22(5), 565–586. <https://doi.org/10.1080/13533312.2015.1094193>
- CRED (Centre for research Epidemiology of Disaster) (2021). EM-DAT: Disaster of the week. retrieved <https://www.emdat.be/> on 29th April 2021.
- Drummond, W. J., & French, S. P. (2008). The future of GIS in planning: Converging technologies and diverging interests. *Journal of the American Planning Association*, 74(2), 161–174. <https://doi.org/10.1080/01944360801982146>
- Goodchild, M. F. (2009). Geographic information systems and science: today and tomorrow. *Annals of GIS*, Vol. 16 (1).
- Horváth, Z. (2020). Transforming Our World. *Hungarian Yearbook of International Law and European Law*, 4(1), 167–194. <https://doi.org/10.5553/hyiel/266627012016004001011>
- Ibrahim, F. I., Omar, D., & Mohamad, N. H. N. (2015). Theoretical Review on Sustainable City Indicators in Malaysia. *Procedia - Social and Behavioural Sciences*, 202(August), 322–329. <https://doi.org/10.1016/j.sbspro.2015.08.236>
- Ibrahim, M. H., Latiff, N. A. A., Ismail, K., & Isa, N. K. M. (2018). Effect of urbanisation activities towards the formation of urban heat island in Cameron Highlands, Malaysia. *IOP Conference Series: Earth and Environmental Science*, 148(1). <https://doi.org/10.1088/1755-1315/148/1/012022>
- Ibrahim, I., & Asmawi, M. Z. (2018). Multicriteria analysis for flood mapping of Sungai Pahang. *Proceedings - 39th Asian Conference on Remote Sensing: Remote Sensing Enabling Prosperity, ACRS 2018*, 1(1), 267–277.
- ICLEI. (2019). *Resilient Cities , Thriving Cities : the Evolution of*.
- Ismail, M. A., Muhamad Ludin, A. N., & Hosni, N. (2020). Implementing Sustainable Urbanisation Development Using Geospatial Approach. *IOP Conference Series: Earth and Environmental Science*, 540(1). <https://doi.org/10.1088/1755-1315/540/1/012044>
- ITU-T Technology Watch (2011). *ICT as an enabler for Smart Water Management*, Venkatesen Mauree of the ITU Telecommunication Standardization Bureau.
- Khan S, Mohiuddin K and Maqbool F (2017). Analysis of Paradigm shift in cloud-based GIS systems. Conference on "Recent Innovations in science, technology and engineering". National Institute of Technology, India. ISBN: 978-93-86171-87-0.
- Long, Y., Shen, Z., & SpringerLink (Online service). (2015). *Geospatial Analysis to Support Urban Planning in Beijing*. Springer EBooks, 2015, 1–15.
- Miller, M.A (2020). Urban Resilience in a time of COVID 19 and climate change in Southeast Asia. <https://blogs.lse.ac.uk/seac/2020/12/29/urban-resilience-in-a-time-of-covid-19-and-climate-change-in-southeast-asia/> retrieved on 1st May 2020.

