

Acceptance of the Smart City Standard by Local Authority: A case study of Majlis Bandaraya Diraja Klang, Selangor, Malaysia

Daimatul Syuhudiyah Aziz¹, Seng Boon Lim^{1*}, Ridwan Sutriadi²

**Corresponding Author*

¹Department of Built Environment Studies and Technology, College of Built Environment, Universiti Teknologi Mara Perak Branch, Malaysia

²Department of Regional and City Planning, School of Architecture, Planning, and Policy Development, Institut Teknologi Bandung, Indonesia

2023325915@student.uitm.edu.my, lim@uitm.edu.my, readone@itb.ac.id
Tel: +605-374 2000

Abstract

While most of the national smart city frameworks outline the urban challenges, local authorities are struggling to translate the top-down plan and align the smart city action plan with ISO 37122 indicators, including the case of Majlis Bandaraya Diraja Klang (MBDK), Malaysia. This paper evaluates MBDK's smart city status and acceptance of ISO standards. The quantitative survey findings indicate a positive perception of smart city standards, with unanimous agreement on the importance of ISO Smart City Standards. This research contributed to one of the pioneer studies evaluating the acceptance of ISO indicators in smart city development in Malaysia and beyond.

Keywords: ISO Indicator, Smart City Action Plan, Smart City Standard Acceptance, Stakeholder Collaboration

eISSN: 2398-4287 © 2024. The Authors. Published for AMER and cE-Bs by e-International Publishing House, Ltd., UK. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>). Peer-review under responsibility of AMER (Association of Malaysian Environment-Behaviour Researchers) and cE-Bs (Centre for Environment-Behaviour Studies), College of Built Environment, Universiti Teknologi MARA, Malaysia.
DOI:

1.0 Introduction

Many countries in the developed and developing world are executing smart urbanism to achieve a sustainable urban future. Ensuring the smart city action plan's compliance with the national smart city blueprints and (ISO) international standards is crucial for dispelling scepticism and ensuring comprehensive implementation. Malaysia introduced its national smart city framework in 2019, with local implementation planned for 2022–2023. The Smart City Framework Malaysia (MSCF), developed by the Malaysian Administrative Modernisation and Management Planning Unit (2021), provides guidance for local authorities, governments, businesses, academics, and other stakeholders in planning and developing smart cities. The MSCF emphasizes the importance of smart cities in Malaysia, aiming to achieve national and international goals while addressing urban challenges such as inefficient service delivery, pollution, and traffic congestion (Department for International Trade, 2021). It also ensures Malaysia remains aligned with global urban development trends.

Malaysian smart city initiatives focus on improving livability, fostering economic growth, ensuring safety, and promoting effective urban management. The main goals are a competitive economy, a sustainable environment, and an enhanced quality of life. The MSCF includes seven key components: Smart Economy, Smart Living, Smart Environment, Smart People, Smart Government, Smart Mobility,

eISSN: 2398-4287 © 2024. The Authors. Published for AMER and cE-Bs by e-International Publishing House, Ltd., UK. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>). Peer-review under responsibility of AMER (Association of Malaysian Environment-Behaviour Researchers), and cE-Bs (Centre for Environment-Behaviour Studies), College of Built Environment, Universiti Teknologi MARA, Malaysia.
DOI:

and Smart Digital Infrastructure. Several cities, including Ipoh, Putrajaya, Penang, Iskandar, Melaka, and Selangor, have begun implementing the MSCF blueprint. Furthermore, MS ISO 37122 was launched in 2021. According to KPKT and PlanMalaysia, these standards should be considered when drafting smart city action plans at the local level.

While Malaysia's national Smart City Framework outlines the urban challenges, local authorities are struggling to translate the top-down plan and align the smart city action plan with MS ISO 37122 indicators, including the case of Majlis Bandaraya Diraja Klang (MBDK) is undetermined, leading to uncertainties. This paper aims to evaluate MBDK's smart city implementation status, analyzes ISO standards acceptance, and proposes adoption strategies.

