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Harnessing technology and data for sustainable urban mobility in Malaysia

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Authors:
Nigham Shahid (GSMA Mobile for Development)

Contributors:
Carol Koh (Foreign, Commonwealth and Development Office)
Charis Yeap (Foreign, Commonwealth and Development Office)
Daniele Tricarico (GSMA Mobile for Development)
Sone Osakwe (GSMA Mobile for Development)
Clara Aranda (GSMA Mobile for Development)
Mojca Cargo (GSMA AI for Impact)
George Kibala Bauer (GSMA Mobile for Development)
Hilary Kemp (GSMA)
Michele Palladino (IfM)
Chandran Govindaraju (C&G Analytica)
Naesh Sarpaneswaran (C&G Analytica)

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Pusat Bandaraya
Pandan Indah
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Glossary of terms

Active transport mode	Active transport modes refer to walking, cycling and other physical modes of travel.
Artificial intelligence	Artificial Intelligence (AI) refers to the use of data to make decisions or perform tasks normally considered to require human knowledge, intelligence, learning and understanding. Such tasks include visual perception, speech recognition and decision-making.
Big data	Big data is a combination of structured, semi-structured and unstructured data collected by organisations that can be mined for information and used in machine learning projects, predictive modelling and other advanced analytics applications.
Blockchain	System for recording and sharing encrypted data across multiple data stores.
Call detail record	Every time a call is placed on a telecommunications network, descriptive information about the call is saved as a call detail record (CDR). Deidentified and aggregated, CDR data can give reliable information about population movement patterns in an area.
Cloud computing	Using a network of remote servers hosted on the internet to store, manage and process data.
Digital tools	Electronic tools, systems, devices and resources that generate, store or process data.
Digitalisation	Enabling or improving processes by leveraging digital technologies and digitised data.
Frontier technology	Frontier technologies are defined as potentially disruptive technologies that can address large-scale challenges or opportunities. Frontier technologies include AI, big data, blockchain, the Internet of Things (IoT), augmented reality, virtual reality, drones and robotics.
GPS data	The Global Positioning System (GPS) is a navigation system using satellites, a receiver and algorithms to synchronise location, velocity and time data for air, sea and land travel. GPS data can be used for preparing accurate surveys and maps, taking precise time measurements, tracking position or location and for navigation.

Integrated transport system	An integrated transport system (ITS) encompasses a city's territory and enables public transit users to use multiple modes of transport that work in coordination.
Internet of Things (IoT)	The Internet of Things (IoT) refers to networks of physical objects (devices, vehicles, buildings, equipment, etc.) connected to the internet.
Interoperability	Enables unrestricted data sharing and use between different systems. In an interoperable system, two or more systems can share and exchange data so that it is understood by all systems involved.
Modal share	The percentage of travellers using a particular type of transport.
Multimodal transport	The use of several modes of transport to get to a destination, including cars, trains, bikes, walking, scooters, etc.
Open data	Open data is openly accessible, exploitable, editable and shareable by anyone for any purpose.
Shared mobility	A transport system in which travellers share a vehicle either simultaneously as a group or over time as a personal rental.
Smart city	A smart city uses information and communication technology (ICT) to improve operational efficiency, share information with the public and provide better quality government services and citizen welfare.
Smart mobility	Involves optimising transport for sustainability, accessibility, efficiency, safety and decarbonisation using frontier technologies.

Executive summary

Rapid urbanisation in Malaysia is putting significant pressure on urban mobility. According to the World Bank, 78 per cent of Malaysia's population lived in cities at the end of 2021.[1] This rapid urbanisation has put a strain on the country's urban mobility system, which is characterised by heavy use of private transport.

In Kuala Lumpur, Malaysia's capital and biggest city, private cars account for 80 per cent of transport, with similar rates in other major cities. Reliance on private cars has led to congestion[2] and poor road safety, with 24 fatalities per 100,000 population from road accidents compared to 10.7 in Korea and 19.7 in Indonesia.[3] High use of private cars has also had environmental impacts, with transport being the second leading cause of greenhouse gas (GHG) emissions in the country. The expense of private car ownership has placed a disproportionate burden on low-income groups.[4] In addition, 23 per cent of Malaysia's total urban area is prone to flooding, and flash floods have had devastating impacts on road infrastructure and traffic.

The government is committed to moving towards more sustainable urban mobility. Malaysia's National Transport Policy (2019–2030) lays out the government's commitment to more sustainable urban mobility by improving and promoting public transport, optimising traffic flow in cities, supporting green mobility solutions and providing infrastructure to enable active and healthier modes of travel.[5] The National Energy Policy 2022-2040 (NEP), released in September 2022, sets a target for 38 per cent electric vehicles by 2040, up from less than 1 per cent currently and a target of 50 per cent for urban public transport modal share, to lower carbon emissions.[6]

Digital and frontier technologies are making data-driven, integrated urban mobility planning possible. Digital and frontier technologies are disrupting urban mobility by enabling data-driven policymaking, which promotes sustainable mobility via integrated public transport systems, advanced traveller information systems and intelligent transport management.[7] These systems primarily use the Internet of Things (IoT), artificial intelligence (AI) and big data analytics to generate and/or process data from a variety of public and private data sources to support evidence-based urban planning. Governments around the world are forming public-private data-sharing partnerships to deploy big data analytics effectively and make transport systems more sustainable.

A more enabling environment for data use and data sharing would facilitate evidence-based mobility planning in Malaysia. Several open data and data-sharing initiatives have been launched to improve urban mobility in Malaysia, but data sharing for urban planning has proceeded slowly due to the challenges of coordination, regulatory barriers, and a lack of interoperability, shared data standards and digital literacy.

To accelerate data sharing for urban mobility planning, several policy actions could be undertaken, including:

- Greater interagency coordination for transport governance among federal agencies and between federal, state and local governments;
- Updating public and private sector regulations on data sharing;
- Formulating and/or operationalising data-sharing frameworks to build confidence in data sharing, creating a data-sharing culture and guiding data-sharing partnerships;
- Taking a proactive approach to building public-private partnerships for urban mobility data;
- Establishing data standards for different modes of transport and open APIs for data sharing; and
- Investing in digital upskilling in the public and private sectors.

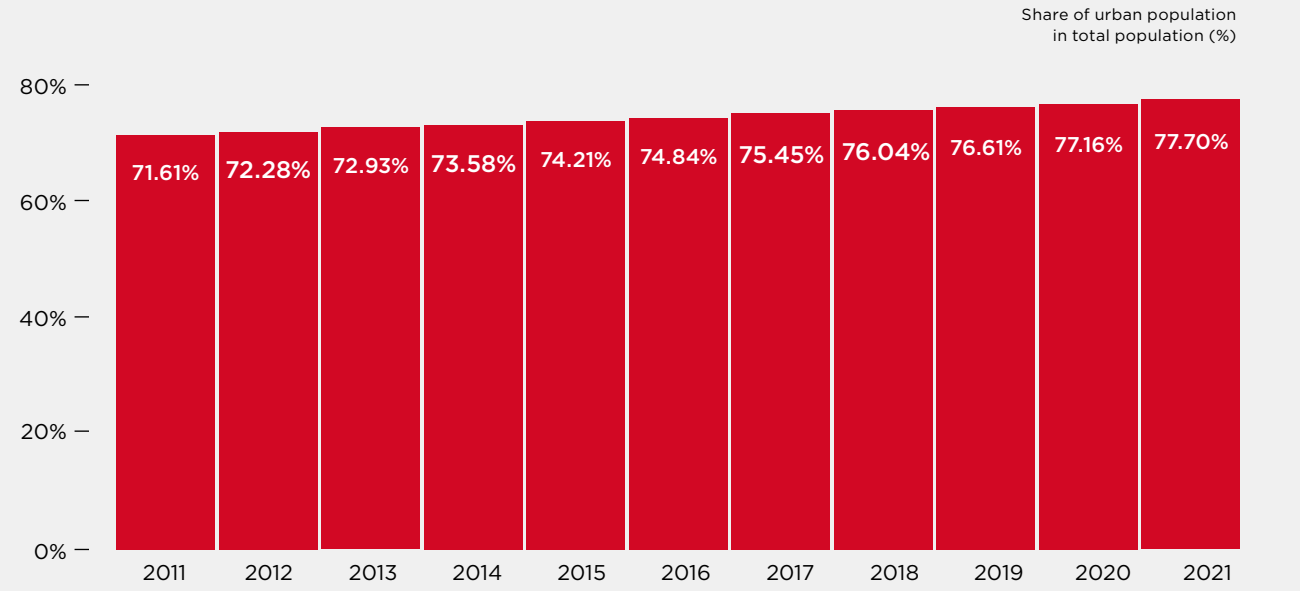
The use of digital technologies for urban mobility planning must be driven by a sustainability agenda and the principle of universal access to ensure urban mobility is inclusive, safe, efficient, green and does not leave vulnerable urban residents behind.

1. World Bank. (2022). "Urban Population (% of total population): Malaysia".
2. Teh, E. (22 July 2022). "Traffic congestion in Malaysia and the lessons we must learn". Heinrich Boll Stiftung Southeast Asia.
3. Statistics from Malaysia's National Transport Policy (2019–2030).
4. Ibid.
5. Malaysia's National Transport Policy 2019–2030.
6. Economic Planning Unit. (2022). National Energy Policy (2022-2040).
7. UNESCAP. (n.d.). Malaysia: Sustainable Urban Transport Country Report.

Introduction

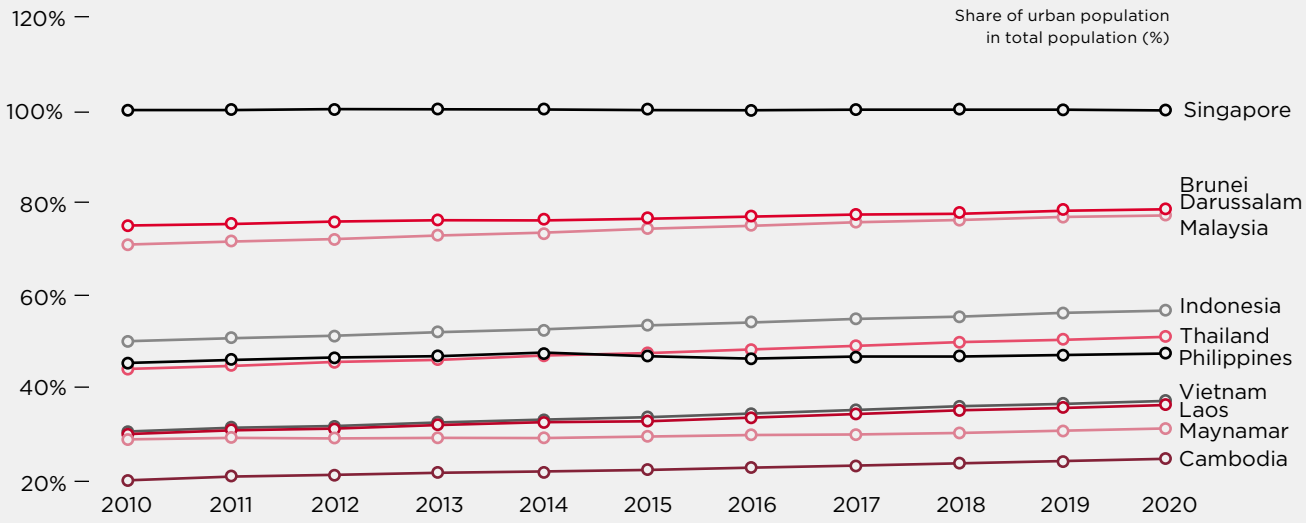
Malaysia has experienced rapid urbanisation in the past few decades, which has strained resources and created urban planning challenges. As of 2021, 78 per cent of Malaysia's population lived in urban areas[8] (Figure 1), and by 2050 it is estimated that more than 85 per cent of the population will live in cities. Malaysia also has one of the highest rates of urbanisation in the ASEAN region (Figure 2).