REFERENCES

- Moraci, F., Errigo, M. F., Fazio, C., Burgio, G., & Foresta, S. (2018). Making less vulnerable cities: Resilience as a new paradigm of smart planning. *Sustainability (Switzerland)*, 10(3), 1–18. <https://doi.org/10.3390/su10030755>
- Noor, N.M., & Marina, M.N. (2020). Geospatial Technology and Innovation Enablement for Physical Planning. Space and Process. International Congress of Architecture and Planning (ICONARCH IV). ISBN: 978-625-7327-00-8
- Robinson, A. C., Demšar, U., Moore, A. B., Buckley, A., Jiang, B., Field, K., Kraak, M. J., Camboim, S. P., & Sluter, C. R. (2017). Geospatial big data and cartography: research challenges and opportunities for making maps that matter. *International Journal of Cartography*, 3(sup1), 32–60. <https://doi.org/10.1080/23729333.2016.1278151>
- Bieszczad, G. (2018). Advanced Technologies in Practical Applications for National Security. 106(July). <https://doi.org/10.1007/978-3-319-64674-9>
- Borie, M., Ziervogel, G., Taylor, F. E., Millington, J. D. A., Sitas, R., & Pelling, M. (2019). Mapping (for) resilience across city scales: An opportunity to open-up conversations for more inclusive resilience policy? *Environmental Science and Policy*, 99(August 2018), 1–9. <https://doi.org/10.1016/j.envsci.2019.05.014>
- Brunetta, G., & Salata, S. (2019). Mapping urban resilience for spatial planning-A first attempt to measure the vulnerability of the system. *Sustainability (Switzerland)*, 11(8). <https://doi.org/10.3390/su11082331>
- Chelleri, L., & Baravikova, A. (2021). Understandings of urban resilience meanings and principles across Europe. *Cities*, 108(June 2020), 102985. <https://doi.org/10.1016/j.cities.2020.102985>
- Dangermond, J., & Goodchild, M. F. (2020). Building geospatial infrastructure. *Geo-Spatial Information Science*, 23(1), 1–9. <https://doi.org/10.1080/10095020.2019.1698274>
- Ibrahim, I., & Asmawi, M. Z. (2018). Multicriteria analysis for flood mapping of Sungai Pahang. *Proceedings - 39th Asian Conference on Remote Sensing: Remote Sensing Enabling Prosperity, ACRS 2018*, 1(1), 267–277.
- Jamaludin, I. S., & Sulaiman, N. (2018). Malaysia resilient initiatives: Case study of Melaka into a resilient city. *Planning Malaysia*, 16(1), 15–24. <https://doi.org/10.21837/pmjournal.v16.i5.407>
- Kervyn, M., Jacobs, L., Maes, J., Che, V. B., De Hontheim, A., Dewitte, O., Isabirye, M., Sekajugo, J., Kabaseke, C., Poesen, J., Vranken, L., & Mertens, K. (2015). Landslide resilience in Equatorial Africa: Moving beyond problem identification! *Belgeo*, 1, 0–22. <https://doi.org/10.4000/belgeo.15944>
- Kristin Stock, H. G. (2016). Geospatial Reasoning With Open Data. In *Automating Open Source Intelligence* (pp. 171–204). Syngress.
- Lim, T. K., Rajabifard, A., Khoo, V., Sabri, S., & Chen, Y. (2021). The smart city in Singapore: How environmental and geospatial innovation lead to urban livability and environmental sustainability. In *Smart Cities for Technological and Social Innovation*. Elsevier Inc. <https://doi.org/10.1016/b978-0-12-818886-6.00003-4>
- Meerow, S., Newell, J. P., & Stults, M. (2016). Defining urban resilience: A review. In *Landscape and Urban Planning* (Vol. 147, pp. 38–49). Elsevier B.V. <https://doi.org/10.1016/j.landurbplan.2015.11.011>
- Mohamad, N., Jusoh, H., & Ahmad, H. (2021). Indicators of Urban Community Resilience in. 18(2).
- Mohamad, N., Jusoh, H., & Kassim, Z. (2019). Localising of community resilience indicators for assessing the urban community resilience in Putrajaya, Malaysia. *International Journal of Engineering and Advanced Technology*, 8(5), 359–365. <https://doi.org/10.35940/ijeat.E1051.0585C19>
- Moraci, F., Errigo, M. F., Fazio, C., Burgio, G., & Foresta, S. (2018). Making less vulnerable cities: Resilience as a new paradigm of smart planning. *Sustainability (Switzerland)*, 10(3). <https://doi.org/10.3390/su10030755>
- Pereira, J. J., Muhamad, N., Li, C. S., Azi, S., & Hunt, J. (2019). Making cities disaster resilient in a changing climate: The case of Kuala Lumpur, Malaysia. In *North*.
- Ribeiro, P. J. G., & Pena Jardim Gonçalves, L. A. (2019). Urban resilience: A conceptual framework. *Sustainable Cities and Society*, 50(November 2018). <https://doi.org/10.1016/j.scs.2019.101625>
- Sharma, R., Pradhan, L., Kumari, M., & Bhattacharya, P. (2021). Assessing urban heat islands and thermal comfort in Noida City using geospatial technology. *Urban Climate*, 35(October 2020), 100751. <https://doi.org/10.1016/j.uclim.2020.100751>
- Taylor, F. E., Millington, J. D. A., Jacob, E., Malamud, B. D., & Pelling, M. (2020). Messy maps: Qualitative GIS representations of resilience. *Landscape and Urban Planning*, 198(August 2019). <https://doi.org/10.1016/j.landurbplan.2020.103771>
- Thongs, G., & Griffith, K. (2019). Developing urban resilience through the evaluation of landslide causative factors. *Caribbean Urban Forum 2019: "Urban Resilience" – Disaster & Climate Change Resilience in the Caribbean*, June 2018, 1–18.
- Tomaszewski, B., Walker, A., Gawlik, E., Lane, C., Williams, S., Orieta, D., McDaniel, C., Plummer, M., Nair, A., Jose, N. S., Terrell, N., Pecsok, K., Thomley, E., Mahoney, E., Haberlack, E., & Schwartz, D. (2020). Supporting disaster resilience spatial thinking with serious GeoGames: Project Lily Pad. *ISPRS International Journal of Geo-Information*, 9(6). <https://doi.org/10.3390/ijgi9060405>
- Westen, C. Van. (2013). Remote sensing and GIS for natural hazards assessment and disaster risk management. *Treatise on Geomorphology*, 3(2004), 259–298.
- Jamaludin, I. S., & Sulaiman, N. (2018). Malaysia resilient initiatives: Case study of Melaka into a resilient city. *Planning Malaysia*, 16(1), 15–24. <https://doi.org/10.21837/pmjournal.v16.i5.407>
- Kervyn, M., Jacobs, L., Maes, J., Che, V. B., De Hontheim, A., Dewitte, O., Isabirye, M., Sekajugo, J., Kabaseke, C., Poesen, J., Vranken, L., & Mertens, K. (2015). Landslide resilience in Equatorial Africa: Moving beyond problem identification! *Belgeo*, 1, 0–22. <https://doi.org/10.4000/belgeo.15944>
- Kristin Stock, H. G. (2016). Geospatial Reasoning With Open Data. In *Automating Open Source Intelligence* (pp. 171–204). Syngress.
- Lim, T. K., Rajabifard, A., Khoo, V., Sabri, S., & Chen, Y. (2021). The smart city in Singapore: How environmental and geospatial innovation lead to urban livability and environmental sustainability. In *Smart Cities for Technological and Social Innovation*. Elsevier Inc. <https://doi.org/10.1016/b978-0-12-818886-6.00003-4>
- Meerow, S., Newell, J. P., & Stults, M. (2016). Defining urban resilience: A review. In *Landscape and Urban Planning* (Vol. 147, pp. 38–49). Elsevier B.V. <https://doi.org/10.1016/j.landurbplan.2015.11.011>
- Mohamad, N., Jusoh, H., & Ahmad, H. (2021). Indicators of Urban Community Resilience in. 18(2).
- Mohamad, N., Jusoh, H., & Kassim, Z. (2019). Localising of community resilience indicators for assessing the urban community resilience in Putrajaya, Malaysia. *International Journal of Engineering and Advanced Technology*, 8(5), 359–365. <https://doi.org/10.35940/ijeat.E1051.0585C19>
- Moraci, F., Errigo, M. F., Fazio, C., Burgio, G., & Foresta, S. (2018). Making less vulnerable cities: Resilience as a new paradigm of smart planning. *Sustainability (Switzerland)*, 10(3). <https://doi.org/10.3390/su10030755>

Pereira, J. J., Muhamad, N., Li, C. S., Azi, S., & Hunt, J. (2019). Making cities disaster resilient in a changing climate: The case of Kuala Lumpur, Malaysia. In North.

Ribeiro, P. J. G., & Pena Jardim Gonçalves, L. A. (2019). Urban resilience: A conceptual framework. *Sustainable Cities and Society*, 50(November 2018). <https://doi.org/10.1016/j.scs.2019.101625>

Sharma, R., Pradhan, L., Kumari, M., & Bhattacharya, P. (2021). Assessing urban heat islands and thermal comfort in Noida City using geospatial technology. *Urban Climate*, 35(October 2020), 100751. <https://doi.org/10.1016/j.uclim.2020.100751>

Taylor, F. E., Millington, J. D. A., Jacob, E., Malamud, B. D., & Pelling, M. (2020). Messy maps: Qualitative GIS representations of resilience. *Landscape and Urban Planning*, 198(August 2019). <https://doi.org/10.1016/j.landurbplan.2020.103771>

Thongs, G., & Griffith, K. (2019). Developing urban resilience through the evaluation of landslide causative factors. *Caribbean Urban Forum 2019: "Urban Resilience" – Disaster & Climate Change Resilience in the Caribbean*, June 2018, 1–18.

Tomaszewski, B., Walker, A., Gawlik, E., Lane, C., Williams, S., Orieta, D., McDaniel, C., Plummer, M., Nair, A., Jose, N. S., Terrell, N., Pecsock, K., Thomley, E., Mahoney, E., Haberlack, E., & Schwartz, D. (2020). Supporting disaster resilience spatial thinking with serious GeoGames: Project Lily Pad. *ISPRS International Journal of Geo-Information*, 9(6). <https://doi.org/10.3390/ijgi9060405>

Westen, C. Van. (2013). Remote sensing and GIS for natural hazards assessment and disaster risk management. *Treatise on Geomorphology*, 3(2004), 259–298.

