

Modern City Issues, Management and the Critical Role of Information and Communication Technology

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Abstract—Cities are currently dealing with major difficulties that no longer allow slight adjustments to the way cities operate. Instead, local officials must devise creative, transformative solutions. Fortunately, novel approaches to municipal administration and technological advancements are providing city officials with new and beneficial tools. As a result of these improvements, citizens, businesses, and other groups in the city will be able to actively participate in implementing the reforms. In a nutshell, technology can assist cities in becoming smarter. This paper highlighted the implications of the management challenges of cities, the types of cities, and the issues that cities face during epidemics. A coordinated approach that reacts to both COVID-19 and climate change is required to avoid negative outcomes from both. To figure out how Malaysian city administration works and how important information and communication technology is in Malaysian smart cities, it is important to look into technology and data opportunities.

Keywords—Cities; modern city; smart city; COVID-19; information communication technology (ICT); challenges; data; geographic information system (GIS)

I. INTRODUCTION

Cities today are facing enormous challenges. A small sample of cities from throughout the world deserves special attention [1]. By 2025, 600 cities will account for over 60% of global growth [2]. Currently, the city houses half of the world's population. The globe is seeing tremendous urbanization [3],[4]. The high urban population growth trajectory is not just an intriguing reality; it also causes a demanding urgency for sustainable development and improved livability. The growth of cities is fraught with difficulties. Although cities account for less than 2% of the world's territory, they use almost three-quarters of the world's natural resources and are the primary source of greenhouse gas emissions [5]. Rapid urbanisation has resulted in a loss of essential capabilities that make a place habitable, such as waste management challenges, resource shortages, air quality, human health problems, traffic congestion, and insufficient, degrading, and ageing infrastructure [6].

Social and organisational issues, rather than technical, physical, or material issues, are another group of issues. Multiple different participants, high levels of interconnection, opposing ideals, and political and social complexity are all linked to concerns. Problems get vicious and convoluted in this way [7]. While behind Singapore, Japan, and South Korea, and Taiwan, China, Malaysia is the fifth most urbanised economy

in East Asia. Malaysia's three major cities, together with Georgetown City and Johor Bahru, account for over 60% of the country's urban population. For financial services, Kuala Lumpur's economic growth rate per worker is just around 0.46 of Hong Kong's. The cost of living in Kuala Lumpur is 83% more than in New York City [8]. In 2017, over 75% of Malaysia's population lived in cities and metropolitan regions. As a result, Malaysia is one of the most urbanised countries in Southeast Asia. Malaysia's urban population was 77.2% in 2020. Malaysia's urban population expanded from 34.3% in 1971 to 77.2% in 2020, expanding at a 1.67% yearly pace [9].

Malaysia created (Malaysia Urban Information Network [MURNInet]) in 2002 [10]. The plan was renamed MURNInet 2.0 by the (Federal Department of Town and Country Planning Peninsular Malaysia) in 2017 to reflect current urban developments [11]. The (National Urbanization Policy [NUP]) was designed in 2006 by the Federal Department of Town and Country Planning as part of a comprehensive and integrated framework to supply excellent urban services that would assure the establishment of safer, systematic, contemporary, and interesting cities (Federal Department of Town and Country Planning, 2006) [12]. However, because of the many properties of urban planning, many strategies have lived side by side with NUP over time [13]. The smart city goal is not just for medium and large cities; it is equally vital for smaller towns and cities. This research sought to answer the following question: What are the modern city's challenges? What are the challenges confronting Malaysia's urban community? Whether technology and data opportunities have aided in the resolution of these issues is unclear?

The remainder of the paper is summarised as follows: The 2nd section is about the challenges of modern cities; the 3rd section, the challenge of city management, outlines the opportunities associated with technology and data in Section 4, while Section 5, talks about cities' types; the following section, about the benefits of integration; and Section 7, presents the conclusion and goal of the research.

II. MODERN CITIES' CHALLENGES

And according to the United Nations, urban regions are home to 55% of the world's population [14]. By 2050, the percentage is predicted to climb to 68%. With few exceptions, metropolitan areas are expected to grow and diversify. The issues cities confront today include the following as

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urbanisation grows Table I, particularly in Asian and African countries [15]. The city's challenges are illustrated in "Fig. 1".



Fig. 1. Cities' Challenges.