Figure 1: Urbanisation in Malaysia, 1990–2021



Source: Statista

Figure 2: Urbanisation in ASEAN countries, 2012–2020



Source: Statista

8. World Bank. (2022). "Urban Population (% of total population): Malaysia".

Rapid urbanisation has increased demand on urban transport systems and had a negative impact on the environment. Heavy reliance on private transport has led to road congestion and high carbon emissions. The transport sector is the second biggest source of CO^2 emissions in the country and road transport is responsible for most of them.[9] Malaysia has a lower sustainable mobility score than other countries in the region, ranking 69th out of 183 countries (Indonesia ranks 46th, the Philippines 50th and Singapore second).[10] While road fatalities have decreased over time, road accidents increased steadily between 2011 and 2019.[11] With private car use primarily driving urban transport planning, cities do not have sufficient infrastructure for active mobility modes, such as walking and cycling.

Mobile, digital and frontier technologies can improve urban planning and enhance the efficiency of urban transport. Globally, cities are deploying these technologies to create smart cities, defined as "places where traditional networks and services are made more efficient with the use of digital solutions for the benefit of inhabitants and business."[12] Some of these technologies, such as sensing technology, generate vast amounts of data while others, such as big data analytics and artificial intelligence (AI), analyse vast amounts of data that can be used for evidence-based urban planning and predictive analysis to make cities more efficient, green and inclusive.

Malaysia is well on its way to becoming an advanced digital society, and recent development plans, such as the 12th Malaysia Plan 2021–2025[13] and the Digital Economy Blueprint[14] provide a roadmap for the digitalisation of various economic sectors. The effective deployment of digital technologies can transform urban service delivery at a critical juncture in the nation's development. However, digitalisation must be underpinned by an urban development agenda with inclusion, equity and sustainability at its core so that no resident is left behind.

Objectives and methodology

This report investigates the opportunities of mobile, digital and frontier technologies and the role that data-sharing partnerships can play in addressing urban mobility challenges in Malaysia.

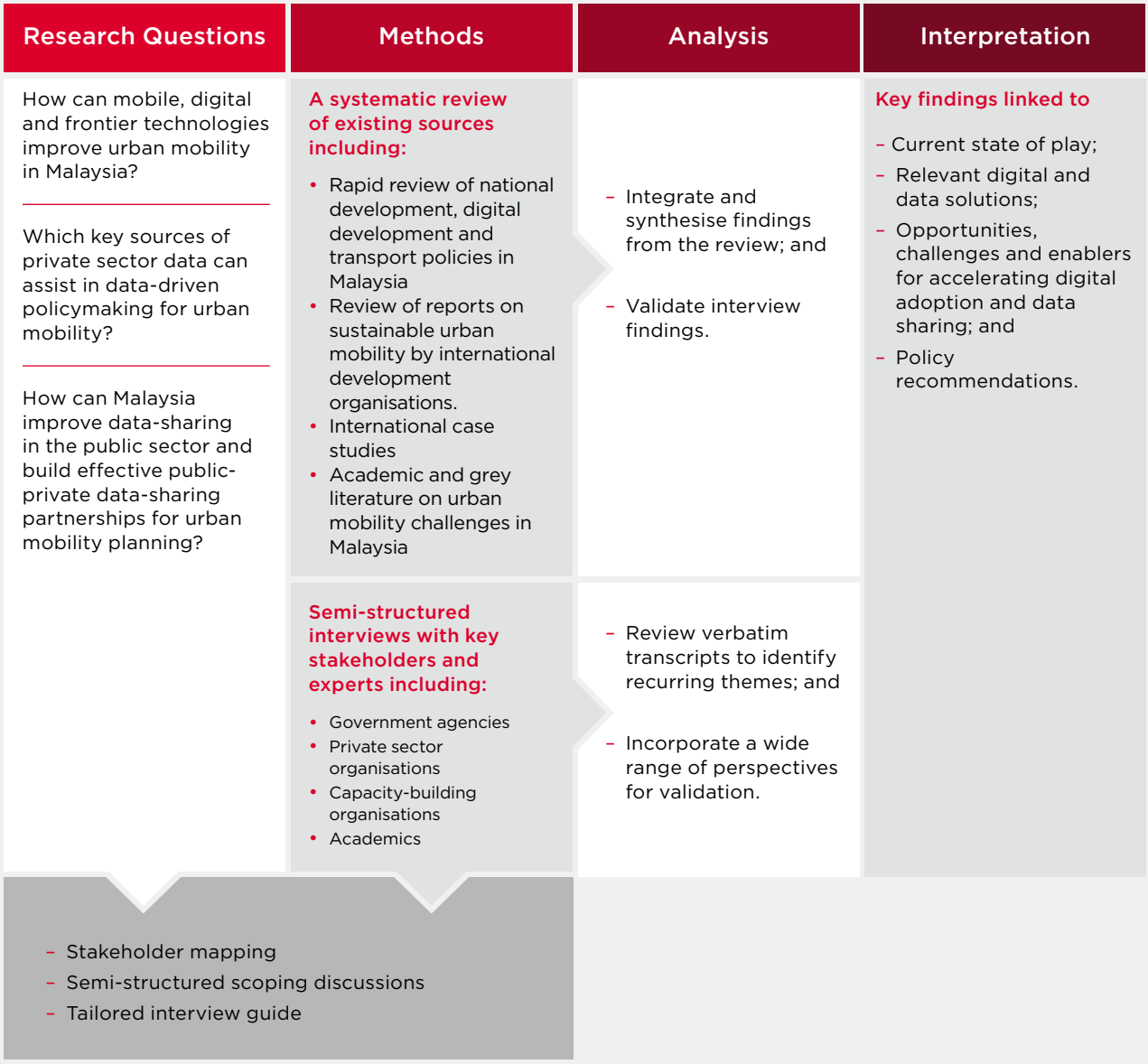
It specifically investigates:

- The role of mobile and data-driven technologies in creating more sustainable and efficient urban mobility; and
- The challenges and opportunities for public and private sector organisations to share data to improve urban mobility and support evidence-based policymaking.

The report draws on earlier research by GSMA Mobile for Development (M4D),[15] as well as peer-reviewed and grey literature. Insights from interviews with 23 key stakeholders, including government agencies, capacity-building organisations, technology start-ups and data-holding companies shine a light on the opportunities and challenges of using digital tools and data for urban mobility.

9. Solaynami, S. (2022). "CO^2 Emissions and the Transport Sector in Malaysia". Frontiers in Environmental Science, 13.
10. SuM4All. (n.d.). "Policy Decision-Making Tool for Sustainable Mobility 3.0".
11. Ministry of Transport, Malaysia Official Portal. "Road accidents and fatalities in Malaysia; Road crash data tracking and collection".
12. See the European Commission's definition of smart cities.
13. See the 12th Malaysia Plan.
14. MyDigital (2021). Malaysia Digital Economy Blueprint.
15. Reports by GSMA AI for Impact, the GSMA Digital Utilities programme and GSMA research on digital health, including the AI for Impact Toolkit, the report Innovative Data for Urban Planning: The opportunities and challenges of public-private data partnerships and an extensive case study, CASALUD: A suite of digital health services for the prevention and management of NCDs.

Figure 3: Research methodology



Source: GSMA Mobile for Development

In addition to an overview of the opportunities of digitalisation and data-driven policymaking for sustainable urban mobility, this report provides illustrative international case studies and policy recommendations for federal, state and local governments, transit authorities and public transport operators on how to make current urban mobility initiatives in Malaysia more effective.

1. Urban mobility in Malaysia

1.1 Urban mobility challenges

The Sustainable Mobility for All (SuM4All) initiative defines sustainable mobility as more accessible, efficient, safe and climate-friendly mobility.[16] According to SuM4All, Malaysia ranks 69th out of 183 countries in sustainable mobility, with low rankings in universal access, safety and GHG emissions (Figure 4).

16. The SuM4All Partnership is a global coalition of 56 international organisations and companies aiming to transform the future of transport and mobility. For more information, see the SuM4All website. .

Figure 4: Mobility at a glance in Malaysia

Sustainable mobility index score: 50

Sustainability rating by goal						
Universal access			Efficiency	Safety	Green mobility	
Rural access	Urban access	Gender			Air pollution	GHG emissions
B	C	C	B	C	A	C

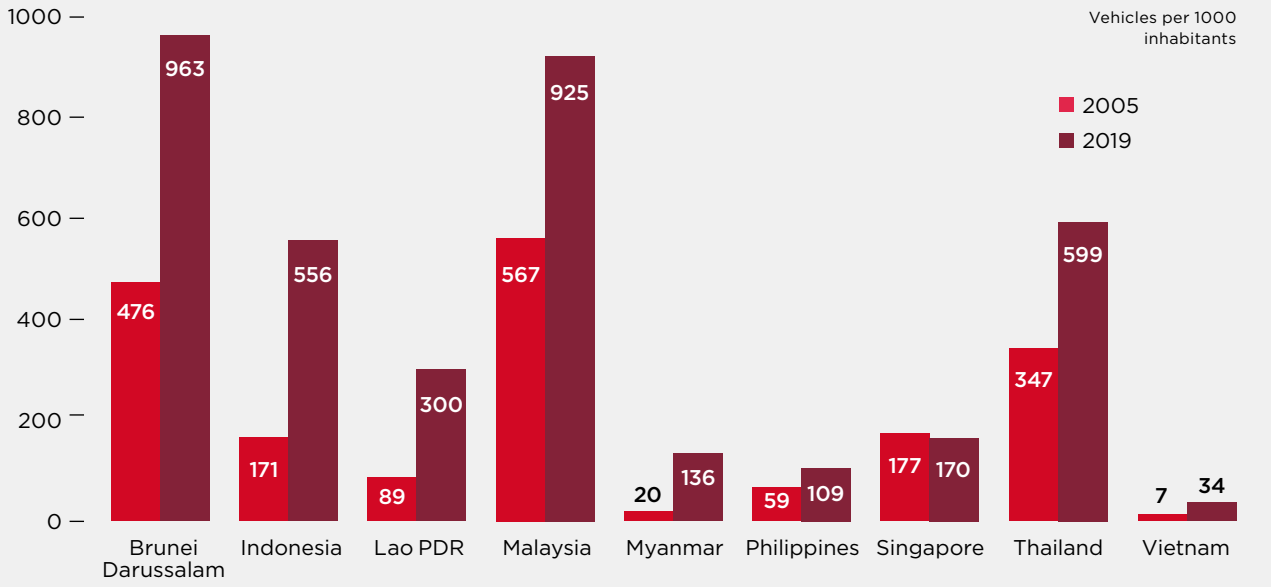
Source: SuM4All Malaysia Country Dashboard.

While the government has made investments in upgrading transport infrastructure,[17] heavy reliance on private transport is causing unsustainable congestion on urban roads and creating challenges for sustainability and equal access. Malaysia has more registered cars per 1,000 population than almost all other countries in Southeast Asia (Figure 5) and higher CO^2 emissions from transport than Singapore, Thailand and Vietnam (Figure 6). The rate of road accidents rose steadily until 2019 and then declined in 2020 due to reduced mobility during the COVID-19 pandemic (Figure 7). Traffic accident casualties in Malaysia in 2020 were higher than in Singapore, Vietnam, Cambodia and the Philippines (Figure 8).

Despite investments in public transport, insufficient mobility solutions in the first and last mile and limited access to bus and train stops have discouraged the use of public transport. Malaysia also has a relatively low number of public buses per 1,000 population compared to almost all other Southeast Asian countries (Figure 9).