Satterthwaite, D. (2017). Successful, safe and sustainable cities: towards a New Urban Agenda. *Commonwealth Journal of Local Governance*, 19, 3–18. <https://doi.org/10.5130/cjlg.v0i19.5446>

Shafat Khan, Khalid Mohiuddin, Faisal Maqbool (2017). Analysis of Paradigm Shift in Cloud-based GIS System, *International Journal of Advance Research in Science and Engineering*, Vol. 6 (3)

Scott, G., & Rajabifard, A. (2017). Sustainable development and geospatial information: a strategic framework for integrating a global policy agenda into national geospatial capabilities. *Geo-Spatial Information Science*, 20(2), 59–76. <https://doi.org/10.1080/10095020.2017.1325594>

Shekhar, S., & Aryal, J. (2019). Role of geospatial technology in understanding urban green space of Kalaburagi city for sustainable planning. *Urban Forestry and Urban Greening*, 46(September), 126450. <https://doi.org/10.1016/j.ufug.2019.126450>

Spaans, M., & Waterhout, B. (2017). Building up resilience in cities worldwide – Rotterdam as participant in the 100 Resilient Cities Programme. *Cities*, 61, 109–116. <https://doi.org/10.1016/j.cities.2016.05.011>

Sun, Y., & Du, Y. (2017). Big data and sustainable cities: applications of new and emerging forms of geospatial data in urban studies. *Open Geospatial Data, Software and Standards*, 2(1), 2–5. <https://doi.org/10.1186/s40965-017-0037-0>

The new urban agenda. (2016). <https://doi.org/10.18356/4665f6fb-en>

Taylor, F. E., Millington, J. D. A., Jacob, E., Malamud, B. D., & Pelling, M. (2020). Messy maps: Qualitative GIS representations of resilience. *Landscape and Urban Planning*, 198(August 2019). <https://doi.org/10.1016/j.landurbplan.2020.103771>

Thongs, G., & Griffith, K. (2019). Developing urban resilience through the evaluation of landslide causative factors. *Caribbean Urban Forum 2019: "Urban Resilience" – Disaster & Climate Change Resilience in the Caribbean*, June 2018, 1–18.

Tomaszewski, B., Walker, A., Gawlik, E., Lane, C., Williams, S., Orieta, D., McDaniel, C., Plummer, M., Nair, A., Jose, N. S., Terrell, N., Pecsock, K., Thomley, E., Mahoney, E., Haberlack, E., & Schwartz, D. (2020). Supporting disaster resilience spatial thinking with serious GeoGames: Project Lily Pad. *ISPRS International Journal of Geo-Information*, 9(6). <https://doi.org/10.3390/ijgi9060405>

World Bank (2021). Population estimates and projection. retrieved from <https://databank.worldbank.org/source/population-estimates-and-projections> on 29th April 2021

Westen, C. Van. (2013). Remote sensing and GIS for natural hazards assessment and disaster risk management. *Treatise on Geomorphology*, 3(2004), 259–298.

Zhang, X., & Li, H. (2018). Urban resilience and urban sustainability: What we know and what do not know? *Cities*, 72(July 2017), 141–148. <https://doi.org/10.1016/j.cities.2017.08.009>

Zuniga-Teran, A. A., Gerlak, A. K., Mayer, B., Evans, T. P., & Lansey, K. E. (2020). Urban resilience and green infrastructure systems: towards a multidimensional evaluation. *Current Opinion in Environmental Sustainability*, 44, 42–47. <https://doi.org/10.1016/j.cosust.2020.05.001>



Book Review

Nor Nadiah Najib
Fauziah Abd. Jalil

BOOK REVIEW 1

ISOCARP REVIEW 15 : PLANNING FOR METROPOLITAN AREA

Author : Collection of articles and various authors for ISOCARP Review 15

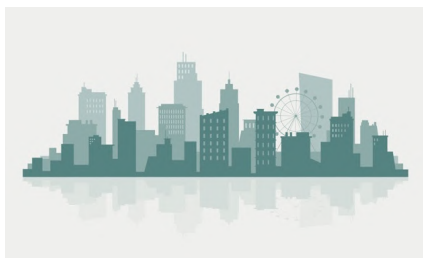
Publisher : International Society of City and Regional Planners: The Netherlands

Year of Publication : 2019

ISBN: 978-90-75524-628

Pages : 426

Reviewed by : Fauziah Abd. Jalil



More than before, cities and especially agglomerations of cities will be the engines of the global economy. At the same time, climate change, emerging new technologies, increasing (domestic and trans border) migration, and growing inequality urgently demand solutions at the scale of cities. Cities and their planners need to rethink and innovate the way people live, work and recreate in cities; how they produce and consume food, water, energy and everyday products; and how they make cities attractive, socially inclusive, healthy, accessible, green, safe, liveable and competitive.

Cities and metropolises play a crucial role in implementing the Sustainable Development Goals, which address both the hardware and the software of cities. Therefore, city and regional planners have a profound responsibility to ensure that cities and metropolises become more liveable, inclusive and sustainable. They have to overview and capable to implement the Goals set by the United Nations.

The book is a compilation of articles written in lieu of the 55th ISOCARP Congress in Jakarta in the year 2019, aims to become an event where planners, developers, politicians and NGOs meet and discuss the future of urban resilience of agglomerations of Jakarta and beyond. The theme "Beyond Metropolis" evokes the complex and daring challenges for our present and future cities. This is in line with the venue chosen for the congress-Jakarta being the second largest agglomeration on earth, has taken on the courageous responsibility to put the future of its metropolis on the agenda and hosted the 55th ISOCARP Congress.

The second section under the theme Planning Practice – explores whether and how Asian cities should develop an indigenous design language for their emerging cities, whether Italian landscape preservation planning might be considered for application to Russia, and whether the French certification program for historic neighbourhoods should be applied to other countries. In all these articles, insights into the need for strategic planning and case studies on how to augment local staffs to accomplish these plans are explored. Interestingly at the end of the section, there's a write-up that shares on Indonesia's efforts to alleviate slums.

The third section entails on environmental planning projects. There is a fascinating overview of efforts to use dredge material to develop sustainable urbanization in delta areas. The second article in the section describes a small town's effort to redevelop a contaminated site for private market housing and recreation.

The last section is named Noteworthy Plans. Readers may learn about Quito's effort to achieve food sustainability. The book also presents three articles from Africa, each intent on improving well-being. Each of these articles is important as they document the difficulties of developing viable plans in the face of resource constraints. The last article in the section examines if smart technology has improved planning participation in villages near Jakarta, Indonesia.



In a nutshell, this ISOCARP Review 15 edition is very comprehensive and enriching as the write-ups are very forward looking and always exploring new approaches and topics in the urban planning discipline. Hence, as planners managing daily practices on various urban development and sustainability issues at the Federal level in PLANMalaysia, we must always seek knowledge from various case studies and experiences shared around the globe so that we are always well verse, competent and knowledgeable in addressing the various urbanization issues that we are facing today with innovative urban solutions tailored to local context. This is important to further navigate Malaysia into a Sustainable Urban Nation that uphold the societal well-being, economic prosperity as well as environmental protection.

The articles are very interesting – 19 articles organized into four sections: Metropolitan Plan and Tools; Planning Practices; Environmental Planning Projects, and Noteworthy Plans. As ISOCARP is the global network on International Society of City and Regional Planners, it's a global platform where planners around the world share, network and learn, hence various pressing issues, like climate change and energy transition, have a great effect and need to be addressed at local scale with very short notice.

Articles outlined and shared are enriching and serve as a platform to reach out to planners from around the world and publish the wonderful and varied work they are doing.

It ranges from stories about planning projects in each of the main Continents except for Antarctica: three from North America; two from South America; two from Australia/Oceanic; three from Africa; four from Asia; and three from Europe. Two other articles reference planning projects in several continents. These articles share and record planning efforts in resource-rich and poor places and present how the focus of planning changes from place to place.

The articles in the first section under the theme Metropolitan and Tools describe the successful regional planning efforts underway for the New York, Greater Sydney and Metropolitan Doha areas. There's also an article about the disappointing results from the State of New Jersey's (USA) multi-year effort to plan for more equitable regional land uses. This article is especially interesting as it provides insights into political, social, judicial and historic causes behind the general failure of regional planning in the USA.



