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SMART CITY INITIATIVES IN ENHANCING THE QUALITY OF LIFE FOR URBAN POPULATION

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Abstract

Smart cities are widely accepted worldwide as an important component of the modernisation initiatives. The use of technology offering an alternative way to tackle complex and dynamic problems in urban studies. As urban areas progressively adopt intelligent and interconnected technologies, the rapid urbanisation and population expansion has adversely affected human health and their quality of life due to living in heightened densities area, worsened traffic congestion, and deteriorated pollution levels. Smart cities are not just about integrating technology into urban life. It also involves a comprehensive and holistic approach to city administration and planning authorities that includes multiple systems that lead to a good quality life. Therefore, the goal of this article is to explore the integration of smart city technologies as a strategic framework for enhancing quality of life of urban dwellers. The aim of this article is to increase the understanding of how smart cities may facilitate urban planning processes that grappling with a range of urbanization challenges with a focus on smart living and smart environment. A questionnaire survey was distributed to residents who work or live in the urban area. A total of 220 respondents living in Seremban City have participated in this study. The findings that have been identified are in line with the quality of life model which highlighted the relationship between the implementation of smart city technology and the well-being of the community. Hence, a collaboration between stakeholders and community involvement is vital to increase awareness and improve the quality of life of urban community in Seremban.

Keywords: Smart cities, quality of life, urban planning, smart living, smart environment

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INTRODUCTION

In the rapidly evolving landscape of urban development, smart cities have emerged as a pioneering model that integrates advanced technology, data analytics and innovative infrastructure to enhance the quality of life for urban populations. As cities become more interconnected and data driven, there is growing recognition of the potential for smart city interventions to shape and improve well-being. The term smart city is said to have first appeared in the middle of the 1990's and the core idea is to introduce smartness in every entity of the ecosystem that the people live in and interact (Shamsuzzoha et al., 2021).

LITERATURE REVIEW

Smart Cities

The concentration of housing in urban areas and the strong population growth imply that cities must adapt to improve the quality of life for their residents. Therefore, smart cities offer a viable solution by bringing together public resources, human capital, social capital and information and communication technologies (ICT) to promote sustainable development. The growing urbanisation has had a severe negative impact on the environment, this increasing the demand for sustainable development in urban planning. Smart cities are urban areas that use advance technologies and data driven strategies to enhance the quality of life for their residents, improve environmental sustainability and optimise the efficient of urban services and infrastructure. Different authors defined smart cities differently, where Batty et al., (2012) state that smart cities are instruments for improving competitiveness in such a way that community and quality of life are enhanced. Other than that, Chen & Chan (2023) defined smart city as a city that is integrated with high level of smartness, gained from the utilisation of available intelligent systems and services. These systems and services either improve or automate city functions, thereby generating jobs and increasing citizens' satisfaction. It is the automation of managing transportation, water energy, security and safety, traffic services, wastage, communications and other resources (Sharida et al., 2020). Therefore, it can be highlighted that smart cities are intelligent system that integrates different devices and hardware to enable automation.

Smart cities are increasingly important as they offer innovative solution to the challenges that is posed by rapid urbanisation and resource constraints. By leveraging advanced technologies such as Internet of Things (IoT), big data and artificial intelligence, it enables to enhance the efficient of urban services, reduce energy consumption and improve public safety. It plays an important role in economic growth in terms of production, resource efficiency, job opportunities, new investors and tourism (Sharida et al., 2020).

The framework of a smart city typically includes the integration of internet of things (IoT) devices, data analytics and digital platforms to monitor and manage urban systems. This interconnected network enables real time data collection and analysis, allowing city administrators to make informed decisions, reduce resource consumption and address challenges such as traffic congestion, pollution and emergency response more effectively. They are built upon a set of components that work together to enhance urban living through integration of technology, data and innovative solution. It includes smart digital infrastructure, smart government, smart environment, smart mobility, smart economy, smart people and smart living (Refer Figure 1).

