

# **MAKING KUANTAN AS PEOPLE CENTRIC CITY: ENABLING DATA-DRIVEN DECISIONS VIA SMART CITY IMPLEMENTATION**

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## **ABSTRACT**

A smart city is a sustainable city that solves urban problems and improves citizens' quality of life through the fourth Industrial Revolution technology and governance between stakeholders. It is estimated that by 2050 more than two thirds of the world population will live in urban areas. This paper aims to identify improvements that can be made in the State of Pahang using evolving technology to benefit the community. The research will focus on the City of Kuantan in Pahang, whereby 82% of the state's population live in urban areas. In 2021 the total estimated population of Kuantan was 1.68 million. The concept of the smart city in Kuantan emphasis on data driven community. However, there is no complete smart city without security features play an important role in sustainability. The creation of these smart applications may also pose numerous security and privacy problems due to the existing vulnerabilities in each layer of a smart system. This study uses a qualitative approach that focuses on interviews with local administrators. It reveals four important themes: governance, smart city components, initiatives, and challenges. The finding of the study hopefully can be used as a basis to determine the direction of the government is using the smart cities model and whether this development should be taken into consideration as part of the government initiative to pursue a sustainable quality of life for the city residents in Pahang.

***Keywords:*** *Smart City, Sustainability, Security, Digital, Transformation*

## 1. INTRODUCTION

Today urbanization is going through a rapid process and has imposed many new challenges to urban development. The ensuing “urban diseases” in population, resources, transportation, and environment have severely restricted and hindered development, become a bottleneck for urban development, and become a dilemma for city managers. A smart city is a new form of urban construction that has emerged gradually in the rapid development of a new generation of information technology, the widespread use of informatization in urban management practices, and the promotion of changes in urban management methods. A 2018 study by McKinsey estimates that cities can use technology to improve quality of life indicators by 10% to 30%, and help them make moderate or significant progress towards 70% of the UN’s Sustainable Development Goals. This involves reducing costs and resource consumption in addition to more effectively and actively engaging with their citizens. Some cities that are active in implementing smart city strategies include Amsterdam, Barcelona, Seoul, Stockholm, Singapore, Phuket, and Jakarta. IBM accomplished more than 100 smart city projects worldwide in 2010–2017, projects whose themes included administration, citizen engagement, economic development, education and workforce, the environment, public safety, social services, transportation, and urban planning (IBM Smarter Cities Challenge, 2017). Smart city concept is a viable solution to solve the dilemmas of urbanization. The concept of smart city typically has three themes which are:

- 1) Using information, communication and digital technology to address urban challenges, improve urban management and quality of life, sustainability, efficiency and security;
- 2) Increase economic and business activities; and
- 3) Continuous public participation and urban innovation.

The various attributes of smart cities include security, sustainability, quality of life, urbanization, and smartness. The sustainability of a smart city is related to city infrastructures and governance, energy and climate change, pollution and waste, social issues, economics and health. The quality of life can be measured in terms of the emotional and financial well-being of the citizens. The smartness of a smart city is conceptualized as the ambition to improve economic, social and environmental standards of the city and its inhabitants.

In 2007, Rudolph Giffinger with Edinburgh Napier University created a smart city ranking of 70 cities within the European Union based on urban characteristics and created city profiles consisting of six “smart” characteristics: economy, people, governance, mobility, environment, and living. These profiles will be the base of many measurements in smart city development. This concept then was further developed into a model known as the “Smart City Wheel” by Boyd Cohen (2013), who identified 18 key working areas based on as mentioned before, which are six key domains, as simpler assessment criteria.

There are four core themes for a smart city, namely society, economy, environment, and governance. The society theme of a smart city signifies that the city is for its inhabitants or the citizens. The economic theme of a smart city signifies that the city can thrive with continuous job growth and economic growth. The environment theme of a smart city indicates that the city will be able to sustain its function and remain in operation for current and future generations. The governance theme of a smart city suggests that the city is robust in its ability to administer policies and combine the other elements. The infrastructure of the smart city includes physical, information and communication technology (ICT), and services. Generally, there is no universal definition of a smart city. Although there is no standard for defining a smart city, various organisations and researchers have described it in their terms. There are few definitions on smart city as follows: -

**Figure 1: Smart City Definitions**

Smart city Definition	Reference
The vision of ‘Smart Cities’ is the urban centre of the future, made safe, secure environmentally green, and efficient because all structures – whether for power, water, transportation, etc., are designed, constructed, and maintained making use of advanced, integrated materials, sensors, electronics, and networks which are interfaced with computerized systems comprised of databases, tracking, and decision-making algorithms.	(Hall et al. 2000, p. 1)
A smart city is a city well performing in a forward-looking way in these six characteristics [economy,	(Giffinger et al. 2007, p. 11)

Smart city Definition	Reference
people, governance, mobility, environment, and living], built on the ‘smart’ combination of endowments and activities of self-decisive, independent and aware citizens.	
A city to be smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance.	(Caragliu, DelBo, and Nijkamp 2011) (tiada dalam senarai rujukan)

## 2. BACKGROUND OF SMART CITY IN MALAYSIA

A smart city is seen as a new approach to urban management and development to make Malaysia's cities more sustainable and liveable. At the same time, technological advancement and the usage of information technology (IT) applications make the smart city more practical and convenient for the urban population and city managers.

According to the Ministry of Housing and Local Authority (KPKT), the definition of Malaysia Smart City is cities that use information and communication technology (ICT) and technological advancement to address urban issues, including improving quality of life, promoting economic growth, developing a sustainable and safe environment, and encouraging efficient urban management practices. The 3rd National Physical Plan projected that about 77% of Malaysia's population will live in cities in 2020 and is expected to increase to 82% by 2030 and 87% by 2050.