17. The Government of Malaysia has made significant investments in road infrastructure in cities, suburbs and busy routes, such as from Port Klang to Kuala Lumpur. The public bus network and rail network (KTM Komuter, LRT and MRT) have benefited from investments to increase connections to the city centre. The Express Rail Link was also built to connect Kuala Lumpur city centre to Kuala Lumpur International Airport (KLIA).

Figure 5: Registered cars per 1,000 population in Southeast Asia



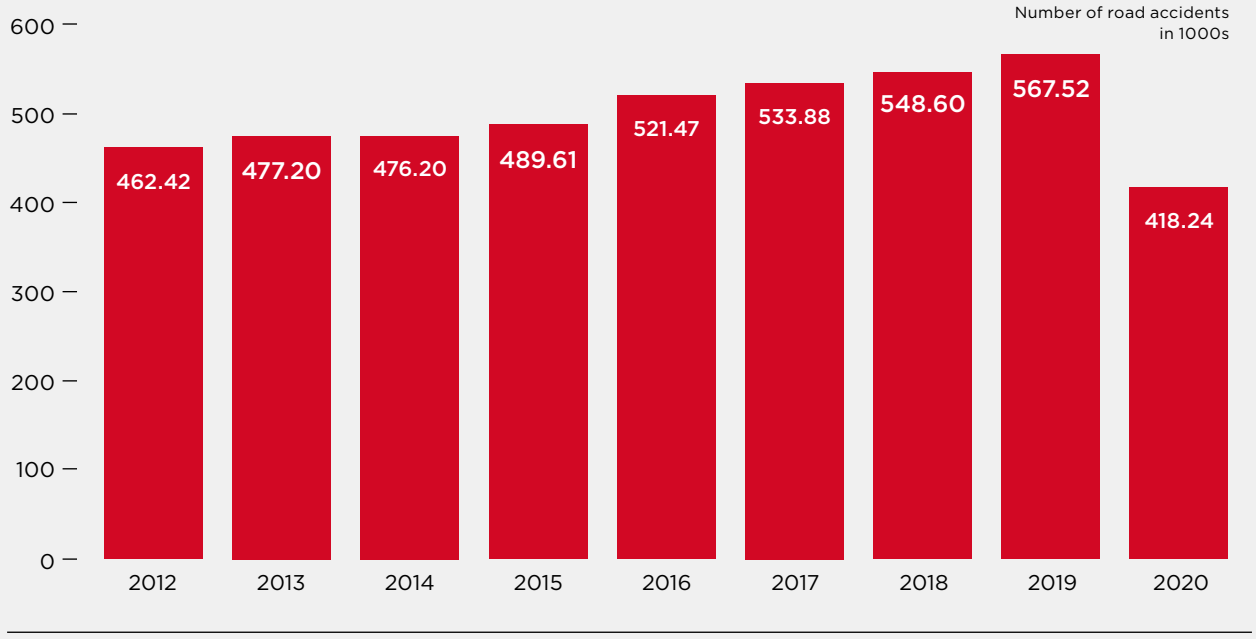
Source: UNESCAP. (2021). Review of Transport Developments in Asia and the Pacific 2021.

Figure 6: Relative contributions to CO^2 (transport and road transport) in ASEAN countries

	% transport vs total energy C02	% road vs. transport C02	% road vs. total energy CO2
Brunei Darussalam	23	100	23
Lao PDR	53	85	45
Indonesia	29	88	26
Malaysia	28	96	27
Myanmar	42	87	37
Philippines	30	86	25
Singapore	15	98	15
Thailand	26	95	25
Vietnam	19	97	19

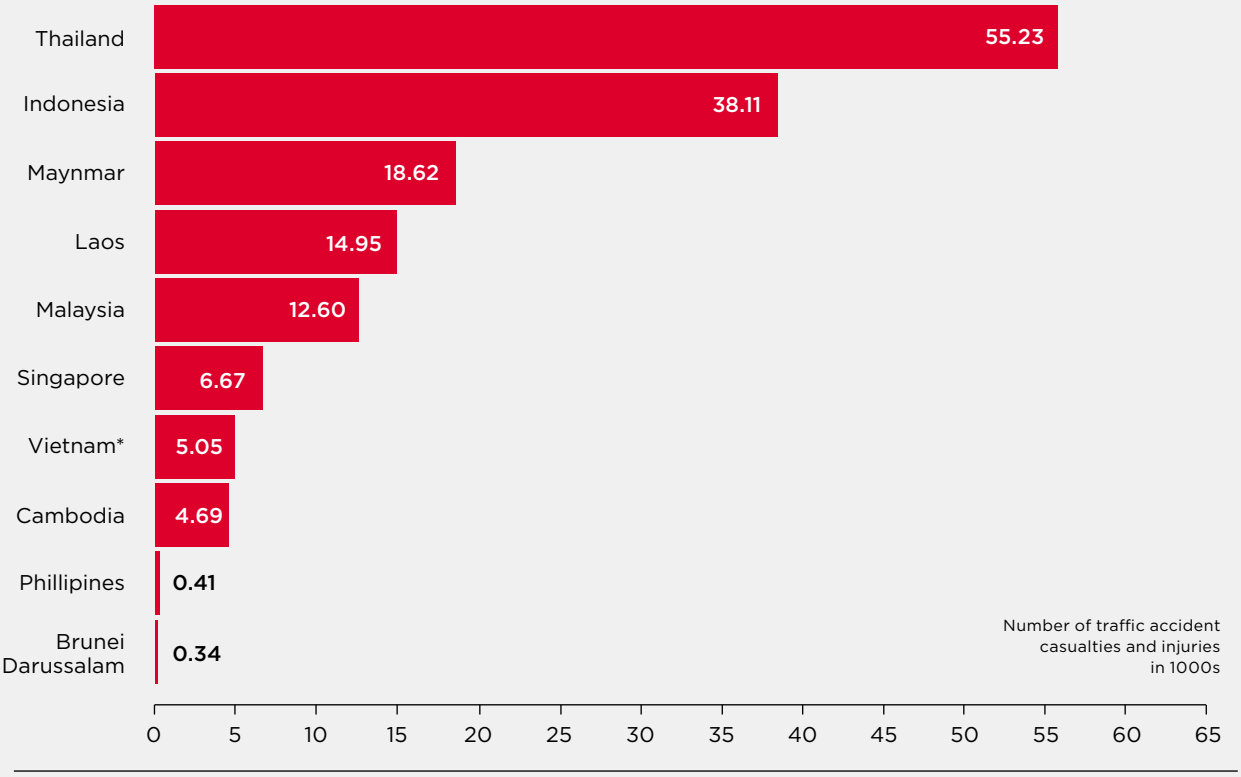
Source: International Energy Agency (2017) in ASEAN, 2021

Figure 7: Traffic accidents in Malaysia, 2012–2020



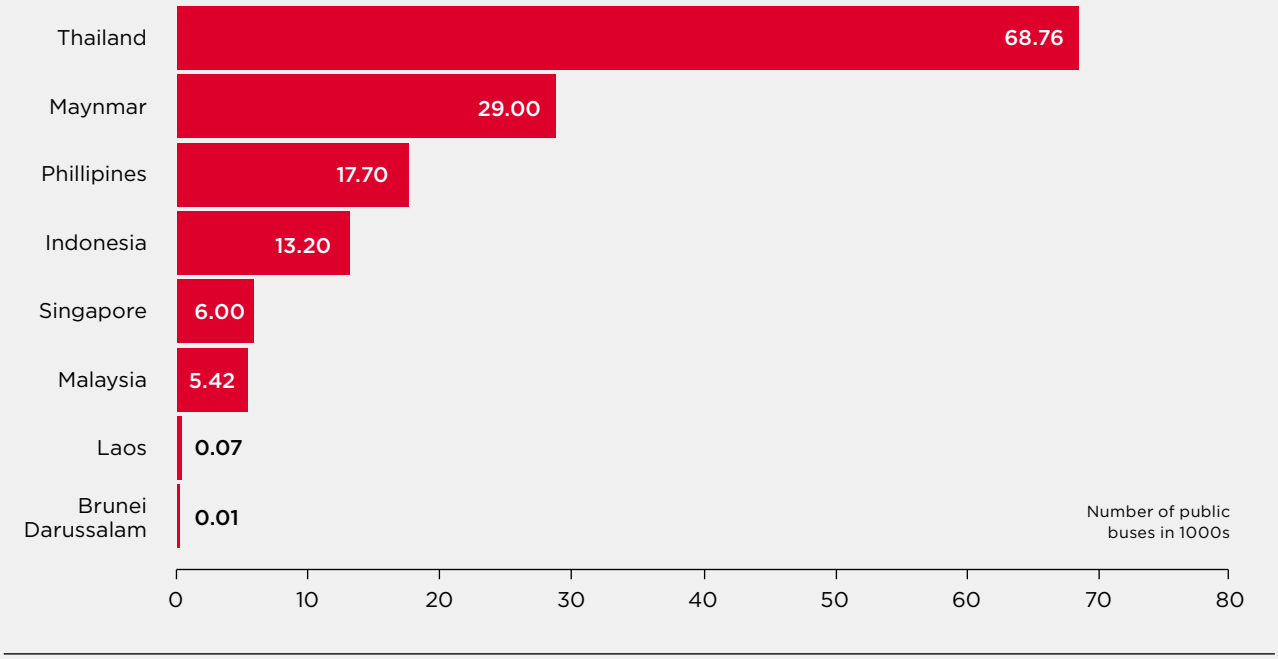
Source: Statista

Figure 8: Estimated number of traffic accident casualties in ASEAN, by country (2020)



Source: Statista

Figure 9: Estimated number of public buses in Southeast Asia, 2020



Source: Statista

Although urban development plans reflect the need for infrastructure that supports active and micromobility modes, infrastructure planning to date has tended to be car-centric, making it difficult to integrate other modes of transport in existing road infrastructure.[18] This is partly due to the pattern of urban development in Malaysia where many cities have grown unplanned, with low-density settlements located far from city centres, making them difficult to serve via public transport.

Universal access

A key principle of sustainable urban mobility is inclusion, and governments need to consciously support universal access to ensure no one is left behind. While Malaysia is committed to this, it ranks low on urban universal access and gender in the Sustainable Mobility Index, compiled by Sum for All.[19] Malaysia's National Transport Policy 2019–2030 highlights that in Kuala Lumpur, for example, 10 per cent of household income is used for transport, a significant cost.[20] Affordability is a critical component of universal access that requires consideration.

18. London, a city that has made progress in shifting from a car-centric to public and multimodal and active modes of transport, introduced a "healthy streets" approach to urban planning in 2014 that identified 10 indicators of healthy streets: 1) Pedestrians from all walks of life; 2) Easy to cross; 3) Shade and shelter; 4) Places to stop and rest; 5) Not too noisy; 6) People choose to walk, cycle and use public transport; 7) People feel safe; 8) Things to see and do; 9) People feel relaxed; and 10) Clean air. See Healthy Streets Explained.
19. Sum 4 All. (2020). Mobility at a Glance Report.
20. National Transport Policy 2019–2030.

Urban transport must be made available and designed with the barriers residents face in mind, including women, older persons, persons with disabilities and those with lower incomes, all of whom are less likely to be included in transport systems due to lack of access, affordability or safety.[21] To ensure universal access, it is important to consult with transport users in these groups. To make infrastructure development and transport design more consultative and inclusive, local governments are providing online tools for citizens to engage and provide feedback.[22]

A successful example of effective online citizen engagement is the Qlue app in Indonesia, which residents can use to register complaints that the government then uses to formulate policy and redirect resources. Another example is in Taiwan where a government innovation lab was launched in 2018 and an AI-powered digital tool, vTaiwan, was introduced to crowdsource public opinion.[23] The government also uses an online survey tool to engage with citizens, but every Wednesday a physical space is also made available for citizens from diverse backgrounds to gather and share their views on a wide range of topics. This helps to make governance more inclusive and provides an antidote to top-down decision-making.[24]

As part of the Global Future Cities Program (GFCP), a program under the UK Foreign, Commonwealth and Development Office (UK-FCDO), a geospatial citizen feedback portal (CFP) was recently piloted in Iskandar Puteri in the state of Johor to simplify engagement between the local government and citizens. The current system for complaint management in Malaysia, Sistem Pengurusan Aduan Awam (SisPAA), requires that data be extracted and converted to a Geographical Information System (GIS) format. The citizen feedback portal incorporates GIS functionalities, removing the need for data conversion and making the process significantly more efficient.[25] The design of the portal was consultative and inclusive, involving youth, women, persons with disabilities and older persons.