Source: <https://www.ritzcarlton.com/en/hotels/new-york/central-park>

BOOK REVIEW 2

HAPPY CITY : TRANSFORMING OUR LIVES THROUGH URBAN DESIGN

Author: Charles Montgomery

Publisher: Farrar, Straus and Giroux

Year of Publication: 2014 (Third Edition) ISBN: 978-0-374-53488-2

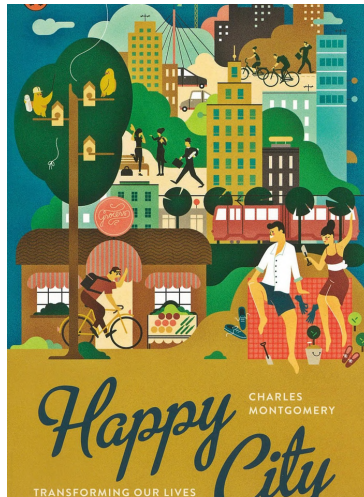
Pages: 358

Reviewed by : Syed Muhamad Iqbal Shah Bin Syed Asghar Ali

Happiness is often viewed by economists and policy makers through the lens of economic data such as Gross Domestic Product and income per capita. While happiness and wellbeing do correlate with economic vitality.

Charles Montgomery, through his book Happy City takes a different approach in defining happiness. He defines happiness with an equation, measurable and is directly influenced by our built environment.

He argues that if happiness is a by-product of wealth, then people must be happier now compared to a century ago. But his research shows otherwise, people are now more likely to suffer from clinical depression and mental illness compared to generations ago. Montgomery highlights the research of the Nobel Prize-winning Professor Daniel Kahneman, known as



“hedonic psychology,” which had found a relationship between people's happiness and their experience with urban life. In this 13-chapter book, the author ventures into how urban design affects our behaviour and well-being with reference to various scientific researches by psychologists, behavioural economists, and their experiments.

A Happy City in the eyes of the author is defined as a social city. His views can be related to the philosophy of Aristotle which he quotes in the book as saying “He who is unable to live in society, or who has no need because he is sufficient for himself, must be either be a beast or a god”.

While not denying the importance of wealth in the pursuit of happiness, social interaction ranked higher in his happiness philosophy. Montgomery stresses that people who have higher social interactions are likely to be happier, healthier and more productive in which cities play a crucial role in influencing those interactions.

One of the key ideas highlighted in the book is the role of dispersal or sprawl in reducing social interaction and happiness.



Source: <https://www.bloomberg.com/news/articles/2013-12-09/how-to-design-a-happier-city>



Source: <https://natgeotraveller.in/how-to-design-a-happy-city-copenhagen-might-have-the-answer/>

People are now more likely choosing to live in a sprawling suburban area where houses are cheaper and bigger than in the inner city without paying too much attention to the effects of commuting for work or social interactions. Dispersal promotes auto-dependent society and people who live in auto-dependent neighbourhoods are less likely to engage with their community as most of their time are spent commuting.

To build a happier city, people need to be living in a dense, compact and walkable city environment rather than low density, sprawling suburban area. Compact city promotes social interactions as people are living closer to each other, a term he refers to as proximity.

He explains in detail that “to say proximity is the key to happiness” is wrong as people value their privacy as much as they value living close to each other. Thus, it is the role of city designers especially planners to strike a balance between designing a neighbourhood that promotes social interactions without jeopardising privacy.

Montgomery also highlights the role of nature and public spaces in the urban environment and how it affects our behaviour with each other. In one of his social experiments, he concludes that people are more likely to help a lost tourist in lively public spaces where street edges are filled with small businesses and activities compared to a sterile unattractive sidewalk.

Happy City is hardly a design manual on how to build a happier city but rather an insightful journey into the effects of urban design on the behaviour and well-being of its inhabitants. The book invites readers through the experiences of many cities such as Bogota - on how to reclaim the city from automobile, Vancouver - on how to create lively street edges, Copenhagen - on creating freedom of movement through cycling, among many other cities and examples around the globe.

Happy City provides a powerful argument on the importance of improving well-being in cities and recommended for casual readers and professionals on how to create a better and happier urban design. Happy reading folks!

BOOK REVIEW 3

GLOBAL ENVIRONMENTAL ISSUES

Author: Collection of lecture course at Kingston University

Publisher: John Wiley & Sons Ltd. West Sussex, England

Year of Publication: 2004 (First Edition)

ISBN: 0-470-84561-9

Pages: 336

Reviewed by : Mohd Ariffin bin Ahmad



Book entitled Global Environmental Issues gives the substance of discourse on the existing world environmental problems faced by various countries. Environmental problems were viewed as complicated issues, attaching with network of causes which influenced by numerous people with differing priorities. This book covers chapters interlinking human demands on the Earth's resources to natural biophysical change - not simply a 'cause and effect' treatment of global issues and environmental change.

It assembles a team of well-qualified authors, who between them consider such important environmental issues such as climate and sea level change, biodiversity, GM crops, energy supply, urbanization, pollution, and efforts towards sustainable development.

Global Environmental Issues stresses that environmental issues need to be addressed urgently as they are complex, involving many stakeholders and related to our consumption patterns to reduce pollution to the earth. It also discusses the main biophysical causes and illustrates how socio-economic and political factors determine why and how people use land, resources, and technology, and how they affect natural resources management.

According to the book, human-environment interactions involve resource use per person and our ability to understand the science of the environment. Along with that, this book also considers the scientific evidence for global environmental issues from all perspectives. It includes global case studies from the UK, USA, Asia, and South America and identifies stakeholders with interest in each issue, their perceptions of the problem, and suggestions for the solutions.

The style of writing in this book is clear and non-technical, the coverage is global and the text is supported by numerous figures and illustrations. Boxed case studies provide useful exemplification of general issues.

All the issues discussed and initiatives suggested, seen suitable to be applied everywhere including in Malaysia. This book is an essential read for private and government personnel, city managers and citizens, as an inspiration to do more in the journey toward sustainable environmental and resilient development. This book concludes that it is high time for all multi-disciplinary professions to make relevant efforts with new ideas of protecting the environment (such as nature-based solutions), in our long fight to preserve the environment and to save our mother earth from being deteriorated.



Source: <https://www.theguardian.com/global-development-professionals-network/2016/dec/03/five-ways-to-take-action-on-climate-change>

BOOK REVIEW 4

THE IMAGE OF THE CITY

Author: Kevin Lynch

Publisher: The M.I.T. Press

Year of Publication: December, 1960

ISBN: 0-470-84561-9

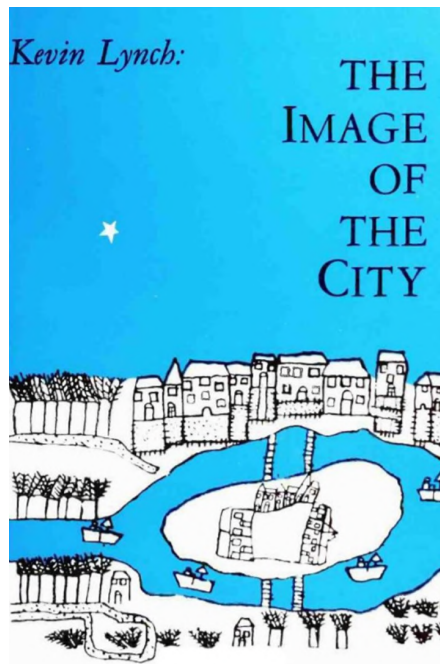
Pages: 336

Reviewed by :Mohd Halid bin Roslei

In this book, Lynch argues that people in urban situations orient themselves by means of mental maps. He compares three American cities (Boston, Jersey City, and Los Angeles) and looks at how people orient themselves in these cities. A central notion in this book is that of legibility (also called imageability and visibility). Legibility means the extent to which the cityscape can be 'read'.