The emphasis towards making Malaysian cities into smart cities and strengthening digital infrastructure has been embedded in Malaysia's development plans, such as the Twelve Malaysia Plan, the National Physical Plan 4, and the National Urbanisation Policy 2. The development of smart cities is also to uplift Malaysian Cities' competitiveness and support Malaysia's commitment, especially towards achieving the Sustainable Development Goals 2030 (SDGs) objectives and to ensure that Malaysia is keeping abreast with the global urban development trends.

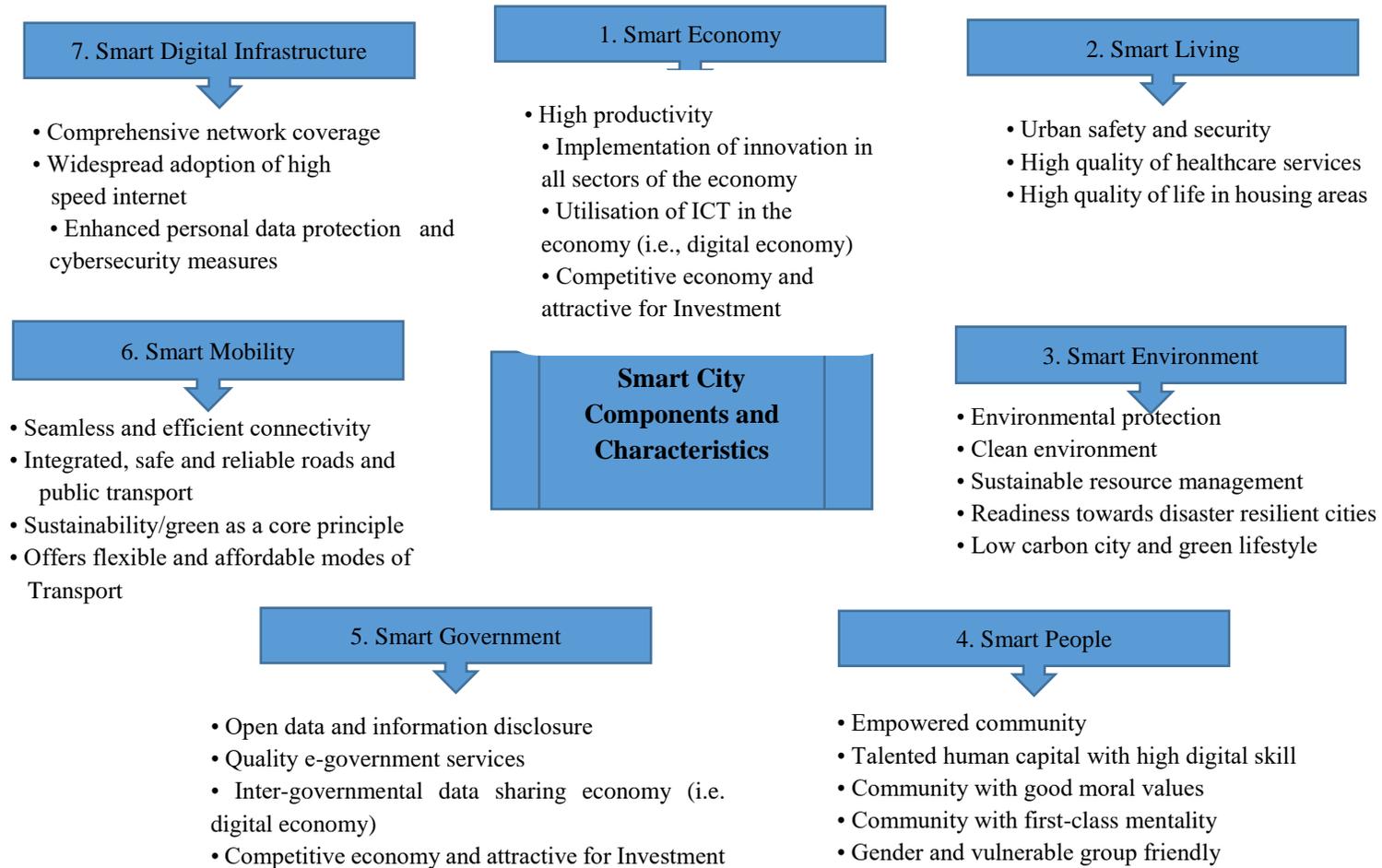
## 2.1 Malaysia Smart City Framework (MSCF)

The Malaysia Smart City Framework (MSCF) was developed considering the importance of smart city development and implementation in Malaysia. The MSCF is a national-level framework that serves as a guide and reference to Local Authorities city managers, state governments, federal ministries and departments, industry players, academicians, and other stakeholders in planning and developing smart cities in Malaysia holistically and in line with the current developments. Malaysia's Government launched the MSCF in 2019 and believes that a smart city is a future approach to urban planning, development, and management that can provide solutions to urban challenges such as the inefficient delivery of urban services, environmental pollution, and traffic congestion, thus improving the quality of life of urban people. The need to develop a smart city in Malaysia can be attributed to the following:

- 1) To address urban challenges arising from rapid urbanisation - with an increase in population, municipal issues & challenges requires an approach new in planning and urban management to improve quality of life;
- 2) To meet national and global agendas - sustainability development such as SDGs, MSCF, Digital Economy Policy, National IoT, Fourth Industrial Revolution (4IR) for making cities more competitive;
- 3) State of Art Technology - Internet of Things (IoT) including big data, artificial intelligence (AI), automation, machine learning, and Geospatial Information System (GIS) to help make decisions based on data-driven decision making;
- 4) To position Malaysian cities to be on par with other cities globally - Preparing cities in Malaysia towards the smart city through smart city standard indicator to be comparable ranked International.