2.0 Literature Review

2.1 Indicator of MS ISO 37122: Measuring progress with 85 Indicators across 19 Categories

PLANMalaysia (Federal Department of Town and Country Planning Malaysia) 's adoption of the MS ISO 37122 Smart City Standard includes indicators in categories such as economy, governance, environment, living, mobility, and people. These indicators, tailored by PLANMalaysia, provide a framework for evaluating economic growth, transparency, environmental sustainability, quality of life, transportation infrastructure, and social inclusion. They serve as essential metrics for tracking the performance and progress of smart city projects in Malaysia, enabling effective monitoring and data-driven decisions for sustainable and inclusive urban development. According to Md Farabi Yusoff (2022), the MS ISO 37122:2019 Standard Smart City Indicators benchmark Malaysia's smart city efforts against global standards. Malaysia has approved these indicators as "identical adoption," with a 'National Annex' adapting them to local needs (Md Farabi Yusoff, 2022).

Moreover, the MS ISO 37122 standard for smart cities offers indicators to assess cities' performance and progress in their journey toward smart and sustainable development. However, access to the specific list of indicators within MS ISO 37122 is currently unavailable. As highlighted by Md Farabi Yusoff (2022), a comprehensive framework is crucial for evaluating and monitoring cities' success in transitioning to smart cities, encompassing 85 indicators across 19 categories (Figure 1). These indicators, carefully designed within the categories, measure various aspects of urban development and sustainability, allowing cities to assess their performance, identify improvement areas, and track progress. The adoption of such a standardized framework enables comparability and benchmarking among cities, fostering the exchange of best practices and promoting sustainable smart city development globally.

85 INDIKATOR INDIKATOR BANDAR PINTAR				
5 Indikator Baharu di dalam National Annex				
ECN Economy (4)	EV Environment & Climate Change (3)	SR *Sports & Recreation (1)	TR Transportation (14)	UP Urban Planning (4)
1. Open Data on City Services	18. Newly Built / Refurbished Green Building Principles	36. * Online Booking for Public Recreation and Sports Facilities	56. Real-time Online Traffic Alert and Information	73. Citizen Engaged in Planning Process
2. New Businesses	19. Real Time - Air Quality Station	SF Safety (1)	57. Sharing Economy Transportation	74. * Construction Permits Through e-Submission
3. ICT Labour Force	20. * Indoor Air Quality System (Public and Private Building)	37. Digital Surveillance Camera	58. Low-Emission Vehicle	75. * Construction Permit Approval
4. Education & R&D Labour Force	FNC Finance (2)	38. * Volunteer Smartphone Patrol	59. * Micro Mobility-Sharing Services	76. City Population by Density
ED Education (3)	21. Revenues - Sharing Economy	39. * High Risk Building-fire Certificate	60. Transport Lines with Real-Time System	WW Wastewater (5)
5. Proficiency In > 1 Language	22. E-Payment	40. * Response Time - Fire & Rescue	61. Public Transport with Unified Payment System	77. Treated Wastewater being Reused
6. Digital Learning Devices	GV Governance (4)	41. Crime Index Threshold Value	62. Parking Spaces with e-Payment Systems	78. Bio-Solids being Reused
7. * Higher Education Degrees	23. Online Open Data	SW Solid Waste (7*)	63. Parking Spaces with Real-Time Availability Systems	79. Energy Derived from Wastewater
EGY Energy (10)	24. City Services Requested Online	42. Waste Drop-off (telemetering)	64. Intelligent /Smart Traffic Lights	80. Wastewater reused to Generate Energy
8. * Electrical Energy Produced from Wastewater/Solid Waste /Liquid Waste/ Waste Heat	25. * Non-Emergency Response Time	43. Door-to-door Garbage Collection	65. Real-time Interactive Street Maps	81. Real-Time Wastewater Pipeline Network
9. Electrical & Thermal Energy Produced from Wastewater	26. IT Infra Downtime	44. * Waste Vehicles with System	66. Registered Autonomous Vehicles	W Water (4)
10. Energy from Solid Waste/Liquid Waste Treatment	H Health (3)	45. Waste to Energy	67. Public Transport Routes with Internet Connectivity	82. Real-Time Drinking Water Quality Monitoring
11. * Electricity from Distributed Generation Production System	27. Online Unified Health File	46. Plastic Waste Recycled	68. Autonomous Driving Systems	83. * Real-Time Environmental Water Quality Monitoring
12. Storage Capacity Energy Grid	28. * Medical Appointment Conducted Remotely	47. Sensor-Enabled Public Bins	69. Motor Driven City's Bus Fleet	84. Water Distribution with Smart Water System
13. * Smart Street Light with Performance System	29. * Real Time Alert System for Air & Water Quality	48. Recycled E-Waste	70. Budget on Urban Agriculture Initiatives	85. Buildings with Smart Water Meter
14. Refurbished / Newly Installed Street Lighting	HS Housing (2)	CUL *Culture (4)	71. Food Waste being Composed	
15. Refurbished / Renovated Public Building	30. * Smart Energy Meter	49. Online Booking for Cultural Facilities	72. Online Food-Supplier Coverage	
16. * Smart Energy Meter (Accounts)	31. * Smart Water Meter	50. Digitised Cultural Record		
17. EV Charging Station	32. Building Accessible Special Needs	51. E-Books		
	POP Population & Social (4)	52. Active Library User		
	33. Budget for Special Need	TEL Telecommunication (3)		
	34. Pedestrian Crossing with Signals	53. Fast Broadband		
	35. Budget for Bridging Digital Divide	54. White/Dead Zone on Telecom Connectivity		
		55. Internet Connectivity Coverage		