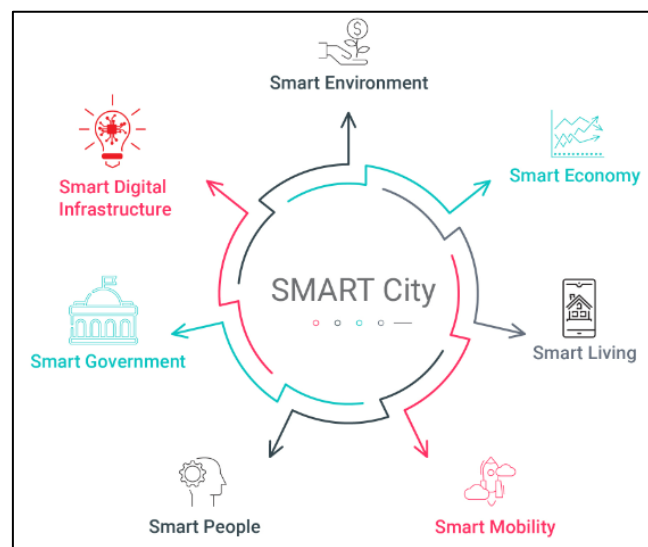


Figure 1. Smart City Components

Source: <https://smart.cidb.gov.my/article/future-of-smart-cities-444>

Smart City Components

In this article, smart city components have been selected to be used as a reference. These components were chosen based on a comprehensive review and summary of study from various scholars and researchers on smart city. The selection process focused on identifying the characteristics that have the most significant impact on the public and community in order to address the relevant aspects of urban living. Moreover, those components will be as a guide and indicators to conduct this study smoothly. The key components considered for this study will be smart living and smart environment as described below:

a) Smart living

Smart living refers to a lifestyle that incorporates technology and connected devices to improve the convenience, efficiency and overall quality of everyday life. It involves the use of smart technologies such as internet of things (IoT), automation and artificial intelligence (AI) to manage various aspects of daily activities. When focusing on smart living, citizens are the key users (Axelsson et al., 2024). According to a study conducted by (Sharida et al., 2020), safety and security is one of the main concerns in urban development, where violence, accidents, hazard will affect greatly on quality of life. Hence, by using smart devices such as automated systems, wearable health monitors and energy efficient appliances, individuals can streamline tasks, optimize their environment and improve the health and lifestyle.

As highlighted in the Executive Summary of Smart City Framework Malaysia (2018), smart living can be described as a component that focuses on high quality of life especially in residential areas and is closely related to healthcare services. This includes examples like smart devices integrated in the house, healthcare systems and eco-friendly infrastructure that boost safety, convenience and comfort to residents. Besides, researchers have emphasized how important cultural infrastructure, smart healthcare systems, and energy management are in creating a living environment that is both efficient and interconnected, helping to improve the overall quality of life in cities. By integrating advanced technology into homes, workplaces and public spaces, the smart living component may help to create a more sustainable and comfortable way of life in the cities as well as enhances the daily experience for residents while promoting long-term sustainability.

b) Smart environment

Environment plays an important major role in smart cities as in the strong population growth, many agreed that cities have high pollution and will affect the quality of life in cities (Sharida et al., 2020). The smart environment component refers on prioritizing the environmental sustainability of resource management which maximizes the use of natural resources as well as reduces the urban ecological footprint. It can also be concluded that this component integrates renewable energy, efficient waste management and having green area to promote to protect the environment. Plus, this component also plays a role in protecting the environment, keeping the environment clean, as well as adopting a green lifestyle and a low-carbon city. Hence, smart environment refers to a physical space that is equipped with advanced technologies and interconnected systems designed to monitor, manage and enhance various environmental aspects in real-time. These technologies such as sensors, internet of things (IoT) and data analytics, work together to monitor, manage and enhance various environmental

aspects in real-time. The goal of smart environment is to improve the sustainability, efficiency and livability of the space by optimizing resource usage, reducing waste and minimize environmental impact. The key features of smart environment include energy efficiency, water management, air quality monitoring, waste management, sustainable transportation and climate adaptation. Additionally, it helps cities toward more resilient to future challenges and may contributes in order to maintain a healthy urban ecosystem, creating a balanced environment that enhances the quality of life for residents.