MSCF has identified 16 policies, 36 strategies, 112 initiatives, and 92 indicators for Smart City 2019-2025. It also has outlined the guidelines for seven components and characteristics of a smart city in Figure 2. The MSCF considers seven smart pillars: environment, economy, energy, mobility, people, living, and governance, with a focus on community wellbeing that is supported by ICT. Any smart city development of in Malaysia can make the guideline as the pillar.

**Figure 2: Components of Smart City in Malaysia**



Smart City Indicator Standard MS ISO 37122:2019 has been published. This standard will be a benchmark in planning and determining levels of implementation of smart cities in Malaysia in the future. It is in line with the global rankings and guides local authorities in smart city planning. Now, PLANMalaysia and KPKT (shortform at page 5) are developing Malaysia National Annex to MS ISO 37122:2019 that will be used together with this standard to suit the smart city indicators in the Malaysian context.

In implementing a smart city in Pahang, this study makes a benchmark for a few states with the intention in Malaysia to develop an understanding of different smart city models implemented in Malaysia. Penang, Selangor, Sarawak, and Johor, have embarked on their smart city plans.

#### *2.1.1 Smart City in Penang*

Penang aims to cover: Smart Economy, Smart Governance, Smart Environment, Smart Mobility, Smart People, Smart Living. One of the successes of the innovation is the Penang Smart Parking application. Penang has 23 agencies, and all their services are online now since they are trying to reduce bureaucracy and get things done online to avoid traffic congestion. It has become the country's first smart car parking system.

#### *2.1.2 Smart City in Johor*

In recent years, Johor Bharu City Council has pioneered the practice of a low carbon economy to limit greenhouse gasses, and various private players have signed MoU to develop smart solutions for making the city safe and sustainable. Currently, PLANMalaysia is assisting the State of Johor in preparing the Johor Smart City Blueprint which is estimated to be launched by June this year.

#### *2.1.3 Smart City in Selangor*

The Smart Selangor Delivery Unit was established in 2016 to make Selangor a liveable smart state by 2025. The initiatives that the state has delivered include an intelligent Traffic Monitoring System in Subang Jaya; cashless transactions (CEPat and Smart Selangor Parking application); the Selangor Intelligent Transport System (SITS). The state has also built the digital infrastructure. The Selangor Gigabit Network and Smart Selangor Data Centre

provide connectivity and cloud storage for the state government, while the Smart Selangor Operations Centre monitors selected critical state services.

#### *2.1.4 Smart City in Kuching, Sarawak*

The Kuching Smart City Masterplan, aligned with the Sarawak Digital Economy Strategy, was completed at the end of 2020. Among them is the upgrading 42 road junctions in the city with a smart traffic light system to optimize traffic flow and reduce congestion. The state has also introduced cashless payments in the form of Sarawak Pay, an e-wallet that is accepted by more than 60,000 merchants in the state. The state has also introduced a digital identity platform known as Sarawak ID. More than 20% of Sarawak's population has registered and uses it for end-to-end services.

## **2.2 Proposal of Smart City in Pahang**

Although the government is interested in developing Kuantan as a smart city, there is still no specific study to realize this in line with the government's intentions. Kuantan City Council's (MBK) efforts to create Kuantan as a smart city will not be achieved if there is no comprehensive impact study to ensure the effectiveness of its implementation. This will make the state government unable to make any initiatives towards making Kuantan as a Smart City. Therefore, a study needs to be prepared to ensure the government can adequately embark on making Kuantan City a Smart City. The proper planning and direction, can facilitate policymakers to make decisions and pursue the agenda by identifying potential investors to support the strategic roadmap toward realizing the transformation agenda to digital technology.

In this research, Kuantan is expected to focus on digital approaches for the administrator, community, and businesses in Kuantan City. Smart City Kuantan will enable the people to enjoy better living and reap the benefits of technologies in most parts of their lives, such as education, transportation, and healthcare. Based on the implementation of smart cities in other states, Pahang State Government also embarked on the same journey and identified a pilot project called Kuantan City.

With the implementation of a smart city, various benefits and advantages, including the potential for financial gain and reduction of operating costs can be enjoyed by the people, the community itself, as well as stakeholders in the business community and also the government. Another critical aspect of a smart city is the concern for security and safety, or how the people or businesses are getting protected better by introducing technologies into their daily routines. Ensuring the safety and security of citizens in smart cities is one of the key challenges for governments, mayors, and policymakers. "Safe City" is a future-oriented solution prepared for further adaptations according to the market and regulatory needs.

### **3. METHODOLOGY**

Research Aim: determining the current implementation of the smart city concept in Kuantan and potential enhancement based on practical requirements.

The research method used in this study is the qualitative analysis, where personal interviews were conducted with six senior state government officials. Qualitative research design is more appropriate for exploratory research because it produces actual words of participants in the study and provides multiple perspectives on the issue being studied. By adopting a qualitative research design, we can gain complex and rich details from individuals directly dealing with the smart city implementation. This is crucial because existing literature provides little knowledge about the implementation of the inclusive smart city concept in Malaysia. The study utilizes thematic analysis in analysing and interpreting relevant data. The thematic analysis offers an approach to interpreting, discovering, and reporting clusters and patterns of meaning related to the smart city concept. The **Figure 3** below identifies the respondents for the interview.