Fig. 1. MS ISO 37122 - 85 Indicators across 19 Categories
(Source: Ministry of Housing and Local Government (2023))

The Ministry of Housing and Local Government explains that the ISO 37122:2019 standard covers diverse smart city indicators in various categories (Figure 2). For Smart Government, it includes non-emergency response time, online city services, citizen engagement in planning, and e-submission for building permits. Smart Living indicators encompass indoor air quality, sensor-equipped garbage bins, smart energy meters, river water quality monitoring, green buildings, and electronic waste recycling. In the Smart Mobility - Transportation category, there are indicators like sharing economy transportation, real-time transport lines, e-payment for parking, intelligent traffic lights, low-emission vehicles, and micro-mobility-sharing services. The Smart Economy category includes open data city services, new businesses, ICT labour force, education, R&D, sharing economy, and e-payment. Smart Digital Infrastructure - Telecommunication indicators cover high-speed broadband, internet coverage, and addressing connectivity gaps. Lastly, the Smart

People category focuses on indicators such as digital learning devices, STEM higher education degrees, and proficiency in other languages. These indicators offer a comprehensive assessment of a city's progress in becoming a smart city, facilitating a holistic evaluation and enabling targeted improvements to achieve smart city goals.

SMART ECONOMY	SMART DIGITAL INFRASTRUCTURE	SMART MOBILITY	SMART PEOPLE	SMART ENVIRONMENT			SMART LIVING		SMART GOVERNMENT
Economy (4)	Telecommunication (3)	Transportation (14)	Education (3)	Energy (10)	Environment & Climate Change (3)	Solid Waste (4)	Health (3)	Sport & Culture (4)	Governance (4)
1. Open Data City Services	48. Fast Broadband	51. Online Traffic Alert and Information	5. Proficiency in Other Language	8. Electrical & Thermal Energy Mix Produced from Wastewater	18. Newly Built / Refurbished Green Building	38. Waste Drop-Off Centres with Telemetering	27. Online Unified Health File	44. Online Booking for Cultural Facilities	23. Online Open Data
2. New Businesses	49. White/Dead Zone on Telecommunication Connectivity	52. Sharing Economy Transportation	6. Digital Learning Devices	9. Electrical & Thermal Energy Produced from Wastewater	19. Real Time (Air Quality Station)	39. Door-to-Door Garbage Collection with Monitoring	28. Medical Appointment Conducted Remotely	45. Digitised Cultural Record	24. City Services Requested Online
3. ICT Labour Force	50. Internet Connectivity Coverage	53. Low-Emission Vehicle	7. Higher Education Degrees	10. Energy from Solid Waste/Liquid Waste Treatment	20. Indoor Air Quality System	40. Waste to Energy	29. Real Time Alert System for Air & Water Quality	46. E-Books	25. Non-Emergency Response Time