1.2 Urban mobility administration and policy

Coordinating mobility planning between government agencies

National transport administration is complex and tends to involve a wide range of public sector actors with varying degrees of authority over development agendas. In situations where the roles of different government agencies are unclear or overlapping, or there are many agencies involved in transport planning, as in Malaysia, policy implementation can be impeded. Governance in Malaysia is relatively centralised and transport policy is set at the federal level. The administrative system is divided into 13 states and three federal territories and further subdivided into city, municipal and district authorities. States and cities in peninsular Malaysia have limited autonomy to make and finance development plans, unlike states in Eastern Malaysia (Sabah and Sarawak), which have more autonomy.

At the federal level, the Ministry of Finance, Ministry of Transport and Ministry of Works play a key role in transport governance. The Ministry of Finance owns a significant part of the public transport infrastructure, including some of the biggest public transport providers in peninsular Malaysia, such as Prasarana Berhad and KTMB. The Ministry of Transport is tasked with devising and implementing transport policies, as well as building more integrated transport systems. In peninsular Malaysia, the Land Public Transport Agency (APAD) executes this task. The Ministry of Works oversees the building and management of federal roads.[26] In addition, the Ministry of Housing and Local Government (MHLG) oversees infrastructure development for active mobility.

Many other federal ministries and agencies are involved in transport planning and development, some of which include the Economic Planning Unit, the Ministry of Green Energy, Technology and Water (KeTTHA), the Ministry of Energy and Natural Resources (KeTSA), GreenTech Malaysia and the Sustainable Energy Development Authority, Malaysia. According to a report on sustainable urban transport in Malaysia by the United Nations Economic and Social Commission

21. In countries where the labour force is comprised primarily of men, for example, transport that caters primarily to work commutes risks leaving out women, who may need access to other points of interest such as schools and markets.
22. It is important to otherwise include groups that are less likely to own smartphones or have broadband access. In Malaysia, this is lower-income residents, also referred to as the bottom 40 per cent or B40 of the population.
23. See vTaiwan website.
24. Basu, M. (22 May 2018). "How Taiwan is reinventing government". GovInsider.
25. Clarice, R. (2022). Citizen Feedback Portal: A smart technology tool developed by GFCP Malaysia to support evidence-based planning in Iskandar Malaysia. Global Future Cities Programme.
26. UNESCAP. (n.d.). Malaysia Sustainable Urban Transport Country Report.

for Asia Pacific (UNESCAP), there is little coordination between federal ministries in the implementation of transport policies, leading to fragmentation and de-linked transport initiatives.[27]

Federal level transport objectives inform state and local urban mobility plans. Federal, state and local governments therefore need to be well coordinated for urban mobility to be well planned. Malaysia's 12th National Development Plan recognises that the transport sector faces significant challenges with uncoordinated government planning and implementation,[28] and a key objective of Malaysia's National Transport Policy (2019–2030) is strengthening coordination between state and federal agencies via the National Transport Commission in peninsular Malaysia and through Lembaga Perlesenan Kenderaan Perdagangan (LPKP), the commercial vehicle licensing board, which will expand to become the lead transit agency in Eastern Malaysia.[29]

Coordinating land use and mobility planning

Mobility planning can only be sustainable if it is closely coordinated with land use planning. Evolving concepts of sustainable cities and urban mobility, such as the 15-minute city[30] or transit-oriented development,[31] are based on the idea that urban communities should be located around transport hubs and designed as self-contained "campuses," reducing commutes and making cities more sustainable. These concepts extend or modify an Avoid-Shift-Improve framework[32] for sustainable transport in cities, which proposes that cities be planned to reduce the need for commutes (avoid), to allow people to move to more sustainable modes of transport such as public transport (shift) and to make traffic flow and transport infrastructure more efficient (improve).

Malaysia's development plans reflect the aim to pursue transit-oriented development. In international contexts, however, this has been executed best when local authorities have the power to plan land use and transport based on local needs, and there is a central coordination or development agency at the municipal level overseeing both elements. This has been evidenced in smart, sustainable cities in Europe that have reduced the need for complex coordination at different levels of government, cut red tape and created more agile systems.

Transport administration and financing

Transport administration systems also have an impact on the amount of financing available for cities to invest in mobility initiatives and infrastructure. In countries with more centralised governance like Malaysia, states and cities can typically generate only limited financing for transport. Reliance on public transport fares for revenue can be a risky and volatile strategy. For example, as fare payments declined during the COVID-19 pandemic, it became very difficult for public transport providers to sustain themselves. Depending on regulations and administrative structures, cities elsewhere have established other transport funding models. Hong Kong, for example, not only owns the city transport provider, but also the transport hubs and adjoining land, which are developed to add value and generate revenue. Paris' local government charges firms with more than 11 employees a small transport-specific payroll tax (Versement Transport) and Singapore generates revenue[33] for urban mobility initiatives from car-restricting policies.[34]

In Malaysia, the federal government plays a significant role in transport infrastructure funding. Public-private partnerships are also a source of investment. Private contractors, or concessionaires, operate a range of public transport modes, and coordinating routes and services adds even more complexity to transport management, especially due to competition for high-demand routes. In Brazil, concessionaires engage with municipal and federal government as collective transport associations, simplifying this coordination challenge.[35] In 2016, Singapore overcame a lack of coordination between private bus service providers by contracting out bus services to operators while retaining control of the fleet and installing a single fleet management solution in all buses to smooth service delivery.[36]

27. Ibid.
28. According to the Executive Summary of the 12th Malaysia Plan, under the policy enabler, "Enhancing connectivity and transport infrastructure", it is stated that "...fragmentation of the industry, low technology adoption, uncoordinated planning and implementation as well as weak governance have resulted in the mediocre quality of services and relatively higher cost."
29. Malaysia's National Transport Policy 2019–2030.
30. The 15-minute city concept was popularised by Paris mayor Annie Hidalgo and is credited to Sorbonne professor Carlos Moreno. See: Willsher, K. (7 February 2020) "Paris mayor unveils '15-minute city' plan in re-election campaign". The Guardian.
31. Westwood. (25 April 2017). "History of Transit-oriented Development: The Streetcar Suburb".
32. The Avoid-Shift-Improve model was first developed in Germany in the 1990s to move towards more sustainable transport.
33. Rodrigues, G. and Gibson, J. (6 July 2022). "What TfL could learn from Hong Kong's public transport funding model". Centre for Cities Blog.
34. Ibid.
35. Transit Unplugged. (7 July 2021). "Dimas Burreira Putting Technology and Innovation in the Driver's Seat in Fortaleza". Season 4, Episode 39.
36. Trapeze. (n.d.) "Singapore's Land Transport Authority's Efficient Fleet Management".

Malaysia's National Transport Policy and digitalisation

Malaysia's National Transport Policy (2019–2030) broadly promotes sustainability by increasing the efficiency of transport, providing transport that caters to people's needs and is green and safe (Figure 10).

Figure 10: Malaysia's National Transport Policy objectives

To develop a sustainable transport sector that accelerates economic growth and supports the well-being of the rakyat (the people), in line with an advanced nation status.

	Economic competitiveness		Social element		Environmental protection	
Objectives	Create a conducive transport system	Facilitate seamless movement	Provide mobility that meets people's needs	Increase modal share of public transport	Deliver an intelligent, safe and secure system	Ensure sustainable use of resources
Policy Thrusts	• Strengthen governance to create a conducive environment for the transport sector • Optimise, build and maintain transport infrastructure, services and networks for efficiency • Enhance safety, integration, connectivity and accessibility • Advance toward a green transport ecosystem • Expand global footprint and promote the internationalism of transport services					

Source: Malaysia's National Transport Policy 2019–2030.

While Malaysian states are at different stages of technology adoption and have different local mobility challenges, needs and capacities, urban transport plans (summarised for five cities in Box 1) align with the National Transport Policy in four key areas:

- Facilitating the efficient movement of traffic via route optimisation to reduce congestion in city centres and on roads;
- Greener mobility solutions;
- More integrated transport and higher use of public transport; and
- Improvements in planning and infrastructure to encourage micro and active mobility modes.

BOX 1

Urban transport priorities in key Malaysian cities

City: George Town, Penang
Plan: George Town Special Area Master Plan[37]

Key objectives:
- Make George Town a walking city by improving pedestrian walkways; and
- Improve multimodal transport.

City: Ipoh, Perak
Plan: City Council Strategic Plan (2021–2030)

Key objectives:
- Reduce GHG emissions by 45 per cent by 2030; and
- Make Ipoh a more walkable and cyclable city.[38]

City: Kuching, Sarawak
Plan: Kuching Urban Transport System (KUTS)

Key objectives:
- Modernise the traffic system and reduce traffic in the city centre by developing an integrated and efficient transport system;
- Introduce an automated rapid transit system, a hybrid of a bus, rail and tram; and
- Introduce two new bus lines with further connections to hydrogen-powered rolling stock and feeder buses.

City: Putrajaya, Federal Territory
Plan: Putrajaya Smart City Blueprint

Key objectives:
- Develop a smart parking guidance system;
- Enable digital payments for parking and bus fares;
- Smart traffic management;
- Smart bus stops; and
- Low-emission transport.[39]

City: Shah Alam, Selangor
Plan: Shah Alam Local Plan 2020[40]

Key objectives:
- Build a city-wide drainage system, in part by developing an Integrated Urban Flood Forecasting and Monitoring System; and
- Improve sustainable and green mobility by building bicycle lanes and urban paths and enabling micromobility.

37. Institute for Transportation and Development Policy. (4 March 2019). "George Town Could Become a Malaysian Best Practice in Transport." Transport Matters Blog.
38. Mat Arif, Z. (9 February 2022). "Ipoh to become low-carbon and walkable city by 2030". New Straits Times.
39. The Putrajaya Medium Rapid Transit line was opened on 16 June 2022, with most stations offering park-and-ride facilities.
40. Shah Alam Local Plan 2035 is in the draft stage.