People who move through the city engage in way-finding. They need to be able to recognize and organize urban elements into a coherent pattern. In the process of way-finding, the strategic link is the environmental image, the generalized mental picture of the exterior physical world that is held by an individual.

In Lynch's view, image can be explained as "a picture especially in the mind", a sentimental combination between objective city images and subjective human thoughts. She highlights five basic elements which people use to construct their mental image of a city: (1) paths: routes along which people move throughout the city; (2) edges: boundaries and breaks in continuity; (3) districts: areas characterized by common characteristics; (4) nodes: strategic focus points for orientation like squares and junctions; and (5) landmarks: external points of orientation, usually an easily identifiable physical object in the urban landscape. Of these five elements, paths are especially important since they organize urban mobility.



A clear mental map of the urban environment is needed to counter the always looming fear of disorientation. A legible mental map gives people an important sense of emotional security, it is the framework for communication and conceptual organization, and heightens the depth and intensity of everyday human experience.

The city itself is thus a powerful symbol of a complex society, argues Lynch. An environmental image has three components: identity (the recognition of urban elements as separate entities), structure (the relation of urban elements to other objects and to the observer), and meaning (its practical and emotional value to the observer).

It is important that these urban elements are not hermetically designed into precise and final detail but present an open-ended order. Urban inhabitants should be able to actively form their own stories and create new activities.

Lynch presents his work as an agenda for urban designers. The city shall be designed to give room for three related 'movements': mapping, learning, shaping. First, people should be able to acquire a clear mental map of their urban environment. Second, people should be able to learn how to navigate in this environment by training. Third, people must be able to operate and act upon their environment.

It shows that urban space is not just composed of its physical characteristics but equally by representations in mental images. Mobility is not just (the potential for) free-flowing movement but heavily relies on structuring and identifying the environment through the aid of mental maps. Lynch' work has been influential to many.

Lynch' work brings much impact to urban design and raises various questions about the present role of mobile and locative media technologies in the urban context. Still, "The Image of the City" is a classic work and can be reread as a fresh work in this age. Lynch' division of mapping, learning and shaping can well be applied as important knowledge for all locative media projects.



Landmarks.

BOOK REVIEW 5

SPACES OF SUSTAINABILITY

Author: Mark Whitehead

Publisher: Routledge

Year of Publication: 2007 (First Edition)

ISBN: 978-0-415-415-35804-0

Pages: 242

Reviewed by : Suraya Badaruddin

Spaces of Sustainability delivers an intriguing introduction to important propositions, underlining sustainable development concept. This book provides key deliberation of factors underpinning sustainability issues in developed and developing countries.

The term 'sustainability' as defined by the World Commission on Environment and Development (Brundtland, 1987) includes the inter-generational justice in resource management and distribution, recognizing that environment, economic and social components are prerequisite and compliment each other. Interestingly, the beginning of ecological movement has changed the perspective of sustainability globally.

Section 1 of this book deliberates the historical overview of the emergence of ecological modernization in the west that led to sustainable development concept globally.

Unlike many other authors provoking insights on sustainable development concept, the author takes a different approach through reminiscing historical background on early struggles of ecological movement that changed the socio-political contexts in many western countries and other parts of the world that led to global agreements on issues related to sustainability.

It depicts how such movement transformed the way of doing business through sustainable development approaches and provides detailed anatomy of the post-socialist world in the context of sustainable development.

Can sustainability work in other parts of the world using the same value system as developed countries? The author tries to explore this question and justify the reality of sustainability from geographical perspectives. Sustainability definition is not deliberately contested by the author however he is concerned about the compatibility of sustainable development with "Western liberal values". In his (2007:54) words:

"After all, sustainability does something of a 'threat' to Western liberal values of free enterprise, profit making and property owner ownership. Consequently, when we look at the bastions of Western liberal values, namely government department, royal commissions and presidential offices, we should expect to find some suspicion and resistance to many of the values which sustainability implies".



Source: https://www.researchgate.net/figure/Concept-sketch-of-the-Expositions-public-spaces-planning-The-Expo-2022-feasibility_fig3_327871301

Similar provoking thoughts which might have impacts on local culture especially in developing countries. Such values may result to resentment towards the sustainable paradigm because of culture differences in defining sustainability concept. This also include culture challenges in managing local pressures on rising income and meeting basic needs. The post-materialistic values of the western societies had shaped capitalist system practicing social and economic values of neo-liberal and the free market economies.

Debates on capitalism in western countries highlights the weaknesses of the free market in capitalism, both historical and modern when it failed to see the importance of culture, politics and created uneven forces in shaping the operation of markets (Pezzarossi, 2019). Notably, the western societies are oriented towards the creation of wealth and enhancement of other aspects of quality of life.

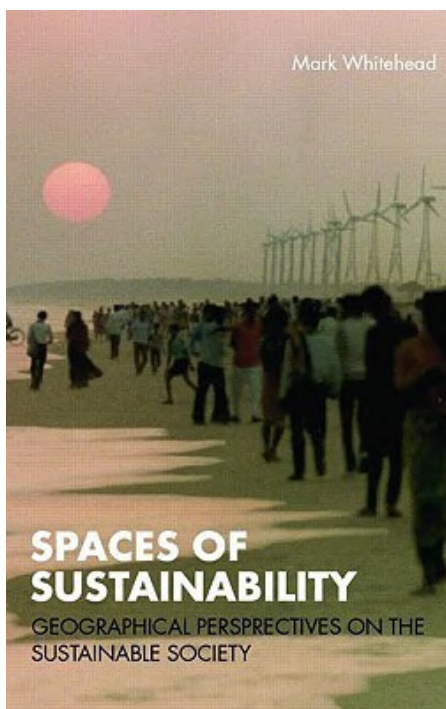
A pessimist view by the author whether such concept would work with western social and economic values based on the western neoliberal thinking and capitalist economic system is worth a thought.

Section 2 of the book highlights the Scales of Sustainability that analyses the underlying global concept of sustainability. An interesting observation by the author where he presents the notion that sustainability varies in a form of geographical organizations sites to region. It implies thinking about the association between social and environment worlds, interdependence of economies, geography, ecology, politics and nature.

An invoking belief that new scales of decision making and action are becoming important within sustainable global communities.