4. Education & R&D Labour Force		54. Micro Mobility-Sharing Services		11. Electricity from Decentralized Production System	Urban / Local Agriculture & Food Security (3)	41. Plastic Waste Recycled	30. Smart Energy Meter	47. Active Library User	26. IT Infra Downtime
Finance (2)		55. Transport Lines with Real-Time System		12. Storage Capacity Energy Grid	65. Budget on Urban Agriculture Initiatives	42. Sensor-Enabled Public Garbage Bins	31. Smart Water Meter		Urban Planning (4)
21. Sharing Economy as Own-Source Revenue		56. Unified Payment System		13. Street Light (Performance System)	66. Food Waste being Composed	43. Recycled E-Waste	32. Building Accessible for Person with Special Needs		68. Citizen Engaged in Planning Process
22. E-Payment		57. Parking Spaces with e-Payment Systems		14. Refurbished / Newly Installed Street Lighting	67. Online Food-Supplier Coverage	44. Wastewater (5)	33. Budget for Citizen with Special Need		69. Building Permits Through e-Submission
		58. Parking Spaces with Real-Time Availability Systems		15. Refurbished / Renovated Public Building	Water (4)	72. Treated Wastewater being Reused	34. Pedestrian Crossing with Signals		70. Building Permit Approval
		59. Intelligent /Smart Traffic Lights		16. Smart Energy Meter	77. Real-Time Water Supply	73. Bio-Solids being Reused	35. Budget for Bridging Digital Divide		71. City Population by Density
		60. Real-Time Interactive Street Maps		17. EV Charging Station	78. Real-Time Water Quality Monitoring	74. Energy Derived from Wastewater	Recreation (1)		
		61. Autonomous Vehicles			79. Water Distribution with Smart Water System	75. Wastewater reused to Generate Energy	36. Online Booking for Public Recreation		
		62. Public Transport Routes with Internet Connectivity			80. Buildings with Smart Water Meter	76. Real-Time Wastewater Pipeline Network	Safety (1)		
		63. Autonomous Driving Systems					37. Digital Surveillance Camera		
		64. Motor Driven City's Bus Fleet							
6	3	14	3	31			15		8

Fig. 2. Alignment of the ISO 37122 City Indicator according to the seven domains of a smart city (Source: Ministry of Housing and Local Government (2023))

2.2 Klang smart city

Klang, located in Selangor, Malaysia, is progressing towards becoming a smart city, aiming to enhance the quality of life for its residents and promote sustainability through technology and data integration. According to the official portal of the Majlis Bandaraya Diraja Klang (MBDK), the city endeavours to establish a connected and efficient urban environment by incorporating digital technologies into various facets of city life. This initiative aligns with the implementation of the MS ISO 37122:2019 indicator, reflecting Klang's commitment to leveraging innovation for a more sustainable and inclusive urban future (Table 1). These efforts underscore Klang's dedication to creating a vibrant and forward-thinking city for its residents.