**Figure 3: Profile of the Respondents**

<b>Respondent</b>	<b>Position</b>	<b>Department/ Agency</b>
1	Head of Section Administrative & Diplomatic Officer	Economic Planning Division, Pahang State Secretary Office
2	Head of Section Information Technology Officer	Information Technology Division, Pahang State Secretary Office
3	Head of Section Administrative & Diplomatic Officer	Local Authority Division, Penang State Secretary Office
4	Head of Section Information Technology Officer	Information Technology Department, Kuantan City Council
5	Head of Section Administrative & Diplomatic Officer	Local Authority Division, Pahang State Secretary Office
6	Deputy Director Town Planning Officer	Pahang PLANMalaysia Department
7	Mayor Administrative & Diplomatic Officer	Temerloh Municipal Council (MPT)
8	Deputy Director	Pahang Malaysians Communication & Multimedia Commission (MCMC)
9	Pahang Police Chief	Pahang Royal Malaysia Police (RMP)
10	Head of Unit Town Planning Officer	Development Planning Division, PLANMalaysia, KPKT
11	Pensioner, Former Director	Pahang PLANMalaysia Department

On the same note, these are the methods used for information gathering to support the findings which Online Interviews, Online Observations, Online Document Analysis. Another method is interview session based on guidelines by Salmon (2010).

The interview sessions were conducted from October 2021 to March 2022. The interview duration was between 30-45 minutes, and the respondents were notified of the objective of study prior to the interview. Structured

interviews consist of the several different questions to all participants. Semi-structured interviews balance the pre-planned questions of a structured approach with the spontaneity and flexibility of the unstructured interview. The researcher prepares discussion topics in advance and generates follow-up questions during interview. Unstructured interviews are used to collect data through a conversation between the researcher and participant.

Based on the information collected during the interviews, it was found that the state government implemented seven (7) components of MSCF directly or indirectly towards the creation of a smart city. The results of the study have been listed into four main themes. Figure 4 portrays the main themes, sub-themes, and additional indicator of the initiatives being explored.

**Figure 4: Kuantan Smart City Framework**

<b>THEMES</b>	<b>SUB-THEMES</b>	<b>INDICATOR</b>
<b>Governance</b>	1. Policy direction	Malaysia Smart City Framework and Pahang Digital Plan 2021-2025
	2. Budgetary Allocation	Federal Government RMK-12 State Government Budget
	3. Involvement and Engagement with Multiple Parties	Establish directives via administrative circular
<b>Smart City Components</b>	1. Smart Living	
	2. Smart Economic	
	3. Smart Environment	
	4. Smart People	
	5. Smart Government	
	6. Smart Mobility	
	7. Smart Digital Infrastructure	
<b>Smart City Initiatives</b>	<b>Smart Living</b>	
	1. Improve quality of life	Smart Water Meter Smart Recreational Facilities
	2. Safety and Security	Command Center

THEMES	SUB-THEMES	INDICATOR
		Safe City
		Sensor Systems
	<b>Smart Economic</b>	
	3. Promote economic growth	Digital Payment
		Smart Tourism
	<b>Smart People</b>	
	4. Data Driven Community	Education
		Innovation
	<b>Smart Environment</b>	
	5. Develop sustainable and safe environment	State Government Agendas
	- SDGs 2030 Agenda	Green Technology
		Solid Waste Management
	<b>Smart Government</b>	
	6. Digital transformation	E-government
		Open data and data sharing practices
		Enhancing Personal Data Protection and Cyber Security
	<b>Smart Mobility</b>	
	7. Efficient urban management practices	Smart city applications for citizen
		Smart traffic light
	<b>Smart Digital Infrastructure</b>	
	8. Provisioning best internet connectivity as foundation	Fiberized connectivity
		4G / 5G for wireless access
<b>Issue and Challenge</b>	1. Budgetary Allocation	
	2. Coordination of Information	
	3. Citizen Engagement in Planning Process	

## **4. FINDINGS AND DISCUSSIONS**

This section discusses the analysis of results from the interviews and reports the summary of critical findings according to the research questions. This research aims to identify improvements that can be made to Kuantan City based on digital technology to benefit the community. Among the problems identified experienced by the stakeholders and committee are difficulties in coordinating information due to the lack of communication by letter or email from various departments and agencies. Other issues identified are parking problems in limited areas, road congestion, unpredictable natural disaster, water disruption, solid waste management, and increasing crime rate such as house-breaking in residential, commercial, and relatively remote areas. There are four major themes obtained from the interviews. They include governance, smart city concept, implementation, and challenges.

### **4.1 Governance**

Almost all respondents highlighted the critical aspect of governance in creating a smart city. The four (4) issues highlighted are policy direction, budgetary, involvement of departments and agencies, and data integration.

#### *4.1.1 Policy Direction*

From the interview, Respondent 4 mentioned that Kuantan Smart City had been declared during the proclamation of Kuantan City. For the time being, the smart city initially has been implemented by MBK but in a certain concept such as for safety purposes through the installation of CCTV, lighting, and smart parking. However, the coverage of the smart city is still limited.

Meanwhile, based on the input from Respondents 1 and 2, they explained that the State of Pahang will be implementing the Pahang State Digital Plan 2021-2025. Through this plan, there is a stated progressive administration through digital government transformation. The digital plan has outlined various initiatives, and targeted outcomes for the benefit of the people, industry players, businesses, and the government. The implementation of the Pahang Digital Plan focuses on the value of well-being that will benefit all levels of society. Local Authority Division, Pahang State Secretary Office,

will facilitate any project involving smart city elements, smart infrastructure, property development based on green technology, smart community application, digitalization government sector.

Based on the input, it is understood that smart city implementation will become a government priority in the future, and it is a part of the Pahang Digital Plan. The truth is developing a smart city needs clear government policies such as the one MSCF produced.