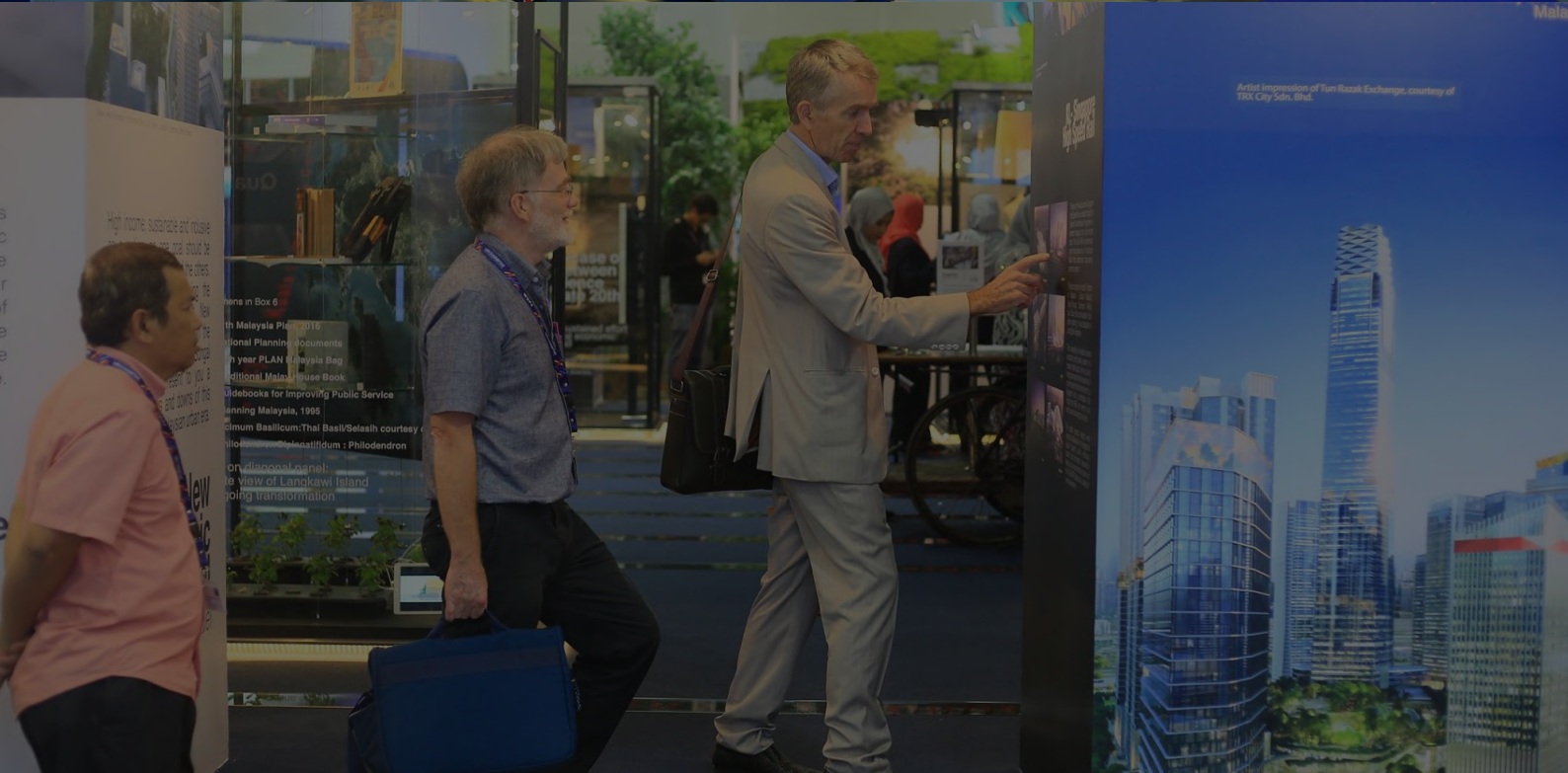
A strong proposition by the author that the society needs to rethink economic values and practices rather than allowing existing economic structure to shape social and environmental policies and should not compromise just to meet economic objectives. Such contention is explained through a series of enthralling case studies featured in this book. Lesson learnt from each case study must be based on social and environmental consideration and benefit of the whole society. In addition, the best practices of sustainability through spatial dimension are legitimately required.

In conclusion, this book offers a unique perspective on initiatives towards a more sustainable society through spatial dimension and how sustainability in local context is imperative towards achieving sustainability objectives. Such deliberation may justify the book is worth reading!!



Source: <https://www.re-thinkingthefuture.com/rtf-fresh-perspectives/a1062-10-sustainable-and-innovative-public-spaces-around-the-world/>





Programmes

Lilian Tai Yee Chi
Hamdan Sapri

➔ Program Cakna Ilmu KESPERB Vaksin Covid-19: Satu Penyelesaian

Date : 23 February 2021 (11.00am - 12.00pm)
Venue : Virtual Online
Organizer : Kelab Sukan dan Kebajikan Perancang Bandar Malaysia (KESPERB), PLANMalaysia



➔ Knowledge and Sharing Session: How to Accelerate the Implementation of Smart Cities in Malaysia.

Date : 15-16 March 2021 (8.30am - 1.15pm)
Venue : Virtual Online
Organizers : PLANMalaysia, iKPKT, URBANICE Malaysia, Malaysian Industry-Government Group for High Technology (MIGHT), World Bank Group and United Nations Industrial Development Organization (UNIDO)
Website : <https://fb.watch/aqLKxdm1z/>



➔ Program Cakna Ilmu KESPERB Pembangunan Lot Lidi: Murah Tapi Risiko

Date : 20 March 2021 (9.30am - 11.30am)
Venue : Virtual Online
Organizer : Kelab Sukan dan Kebajikan Perancang Bandar Malaysia (KESPERB), PLANMalaysia



➔ Urban Talk 2021: Urban Planning (Kriteria Penentuan Kepadatan Pembangunan Perumahan Bertingkat Berkepadatan Tinggi di Malaysia)

Date : 29 March 2021 (2.30pm)
Venue : Virtual Online
Organizer : i-KPKT
Website : <https://www.facebook.com/ikpkt>



➔ Program Executive Talk Perundangan Perancangan Akta Perancangan Bandar Dan Desa 1976 [Akta 172] Bersama Ahli Majlis Pihak Berkuasa Tempatan (PBT) Peringkat Negeri Johor

Date : 30 March 2021
Venue : Fraser Place, Johor
Organizer : PLANMalaysia@Johor



➔ Webinar Kejiranan Hijau : Sedekad Melestari Kehidupan

Date : 19 April 2021 (9.00am - 11.30am)
Venue : Virtual Online
Organizer : Bahagian Penyelidikan dan Pembangunan, PLANMalaysia
Website : Secara Live menerusi FB Rasmi PLANMalaysia
<https://www.facebook.com/PLANMalaysia/>
dan aplikasi CiscoWebex
http://bit.ly/webinarAKH2021_Sesi2



➔ International Webinar on Comparative Planning System (COMPASS 2021)

Date : 27 April 2021 (9.00am - 5.00pm)
 Venue : Virtual Online - Zoom
 Organizer : Dept. of Urban & Regional Planning,
 Kulliyah of Architecture & Environmental
 Design, International Islamic University
 Malaysia
 Website : <https://taplink.cc/icswebinar2021>



➔ Virtual International Graduate Conference of Built Environment and Surveying 2021 (GBES 2021)

Date : 22 June 2021 (8.30am - 1.15pm)
 Venue : Virtual Online
 Organizers : 'Postgraduate Office' dan 'Postgraduate
 Student Society of the Faculty of Built-
 Environment and Surveying', Universiti
 Teknologi Malaysia (UTM).
 Website : <https://m.facebook.com/built.surveyUTM/>
<https://m.facebook.com/profile.php?id=100062885437776...>
<https://builtsurvey.utm.my/gbes2021/>



➔ Forum Bual Bicara "Cabaran Perancang Bandar di Era Pandemik Covid-19" Malaysia - Indonesia.