Table 1. Seven domains of implementing smart city in Majlis Bandaraya Diraja Klang (MBDK)

Domains	Functions	Aspect / Focus
Smart Government	Enhancing governance and public service delivery through digital technologies and data-driven decision-making.	<ul style="list-style-type: none"> Digitizing government services. Promoting transparency. Citizen engagement. Efficient administrative processes.
Smart Economy	Promoting economic growth, innovation, and entrepreneurship through integrating digital technologies into business processes.	<ul style="list-style-type: none"> Supporting digital industries. Fostering startups. Facilitating e-commerce. Enhancing international trade and investment.
Smart Community	Empowering and engaging the community through technology-enabled platforms for participation, collaboration, and access to information.	<ul style="list-style-type: none"> Citizen engagement. Digital inclusion. Promoting social cohesion. Providing platforms for community collaboration and communication.
Smart Mobility	Improving transportation systems, reducing traffic congestion, and enhancing the efficiency and sustainability of mobility.	<ul style="list-style-type: none"> Intelligent traffic management. Integrated public transportation. Smart parking solutions. Promoting active transportation and alternative mobility options.
Smart Living	Enhancing the quality of life for residents through the adoption of smart technologies in various aspects of daily living.	<ul style="list-style-type: none"> Smart homes. Energy-efficient buildings. Digital healthcare services. Smart safety and security systems. Promoting a healthy and connected lifestyle.
Smart Environment	Promoting sustainability, environmental conservation, and efficient use of	<ul style="list-style-type: none"> Smart waste management.

	resources through the application of smart technologies.	<ul style="list-style-type: none"> Monitoring and reducing environmental impacts. Promoting renewable energy. Encouraging eco-friendly practices.
Smart Digital Infrastructure	Establishing a robust digital infrastructure to support and enable various smart city initiatives and services.	<ul style="list-style-type: none"> High-speed internet connectivity. Data centers. IoT infrastructure, cybersecurity measures. Data management systems.

(Source: *Majlis Bandaraya Diraja Klang (MBDK) (2023)*)

In Klang Smart City, ongoing initiatives are working towards transforming the city into a more connected, sustainable, and technologically advanced urban environment, such as smart traffic management, digital government services, green initiatives and sustainability, digital infrastructure development, and smart community engagement. Additionally, Klang strongly emphasises improving digital skills among residents, recognizing the importance of preparing individuals for the demands of the digital economy. These efforts align with Klang's goal of creating a smarter, more livable, and inclusive city for its residents, as highlighted by Rajendra in 2023. While specific projects may vary, the overarching objective of Klang's smart city transformation remains consistent: to build a city that meets the needs of its citizens, enhances their quality of life, and ensures a sustainable and technologically advanced future (Rajendra, 2023).

3.0 Methodology

The study used quantitative survey questionnaires. By incorporating appropriate question structures and thoughtful guidance, the questionnaire served as a reliable tool to gather accurate and meaningful data, contributing to the overall success of the research project. This research included two types of questions, close-ended and open-ended, in the questionnaire. The assessment of respondent experience and opinion on the standards of a smart city in Klang primarily relies on open-ended questions utilizing a 5-point Likert scale. The questionnaire is thoughtfully divided into four main sections (Table 2).

Table 2. Section in questionnaire

Section A Respondent's Demography	Gender, age, marital status, race, and other relevant details.
Section B The perception of Smart City Implementation in Relation to Smart City Standard in Klang	Delves into perceptions of the Smart City in Klang, e.g., Draft of Klang Smart City Action Plan 2030 relate to MS ISO 37122 – Indicators for Smart Cities.
Section C The acceptance of Smart City Standard	Respondent's experience in knowing more about implementing smart city standards in Klang.
Section D Respondent Suggestion	Respondent's suggestion for improvement in smart city development in Klang.

(Source: *authors*)

In this case, the questionnaire distribution occurred at MBDK from June to July 2023. The research collected 120 respondents, comprising MBDK officers, consulting officers, and members of the public through stratified random sampling in the Planning Department, one-stop center, and MBDK's main lobby. This sample size of 120 participants was deemed acceptable and reliable, providing a 95% confidence level with a 10% margin of error, ensuring a representative data collection process.

4.0 Findings

4.1 Respondent's demography

In this study, 120 respondents were sampled from various categories within MBDK. According to Table 3, gender distribution was evenly split, with 50% identifying as male and 50% as female. The age distribution showed that most respondents were in the 18-24 age group (38%), followed by 25-34 (40%). Participants aged 35-44 comprised 20%, while those aged 45-54 were 0.8%. Marital status revealed that 50% were single, 49.2% were married, and none were divorced. Regarding race, the majority were Malay at 49.2%, Indian at 20.8%, and Chinese at 30%.