Smart cities have the potential to significantly enhance the quality of life for their residents by leveraging technology and data driven solutions to address urban challenges. Accordingly, from this study, adaptation strategies and decision makers can make the right decisions and also minimise the impact of mental health by integrating technology in urban land dynamics domain to enhance peoples' quality of life.

Relation Between Smart City and Urban Planning

The concept of smart city in this era is increasingly relevant in the context of modern and advanced urban development. Smart cities play an important role in shaping future urban planning towards more efficient, sustainable and inclusive. According to Lim & Malek (2022), the development of smart cities in Malaysia focuses on a citizen-based approach where digital technology is used to improve the quality of life of residents and at the same time encourage active community participation in the planning process. The application of technology nowadays makes a city more responsive and advanced including to prevent the issues of urbanization. Moreover, integrating technology into urban planning benefits not only the community but also the city itself. These benefits include improvements in sustainable mobility and transportation where a transport system with smart technology can help to solve the traffic issues that often occur (Narain, 2024). In addition, environmental sustainability is also ensured with the support of smart city technology by increasing energy efficiency and helping to reduce carbon emissions into the air while being able to preserve the nature (Narain, 2024). Therefore, the smart city concept was created to introduce a certain extent in order to help solving mainly urbanisation issues with the latest technology.

Quality of Life

Quality of Life (QoL) refers to the overall well-being and satisfaction that individuals experience in their daily lives. In recent years, QOL has gained relevance in the fields of city planning and governance (Lim et al., 2020). According to World Health Organisation (2021), QOL is defined as an individual's perception of their position in life in their context of the culture and value systems in which they live and in relation to their goals, expectations,

standards and concerns. According to Centre on Quality of Life (2017), QoL can be distinguished into objective domain and subjective domain, where objective domain refers to income, education, healthcare, life expectancy, public security, employment, transportation and residence quality. On the other hand, subjective domain refers to life satisfaction, happiness and perceive QoL. Additionally, it also includes standard of living, achievements, safety and security. QoL encompasses a wide range of factors, including physical health, mental well-being, economic stability, access to education, safe living conditions and a clean environment. It is also influenced by social relationships, cultural opportunities and the availability leisure activities. In broader sense, it reflects how well a society meets the needs and aspiration of its people.

The impact of smart cities on quality of life is significant and multifaceted, that influences various aspects of urban living, including mental health of urban population. Smart cities leverage technology, data and digital infrastructures to improve efficiency, sustainability and liveability of urban environments. One of the positive impacts of smart cities in improving quality of life is through the improvement of health and wellbeing, in which the integration of technology into healthcare systems. Hence, QoL in the context of smart cities is directly related to government actions to encourage interaction between public and private entities, with the goal of promoting sustainable development (De Guimarães et al., 2020). Ultimately, smart cities significantly enhance the quality of life of urban population in establishing liveable and sustainable urban environment.

RESEARCH METHODOLOGY

A primary and secondary data was used to gain comprehensive insights on how smart cities may facilitate urban planning processes towards achieving a good quality of life on urban population. A case study of Seremban City was selected. Seremban City is central area that has various types of land use such as commercial, transport systems, green spaces, residential and more, which can make it easier for this study to be carried out (Table 1). Additionally, Seremban is also one of the areas that has already begun implementing smart city initiatives.

Table 1: Background of Study Area

Content	Description
Site Location	Seremban Town Centre
State	Negeri Sembilan
District	Seremban City
Mukim	Seremban
Planning Block	Planning Block 1 : Seremban City
Local Authorities	Seremban City Council (MBS)
Population of Negeri Sembilan	1,207,900 (Year 2022)

Content	Description
	Source: (Department of Statistics Malaysia, 2024)
Population of Seremban District	696,900 (Year 2022) Source: (Department of Statistics Malaysia, 2024)
Total Area of Seremban District	95,363.79 hectares
Total area of study area	2,324.09 hectares