Date : 17 July 2021
 Venue : Virtual Online
 Organizer : POLIMAS



➔ Persidangan Bandar Rendah Karbon Malaysia (Malaysian Low Carbon Cities Conference – MyL3C)

Date : 13 July 2021
 Venue : Virtual Online
 Organizer : Ministry of Environment and Water
 Website : <https://www.kasa.gov.my/ms/aktiviti-terkini/item/45-persidangan-bandar-rendah-karbon-malaysia-malaysian-low-carbon-cities-conference-myl3c>
<http://gtalcc.gov.my/events/malaysia-low-carbon-cities-conference-myl3c/>



➔ Webinar: Perancangan Guna Tanah Ke Arah Sekuriti Makanan Negara

Date : 12 August 2021 (8.00am - 4.00pm)
 Venue : Virtual Online
 Organizers : PLANMalaysia bersama UPM dengan kerjasama DOA, DVS, DOF dan FAMA
 Website : <https://www.facebook.com/PLANMalaysia>



➔ Mental Health & Urban Planning: It's Okay to Not Be Okay

Date : 14 August 2021
 Venue : Virtual Online
 Organizers : PLANMalaysia and Malaysian Institute of Planners Training Centre (MIPTC)
 Website : <https://us02web.zoom.us/j/85222486528?pwd=Mj9ONVVVRMGxIMG9BK1hFRmM1VFllU09>



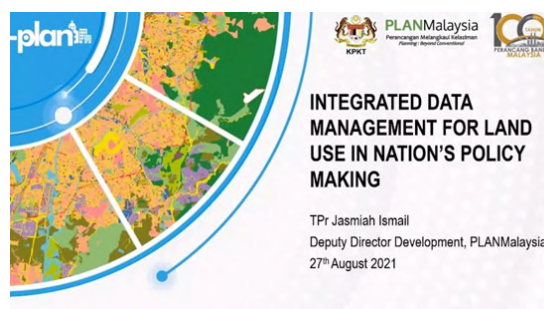
➔ Persidangan Digital Sektor Awam 2021 (PDISA 2021)

Date : 19 August 2021 (9.00am - 4.15pm)
 Venue : Virtual Online
 Organizers : Unit Pemodenan Tadbiran dan Perancangan Pengurusan Malaysia (MAMPU), Jabatan Perdana Menteri
 Website : https://pdisa.mampu.gov.my/?fbclid=IwAR3wpjzD9kQaM68w7_2WKi9oykPA77zgvfiYCCxTnOhoNBpJ9cMfUg9BID0



➔ Virtual Launching on Development of Malaysia's System of Environmental-Economic Accounting (SEEA) Land Account

Date : 29 August 2021
 Venue : Virtual Online
 Organizer : Department of Statistics, Malaysia
 Website : <https://cutt.ly/LaunchingMySEELand>



➔ Malaysia Urban Forum 2021 (3rd Malaysia Urban Forum 2021)

Date : 6-8 September 2021
Venue : Virtual Online
Organizer : URBANICE Malaysia
Website : <https://www.urbanicemalaysia.com.my/muf2021-participant-registration/>



➔ PLANMalaysia CityTALK 2021: Bicara 100 Tahun Perancangan Bandar di Malaysia (Malaysia's 100-Years Town Planning Story)

Date : 13 September 2021 (9.30am-12.30pm)
Venue : Virtual Online
Organizer : PLANMalaysia
Website : <https://www.facebook.com/PLANMalaysia>



➔ Cities 4.0 : Reimagining City Transformation

Date : 21-22 September 2021
Venue : Virtual Online
Organizer : Malaysia Industry Government Group for High Technology (MiGHT) , Confexhub
Website : <https://cities4-2021-virtualexpo.confexmanager.com/https://www.cities4pointzero.com/>



➔ CEM Star Talk: 100 Tahun Perancangan Bandar di Malaysia

Date : 1 October 2021 (10.00am)
Venue : Virtual Online
Organizer : CEM City Expo Malaysia
Website : <https://us02web.zoom.us/j/75jPvV...>



➔ Webinar Pelancongan Negeri Perlis 2021

Date : 26 October 2021 (8.30am - 4.30am)
 Venue : Virtual Online
 Organizer : PLANMalaysia@Perlis
 Website : <https://www.facebook.com/PLANMalaysiaPerlis/photos/pcb.2964002200514465/2964002113847807/>



➔ Young Planners Forum : Liv'in Post Covid-19

Date : 10 November 2021 (9.00am)
 Venue : Virtual Online (CEM Hall 1)
 Organizer : CEM City Expo Malaysia
 Website : <https://www.cityexpomalaysia.com/?fbclid=IwAR1AJlczeFXu2rj1VU0Do49UBOVZaUe1fk-WSMRaKOVUmSPjJIS4iMOeYms>



➔ Program Executive Talk Perundangan Perancangan (Akta Perancangan Bandar Dan Desa 1976 [Akta 172]) Bersama Ahli-Ahli Majlis PBT Negeri Kedah Sempena Sambutan Hari Perancangan Bandar Sedunia (HPBS) Tahun 2021 Peringkat Negeri Kedah

Date : 11 November 2021
 Venue : Grand Ballroom Raia Hotel, Kedah
 Organizer : PLANMalaysia@Kedah
 Website : <https://www.facebook.com/photo/?fbid=187498646907324&set=pcb.187499133573942>



➔ Webinar Gombak-Hulu Langat Geopark: Warisan Suatu Legasi

Date : 16 November 2021 (9.30am-1.00pm)
 Venue : Virtual Online
 Organizer : PLANMalaysia@Selangor
 Website : <https://jpbdselangor.gov.my/berita/587-sambutan-hari-perancangan-bandar-sedunia-hpbs-peringkat-negeri-selangor-2021-dan-webinar-gombak-hulu-selangor-geopark-warisan-suatu-legasi.html>



➔ Coffee Talk Session 1/2021: Forward Planning in Malaysia

Date : 16 November 2021 (10.00am - 11.00am)
 Venue : Virtual Online
 Organizers : Centre of Studies for Town and Regional Planning, and Centre of Town and Regional Planning Society (TRiPS), FSPU, UITM Puncak Alam



➔ Smart City Rap (SCR) 2021: “Digital Infrastructure Accelerate People Centric Smart City Development”

Date : 22 November 2021 (9.00am - 5.30pm)
 Venue : Virtual Online
 Organizers : PLANMalaysia in collaboration with Local Government Department, KPKT, Malaysian Communications and Multimedia (MCMC) and Malaysian Technical Standards Forum Bhd (MTSFB)
 Website : <https://www.facebook.com/search/top?q=planmalaysia>



➔ Webinar Penilaian Impak Sosial Negeri Selangor : “Hala Tuju Penilaian Impak Sosial Dalam Kebenaran Merancang : Suatu Penambahbaikan”

Date : 27 November 2021 (9.30am)
 Venue : Virtual Online
 Organizer : PLANMalaysia@Selangor
 Website : <https://www.facebook.com/Jpbdselangor>