TABLE I. CHALLENGES TYPE AND DETAILS

Type of Challenges	Challenges details
Resilience challenges	Challenges of Resilience Extreme weather[16], food shortages[1], and energy shortages have a significant impact on cities all around the world[17] [18], [19].
Emerging markets	In addition to rising market development, the increasing middle class is predicted to grow from three to six million people by 2050[15]. This will exacerbate economic resource competitiveness. The global race for talent and capital is on[20]. Malaysian cities, such as Kuala Lumpur, must now compete not only with other Malaysian cities but also with global cities[21].
Migration	Many cities are seeing continued inward migration, which is producing traffic jams, pollution, and a rise in service expectations[22]. Even though modern cosmopolitan cities offer a more diverse cultural environment, disparities in social standards might harm social cohesiveness across many populations[23].
Deflation of the industrial sector	In contrast, the population of certain cities is declining while industry is falling [24],[25]
Ageing population	The ageing population is facing an increasingly negative influence on both overall income and government service expenses[26].
Citizens.	As digital technology becomes increasingly widespread in all parts of life [22], citizens demand governmental services and become clients [27].
The pace of service innovation	Because of the quick rate of growth in people's daily lives, long-term planning is becoming increasingly challenging[28].
Ageing infrastructure	Most of the infrastructure in Kuala Lumpur cities [29]will need to be updated or renovated in the next few years to make it suitable[30].
Lack of overall control	Specific organisations decide many critical choices affecting urban life with a limited[31], segmented emphasis, instead of considering the town's overall influence[19]. Many areas of urban life are also influenced by regional or national government or agency actions[1].
Money	It's difficult to get the long-term investment finance required to address municipal problems[32], particularly when business models, innovation strategies[33], or modern tech are involved, and especially when budgets are tight[34].
Ageing infrastructure	Over the next several years, a considerable proportion of the infrastructure in global cities will need to be replaced or retrofitted to try and be fit for its purpose [1], [35]

III. CITY MANAGEMENT CHALLENGES

Cities may be thought of as complicated creatures with a plethora of organizations and infrastructures providing the services required for them all to function correctly Fig. 2. Because the municipal government directly manages only a few important municipal services [36], it should carry out its long-term strategic management role in collaboration with other city stakeholders [37].

The huge number of independent stakeholders who contribute directly or indirectly to the city's overall functioning impeded the city's capacity to function as a cohesive entity [37]. To complicate things worse, independent city systems are becoming more complicated while also becoming more interdependent in ways that are frequently poorly understood [20]. For example, both the electrical and information technology systems are critical components of every other municipal system, and any failure in one of them is likely to have a cascading impact on the others. Smart City Framework Standard [PAS181] examines a city's traditional operating paradigm and identifies the issues that result from a lack of coordination and integration across city systems [38], [30]. This operational model is depicted in Fig. 3.

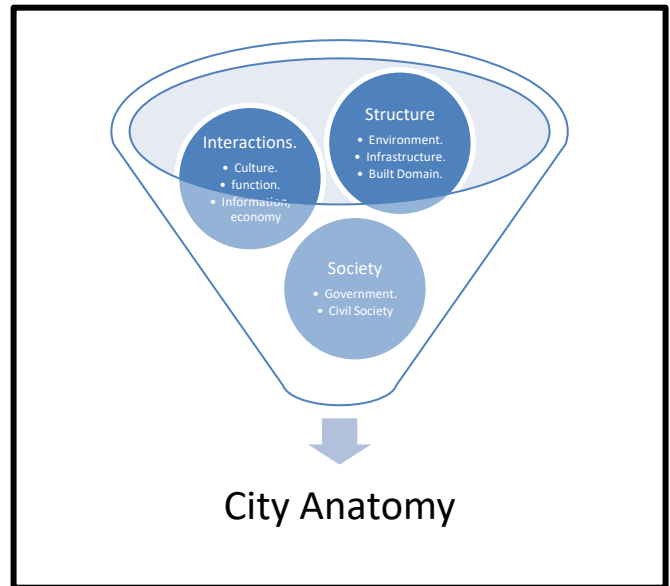


Fig. 2. City Anatomy.

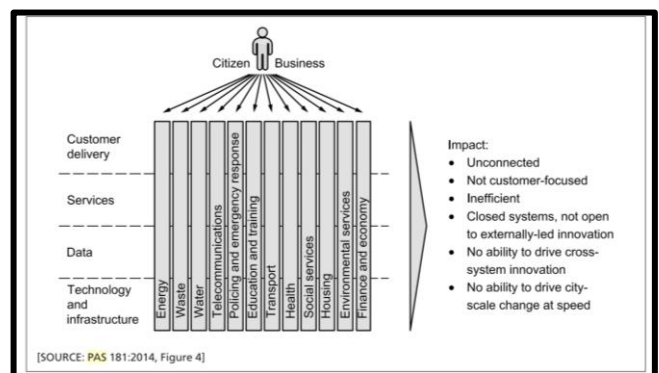


Fig. 3. Citizen Business[39].

Equally difficult is the fact that each city has its own history, set of traits, and geographic location, all of which present distinct difficulties and possibilities for municipal officials to consider. A city must also be run in a way that takes into account its wider social context and the unique opportunities and problems it faces.