The National Transport Policy recognises the disruption that data from new technologies is causing in transportation, as well as the impact of trends such as ride sharing on urban mobility. It identifies IoT and an intelligent transport system as key enablers of improved mobility. Key action items include creating a centralised transport database and modelling and strengthening big data capabilities at the Ministry of Transport, transport agencies and local authorities.[41]

The Malaysia Intelligent Transport System Blueprint (ITS 2019–2023) is a comprehensive policy document by the Ministry of Works. Its strategy for accelerating the use of frontier technologies, digital technology and data aims to make urban mobility in Malaysia more sustainable.[42] To support the development of an ITS to deliver seamless mobility and a congestion-free traffic network, and in particular to coordinate action between the many government agencies that need to collaborate to build the ITS, the blueprint proposes setting up a National Intelligent Transport Management Centre (NITMC).[43] Data sharing is identified as key to the development of the ITS.[44]

Malaysia has many other national development policies that include sustainable mobility objectives. Figure 11 identifies some of these policies at the federal level.[45]

Figure 11: Federal transport-related policies in Malaysia

Policy	Government Ministry/Agency	
– 12th Malaysia Plan	– Published by the Economic Planning Unit	
– Malaysia Smart City Framework	– Ministry of Housing and Local Government	
– Malaysia Digital Economy Blueprint	– Published by the Economic Planning Unit	
– Industry 4WRD: National Policy on Industry 4.0 (2019-2025)	– Ministry of International Trade and Industry (MITI)	
– National Low Carbon Cities Masterplan	– Ministry of Energy, Green Technology and Water (KASA)	
– Low Carbon Mobility Blueprint (2021-2030)	– Ministry of Energy, Green Technology and Water (KASA)	URBAN MOBILITY
– Malaysia Digital Economy Blueprint	– Economic Planning Unit (EPU)	
– Green Technology Masterplan (2017-2030)	– Ministry of Energy, Green Technology and Water (KASA)	
– Malaysian Intelligent Transport System Blueprint (2019-2023)	– Ministry of Works and to be delivered by National Intelligent Transportation Management Centre (NITMC), which was to be established when the policy was released.	
– National Transport Policy (2019-2030)	– Ministry of Transport (MOT)	
– National Automotive Policy (2020)	– Ministry of International Trade and Industry (MITI)	
– National Energy Policy (2022-2040)	– Published by Economic Planning and to be delivered under the Prime Minister by the National Energy Council, to be established	

Source: C&G Analytica

41. Malaysia's National Transport Policy 2019–2030.
42. Malaysian ITS Blueprint 2019–2023.
43. Ibid. The Blueprint identifies 13 government agencies that need to coordinate action for the ITS.
44. However, the Ministry of Works does not list NITMC as one of their agencies and no progress on the ITS has been reported.
45. Additional policies that include transport objectives include, policies linked to the adoption of specific technologies, policies linked to local and state land and infrastructure development and policies linked to automotives and green mobility, such as the National Transformation Program, the Land Public Transport Masterplan, the urban rail and bus development plans, taxi transformation plan, land use plan and travel demand management plan. UNESCAP. (n.d.). Malaysia Sustainable Urban Transport Country Report.

As part of a commitment to sustainable development and an aim to transition to a high-income country, Malaysia's Smart City Framework (MSCF) has been instrumental in providing a roadmap for more technology-enabled, data-driven and holistic urban development.[46] Most importantly, it establishes local authorities as city managers, an important enabler of integrated and sustainable urban transport development.

By accelerating the adoption of frontier technologies such as IoT, cloud computing and big data analytics, Malaysian cities can ensure they remain competitive globally and enhance their development trajectories. Malaysian cities have been working with international partners to empower and enhance their digital capabilities for sustainable urban mobility; for example, Malaka's Green Transport Implementation plan was launched in 2022 in alignment with the MSCF[47] and is currently being piloted. This green mobility pilot includes the placement of e-bikes and e-scooters in Melaka's heritage area, longer hours for pedestrian-only traffic in the Jonker walk area and an app. for live updates on the hop-on, hop-off and Route 17 city bus.[48]

1.3 Digital and frontier technology solutions to improve urban mobility

Digital and frontier technologies and data can enable Malaysia to take an Avoid-Shift-Improve approach to improving urban mobility and decarbonising transport, by:

- Improving the efficiency of public transport to encourage a modal shift away from private transport;
- Improving traffic flow and management to reduce congestion and time on roads; and
- Enabling better-informed infrastructure development for a shift to micro and active mobility modes.

This can be achieved through the development of three types of systems: intelligent transport management, advanced traveller information and integrated public transport (Figure 12).

46. UK FCDO & Malaysia Ministry of Housing and Local Government. (2021). Malaysia Smart City Handbook.
47. Clarice, R. (2022). "Melaka Green Transport Implementation Masterplan successfully launched". GFCP.
48. Ibid.

Figure 12: Frontier technology and data for sustainable urban mobility

Intelligent traffic management system	Advanced traveller information system	Integrated public transport system
Improves traffic flow and enforcement via smart (generally IoT enabled) technology e.g. • Smart cameras • Smart parking • Smart streetlights • Smart traffic lights Culmination: Smart City	Integrates data from various public and private transport providers and provides real-time information to end users, as well as enabling them to pay for journeys Culmination: MaaS	Requires big data analytics for infrastructure and service improvements e.g. • Where to locate transport hubs and bus stops, • Where and when is demand highest • What is the frequency of service required, • Where to locate first and last mile transport solutions Culmination: Digital Twin

Stakeholders /Actors	Residents/ End-users	Government agencies	Transport infrastructure and service providers	Third party data platform and analytics providers	Digital infrastructure and device providers	Data holding private companies
Stake/Interest	- Have transport that is: • Safe • Accessible • Efficient • Convenient • Affordable • Regular	- Deliver mobility services that are: • Safe • Cost-effective • Green • Multimodal • Universal • Integrated	- Depends on public ownership (transport primarily as a social service) versus private (transport primarily as a profitable service).	- Commercial	- Commercial	- Commercial/ ESG/Social good - Concern: • Data privacy

Source: GSMA Mobile for Development

Intelligent traffic management systems

An intelligent traffic management system improves the movement of traffic via frontier technologies, making it safer, more efficient and environmentally sustainable. Such a system is generally enabled by IoT sensors fitted into devices or existing infrastructure to collect and share real-time data, which is then processed at data management centres and can be used to inform traffic management in real time. Devices include smart street and traffic lights, smart parking, smart cameras and environmental sensors that can be used for flood warning systems (Figure 13).

Figure 13: Smart technologies for intelligent traffic management

Smart street lights		When built with motion sensors, smart street lights automatically brighten or dim depending on whether there is a car or pedestrian or not, leading to significant energy savings. They can also gather data on traffic counts and speeds.
Smart traffic lights		Queue detectors or cameras alert a central control system about the traffic flow, which then controls the traffic lights based on the information, to maintain a steady flow of traffic. Smart traffic lights can help with incident management, helping to reroute traffic and alert first responders if there is an accident, reducing congestion.
Smart parking sensors and metres		Smart parking solutions enabled by sensors mounted on overhead infrastructure or buried under the parking spot gather real-time data on parking availability. Connected to LED displays they can alert drivers to available spaces and equally indicate when spaces are unavailable, increasing efficiency and reducing emissions.
Smart closed circuit television (CCTV) cameras		These enable automatic number plate recognition for enforcement, monitor speeds and capture traffic violations.
Environment sensors		These may be utilised to monitor environmental pollution as well as road weather conditions to alert drivers to flooded roads and reroute traffic.

Source: GSMA Mobile for Development

BOX 2

Smart traffic management in Mallorca, Spain

In the city of Mallorca, mobile operator Telefonica is providing smart traffic management solutions to manage traffic and provide information to the public and detect traffic incidents in real time. Four components are integrated in the system: a network of weather stations to determine environmental conditions; 10 bidirectional mobile traffic capacity limitation systems that prevent vehicles from turning onto a road if there are no parking spaces; 21 fixed traffic monitoring stations, 14 CCTV cameras and six variable messaging panels to control traffic flow on highways and national roads; and 180 solar-powered bus shelters that provide passengers with public transport information.[49] Data from this smart infrastructure is integrated, processed and analysed on Telefonica's platform.

Developments in Malaysia

Several Malaysian cities are rolling out smart city solutions,[50] and there are growing examples of smart traffic management initiatives in the country. For example, the country has introduced radio frequency identification (RFID) lanes for toll collection, making toll collection more efficient and reducing bottlenecks on highways. The states of Penang and Selangor have piloted smart parking and smart parking payment solutions and connected buses have also been trialled. Smart cameras for traffic monitoring have also been deployed in Kuala Lumpur. The city of Putrajaya is piloting smart street lighting.

To green urban mobility, a shift to alternative fuel vehicles such as electric vehicles is being encouraged, and electric vehicle charging points have been introduced. The city of Cyberjaya offers a living lab for technology innovations, where 7 kilometres of a public road have been designated to test autonomous vehicles. In a pioneering step, the state of Sarawak has trialled hydrogen-fuelled buses and plans to introduce an automated rapid transit system – a hybrid of a bus, rail and tram that runs on rubber tyres and is guided by sensors to detect markings on the road to stay on track. Malaysia's state-owned oil and gas company, Petronas, has recently launched a subsidiary, Gentari, a clean energy company that will provide electric vehicles' charging infrastructure at scale in Malaysia with ambitions to expand to neighbouring markets.[51]

However, most of these initiatives are nascent and in the pilot stage, indicating that Malaysia is developing the capabilities to scale smart traffic management solutions. At this juncture, learning from smart city expertise in other parts of the world, accelerating public-private partnerships and ensuring that long-term investment is available to scale successful solutions, will all enable Malaysia to keep pace with rapid advancements in smart traffic management globally.

49. See Telefonica: Smart Mobility.
50. These pilot smart cities include Kuala Lumpur, Kota Kinabalu, Kuching, Johor Bahru, Selangor, Cyberjaya and Putrajaya, Melaka and Penang.
51. See Gentari website.

Integrated public transport systems

An integrated public transport system combines different public transport modes, such as buses, trams, railways and metro, with first- and last-mile access to offer urban residents efficient, safe, accessible and reliable transport from end to end. To integrate these modes seamlessly, data on routes, stops, timetables and usage are combined with other sources of transport and mobility data, as well as infrastructure and demographic data, to assess and improve the public transport offering, encouraging a shift away from private cars. Fully integrated public transport systems also offer seamless digital payment solutions, increasing convenience for users.

With growing adoption of sensing technologies that generate real-time data – including fleet management solutions (also known as vehicle telematics) that use IoT devices and GPS trackers to track and manage vehicle fleets – it is becoming increasingly important for cities that aim to remain competitive and sustainable to develop integrated public transport systems by building transport data platforms.

BOX 3

Benefits of smart fleet management solutions

In Sweden, Nobina, the largest public fleet operator in the Nordic region, has been partnering with mobile operator Telia since 2010 to improve and decarbonise public transport so that people have no incentive to use private transport.

More than a decade ago, Telia developed a platform for connecting buses to enable Nobina to collect simple metrics like fuel consumption and bus location for remote monitoring. Since then, the platform has expanded to include 13 connected services, including:

- A smart depot heating tool that pre-heats bus engines so they can start without wasting fuel. This solution has resulted in annual electricity savings of more than 20 GWh.
- An eco-friendly driving tool that provides drivers with real-time feedback on their driving to encourage fuel-saving driving behaviour.
- Connected cameras that provide on-board safety.
- A digital alco-lock that restricts drivers from starting a vehicle if alcohol is detected.
- Connectivity between the driver and traffic management via Voice over Internet Protocol (VOIP).
- Internet and "infotainment" for passengers on board.
- Real-time fleet management information, which allows transport managers to distribute the service.
- An automated passenger count to collect information on travel demand.[52]

52. Telia. (1 April 2020). "Making public transport smarter with Nobina".

Developments in Malaysia

Malaysia is piloting fleet management solutions through partnerships between transport companies and mobile operators. For example, in 2019, mobile operator Digi announced a partnership with Bus Asia (BA) in Sarawak to provide fleet management, Wi-Fi on buses and GPS solutions on 26 buses to enable BA to monitor their fleet in real time. In 2021, mobile operator Celcom Malaysia partnered with Plus SDN. Bhd, the largest highway concessionaire in Malaysia, to provide fleet management solutions using IoT.

Malaysia's ITS policy has been evolving since 1999, guided by a vision of an integrated public transport system based on frontier technologies and data integration[53] Malaysia launched an integrated transport information system (ITIS) in Kuala Lumpur in 2005, but this has not expanded to other cities.[54] In 2007 the Malaysia Highway Authority (MHA) introduced a national traffic management centre, and in 2008 the transport provider PLUS launched a traffic monitoring centre. The MHA also has traffic monitoring centres at all tolled highways to collect and manage traffic data.

However, data centres are currently managed and maintained by separate agencies and concessionaires, and without uniform data standards and interoperable platforms the opportunity to use big data analytics for integrated mobility solutions has been limited. Data collected by these agencies tends to remain in silos, making it difficult to make data-driven policies and decisions on public transport.