#### *4.1.2 Budgetary Allocation*

Additionally, Respondent 5 mentioned that they had tabled the budgeting requisition for developing a smart city in the 12th Malaysia Rolling Plan to the Economic Planning Unit, Prime Minister Department, Putrajaya. However, Respondent 4 said that this initial allocation might not be enough if the state government wants to embark on smart city initiatives for the whole state. Respondents 4 and 5 mentioned that MBK had requested an allocation from the Federal Government through KPKT. Currently, MBK is using department allocation to implement specific smart city initiatives.

Therefore, prior to smart city implementation, the state government needs to plan the budgetary allocation. For instance, Penang state allocates about a hundred million for the smart city. The state government must have a special budget allocation every year to ensure the project is sustainable. Financing might be from various sources such as private partnerships, cost-saving, and self-funding projects. The state government has to be more innovative in finding sources of funds.

#### *4.1.3 Involvement and Engagement with Multiple Parties*

According to Respondent 4, currently, only a few departments have been involved in the implementation of smart city initiatives, such as the Royal Malaysia Police (RMP), because it is related to the security information available in the command center. Meanwhile, MBK has collaborated with Pahang State Subsidiaries in terms of parking implementation.

The success of this initiative is highly dependent on the integration and cooperation between the people, industry, and the government. By engaging a broad community of innovators, the input obtained will cover all aspects and

interests of various parties.

## **4.2 Smart City Components**

The second theme is regarding the concept that needs to be focused on in developing a smart city. The state government has identified these smart city elements, which are: Smart Living, Smart Economic, Smart Environment, Smart People, Smart Government, Smart Digital Infrastructure, and Smart Mobility, that have a high impact on citizen sustainability. These elements are better described below:

- 1) Smart Living - involving innovative solutions to make life more efficient, more controllable, economical, integrated, and sustainable.
- 2) Smart Environment - concerning the control and monitoring of environmental factors such as pollution, waste, green areas, and energy
- 3) Smart Economy - an economy that is based on technological innovation, resource efficiency, sustainability, and high social welfare as engines for success. It adopts new entrepreneurial initiatives.
- 4) Smart people - support the creation of an accessible and inclusive environment to increase prosperity and innovation in a city.
- 5) Smart Government - the management of business processes related to government and administration with the help of intelligently networked information and communication technologies (ICT).
- 6) Smart Digital Infrastructure - providing digital infrastructure, connectivity, and networks.
- 7) Smart Mobility - focuses on developing traffic systems and intelligent and diverse transportation options that are efficiently connected and environmentally friendly.

Respondents 1, 2, 4, and 5 recommended the importance of improving quality of life, promoting economic growth, developing a sustainable and safe environment, and encouraging efficient urban management practices to be prioritized. Respondent 2 highlighted that since Pahang is a large state, the state government can propose any initiatives that will be implemented based on a theme depending on the basic requirement at the place.

### 4.3 Implementation of Smart City Initiatives

The third theme is regarding the proposal to implement smart city initiatives in Kuantan. Based on the earlier finding, components of a smart city focus on improving quality of life, economic growth, sustainability, and safe environment plus the efficiency of urban management practices.

#### 4.3.1 *Improve Quality of Life*

Smart living concept is known for its inclusiveness of improved quality of life. While a smart city generally is about our way of living, we know definitely that the concept will be focused on safety and security, low carbon lifestyle, housing quality, educational quality, health conditions, tourist/recreational attractiveness, time, and cost of living.

i) Smart Water Meter

One of the examples of smart water technologies that Johor Bharu City Council has proposed is a Smart Water Meter that can be linked to a mobile phone via an interactive application.

ii) Smart Recreational Facilities

In order to encourage the community to practice a healthy life, local authorities should consider embedding smart services into recreational elements mainly in terms of surveillance, usage timing, facility bookings, integration with smart applications for a personalized experience, and esports. As such recreational centers, playgrounds, and running tracks are essential for providing the city residents with a high-quality and healthy life, especially in light of the increasing cases of lifestyle diseases. One example of persuasive technology encouraging people to be more active is the Move More App for smartphones deployed in Sheffield, UK.

#### 4.3.2 *Safety and Security*

Safety and security challenges are the most pressing issues in contemporary society. Because of that, safety has become the main concern that is recently being significantly discussed as it is affecting the quality of life of people living in the area (Anuar et al., 2011). While the number of crimes keeps

increasing, it will contribute to the anxiety feelings among the community and tourists (Anuar et al., 2011). This clearly indicates that the increase in crime rates will affect the safety of the citizen. Hence, security has become one of the critical measurements in quantifying the quality of life.

i) Command Center

Referring to Respondent 4, a command center is located at Kuantan City Council building. This command center room is operating 24 hours to monitor the CCTV installed within the smart city area, which are is the town area, and a few nearby locations. These areas are installed with CCTV, and the stream is syndicated to the command center. The Kuantan City Council has also cooperated with the police to maintain the security of the city. For example, in the event of an accident and crime, the police will request CCTV footage from the Kuantan City Council for further action. However, Respondent 4 mentioned that existing CCTVs would not be enough to cater to the whole city since Kuantan is such a vast area with high population.

ii) Safe City

Referring to Maroš Lacinák and Jozef Ristvej (2017), a safe city can be defined as a city with very minimum crime and terror threats that enable its citizens to live in a healthy environment and simple access to healthcare. A safe city system should include as such features: healthcare, smart traffic systems and routes, smart safety systems for surveillance, search, detection and identification, smart systems of crisis management to support decision making, early warning, monitoring and forecasting emergencies and environmental situation, centrally operated units of police and Integrated Rescue System (IRS), safe internet connection and data protection, centers of data processing, and others.