Source: Malaysia Vision Valley Local Plan 2045

The primary data was collected through questionnaires distributed to residents who work or live in the city. A total of 220 respondents have participated in this study by providing the valuable insights on the awareness of smart city technology on urban living in Seremban. The determination of sample was based on Krejcie and Morgan, in which the confidence level used is 90% due to the needs of balance precision and resources like time and available population. The questionnaire survey was divided into four (4) sections which consist of respondents' demographics, the level of awareness of the respondents regarding the implementation of smart city in the Seremban city, relationship between age group and level awareness on smart city initiatives, the use of smart city service, and the components and strategies of smart city that will enhance the quality of life. For the secondary data, the study referred to the existing policies, articles, journals or reports related to smart cities, urban planning and study areas, such as Smart City Framework Malaysia and Seremban Smart and Low Carbon City Special Action Plan 2027 for deeper understanding on smart cities. Relevant documents assist to enriching the important information and data that can be extracted to provide insight into the relevant smart city components.

ANALYSIS AND DISCUSSION

The influence of smart cities initiatives on QoL was studied based on the conceptual framework (Figure 2). The QoL was affected by awareness of respondents and perceptions of urban dwellers on the quality of life as a result of using smart city technologies, particularly the smart living and smart environment initiatives.

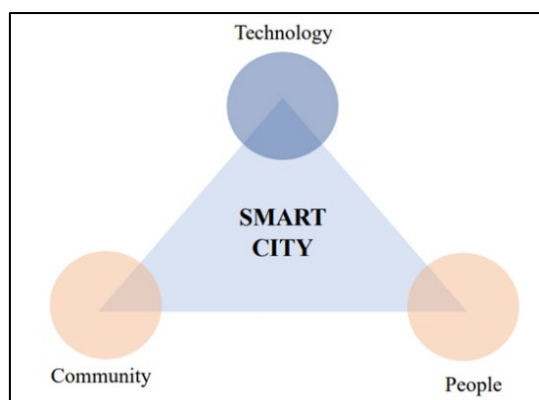


Figure 2. Smart City Elements

Source: Adapted from (Arroub et al., 2016)

The demographic profile is divided into three (3) sections, including age group, occupation and the period the respondents staying in Seremban (Table 2).

Table 2. Demographic Profile

Age Group	Frequency (F)	Percentage (%)
18 – 24 years old	85	38.6
25 – 34 years old	24	10.9
35 – 44 years old	64	29.1
45 – 54 years old	47	21.4
55 years old and above	0	0
TOTAL	220	100.0
Occupation	Frequency (F)	Percentage (%)
Student	77	35.0
Employed	88	40.0
Self-Employed	49	22.3
Unemployed	6	2.7
Retired	0	0
TOTAL	220	100.0
Period of Staying in Seremban	Frequency (F)	Percentage (%)
Less than 1 year	22	10.0
1 – 3 years	52	23.6
3 – 5 years	37	16.8
5 years and above	109	49.5
TOTAL	220	100.0

Table 2 shows that, out of a total of 220 respondents, the age group of 18-24 years old has dominated in answering this questionnaire with a total of 85 respondents (38.6%). Next, the second highest age group consists of the 35 – 44 years old group which represents 64 respondents (29.1%). The lowest age group is 55 years and above because there is no representative from that age group. This shows that the highest group answering this question is from the teenage group while the lowest group is from the old group. Furthermore, there are five (5) employment statuses in the demographic profile. The highest results are from respondents who are working, which is a total of 88 respondents (40.0%) while the lowest employment status is from the retired group. The retired group represents 0 respondents and shows that no respondent from a retired. While the second highest occupation is from the student which are represented by 77 respondents (35.0%). The result shows that the respondents who answered the question consisted of working people and a student.

Finally, for the demographic analysis is the period of staying in Seremban city. This is important as it will affect the level of respondents' exposure to smart city technology. The highest group is from a period of 5 years and above, with a total of 109 respondents (49.5%) while the lowest group is from the less than 1 year group, which represents a total of 22 people (10.0%). Furthermore, the second highest group is from 1 – 3 years old represented by 52 people (23.6%). Respondents who have been settled in Seremban for a long time can provide insight into the changes that have taken place since the start of the smart city implementation in the city of Seremban.

Level of awareness on Smart City Technology

This section identifies the factors influencing the level of respondents' awareness and understanding of smart cities as well as the information gap that exists among respondents.