Table 3. Respondent's demography

	Item	Frequency	Percent (%)
Gender	Male	60	50.0
	Female	60	50.0
Total		120	100
Ages	18 – 24 years old	46	38.0
	25 – 34 years old	48	40.0
	35 – 44 years old	25	20.0
	45 - 54 years old	1	0.8
	55 – 64 years old	0	0
	> 65 years old	0	0
Total		120	100
Marital status	Single	61	50.8
	Married	59	49.2
	Divorced	0	0
Total		120	100
Race	Malay	59	49.2
	Indian	25	20.8
	Chinese	36	30.0
Total		120	100
Employment	Government	47	39.2
	Private	53	44.2
	Self-employed	20	16.7
Total		120	100
Position	Supervisor	11	9.2
	Officer	52	43.3
	Assistance technical	57	47.5
Total		120	100
Sector	Education	18	15.0
	Urban planning	102	85.0
Total		120	100
Origin	Local (inside MBDK)	48	40.0
	Inside Selangor	63	52.5
	Outside Selangor	9	7.5
Total		120	100

(Source: authors)

4.2 The acceptance of smart city standard in Klang

The data highlights respondents' views on smart city initiatives in Klang. According to their feedback, implementing MS ISO 37122 - Indicators for Smart Cities is expected to significantly enhance various smart city initiatives (Table 4). The highest mean rating of 4.08 was for Smart Government initiatives, indicating that respondents believe these standards will greatly improve governance and public services in Klang. Smart Mobility initiatives also received a high mean rating of 4.05, suggesting perceived significant benefits in transportation and connectivity. Other areas, including Smart Living, Smart Environment, Smart Digital Infrastructure, and Smart Community, had mean ratings between 3.88 and 4.03, reflecting positive expectations for improvements in healthcare, waste management, environmental sustainability, digital infrastructure, and community development.

Table 4. Respondents' acceptance of MS ISO 37122 in smart city initiatives in Klang

Item	Scale					Mean	Sd.	Total
	1	2	3	4	5			
Smart Government initiatives	0 (0%)	0 (0%)	25 (20.8%)	60 (50.0%)	35 (29.2%)	4.08	0.705	120 (100%)
Smart Economy initiatives	0 (0%)	0 (0%)	36 (30.0%)	61 (50.8%)	23 (19.2%)	3.89	0.696	120 (100%)
Smart Community initiatives	0 (0%)	0 (0%)	33 (27.5%)	60 (50.0%)	27 (22.5%)	3.95	0.708	120 (100%)
Smart Mobility initiatives (i.e., Transportation)	0 (0%)	0 (0%)	28 (23.3%)	58 (48.3%)	34 (28.3%)	4.05	0.720	120 (100%)
Smart Living initiatives (i.e., Healthcare, Waste Management)	0 (0%)	0 (0%)	28 (23.3%)	60 (50.0%)	32 (26.7%)	4.03	0.709	120 (100%)
Smart Environment initiatives	0 (0%)	0 (0%)	38 (31.7%)	59 (49.2%)	23 (19.2%)	3.88	0.705	120 (100%)
Smart Digital Infrastructure initiatives	0 (0%)	0 (0%)	33 (27.5%)	61 (50.8%)	26 (21.7%)	3.94	0.702	120 (100%)

Notes: (1) Strongly Disagree (2) Disagree (3) Either Agree or Disagree (4) Agree (5) Strongly Agree. (Source: authors)

Respondents in Klang showed strong agreement on the potential of smart city standards to enhance sustainability and reduce environmental impact, with a mean rating of 4.05 (Table 5). They also recognized the importance of collaboration among government, businesses, and citizens for effective implementation, reflected by a mean rating of 4.08. These results underscore the respondents'

appreciation for collective efforts in achieving smart city goals. Overall, there was moderate acceptance of implementing smart city standards in Klang, with a mean rating of 3.91, indicating a generally positive attitude. The low standard deviations suggest a consistent level of agreement among respondents on each statement.