BOX 4

Using a GIS system for urban mobility planning

GIS is a system that maps a wide range of data, from infrastructure data (where things are located) to descriptive information, such as the condition of the location or infrastructure, enabling data-driven transport infrastructure planning. The system can be used as a foundation on which other layers of data can be added and visually mapped.[55]

ArcGIS, a commercially available GIS software, allows for public transit analysis to assess who the transport serves, how well they are served and how easily they can get to important destinations, such as workplaces. It does this by mapping the coverage and frequency of the service using transit data on routes, stops and frequency. The system also enables data sharing and collaborative planning between transport planning agencies, which is generally challenging due to a lack of interoperability.[56]

Among many other regions in the UK, the City of London uses GIS for urban mobility improvements. Initially adopted to cope with the influx of new riders in the city during the 2012 Olympics, TfL invested in GIS in 2014 to develop a "surface playbook", an app that captures and shares projects planned for the London road network over the next 10 years and allows stakeholders to collaborate. Nominated staff across London's boroughs can access the playbook and add relevant information on utilities, as well as infrastructure investments and improvements.

During the COVID-19 pandemic, TfL used existing maps from the surface playbook to expand and improve street infrastructure to help people move through London safely using active mobility modes.

The GIS system is being increasingly adopted in cities in the US and Europe for public transport analysis.

53. See the Malaysian ITS Blueprint 2019–2025.
54. In 2020, Kuala Lumpur City Hall conducted a pilot test of an intelligent traffic management system with a local traffic management company as part of the Malaysia City Brain Initiative. It was found that travel times could be reduced by 12 per cent with an intelligent traffic management system.
55. See GIS website: What is GIS?
56. Ibid.

Advanced traveller information system

An advanced traveller information system enables transport users to use real-time traffic and transport information to plan their trip on either public or private transport. The system is delivered via mobile apps or at transport hubs, smart bus stops, roadsides, parking facilities or in-vehicle. It also enables people to switch to multimodal transport and reduce the use of private cars, as transport information and trip planning become more efficient and convenient.[57]

The concept of Mobility as a Service, or MaaS, is the best example of a well-developed advanced traveller information system. Transport users can view schedules and the availability of various transport modes in real time and plan and pay for their journeys, all in a single app.

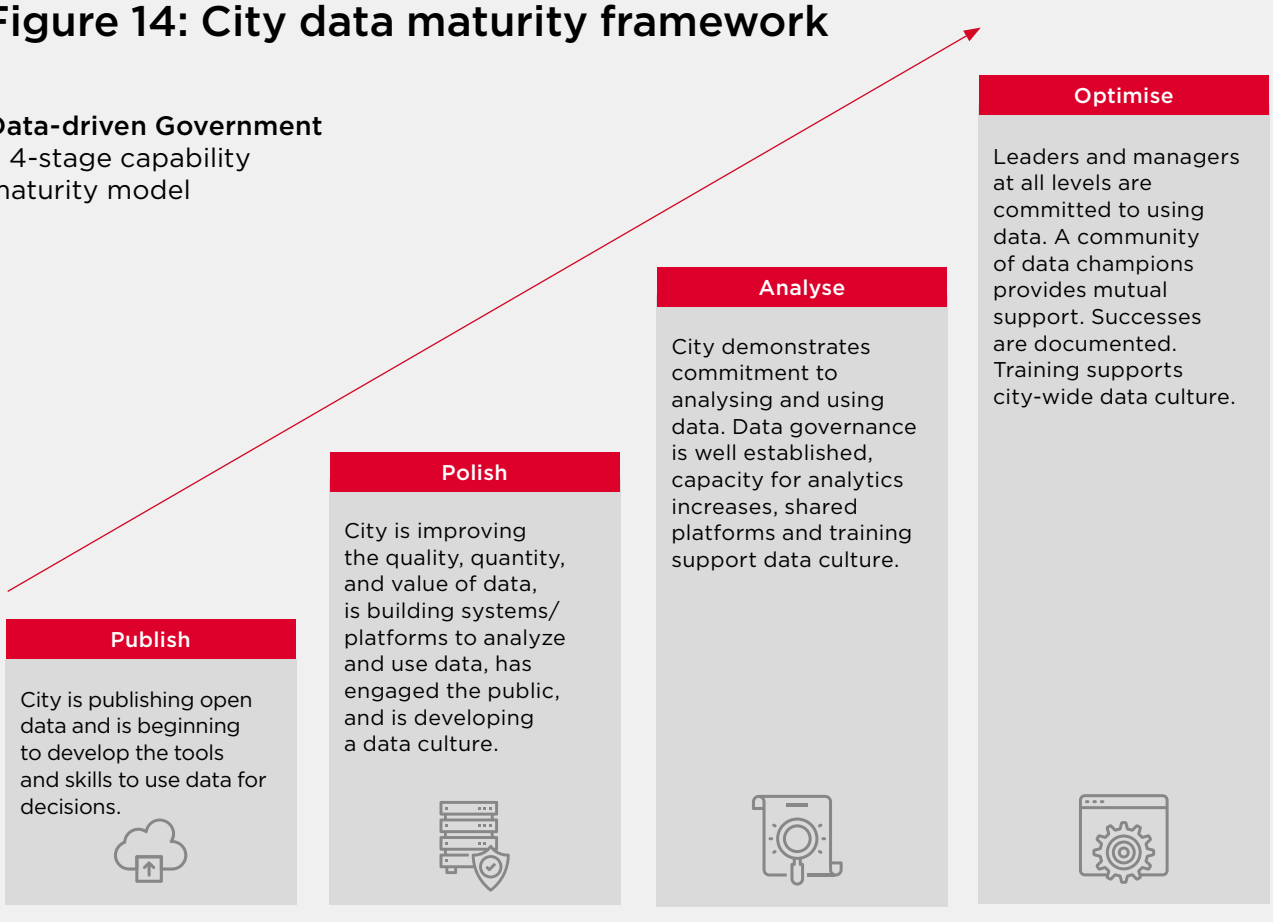
MaaS apps have been developed using various business models. In Madrid, the city-owned public transit operator integrated data from private transport providers under bilateral agreements to develop and offer MaaS through their app (Box 5), while Moovit, a private navigation app, uses crowdsourced data and data from public transit agencies to offer MaaS in more than 112 countries, including Malaysia.

Developments in Malaysia

For local authorities and/or public transit operators to develop MaaS solutions, a city needs to have a significant level of data maturity, as multiple data sources need to be integrated from a range of mobility service providers.

In the US, as some cities have become more data driven, digital leaders have formed a Civic Analytics Network, which formulated a four-stage city data maturity framework for cities to self-assess their data maturity (Figure 14).[58]

Figure 14: City data maturity framework



Source: Harvard University

57. However, its impact needs to be carefully measured as, in some cases, it can act as a deterrent to public transport use and increase GHG emissions.
58. Wiseman, J. (11 June 2018). "How data-driven is your city?" Data-Smart City Solutions, Harvard University.

While the digital development of Malaysian cities varies, many are still in the first stage while a few are further along. Cities may need to reach a greater level of data maturity to launch MaaS. However, in the smart city of Cyberjaya, one of Malaysia's most digitalised cities, the MoT-owned company Cyberview Sdn. Bhd. has recently partnered with the private sector to develop MaaS.[59]

BOX 5

Case study: **Developing MaaS in Madrid**

Spurred by research in Spain that found people in cities with a population of more than 1 million seemed unaware of public transport options, Empresa Municipal de Transportes de Madrid (EMT), the main city-owned transport company in Madrid, launched a project in 2018 to develop MaaS. This project aimed to improve the environment and congestion in the city by encouraging people to use cars less and use public and other modes of transport more. Madrid has 41 public transport operators and there are also 29 shared mobility providers, all of which use electric-powered transport solutions. Coordination between the two is managed by the regional transport authority, Consorcio Regional de Transportes de Madrid (CRTM).

In collaboration with the CRTM, EMT began engaging with public sector transport providers and ride-sharing companies to share transport data. In the first phase, EMT built a data aggregator that could integrate data from various transport sources, with ride-sharing companies providing data on location, availability and areas of operation, as their services were restricted in some areas.

By 2019, MaaS Madrid was in the second stage, which was tendered to a private company to add functions such as a route planner, payments and bookings integration. This provided all the functionality users needed to get from one point to another in the city conveniently and efficiently.

Data-sharing partnerships between EMT and the mobility solutions providers have worked because they have common interests. As a public transport company owned by the city, the objective of EMT is to improve the urban environment by reducing private car use. Meanwhile, by integrating their data, ride-sharing companies can use EMT and other public transport providers' data to assess demand and plan their services accordingly.

Bilateral agreements were signed between EMT and each ride-sharing company. The main data regulations governing contracts were the European Data Privacy and Protection Regulations, the GDPR. Shared data is governed by EMT, which despite having an open data initiative cannot share private operators' data to the open data platform as per the agreements. MaaS Madrid launched the Madrid Mobility 360 app in December 2020. According to EMT, the main challenge delivering MaaS has been the varying degrees of digitalisation among public sector transport providers, which affected their readiness to share data.[60]

EMT Madrid participated in and learned from two international programmes: CIVITAS, which offers a living lab for cities to test integrated sustainable mobility solutions, and IMOVE, an EU-funded initiative with the Association of Public Transport (UITP), which aims to build a coordinated European MaaS network with participating proof-of-concept cities Gothenberg, Manchester, Turin and Berlin.[61]

59. The Star. (18 August 2022). "Yinson inks MoU with Cyberview to develop smart mobility ecosystem in Cyberjaya".
60. EU Support Centre for Data Sharing. (2019). "Data sharing for smart mobility: MaaS Madrid".
61. See: IMOVE/UITP.

2. Data for urban mobility planning in Malaysia

2.1 Public sector data sharing

Before frontier technologies made real-time data available and big data analytics possible, transport and other forms of urban planning relied on static datasets from government agencies and public service providers. While these are still significant in urban transport planning, the data landscape has radically transformed in the last decade, making public sector data sharing and open data platforms powerful tools for evidence-based urban planning and innovation. This has been demonstrated by the London Datastore, a pioneering open data platform for the City of London launched in 2010 (Box 6).

BOX 6

Case study: **The London Datastore and Transport for London**

In 2010, the Greater London Authority (GLA) launched the London Datastore as an open database to create more transparency in governance and enable better policymaking. When it was launched, it was a pioneering initiative that shared 500 datasets, including transport data from TfL, London's transport authority, which had been offering open data since 2007. Recognised as one of the most widely used datasets for innovations and apps, by 2010 TfL was sharing transport data on station locations, TfL pier locations, live traffic cameras, Oyster ticket stop locations, cycle hire locations, riverboat timetables and the number of London underground signals passed at danger (SPAD). It was also sharing data on the TfL investment programme and business plan.

In 2010, TfL committed to sharing bus stop and bus route data and rolling origin and destination survey data (RODS), followed by bus schedule data. Efforts were made to make the data user friendly via dashboards. In 2015, data began to be shared using a unified API (Figure 15).

	Tube	Bus	DLR	Over ground	TfL Rail	National Rail	Tram	River	Cable car	Cycle Hire	Roads
Multimodal journey planning (now and future)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ (cycling and walking)
Status (now and future)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ (dock available now)	✓ (road corridor status)
Disruptions (now)/ Planned works (future)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ (closed docks)	✓ (roadworks and modernisation)
Arrival/ Departure predictions	✓	✓	✓	✓	–	–	–	✓	–	–	–
Timetables	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓
Embarkation points and facilities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ (docking stations)	✓ (road corridors)
Routes and lines	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ (cycling super highways)	✓
Fares	✓	✓	✓	✓	✓	–	✓	–	✓	–	✓

Source: TfL

BOX 6 continued

Case study: **the London Datastore and Transport for London**

In 2017, it was estimated that 600 apps were using the data and that the release of open data by TfL was generating annual economic benefits and savings of up to £130 million for travellers, the City of London and TfL.[62]

2018 was a turning point for the Datastore when the ability to share private data and sensing technology data was added. This dynamic data was radically different from the static data used previously,[63] and the GLA GIS team was able to develop a green infrastructure database to identify where investments in green infrastructure where needed.