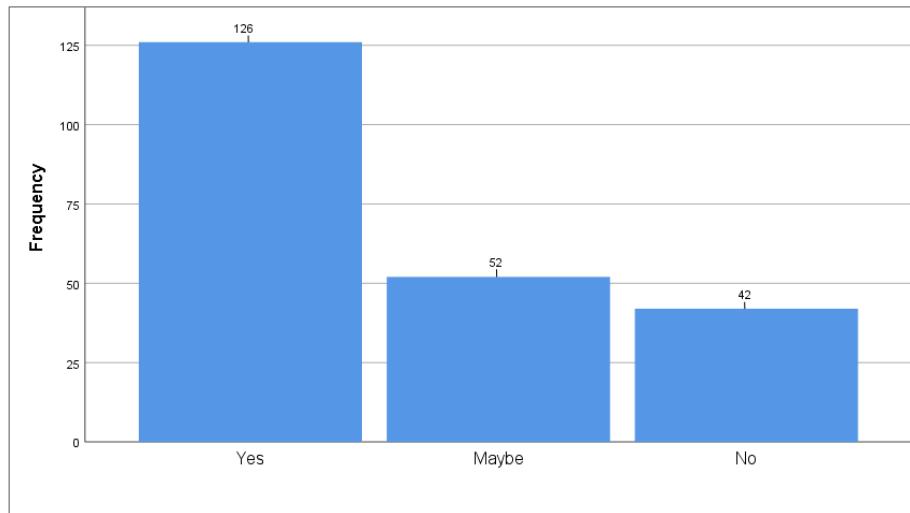


Figure 3. Frequency Level of Awareness on Smart City Technology

Figure 3 shows the level of awareness of the respondents regarding the implementation of smart city in the Seremban city. A total of 126 respondents (57.3%) are aware of the smart city implementation in Seremban city while a total of 42 respondents (19.1%) is not aware of the smart city implementation in Seremban city. The following are the highest and lowest numbers chosen by the respondents. The number of respondents who chose not to be aware is likely due to a lack of knowledge about smart cities. Moreover, the remaining number of respondents have chosen answers that show the respondents are not sure and have doubts about smart city knowledge. This is due to, 52 respondents (23.6%) are not confident and have a little knowledge regarding the smart city initiatives. This shows that there is a need to increase awareness and promotion of smart city initiatives to the public especially to those who are unaware or unsure about the smart city.

Perception of the Influence of Smart Environment on Quality of Life

Smart environment is one of the components of a smart city which combines advanced technologies such as sensors, IoT, environmental monitoring based on AI and green infrastructure, which has been shown in this study. For the context of urban living in Seremban city, smart environment aims to optimize waste management and promote sustainable energy use. With the implementation of smart city initiatives, the city can reduce its carbon footprint, even improve the quality of life of residents and will ensure environmental resilience in the long term.

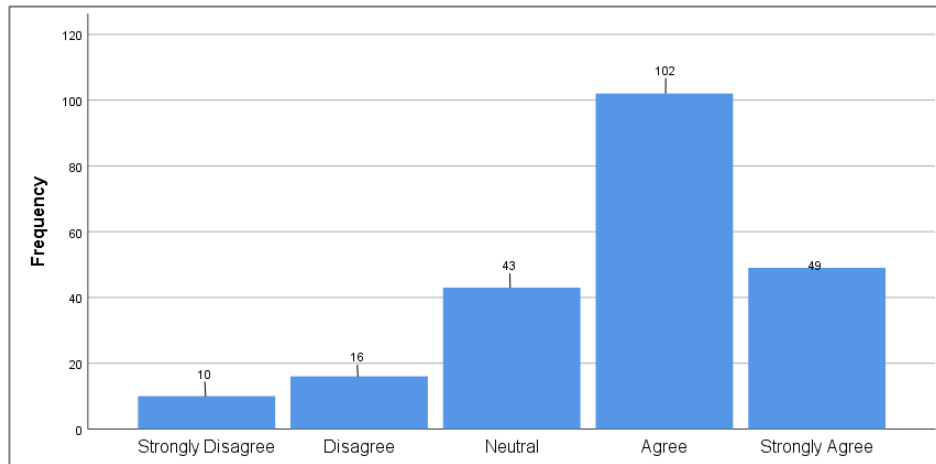


Figure 4. Frequency Perception on the Influence of Smart City Technologies on Quality of Life