Table 5. Respondents' acceptance of sustainability, collaboration and implementation of MS ISO 37122 smart city initiatives in Klang

Item	Scale					Mean	Sd.	Total
	1	2	3	4	5			
To enhance sustainability and reduce environmental impact.	0 (0%)	0 (0%)	25 (20.8%)	64 (53.3%)	31 (25.8%)	4.05	0.684	120 (100%)
A successful smart city requires collaboration between the government, businesses, and citizens.	0 (0%)	0 (0%)	25 (20.8%)	61 (50.8%)	34 (28.3%)	4.08	0.700	120 (100%)
The implementation of smart city standards in my city.	0 (0%)	0 (0%)	34 (28.3%)	63 (52.5%)	23 (19.2%)	3.91	0.686	120 (100%)

Notes: (1) Strongly Disagree (2) Disagree (3) Either Agree or Disagree (4) Agree (5) Strongly Agree. (Source: authors)

5.0 Discussion

This research aimed to identify the acceptance of smart city standards by MBDK, Selangor, and to propose improvement strategies. The objectives were to understand the status of smart city implementation, analyze the acceptance of smart city standards, and suggest strategies for enhancement. Data analysis offered valuable insights into respondents' perceptions and experiences with smart city standards in Klang. Findings showed unanimous agreement on the need for a smart city in Klang and the significance of ISO Smart City Standards for MBDK. However, opinions varied on whether Klang is currently perceived as a smart city, with most respondents agreeing but a few dissenting.

Regarding the Draft of Klang Smart City Action Plan 2030 and MS ISO 37122 standards, most respondents acknowledged a correlation, suggesting alignment between the action plan and ISO standards. However, some respondents did not perceive or were unaware of this relationship. The data also revealed that while most respondents rated the potential benefits of smart city standards highly, indicating a positive outlook, a smaller group expressed a neutral rating, reflecting uncertainty. The main challenges in adopting MS ISO 37122 standards in the Draft of Klang Smart City Action Plan 2030 included high implementation costs, privacy and security concerns, lack of public awareness, and resistance to change from traditional systems. These challenges underscore financial implications, data privacy and security risks, the need for education and communication, and overcoming resistance from established systems.

Respondents identified smart government and mobility as the domains that would benefit most from smart city standards in Klang. While smart economy, smart environment, smart living, and smart digital infrastructure were also recognized as important, they were slightly less prioritized. Experiences with smart city initiatives in Klang showed that implementing MS ISO 37122 standards is expected to significantly impact various initiatives. Smart government initiatives received the highest mean rating, closely followed by smart mobility. Other areas like smart living, smart environment, smart digital infrastructure, and smart community also received positive ratings, indicating potential improvements in healthcare, waste management, environmental sustainability, digital infrastructure, and community development.

Respondents strongly agreed that smart city standards could enhance sustainability, reduce environmental impact, and require collaboration among government, businesses, and citizens. This understanding reflects the importance of collective efforts in achieving smart city goals. While there is general acceptance and a positive perception of smart city standards in Klang, challenges such as costs, privacy, and resistance need to be addressed. Strategies for improvement include targeted communication, education, demonstrating cost-effectiveness, ensuring data privacy and security, and promoting stakeholder collaboration. Despite its importance, the smart environment has yet to receive specific development proposals.

5.0 Conclusion

In conclusion, the research on the acceptance of smart city standards in MBDK offers valuable insights into the perceptions, challenges, and benefits of implementing smart city initiatives. The findings reveal a general acceptance and positive perception of smart city standards among participants and an understanding of the importance of ISO Smart City Standards. However, challenges such as implementation costs, privacy, security concerns, lack of public awareness, and resistance to change were identified. Embracing smart city standards will position the city as a model for technological innovation, environmental sustainability, and citizen-centric services. Successful implementation will require ongoing commitment, collaboration, and adaptability to meet residents' and stakeholders' evolving needs and expectations. This research provides a foundation for informed decision-making, policy development, and practical interventions in implementing smart city standards. By embracing smart city standards, MBDK can create a sustainable, technologically advanced, and livable city for its residents and future generations.