According to Respondent 7, Temerloh Municipal Council (MPT) has implemented a safe city for quite some time. For example, they have a standard system that links their command center to the police department, and the system is running 24 hours, monitored by both departments. This system was established by KPKT and

provided all the info regarding security and safety purposes. Besides, they have installed 22 CCTV in the town area at the strategic places. Additionally, to ensure they can maintain the spirit of a safe city, District Police Chief is appointed as a member of the Council Full Board Meeting. An Index of crime rates will be presented during the meeting. MPT also has created a pedestrian pathway with a soft barrier to minimize the risk of any possible accident involving commuting vehicles. They even have a traffic light equipped with a sensor to reduce road congestion for the time being.

Based on Respondent 9, there is Integrated Command Center in RMP. Crime monitoring through live CCTV in RMP departments in Malaysia, Command Center at Bukit Aman, Contingent Command Center at headquarters in Kuantan, and also in all districts. Live videos from CCTV can be very useful in the surveillance of criminal activities, including vandalism. With additional analytic capability at the backend, the image recognition function will enable cameras monitor and detect any abnormal movements actively. Additionally, sound sensors can be installed to detect distress sounds such as shouts or screams by civilians in emergencies. The center operator will then check on the situation through video footage and dispatch emergency response personnel to the location for immediate assistance. Furthermore, Respondent 9 also explained that the authority could consider the smart city to come with smart routes. It is worth for authority to consider safety measure as the following: -

- 1) Isolation of Pedestrian Walkways with Motorized Roads -  
Identify several public areas such as bus and rail stations to isolate pedestrians from motor routes.
- 2) Provision of Bollard or Fence -  
Provide bollards or fences to separate pedestrian paths from motorcycle paths in more places.
- 3) Cleaning / Tidying Checked and Protected Areas -  
Take special attention to risky areas such as bus station routes, railways, and back lanes of buildings with interesting graffiti.
- 4) Making Roads Safe and Cleared Off the Obstructing Elements -

The bridges that are not covered with billboards can protect the route from public view. Any advertisement on the flyover must be at a level that does not obstruct visibility, such as at roof level.

5) To Reduce Risky Blind Spot Areas -

Install lights on bridges, car parks, tunnels, etc., to facilitate surveillance. All business premises should install lights on the footpath so that it is easy to monitor.

iii) Sensor systems

Meanwhile, in managing the natural disaster, the smart city-based planning of eco-friendly technologies is a collaboration involving various agencies, for example, through integration, information dissemination, and environmental space interactions within the city. Smart cities as a whole can enhance the mitigation of natural disasters that can help in situations where policymakers in planning methods can propose cooperative and effective technologies. Hence, we may concur on the importance of a safe city to the administrator in a period of crisis such as below:

- 1) Creation database of dangerous materials, databases of available sources, personnel, and possible threats;
- 2) Acting as an early warning, and alert system;
- 3) Better decision making and Search & Rescue (SAR) operations coordination;
- 4) Fast and reliable exchange of information during the emergency time, generally by having the data be stored in the cloud.

#### 4.3.3 *Promote economic growth*

The city should be well versed with its economic catalyst and work closely towards enlightening entrepreneurship, investments, tourism, human resource, natural resource, and innovation. A dedicated innovation center, eCommerce, and business center facilitate a smart city economy.

i) Digital payment

According to Respondent 3 from Penang, they have a partnership with a financial provider to ensure the success of the project. One example is that the state government had launched the cashless initiative pilot

project in public markets. With the existence of 55 public markets in Penang, the state government has collaborated with 17 banking institutions and non-bank e-money issuers to help the public markets migrate to e-payment since 2020. Now they have the support from 1,507 merchants in public markets who have adopted e-payment.

ii) Smart Tourism

Tourism is beneficial to cities impacting directly to the city economy, employment, and business opportunities. Currently, in Kuantan City, there is a need for a mobile smart application featuring tourism and attraction discovery, or how to get to the attraction spots. This smart application is a must for Kuantan City as an effort to promote it as a competitive tourism smart city.

#### 4.3.4 *Data Driven Community*

The Smart People dimension in a smart city is an innovation, and the use of new technologies aims to improve knowledge management, access to education, and social capital. It focuses on creating a digital society and skills which emphasized to the availability society against technological change, continuous skills ready workforce, increase skilled workforce through STEM, TVET, and industry collaboration, and encouraging innovation and creation. These are important scopes that administrators should consider in establishing smart people:

- i) Enhancement of Science, Technology, Engineering, and Mathematic fields among the students. Providing technology training at education and community level can produce talent, creativity and innovation.
- ii) The public and private sectors in Pahang should support and participate in any organized innovation programs such as competitions and exhibitions.
- iii) The Administrator should take the initiative to improve public involvement and participation in making policies and planning.

#### 4.3.5 *Develop a sustainable and safe environment*

Globally, The United Nations (UN) has set the Sustainable Development Goals (SDGs) as the New Urban Agenda until 2030. Based on this SDG's agenda, smart cities ideally should deliver a cleaner and more sustainable environment.

##### i) State Government Way Forwards

For the time being, according to Respondent 1, the Pahang State Government way forward in implementing the SDGs agenda. Initially, the Pahang State Economic Planning Department will coordinate a discussion with the all Head of Departments. Meanwhile, MBK had targeted 10 percent carbon reduction by 2020 and Kuantan as a low carbon city with a benchmark from 2019. MBK will expand its implementation, moving forward 45 percent after this.

##### ii) Green Technology

Apart from that, Universiti Malaysia Pahang (UMP) is also actively conducting programs based on the SDGs. The purpose of the programs is to educate the community about the importance of tree planting, care and conservation techniques of lake water quality levels, and provide exposure on to the importance of maintaining health with healthy lifestyle practices and a love of the green environment. The green areas that are new attractions at UMP include the solar technology endowment hut in Rimba Lestari, which is able to can provide facilities for visitors to obtain energy sources.