➔ Seminar Perancangan Bandar dan Desa Negeri Terengganu Tahun 2021 : Mendepani Gelombang Pelancongan Pantai dan Pulau di Negeri Terengganu

Date : 29 November 2021
 Venue : Dewan Undangan Negeri Terengganu
 Organizer : PLANMalaysia@Terengganu
 Website : <https://www.facebook.com/PLANMalaysia>



➔ Soft Launch UK Smart Cities Mission to Malaysia

Date : 7 December 2021 (4.00pm - 5.00pm)
 Venue : Virtual Online
 Organizers : UK Government (British High Commission) and the Department for International Trade (DIT)
 Website : https://icsc-my.org/event/soft-launch-uk-smart-cities-mission-to-malaysia/?utm_source=mailpoet&utm_medium=email&utm_campaign=new-document-newsletter-post-title_1&fbclid=IwAR3ZNIv_CBmgbDEHsWkkmNvff-WIIPJPG5fU7EpAtEriSBS07cdSPJzyKug



**SOFT LAUNCH
UK SMART CITIES
MISSION TO MALAYSIA**
 7 December 2021
 08:00 - 09:00 GMT | 16:00 - 17:00 MYT

Organizer:
 UK Government

Strategic Partners:
 ARUP, bsi, CATAPULT, Digital Perak, MIGHT, SMART, techUK, TMC, URBANISE

➔ Diskusi Nasional Daya Huni Malaysia - 'Aspirasi Belia Ke Arah Negara Berdaya Huni'

Date : 11 December 2021 (9.00am - 11.00am)
 Venue : Ballroom 2, Kuala Lumpur Convention Centre (KLCC)
 Organizer : PLANMalaysia
 Website : <https://www.facebook.com/PLANMalaysia>



➔ 5th International Undergraduate Seminar on Built Environment & Technology 2021

Date : 15 December 2021 (8.30am - 3.00pm)
 Venue : Virtual Online
 Organizers : Department of Built Environment Studies and Technology, Faculty of Architecture, Planning, Surveying, UiTM Perak Branch, Seri Iskandar Campus, in collaboration with Program Study Arsitektur, Universitas Aisyiyah Yogyakarta, Indonesia.
 Website : <http://perak.uitm.edu.my/index.php/component/content/article/25-upcoming-events/294-5th-international-undergraduate-seminar-2021-built-environment-technology?Itemid=101>





KEMENTERIAN PERUMAHAN DAN KERAJAAN TEMPATAN
JABATAN PERANCANGAN BANDAR DAN DESA

Majlis Perasmian Sambutan 100 PBM

100 Tahun Profesion Perancang Bandar di Malaysia

sempena **HBBS TAHUN 2021**

Peringkat Kelaziman

Perasmian oleh

YAB Dato' Seri Ismail Sabri Yaakob

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

Peringkat Kelaziman

The Official Launch: 100 Years of Town Planning Profession in Malaysia (100PBM) by the Prime Minister of Malaysia



The Malaysia Book of Records Certificate Handing Over Session to PLANMalaysia: The Fastest Preparation of Land Use Plan for Kuala Kubu Bharu

A photograph of a street in a historic town. On the left, there are yellow buildings with white window frames and shutters. A tree with pink flowers is in front of one of the buildings. The road is paved with red bricks. In the background, there are more buildings, a car, and a person on a motorcycle. The sky is blue with some clouds.

Blast from the past.

Suraya Badaruddin
Siti Sarah Hanim Basri

CYBERJAYA

Pioneering Smart City for the Nation

Known as Malaysia's Silicon Valley, this city was established to support Smart or Intelligent City Initiatives in early 90s. The city consists of science park with its own living lab initiatives to enhance and encourage the growth of SMEs, attract local talent, intellectual property and local start-ups. In line with the Smart City framework, this city set to rise as a technology-based Capital of Creation. The Layout design of the city has shaped its environment and community through its dynamic spirit of innovation!!



REMAKING PLANNING

”

*Reminiscing The Transformation Of Cities From **Garden to Smart Garden City** in the Malaysian Context*

Cities in Malaysia manifest the influence of both modernist and post modernist characteristics. Modernists put emphasis on urban planning (form and function) while post modernists emphasis on urban design (detail and aesthetic). Modernist influence had taken place especially in early township development in Malaysia since 1924. A small town known as Kuala Kubu Bahru (KKB) marked the evolvement of Ebenezer Howard's Garden City concept in the country. KKB is a beautiful small town located in Selangor, West Malaysia, established in 1924 by Charles Reade, the first government town planner in the Federated Malay States. Read is an ardent supporter of Garden City Movement in the early 20th century and he manifested this through the layout design of KKB. KKB exemplifies many characteristics of the Garden City. These include its recreational area surrounding the town centre. This small-town stands alongside other garden cities worldwide (for example Letchworth and Welwyn in the UK). Meanwhile, the transformation of other cities in Malaysia took place after Malaysia obtained its independence in 1957.

MODERNIST INFLUENCE (GARDEN CITY) AND POST MODERNIST (COMPACT AND SMART CITIES) HAVE TRANSFORMED MAJOR CITIES IN MALAYSIA (KUALA LUMPUR, PUTRAJAYA AND CYBERJAYA TO NAME A FEW) STARTING FROM MID 1990s TO DATE.

THE FIRST GARDEN CITY OF MALAYSIA LOCATED AT KUALA KUBU BAHRU, SELANGOR (1924-2021) SIGNIFIES HOW GARDEN CITY MOVEMENT (MODERNIST INFLUENCE) HAD CONTRIBUTED TO URBAN PLANNING IN THE COUNTRY.



02

BLAST FROM THE PAST

REMAKING PLANNING

These include the birth of new villages, Felda resettlements and formation of new satellite towns such as Petaling Jaya and Bangi. Cities in Malaysia faced their peak transformation in Mid 90s while the country was experiencing rapid growth during the period. The adaptation of garden city concept is further enhanced with Malaysia's own Total Planning Doctrine that put emphasis on good value system. Based on this, man is positioned as the focal point of development and need to maintain the relationships with his creator and the environment. Good value system is emphasized in this doctrine where the element of spiritual values are fundamental in any urban development. The planning doctrine is used as a guiding principle for the development of Putrajaya Administrative Centre in the late 90s. Putrajaya is planned as a garden and intelligent city adopting an interesting mixture of styles: Modern Western, Modern Islamic and British Colonial Roman architecture. As the post modernists put emphasis on design form and space, the application of smart cities initiatives meet such characteristics. Designing a city with adaptation of digital technology aspires for detail design with adoption of internet of things

become key criteria in designing a city. The Multi Media Super Corridor or Cyberjaya Development had paved the way for the country to progress in this aspect since 1990s. Meanwhile, other cities in Malaysia are making similar move as smart city initiatives has become the main urban agenda of this century. The transformation of modernism to post modernism is evident in cities such as Kuala Lumpur, where both the focus on simplicity in design and importance of creating a sense of place are taken place. Post- modernists believe livability and sense of place to become an emphasis especially in highly urbanized cities. However, such transformation is worth to be contemplated as technology driven cities may create impact on the value system of local communities, thus must not be taken for granted. Perhaps the principles of Malaysian Total Planning Doctrine shall be revisited to address urban issues and challenges resulting from current development practices.



PLANMalaysia

ISSN 1675-7629



9 771675 762005