Figure 4 shows the frequency of respondents' perceptions regarding the influence of smart city technology on quality of life in Seremban. Based on the results obtained from the respondents, a total of 49 respondents (17.8%) were reported strongly agreed that smart city technology will improve sustainability and environmental conditions in Seremban. In addition, 102 respondents (54.5%) who are the majority group also agreed that smart city technology will improve quality of life from the aspect of smart environment. This shows that the majority of respondents have a positive perception of the impact of smart environmental technology. According to a study by Arroub et al. (2016), the authors believes that environmental technology, especially smart environment such as waste management and renewable energy systems, can improve the sustainability of a city and help reduce negative impacts on the environment. This is similar to the positive opinions of the respondents regarding the smart city technology in Seremban.

Furthermore, there is also a group of respondents who disagree, with 16 respondents (7.3%) and 10 respondents (4.5%) strongly disagree, which shows a negative view on the impact of smart city technology from the smart environment aspect. In conclusion, the majority of respondents show a view that smart city technology in the smart environment has a positive impact and vice versa.

Perception on the Influence of Smart Living on Quality of Life

Smart living is one of the main components in the development of smart cities which includes various aspects of quality of life such as culture, health, safety, housing, tourism, and many more (Giffinger et al., 2007). In addition, it is not just introducing technology into daily life but also functions as changing the

environment of homes, neighborhoods, workplaces, energy systems and environmentally friendly transportation (Trincă, 2023).

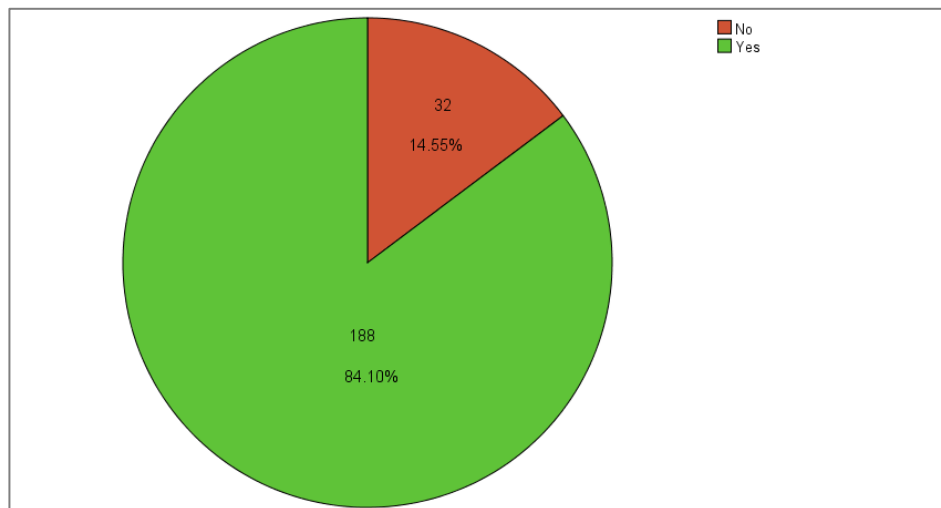


Figure 5. Frequency of Perception on the Needs of Smart Living initiatives

Based on the data findings, figure 5 above measures the level of acceptance of residents regarding the implementation of more smart living initiatives such as garbage separation systems, smart parking in Seremban and so on. The results of the data findings show that the majority of the respondents, namely 188 respondents (84.10%) support the implementation of more smart living initiatives in Seremban while 32 respondents (14.55%) disagree with the proposal. This result reflects that the majority of respondents see smart city technology as a positive step to improve the comfort and efficiency of urban life. To sum up, the findings that have been identified are in line with the quality of life model that shows the positive impacts of smart cities in improving quality of life of urban population through two main key components, smart living and smart environment.