##### iii) Solid Waste Management (SWM)

SWM often becomes the priority in managing a city since it concerns with the comfort of city dwellers. The phenomenon of inefficient and ineffective SWM phenomenon is not a new in Malaysia's urban areas. Pahang State should consider in developing of Decision Support System (DSS) Information System. Currently, there is no DSS or any other information database that has been developed designed for the waste management system in LG. Successful waste management in any given country depends on reliable information about quantities, types, and the amount of material that can be captured and support

decision-makers to make an informed decision in the future (Badgie et al., 2012).

#### 4.3.6 *Digital Transformation*

There's no smart city without a smart government. An ideal smart city is one that practices accountability, responsiveness, and transparency in its governance. Smart Competent government is one of the characteristics of smart cities, having its roots in e-government, in the principles of good governance, and in the assumptions of citizens' participation and involvement in public decision-making. E-municipality, social networks of city councils, GIS, smart justice, and other smart systems can drive smart competent government. Also, other technological solutions like Web portals, online forums, mobile apps, and unified services can help residents share their questions, suggestions, and grievances with the government.

##### i) E-government

Today, the concepts of e-government and smart city are increasingly used to refer to one another and have started to converge. A government that is disorganized in its management, too relaxed with regard to concerning outdated technologies, one that does not listen to its citizens or that ignores the ethical use of digital tools, can only build a dumb city. As a benchmark, we can refer to the report of *Governing Smart Cities: Policy Benchmarks for Ethical and Responsible Smart City Development* (World Forum Economy, 2021), which involves collaboration and participation of the G20 Global Smart Cities Alliance.

Referring to Respondent 2 and from observation, there are many services provided by government agencies in Pahang to the administrators itself and also to and citizen. Such as the use of digital receipt at of Pusat Zakat Pahang (PKZ Pahang), provision of Special Youth Fund to the COVID-19 affected citizen whereby the loan applicants can apply online. Furthermore, there are such other systems that have been developed in for the digitalization of to digitalize Pahang State's revenue collection on the local councils and the State GLCs including e-Lesen, e-Parking, e-Perumahan, e-Ticketing, e-

Payment and many more.

ii) Open Data and Open Government Practices (Data Sharing)

Referring to Respondent 1 and 4, there are many systems are developed in departments and agencies. However, there is no data sharing in terms of information to facilitate the implementation of state government governance. Most of them are stand-alone systems and is only used by the user without being able to access the information for the use of other parties. Based on input from Respondents 2,4 and website itself, it is found that the Pahang State Secretary Office (SUK), in collaboration with the departments and agencies have has identify data sets for the implementation of open data in each agency service. However only a few lists were uploaded on the open data open platform. There are still many more stand-alone systems, each with their its own data and not not made accessible to each other.

It is important to note that, in order to be considered ethical, the government of any given city must also ethically manage all the data it compiles, plus the technologies involved in the process.

iv) Enhancing Personal Data Protection and Cyber Security

Referring to Respondents 9 and 10, both of them agreed that government agencies should protect community data from any leakages. Nowadays, most of the people are saving their official documents through cloud applications for security and accessibility purposes. If the system itself is not safe, there is a possibility that an irresponsible party will take an advantage and misuse the data for their interest. It is important that the government to have has strong cyber security and take the initiative to ensure all the data are protected in on various platforms such as websites and database sharing platform.

4.3.7 *Encourage Efficient Urban Management Practices\*

i) Smart Applications

According to Respondent 3 from Penang State, that it is not an easy task to initiate all the ideas since a few of departments are reluctant to

support the Penang State agenda. However, they have set an engagement engaged with those departments and briefing to highlight the system that they have already developed. This helps the integration of integrate data using big data platforms from various sources and make it shareable among the departments.

On the same note of urban management practices, MBK collaborates with the state agency, PahangGo, for the parking management system. It is an excellent effort and solves common issues such as the need for legacy paper coupons and online compound payment.

ii) Smart Traffic Lights

Kuantan, however, can even be smarter should there is be a mechanism to avoid traffic congestion, for example, with the use of using a smart traffic light. Smart traffic lights, via its their digital sensors and smart analytic capability, would be able to allocate just enough or fair reasonable time delay for traffic rotation based on peak hours' priority. With smarter traffic management, we should be able to reduce waiting time and indirectly increase people's happiness, as well as reducing reduce the carbon footprint from idle vehicles at the junctions. The Respondent 9 has highlighted the importance of sensors in the smart city approach. Sensors on smart traffic lights can detect the existence of vehicles and movement. In some cases, surveillance cameras are also installed at traffic light poles to monitor traffic and congestion on roads.

#### *4.3.8 Provisioning Best Connectivity as Foundation*

Digital infrastructure is the physical foundation that are necessary to for the information technology capabilities of a nation, region, city, or organization, especially for any smart city. Elements of digital infrastructure are including including internet backbone, fixed broadband, mobile telecommunications, a communication satellite, network infrastructure, data centers, cloud computing, platforms, application, systems, APIs and integration, user device, and IoT.

Respondents 2 and 8 mentioned that Pahang State is also towards to upgrading its digital infrastructure. The enhancement of digital infrastructure will enable the state government to achieve success in smart city development. MCMC of Pahang is in progress to implement the JENDELA agenda ensuring all Pahang's citizens to be having access to quality digital connectivity through these targets of quick-win projects such as the construction of 512 new towers to improve quality in-building coverage (IBC), and to expand the coverage of mobile broadband services with 4G network in remote areas, upgrading 902 existing transmitter stations from 2G/3G to 4G network to expand the coverage and increase speed in rural settlements, traditional villages, cluster settlements, and rural roads, upgrading the copper-based network to fibre access to 118,260 premises to enable high-speed fixed broadband provisioning, and providing satellite wireless broadband internet service in 69 Orang Asli Villages.