In 2019, the largest dataset on cycling infrastructure in London was added. Compiled using survey data, TfL surveyed every street in every London borough to collect information on more than 240,000 pieces of infrastructure covering an area of 1,595 square kilometres. The database also contains 480,000 photographs of cycling infrastructure, allowing users to see exactly what they will find on a street. For example, cycle parking users can see what type of parking is available. TfL collected data on 146,000 cycle parking spaces across London and gathered information on 2,000 km of cycle routes and 58,000 wayfinding signs[64] By 2020, datasets on the London Datastore had grown from 500 to 6,000. Data on the London Datastore is governed by the GLA Code of Practice for Statistics, which was introduced in 2018, as well as the UK Statistics Authority Code of Practice for Statistics.

The success of TfL is due to several enabling conditions. First, of all the cities in the UK, London has more power to determine its transport strategy, including control over the provision of bus services. It is also able to negotiate long-term funding settlements and raise local funds. London's governance structure is characterised by the single management of most public transport and the transport strategy is integrated with other policy areas.[65]

62. Deloitte. (2017). Assessing the value of TFL's open data and digital partnerships.
63. Smart Transport. (7 April 2020). "The future of data: Ten years of London Datastore".
64. TfL. (2019). TfL Cycling Infrastructure Database.
65. Wilcox, Z. and Nohrová, N. (1 May 2014). Delivering change: Making transport work for cities. Centre For Cities.

Malaysia is making a concerted effort to encourage public sector data sharing for evidence-based urban planning under two notable initiatives: the MyGDX platform and the open data platform.

MyGDX platform

To foster digitalisation and enable evidence-based policymaking, Malaysia launched the public sector data-sharing platform MyGDX in 2018.[66] The lead government agency is the Malaysia Administrative Modernisation and Management Planning Unit (MAMPU), which is responsible for public sector reform and modernisation. MAMPU aims to make public data available to the private sector and the public at a later stage and is currently focused on sharing data within agencies.[67] As of August 2022, 26 government agencies were sharing data via MyGDX, as reported by MAMPU.

Open data platform

The open data platform currently hosts more than 12,000 datasets that have been converted from manual (CSV) formats to APIs. However, in 2020, Malaysia ranked 78th out of 187 countries in the open data inventory (ODIN) compiled by Open Data Watch, as compared to Indonesia which ranked 33rd, the Philippines, which ranked 18th and Singapore, which ranked 1st.[68] The inventory assesses the coverage and openness of government statistics, whereby coverage measures the availability of key indicators and disaggregation over time, and openness measures the data format and ability to access and download it without restriction.

Interviews with experts suggest that data on the open data platform can be outdated, lacks granularity and is not in a standardised format, all of which limits its usefulness for urban planning. There was a perception that many government agencies are not yet clear on the value of data sharing, which has discouraged a data-sharing culture. While MAMPU has been investing in the digital upskilling of public sector officials, government resources in agencies are sometimes insufficient to ensure that data shared on the open data platform is high quality, granular, standardised and usable.

These data-sharing initiatives could be strengthened by driving, demonstrating and showcasing outcomes from collaborative, innovative mobility planning projects that are using data on MyGDX and the open data platform. Agencies also need to assess whether they have dedicated units and sufficient resources to take a data-first and data-sharing approach to planning. Updating regulations, having a public sector data-sharing guidance framework and capacity building would all help to accelerate data sharing.

Regulations

While Malaysia has a Personal Data Protection Act (PDPA), it is limited to the private sector and does not apply to government personnel or agencies. The primary regulation currently governing public sector data is the Official Secrets Act 1972, under which no specific categories of data are designated as classified. This causes many public agencies to err on the side of caution and retain rather than share data, discouraging a data-sharing culture. While the states of Selangor and Penang have enacted a Freedom of Information Act, there is no such act at the federal level, which means data tends to stay within government agencies.[69]

Public sector data-sharing framework

To encourage data sharing among public sector agencies, several countries, including the UK and Singapore, have developed guiding frameworks that can be considered examples of best practice. Consultations with experts in Malaysia suggest there is low confidence in data sharing in public agencies. To remedy this, MAMPU has recently established a data-sharing framework for the public sector, the Dasar Perkongsian Data Sektor Awam (DPDSA).[70] The framework needs to be operationalised and widely publicised to ensure that government agencies are aware of it and encouraged to build a data-sharing culture.

66. Department of Statistics in Malaysia (DOSM) and the Ministry of International Trade and Industry also have their own open data portals
67. Stakeholder consultation with MAMPU.
68. Open Data Watch. (2020). Open Data Inventory. For comparison, the UK ranked 65th out of 187 countries in 2020.
69. Shaharudin, A. (15 April 2021). Open Government Data in Malaysia: Landscape, Challenges and Aspirations. Discussion Paper 3/21. Khazanah Research Institute.
70. See Malaysia's government portal for more information.

Public sector capacity building

To be useable for urban planning, raw data needs to be quality checked, cleaned, filtered and shared in standardised formats on open, urban and transport data platforms. This is a complex undertaking, and dedicated staff with the right digital skills are needed to move an open data platform for transport forward. According to research on the open data initiative by Khazanah Research Institute in Malaysia, data analytics capabilities and sufficient resources are needed for government agencies to share and use public sector data.[71]

Malaysia's Digital Economy Blueprint (MyDigital) articulates a vision of a future-ready public sector in Malaysia. A number of public and private sector initiatives are currently being offered as part of a national campaign for public sector upskilling in frontier technologies. For example, Telekom Malaysia (TM) offers a cloud connect academy specifically for the digital upskilling of civil servants.[72] Public and open data initiatives have set Malaysia on the path to a data-sharing culture for policymaking. However, to improve and innovate in urban mobility more quickly and with agility, Malaysia would benefit from an open data initiative specifically for transport data, as well as a transport data platform. Although the ITS Blueprint proposes the creation of an NITMC, no progress has been reported. Also, state and city-driven transport data initiatives are likely to have more success than federal ones in improving transport planning, which has been seen in cities with sustainable urban mobility. Interviewees observed that local councils are not sufficiently empowered and have limited capacity to launch such initiatives and will require the support of the MoT to move urban mobility planning through data platforms forward.

BOX 7

oneTRANSPORT: an innovative approach to public sector data sharing

Currently, public sector agencies sharing data in Malaysia need to have a memorandum of understanding (MOU) between them.

The oneTRANSPORT platform is an interesting model of transport data sharing. Conceived as an "open data marketplace," the model offers a solution to the challenge of striking individual data-sharing agreements. In the pilot phase, local authorities paid a subscription to put data on the platform and, in return, received visualisation services, data checking and the ability to see other local authorities' data.[73]

Since the pilot, oneTransport has evolved into a national transport data marketplace, bringing together both real-time and historical data from multiple sources and owners into a data-as-a-service marketplace.[74] One of the benefits of this "data as a marketplace" model has been that data can be shared between stakeholders without needing to sign individual data-sharing contracts and MOUs.

71. Shaharudin, A. (15 April 2021). Open Government Data in Malaysia: Landscape, Challenges and Aspirations. Khazanah Research Institute.
72. TMOne. (2021). "Digital Skills to Boost Malaysian Civil Servants".
73. See: oneTransport website.
74. Ibid.

2.2 Public-private data-sharing partnerships for mobility planning

Private data sources for urban mobility planning

Traditional data sources for mobility planning, although important, rely heavily on survey data, which is both costly and time consuming to collect. Data from sensing technology is enabling smart transport in cities, but can also be expensive due to the infrastructure investments required. However, some companies are inadvertently and organically generating data from their services that is proving to be extremely valuable for urban mobility planning as it enables big data analytics. The most notable data sources are detailed below.

GPS data from navigation apps:
Navigation apps, such as Google maps, Waze and Moovit, provide users with directions to their destination on their mobile phones or other devices. The apps generate real-time data on traffic incidents and bottlenecks from app users and capture origin/destination and trip length data via GPS signals communicated over wireless connections that provide location information. This is valuable information for urban transport planners who can use the data to assess traffic situations in real time and understand long-term mobility patterns across a city.

For example, the navigation app Waze launched data-sharing partnerships with 10 cities under the Waze for Cities programme in 2014. It now has partnerships with more than 1,500 federal, state and local partners to share the real-time data it generates on traffic conditions through a mutual exchange of data from local authorities on real-time incidents, planned infrastructure works and road closures. Waze makes two types of data feeds available to partners: information on accidents and road hazards reported by their users and feeds on traffic jams from anonymised, aggregated user GPS signals that assess location and speed. The feeds are made available on Google Cloud and partnering cities can generate visualisations and integrate their data, which they retain ownership over.[75] Waze offers a simple partnership process that cities can apply for online.

While there is no publicly available data on Malaysian cities building data partnerships with Waze, in 2020, Waze partnered with the City of Kuala Lumpur to install Bluetooth beacons on the Tun Razak Exchange for tunnel mapping.[76]

BOX 8

Integrating survey and GPS data for urban mobility planning in Penang

In March 2022, the ASEAN Australia Smart Cities Trust Fund (AASCTF) published a report on their pilot project in Penang that developed a transport microsimulation model of the historical centre of George Town.[77] The model used GPS data from TomTom, a GPS navigation company offering a GPS navigation device and survey data from video cameras set up at city junctions.

Video traffic surveys collected counts of different types of vehicles, pedestrian and micromobility movement and queue length at every junction in the area. Parking areas were also surveyed. This data was combined with origin destination and speed data from TomTom to establish travel patterns over time. These two data sources were then combined to understand the traffic patterns at every junction at different times in the city, which can be used for evidence-based rerouting and infrastructure planning, such as cycle lanes and walkways.[78]

75. See the Waze for Cities website.
76. MalayMail. (4 March 2020). "Malaysia is the first SEA country to get Waze underground tunnel mapping".
77. See the 2022 survey report: Penang Smart Mobility Micro-simulation Model Development.
78. Ibid.

GPS data from ride-sharing and micromobility companies:
Ride-sharing companies such as Grab, MyCar and EZCar, as well as micromobility providers such as Beam Mobility, OoGyaa Mobilti and Tryke, generate a vast amount of data on people's trips that can offer mobility insights for urban planning. The MaaS case study from Madrid (Box 5) highlights how alignment of interests is critical to data-sharing partnerships between public agencies and private ride-sharing and micromobility transport companies.

Companies may also share deidentified and anonymised data for environmental, social and governance (ESG) purposes. For example, Grab shares anonymised, aggregated data from their drivers' GPS under the OpenTraffic initiative at no cost, and the data can be used by urban planners for transport planning. Grab partnered with the Malaysia Digital Economy Corporation (MDEC) in 2017 to support urban transport planning via the OpenTraffic initiative.[79]

Digital transport fare payments data:[80]
Fare payments for public transport can add a layer of data to understand origin/destination, time and duration of trips. In cities offering MaaS solutions via a public sector agency with integrated transport payment for all modes of travel, payments data may provide additional insights on the travel patterns of private modes of transport, such as ride hailing, taxis and micromobility vehicles.

In rare cases, deidentified and aggregated data from credit card companies has been used to understand footfall patterns, as in 2020 when the London Datastore made a one-off purchase of data from Mastercard to assess the impacts of COVID-19 on mobility and spending in London.