CONCLUSION

The concept of smart city is increasingly relevant in the context of modern and advanced urban development. Smart cities play an important role in shaping future urban planning towards more efficient, sustainable and good quality of life in urban living. In summary for each smart components section, captured the awareness of respondents and perception that revealed the influence of using the smart city technologies towards achieving a good quality of life of urban dwellers in Seremban city. Thus far, the analysis concludes that the majority of

respondents demonstrates awareness and usage of smart city services in Seremban by showing that more than half of them use these services regularly. Whereas, based on the document analysis, the most significant components of smart city that can enhance quality of life is smart living and smart environment.

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REFERENCES

- Arroub, A., Zahi, B., Sabir, E., & Sadik, M. (2016). A Literature Review on Smart Cities: Paradigms, Opportunities and Open Problems.
- Batty et al., (2012) Michael Batty, Centre for Advanced Spatial Analysis, University College London, Gower Street, London
- Chen, Z., & Chan, I. C. C. (2023). Smart cities and quality of life: A quantitative analysis of citizens' support for smart city development. *Information Technology & People*, 36(1), 263–285.
- Department of Statistics Malaysia (2024). Retrieved from <https://newss.statistics.gov.my/newss-portalx/ep/epFreeDownloadContentSearch.seam?cid=842341>
- Ministry of Housing and Local Government (2018). *Malaysia Smart City Framework (MSCF)*. Kuala Lumpur. Federal Department of Town and Country Planning
- Giffinger, R., Wien, T., Fertner, C., Kalasek, R., & Milanović, N. (2007). *Smart cities - Ranking of European medium-sized cities*.
- Julio Cesar Ferro De Guimarães, Eliana Andréa Severo, Luiz Antonio Felix Júnior, Wênkyka Preston Leite Batista Da Costa, Fernanda Tasso Salmoria
- Governance and quality of life in smart cities: Towards sustainable development goals, *Journal of Cleaner Production*, Volume 253
- Karin Axelsson, Ulf Melin, Malin Granath (2024)> Exploring services in a smart city through socio-technical design principles: Revealing five tensions in a smart living context, *Government Information Quarterly*, Volume 41, Issue 1
- Lim, S. B., Malek, J. A., Hussain, M. Y., & Tahir, Z. (2020). Participation in e-government services and smart city programs: A case study of Malaysian local authority. *Planning Malaysia*, 18.
- Lim, S. B., Malek, J. A. (2022). *Pembangunan Bandar Pintar Berpusatkan Rakyat di Malaysia (Citizen-Centric Smart City Development in Malaysia)*. Bangi, Malaysia: Penerbit UKM
- Majlis Bandaraya Seremban, P. B. (2021). *Rancangan Tempatan Malaysia Vision Valley 2045* (P. B. dan Majlis Perbandaran Port Dickson, Ed.).

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- <https://www.mbs.gov.my/sites/default/files/content-mvv/RTMVV-2045-JILID1-WARTA.pdf>
- Narain, S. (2024). Integrating Smart City Technologies for Enhanced Urban Sustainability. *Journal of Sustainable Solutions*, 1(3), 13–17.
<https://doi.org/10.36676/j.sust.sol.v1.i3.15>
- Seremban City Council (2023). *Seremban Smart and Low Carbon City Framework*. Negeri Sembilan. Seremban City Council (MBS)
- Shamsuzzoha A., Juha Nieminen, Sujan Piya, Kendall Rutledge (2021). Smart city for sustainable environment: A comparison of participatory strategies from Helsinki, Singapore and London, *Cities*, Volume 114.
- Sharida, A., Hamdan, A., AL-Hashimi, M. (2020). Smart Cities: The Next Urban Evolution in Delivering a Better Quality of Life. In: Hassanien, A., Bhatnagar, R., Khalifa, N., Taha, M. (eds) *Toward Social Internet of Things (SIoT): Enabling Technologies, Architectures and Applications*. *Studies in Computational Intelligence*, vol 846. Springer, Cham.
- Trincă, V.-T. (2023). The Key Components of a Smart City. *Annales Universitatis Apulensis Series Oeconomica*, 25(2).
<https://doi.org/10.29302/oeconomica.2023.25.1.8>
- World Health Organisation (2021). WHOQOL - Measuring Quality of Life | The World Health Organization

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