#### **4.4 Issues and Challenges in Smart City**

Theme four is about challenges in smart city implementation. Although the smart city concept is still in the infancy stage in Pahang, the state is committed to transforming some of the urbanized cities into an inclusive cities, such as Temerloh.

##### *4.4.1 Budgetary Allocation*

According to Respondents 1 and 4, the state government currently have has discussed the matter to put into on the allocation of budgeting in RMK12, but it depends on the approval of Federal Government. Based on the Respondents 1 and 5, smart city implementation needs a sizeable amount of budget funding. For example, based on Penang and Sarawak, the cost incurred closed to a hundred million ringgits. 1st respondent and 4th respondent suggests that instead of Pahang State allocating the funding, might be the GLS also contributes the funding financing. The allocation from the state government is required if the authority want to expand the use of smart city areas.

##### *4.4.2 Coordination of Information*

Other than that, although the Pahang State Government administration has many government departments and agencies, there are difficulties in

coordinating information. and Many of them still using use manual methods, either by letter or email from various departments and agencies. The absence of a database for information collection makes it difficult for the government to make accurate and efficient decisions in for the interest of the people.

#### *4.4.3 Engagement with the Citizen in Smart City Planning*

As mentioned earlier, there is no proper study of an administrator to embark on the implementation of Smart City in Kuantan. Engagement sessions with the citizen should be organized to ensure the necessity of the people in Kuantan City is within expectations prior to the establishment of the Kuantan Smart City Blueprint. The engagement session could be applied through the town hall platform and also by making doing a random survey via distributing a questionnaire.

## **5. RECOMMENDATION FOR FUTURE STUDY**

Kuantan is now in the phase of implementing a smart city. Although the implementation is still in the early stages with the availability of several services such as smart traffic lights, e-parking, and smart safety, but it needs to be further expanded for the purpose of determining to determine what matters most to Kuantan City in term of digital transformation.

The Pahang State Government can make learning and bench-marking with other states such as Penang and Selangor that have been stable and sustainable in leading the implementation of smart cities in their states through their respective local authorities. Based on the interview with the top administrator in government agencies, research finding shows that financial and governance as authority are the main factors if state governments want to succeed in the implementation of this implementing the smart city. Limited financing can be resolved either through private partnerships.

Based on the researcher's observation, it was found that the direction and driving agenda by the government for the implementation of the smart city throughout the state of Pahang has entered the stage of applying for allocation with the Federal Government. The state government can more clearly

determine the direction of the framework for smart city development to be in line with the citizen-centric smart city. The Pahang State Digital Plan Agenda 2021-2025 can be used as one of the platforms to further improve the direction of the smart city in Pahang.

## **5.1 Governance**

Based on the general interview, we can conclude that there are three main loopholes that people, including governments, tend to fall into. One is that a lot of them many tend to be more tech-driven than outcome-driven. For example, in the case of autonomous vehicles and drones, we are not really being objective in what problems we are trying to solve. This results in a lot of many useless technologies being deployed that do not actually solve problems. Secondly is the lack of sustainable business models for smart city plans. Fancy plans need to be financially sustainable in the long run for someone to be able to maintain it. Thirdly is partnering with the wrong entities. Often In the implementation of smart cities, stakeholders often consult technology vendors without realizing where the technology makes sense and where it does not.

## **5.2 Smart City Components**

The state government will have to foster data-driven and data-proficient governance and build smart city infrastructure if it is to realize its vision of Pahang. In order to develop a digital transformation smart city, stakeholders must realize understand what actually are the necessity of the local community. It can be in terms of education, health care, or safety. Thus, the stakeholder must first define what people really need based on priority. The solution offered by the smart city should be able to address the related concerns in order to make its existence beneficial for the people.

## **5.3 The Implementation of Smart City Initiatives**

It is proposed for further study to implement a smart city in Kuantan. The state government should emphasize and make conduct comprehensive study research on the need to create a safe city because safety is a key factor to ensure

in ensuring resident's quality of living and well-being of local residents. There are four key goals of creating a safe city that can be used as a guide to realizing this Safe City Program can be implemented effectively, namely the following:

- 1) A city that is free from violence damages property and lives.
- 2) Cities that are free from destruction and disasters due to natural disasters such as floods and landslides.
- 3) A city that is free from social and moral decay.
- 4) A city that is free from indoor and outdoor accidents.

## **6. CONCLUSION**

Finally, the goal and objective in developing smart cities in Pahang and initially in Kuantan is are to ensure smart cities should enable us to achieve a better quality of life and solve people's problems. Smart city has a critical role in optimizing our use of resources resource use, this enables allowing us to reduce waste, enhance efficiency and mitigate climate change. Government can use more anticipatory or scenario-based approaches through technologies like remote sensing and big data analytics. governments can use more anticipatory or scenario-based approaches. Therefore, this study can support the national agenda in Kuantan in such a way that the development of smart cities in a planned, integrated, and holistic manner in this country. It is vital to ensure that Malaysia is at par with the global urban development trends for the sake of people, now and way forward.

Generally, we should remind us, ourselves that in all the fields, the development of technology must be followed by the education of citizens about their use. Even the most advanced Smart City fails to fulfil its purpose if the Smart Citizen and Education feature is missing. feature of Smart Citizen and Education will be missing. And that might become a task more challenging than one might anticipate.

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