IV. TECHNOLOGY AND DATA OPPORTUNITIES

Following technological advancements in data utilization Fig. 4 municipal leaders now have new tools and chances for successful transformation that may help them solve these issues.

1) The ability to connect, the digital connection, is rapidly expanding, no longer confined to using computers to access the virtual world; can now use cell phones, tablets, and monitors to access the information, offer feedback, and communicate with one another, anywhere at any time [40].

2) Sensors are a type of device that detects changes in the environment. Sensors, and also smartphones and other digital technology [41], are increasingly being integrated into the built environment, with a rising percentage of people carrying them. This can provide local authorities with a more complete, real-time picture of what's going on in their community [42].

Three more factors are linked to these changes:

- Information. Every two years, the volume of digital data virtually doubles. With the growing usage of (GIS) Geographical Information Systems, data from multiple sources may be connected based on location, providing a much fuller picture of what's going on in the city's many neighbourhoods and districts. It backed this up with open standards from the (Open Geospatial Consortium [OGC]) and the (World Organization for Standardization's Technical Working Group 211 [ISO/TC211]) [43]. The capacity to specify a geographic reference, and support access to link data the strong argument for sharing it among departments, agencies, industry, and research organisations [44].
- Trend analysis. The capacity to interpret and deduce meaning from this data is likewise quickly improving [45]. While smartphone applications and devices may already deliver contextualised information to users on a face-to-face basis as they go about their daily lives, quantum computers can scan large amounts of raw data and provide answers to more challenging problems [46].
- Working together. The growing usage of the internet is facilitating a more collaborative connection between customer and provider, resulting in patients, for example, having a more active part in controlling and measuring their health issues [47].

These developments are allowing for the development of tools that will allow people, businesses, and local authorities to respond to issues faster and with more evidence. These are the tools:

- In order to make better decisions for city administration and long-term planning, make data more accessible and affordable, as well as give people the ability to see and analyse it, so that they can do so.
- Encourage collaboration between government entities, citizens, residents, and government agencies.
- Establish innovative techniques for connecting city systems to enable a more holistic approach to city issues and possibilities, assist in city administration and also to enable integration at a much more detailed level, reducing the risk of a major collapse.

Those instances are relevant to current technical developments. They'll be followed by a steady flow of additional technological advancements, such as the utilisation of new materials, robots, new building methods, as well as domestic industry (e.g. 3D printing). The goal for cities is to foster a continual innovation culture, using innovative technology to serve citizens and improve the city's quality of life.

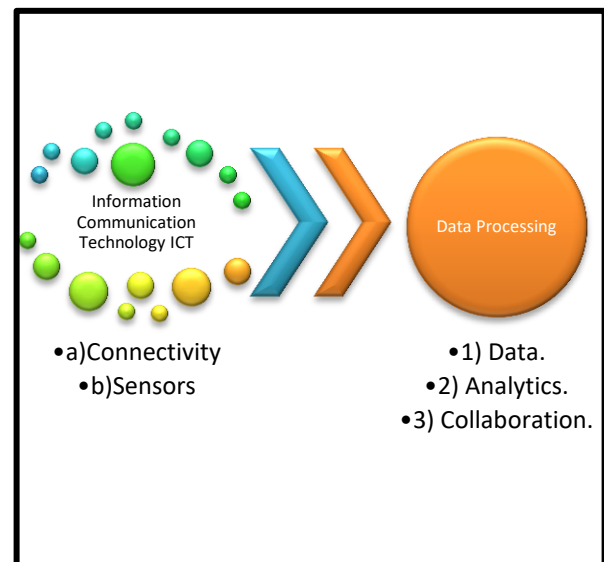


Fig. 4. Technology and Data Processing.

V. TYPE OF CITIES

A. Healthy Cities

Healthy cities, smart cities, and sustainable cities have all emerged as major themes in the modern evolution of cities. The epidemic has shown that having healthy cities as a development criterion is equally critical. Preventing future infections and disease outbreaks would require improving urban medical infrastructure to accommodate the influx of patients with new illnesses and interruptions in medical care, especially public health programmes like vaccination [48]. The present urban primary health care infrastructure must be physically and financially enhanced, as well as monitored, surveillance, and accountability systems that are effective and sophisticated. There must also be minimal friction, and all levels of healthcare must collaborate using a pandemic-related operating procedure that is unique and standard [16].

Digital tools can improve healthcare delivery and strengthen health infrastructure. The COVID-19 situation has increased the usage of telehealth services, which residents had been hesitant to use [49]. The rapid surge in the usage of digital health peripherals will provide the necessary proving ground for the evolution of health-tech that complements rather than replaces traditional types of health care [48]. With innovation education and power levelling programmes being implemented in medical, nursing, and paramedical curricula, this transformation in healthcare delivery will also push digitally aware health personnel [50].