Acknowledgement

The authors thank the National University of Singapore for funding this research through the 100-TNCPI/INT 16/6/2 (053/2023) grant and the Universiti Teknologi MARA and Institut Teknologi Bandung for supporting the research.

Paper Contribution to Related Field of Study

This research contributed to one of the pioneer studies in evaluating the acceptance of ISO indicators in smart city development in Malaysia, and it serves as a valuable resource for decision-makers and practitioners in smart city implementation locally and beyond.

References

- Department of Standards Malaysia. (2021). Sustainable cities and communities Indicators for smart cities (ISO 37122:2019, IDT). Malaysia: Standards Malaysia in 2021.
- Md Farabi Yusoff , M. (2022). Standard Indikator Bandar Pintar (MS ISO 37122:2019). Retrieved 7 June 2023 from <https://jkt.kpkt.gov.my/sites/default/files/2022-02/NO.3%20STANDARD%20INDIKATOR%20BANDAR%20PINTAR.pdf>
- Ministry of Housing and Local Government. (2018). Malaysia Smart City Framework. Malaysia: Ministry of Housing and Local Government.
- Ministry of Housing and Local Government. (2022). Standard Indikator Bandar Pintar MS ISO 37122:2019. Malaysia: Ministry of Housing and Local Government.
- MyGov - The Government of Malaysia's Official Portal. (2021). Malaysia Smart City Framework (MSCF). Retrieved 6 June 2023 from [malaysia.gov.my: https://www.malaysia.gov.my/portal/content/30947](https://www.malaysia.gov.my/portal/content/30947)
- Official Portal Majlis Bandaraya Diraja Klang (MBDK). (2022) What is Smart City? Retrieved 24 May 2023 from [mpklang.gov.my: https://www.mpklang.gov.my/en/node/5504](https://www.mpklang.gov.my/en/node/5504)
- Official Portal Majlis Bandaraya Diraja Klang (MBDK). (2023). Call For Industrial Partners in Smart City. Retrieved 6 June 2023 from [mpklang.gov.my: https://www.mpklang.gov.my/sites/default/files/07022023_pelan_tindakan_bandar_pintar_majlis_perbandaran_klang_tahun_2030.pdf](https://www.mpklang.gov.my/sites/default/files/07022023_pelan_tindakan_bandar_pintar_majlis_perbandaran_klang_tahun_2030.pdf)
- Official Portal Majlis Bandaraya Diraja Klang (MBDK). (2023). Smart Heritage City. Retrieved 12 June 2023 from [mpklang.gov.my: https://www.mpklang.gov.my/en/node/5863](https://www.mpklang.gov.my/en/node/5863)
- Rajendra, E. (2023). Fourth time's the charm for Klang. Retrieved 24 May 2023 from [thestar.com.my: https://www.thestar.com.my/metro/metro-news/2023/02/18/fourth-times-the-charm-for-klang](https://www.thestar.com.my/metro/metro-news/2023/02/18/fourth-times-the-charm-for-klang)
- The Malaysian Administrative Modernisation and Management Planning Unit. (2021). Malaysia Smart City Framework (MSCF). Retrieved 9 June 2023 from [malaysia.gov.my: https://www.malaysia.gov.my/portal/content/30947](https://www.malaysia.gov.my/portal/content/30947)

Note: Online license transfer

All authors are required to complete the E-B Proceedings exclusive license transfer agreement before the article can be published. This transfer agreement enables e-IPH, Ltd., UK to protect the copyrighted material for the authors, but does not relinquish the authors' proprietary rights. The copyright transfer covers the exclusive rights to reproduce and distribute the article, including reprints, photographic reproductions, microfilm or any other reproductions of similar nature and translations. Authors are responsible for obtaining from the copyright holder, the permission to reproduce any figures for which copyright exists.