B. Green Cities

The absence of open spaces, inefficient resource administration for the afflicted people and interruptions in power consumption are only a few of the fissures caused during the COVID-19 crisis. These are issues that have their foundation in the absence of resilient and sustainable urban development. To avoid detrimental consequences from both COVID-19 and the climate problem during pandemics, a coordinated approach that reacts to both must be developed. Prioritize circular economic structures, sustainable urban transportation, and increased green building and renewable power investment [51].

To make cities robust and sustainable in the face of future pandemics, the transportation industry will need to integrate with the green agenda [55]. Adjustments in transportation preference and user behaviour because of congestion phobia must be balanced against institutional decisions on how to ease bottlenecks. Creating well-ventilated public transportation, enforcing congestion limitations and pricing, and supporting non-motorized transportation are some of the approaches to accomplishing this balance [56].

C. Inclusive Cities

Much before the epidemic, there were discussions about the necessity for cities to consider the needs of their vulnerable populations. This crisis has given the pain of the vulnerable a new depth, and it has sparked a discussion about what might be done to prevent similar pain in the future.

An urban-planning framework that incorporates sex-disaggregated data collection on the number of people, number of homes, pockets and regions of susceptibility, as well as sanitation and hygiene services readily available services, is needed to support pandemic responses [52]. There can be no preparedness or response plans until the percentage of people who live in susceptible locations is known, as well as information on the municipal facilities accessible to them. A concerted effort to collect up-to-date data on formal and informal settlements, as well as labourers in cities, is required to accurately estimate the funds needed to ensure appropriate access to housing, food, sanitation, and services in the financial sector [53].

A gendered study of the pandemic's influence on job losses and employment patterns is also required for post-pandemic rehabilitation efforts. To prevent the harshest effects of future pandemics, improved data management must be included in urban design. This data, together with the efficient coordination

that municipal systems can offer, will be critical in the delivery of critical services to the most vulnerable..

D. Rising Cities

In the post-pandemic future, cities' sociological, physical, and economic infrastructure will shift dramatically. Building architecture and workplace layouts will alter as a result of health restrictions put in place during an emergency, with safety being the priority.

At the same time, cities will continue to build skyscrapers and slums, as long as their urbanisation goals are met. However, the most effective urban growth strategy will be one that integrates formal employment generation with the construction of viable housing plans [52].

It may reinvent cities as solitary centres of trade, business, and knowledge as the post-pandemic globe shrinks and the rapid pace of globalisation slows. Commodity and labour movement will be restricted within clearly defined governing zones, and cities may emerge as self-sufficient entities [54].

The COVID-19 problem will force significant changes in how to design, govern and live in cities. The perception of cities as dense hives of continual social contact may need to be rethought, must accept this and guarantee that systems, whether in transportation, housing, work, or financial investments, endure the adjustments that come with it. While it may appear unachievable shortly, parties must work together to implement measures that will help avert future crises and lessen the pandemonium's negative short-term implications [52].

VI. BENEFITS OF INTEGRATION

The streetlamps in Malaysia are turning white. The cause is more complex than you may believe. In Malaysia, seventy-five per cent of street lamps are beyond the age of twenty-five [55]. LEDs are being used to replace incandescent bulbs, which might cut your energy bill in half and save you money on maintenance, with a (return on investment [ROI]) of years [54]. If they were changed, they might also be used as key resources for a Wi-Fi communication network, a hub for a parking system as well as other sensors, a position for air pollution monitoring, and a CCTV stand [56].

Development is one of Kuala Lumpur's major urban redevelopment projects, and it will eventually provide housing, employment, and educational opportunities for 8,419,566 people [57]. The integrated planning and management of water, power, gas, heat, and data services under the control of a single asset owner is a crucial aspect. This integration will allow for significant cost savings and implementation of innovative technology solutions in energy supply, renewable energy, and other areas, all of which will contribute to increased levels of sustainable development and an aimed decrease in CO2 emissions of over 50% compared to 2005 levels [58].

VII. CONCLUSION

The goal of this research was to assess the obstacles that Malaysia's urban community faces, as well as whether government policies have been effective in resolving these

issues. Rising crime rates, a lack of economic prospects, air pollution, and traffic congestion are concerns from the viewpoint of urban residents. The survey found that the government's policies were in line with the public's concerns. However, it would be ideal if the urban population were given the chance to take part in the development of policies on urban livability and contribute comments. The third principle of the City Competitiveness Master Plans (CCMP) framework could not be examined since the data used in this study was obtained from the public domain. As a result, future studies will create particular survey questions that can capture the finer aspects of urban living issues.

The most important message is that cities' prospects would be significantly improved if they could effectively seize opportunities and handle the issues they confront. Below are a few key themes for forthcoming comments on important research and policy activities. When cities are well-managed, they can take advantage of strong tools like innovation and technology, public participation, effective governance, and the ability of communities to bounce back.

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