Mobile big data:
Mobile operators hold both demographic data (e.g. age, gender, residence) and the call detail records (CDR) data of their mobile subscribers. CDR data is generated by mobile phone users as they connect to a mobile operator's cell towers. It has proven to be one of the most reliable and representative sets of data on people's location and movements. CDR data was invaluable during the COVID-19 pandemic when mobile operators around the world collaborated with governments to map and analyse population movement and the impacts of lockdown to predict and curb the spread of the virus.[81] Use cases for CDR data in urban mobility are growing (Box 9), and different mobile operators are at different stages of readiness for sharing this data for mobility planning. As an industry standard, mobile operators share data only once it is deidentified, randomised and aggregated. Data is generally processed in-house and then shared with third parties depending on their data needs, although in some cases third parties provide the data analytics service.

79. Grab. (10 April 2017). "Grab and MDEC along with World Bank Group launch OpenTraffic initiative in Malaysia to combat traffic woes".
80. GSMA. (2022). Innovative Data for Urban Planning: The opportunities and challenges of public-private data sharing partnerships.
81. GSMA. (2021). Utilising mobile big data and AI to benefit society: Insights from the COVID-19 response.

BOX 9

Mobile operator data for transport planning

While use cases for CDR data for urban planning have been emerging for years, the value of it for mapping mobility became clear during the COVID-19 pandemic. The GSMA worked with mobile operators and governments to use mobility insights from CDR data to support countries in controlling the spread of the virus. Mobile operator data provides mobility insights from population maps, which show the number of people in a location at a specific time. Updated regularly, these can provide a dynamic picture of population density. The data can also be used for origin-destination data to understand movement between regions and the average length of trips within regions.[82]

Increasingly, mobile operators are sharing this data to provide mobility insights for transport planning under commercial partnerships. For example, in 2020, mobile operator Telia announced a partnership with Ramboll to use their Crowd Insights Tool to support decision-making in transport planning and urban development in Finland. Before this, Telia's location data service provided anonymised, aggregated information on the movement of people to support government decision-making during the COVID-19 pandemic. The new agreement with Ramboll aims to use mobility data for transport, urban planning and tourism development projects led by both the public sector and private companies.[83]

In the UK, mobile operator Vodafone offers Vodafone Analytics, a tool that enables businesses and public sector agencies to understand mobility patterns for sustainable transport planning. Vodafone Analytics uses anonymised, aggregated location information generated from their network as mobile phones move around, as well as anonymised demographic data, such as age range or gender, to establish mobility patterns. Vodafone produces insights reports for third parties, including public sector partners, and provides data visualisations with their insights partners.[84]

Mobile operator O2 provided daily travel data so that the Office for National Statistics could supply robust and timely evidence for government policy during the COVID-19 pandemic in the UK. The company now offers O2 Motion, a product designed specifically to support urban mobility planning in the UK. O2 provides daily and weekly deidentified, randomised and aggregated data on mobility patterns in easily accessible formats, as well as insights and analysis. O2 has partnered with Transport for West Midlands and the Office for National Statistics to support urban transport planning.[85]

Typically, mobile operators conduct mobility data analytics in-house under commercial business models. However, during the COVID-19 pandemic, mobile operators shared their mobility insights with governments for social good.

82. GSMA. (2020). The role of AI for Impact in the fight against COVID-19: Mobile big data solutions to support decision makers.
83. Telia. (7 January 2021). "COVID-19 reshapes mobility – Telia and Ramboll to cooperate on utilizing mobile network data in transport and urban planning".
84. See: Vodafone Analytics.
85. Office for National Statistics. (2020). O2 Motion data gives ONS insight into mobility in the UK.

These sources of private sector data are increasingly supporting sustainable transport planning, and demand-side organisations such as urban and transport planners should be proactive in seeking data-sharing partnerships with organisations holding such data. However, they must be clear on the purpose of the data. More data is not the goal, as data sharing for a specific purpose is more likely to result in effective planning. The evolution of London Datastore's approach to data sharing during the COVID-19 pandemic is a good example of purpose-driven public-private data-sharing partnerships (Box 10).

BOX 10

Private sector data and the London Datastore

During COVID-19, the London Datastore and TfL realised they needed more than public sector data to understand the impacts of lockdown on mobility in the city. The London Datastore decided to use private sector data to map people's movements in the city and manage COVID-19. The following metrics were used:

- **Pedestrian activity** using Google's COVID-19 community mobility reports to understand visits to points of interest collected from the Google maps app and Android operating systems. GPS data was overlaid with points of interest to assess changes in traffic over time and share anonymised data by geographical location.
- **Mobility data** from Apple was collected through the Apple maps app and shared after being deidentified and aggregated.
- **Wi-Fi connection data** at points of interest provided by Purple, a company that provides guest Wi-Fi services at points of interest.
- **Anonymised and aggregated data** provided by the navigation app, City Mapper, on trips planned by users on the app.
- **Restaurant bookings** made on the OpenTable app.[86]

As data use cases have expanded, the Greater London Authority (GLA) has partnered with the Overseas Development Institute (ODI) to re-evaluate the London Datastore and is now in the process of replacing it with a Data for London Hub where both public and private sector data will be housed and used to support urban development projects. Instead of collecting a wide range of data, the approach will be to acquire private sector data based on the specific needs of a particular project. During COVID-19 lockdowns, for example, London City Hall and local councils combined open data with two private data sources – footfall data from mobile operators and aggregated data on spending from Mastercard – to understand the impact of the pandemic on spending. City Hall purchased the data from both companies.

The City of London has allocated GBP 500,000 (USD 592,000) for the GLA to build cloud-based infrastructure for the Data for London Hub with a technical partner.[87]

The GLA now enables data from infrastructure, utility and water companies to be shared through an infrastructure mapping app, minimising disruptions in the city.[88]

86. ODI. (2021). Greater London Authority Datastore – COVID-19: Mobility Report.
87. Wray, S. (30 June 2022). "Why London is pivoting its data approach". Cities Today.
88. Smart London. (8 January 2020). 10 years of the London Datastore and thinking on city data for the next decade.

BOX 11

Dedicated mobility behaviour analytics providers

Mobility behaviour data analytics companies such as MotionTag in Germany are offering dedicated insights on individual users' mobility preferences. MotionTag designs customised apps for their clients to assess mobility patterns, which are made available to segments of the public whose mobility behaviour is of interest. Sensing data from mobile phones is used to differentiate between many types of travel modes. Mobility behaviour is recorded on the apps and can be matched to modes of transport to derive mobility insights.

Under the GFCP, Betterpoints UK, a behaviour change organisation, developed an app that provides a household travel survey to residents of Melaka and Iskandar Malaysia to understand their mobility needs and behaviours. It also uses sensing data from technology already embedded in mobile phones to assess which transport modes are being used. Survey and sensing data have been combined to inform the GFCP's sustainable mobility and evidence-based transport planning interventions in both regions by enabling assessments of travel demand, trip length and preferred modes of transport that can be used for transport modelling.[89]

As highlighted in the previous section, open and public sector transport data, combined with mobility data from the private sector, can enable an integrated and sustainable transport system with infrastructure for active and micromobility transport modes, improved traffic flow and convenient, safe and efficient end-to-end public transport for urban residents.

However, these partnerships can be difficult to build when trust is low, coordination is complex and objectives are not aligned. Insights from our research highlighted six key elements needed to build successful public-private data-sharing partnerships (Figure 16).

Figure 16: Elements of successful public-private data-sharing partnerships

The demand-side organisation must articulate their data needs and link them to a clear objective.	The data-sharing business model should bring value to all potential partners and be sustainable.	The roles and responsibilities of each potential partner need to be well-defined.
Partners must have the technical capacity required to process and analyse data.	Limitations imposed by legal and regulatory frameworks need to be addressed.	Data governance in the partnership should be clear.

Source: GSMA AI for Impact toolkit & interviews.

89. GFCP. (n.d.). Undertaking a Household Travel Survey (HTS) in a Pandemic: A Smart Approach.

Defining clear objectives and building partnerships proactively

Public sector agencies and transport authorities need to have a clear goal for the use of private sector data and be proactive in building data-sharing partnerships. While there is no standardised approach to building public-private data-sharing partnerships, research by the GSMA AI for Impact[90] team on successful data-sharing agreements highlights the importance of aligned interests and the initiation of the data-sharing request by the public sector agency or donor organisation needing the data for planning.

Interviews conducted for this research suggested that government agencies in Malaysia are generally not proactive in building data-sharing partnerships and that private sector organisations have initiated them instead, which has limited the number of public-private partnerships (PPPs). Interviews also revealed that the processes associated with forming such partnerships, such as signing memorandums of understanding (MoUs) and non-disclosure agreements (NDAs) can be time consuming and slow the partnership-building process considerably.

Business models for data-sharing partnerships

Data-sharing PPPs require a clear business case to scale from pilots to longer-lasting agreements (Figure 17), and demand-side organisations need to be able and willing to invest in these partnerships. Business models vary, from data being offered pro bono to being shared as a commercial product. Depending on how the data will be used, private companies generally share deidentified, aggregated and randomised data under bilateral commercial agreements unless there are other mutually derived benefits from the data-sharing partnership.

Figure 17: Business models for data-sharing partnerships

Philanthropy	Donor-subsidised	Cross-subsidised	Tiered	Commercial
Pro bono data	Costs funded by donor	Costs covered by revenue from other projects	Free or trial based with elements paid for	Paid for product

Partnership sustainability criteria:

- Funding is not time-limited and is reliable;
- Long-term planning is possible;
- Mutually beneficial agreement that is a high priority for both partners; and
- Ways of working and responsibilities in the partnerships are clear.

Source: GSMA AI for Impact toolkit.

90. See: GSMA AI for Impact.

Malaysia has experienced significant political instability in recent years, creating concern in the private sector about the continuity of partnership agreements and investment after regime changes. This has been a deterrent to sustainable public-private data-sharing partnerships. Sustainable financing is critical to building long-term partnerships; otherwise, pilot projects cannot be scaled.

Technical considerations of data-sharing partnerships and data governance

Data processing and analytics capabilities are key to making data-driven policy decisions. Consultations with experts suggest that data processing and analytics capacities in the private sector in Malaysia need to be strengthened.

Effective use of data for urban transport planning requires interoperability and common data standards. The most widely used data standard for public transport data feeds is the Generalised Transit Feed Specification (GTFS) offered by Google,[91] which "defines a common format for public transport schedules and associated geographic information. GTFS feeds enable public transport agencies to publish their transit data, which developers can use to develop applications that consume that data in an interoperable way."[92] GTFS feeds can also be shared by transport agencies on their websites to publish transport schedules and can be easily converted for use with a GIS system to map public transport.

Modelled on the GTFS, the General Bikeshare Feed Specification (GBFS) was developed in the US in 2015 and has become widely adopted by bikeshare companies globally, enabling micromobility operators to share real-time information with end users via mobile apps.[93]

More recently, the Mobility Data Specification (MDS) is a set of APIs that enable local authorities to analyse data from private mobility providers such as car-sharing, dockless e-scooters, bicycles and mopeds.[94]

Meanwhile, public transport providers in Malaysia are building in-house platforms that are not interoperable. This task could be outsourced to technology companies with more expertise, leaving private concessionaires to focus on improving the quality of service based on insights from start-ups. Establishing common data standards for transport data would be extremely helpful in building more data-sharing partnerships and generating richer insights for transport planning.

In addition, when forming data-sharing partnerships, it is important to be clear on data ownership. In partnerships involving many parties or those that are time-restricted, data ownership needs to be established from the outset.

BOX 12

Pilot of the Smart Integrated Mobility Management System in Iskandar Malaysia

Under the GFCP, the framework and implementation plan of a Smart Integrated Mobility Management System (SIMMS) was developed in Iskandar Malaysia. SIMMS integrates GIS data on land use, demographic data and a variety of transport data to provide the local authority with updated visual representations of mobility at specific times. To ensure the system was representative and inclusive, it was developed through a consultative process that takes gender, equality and social inclusion into account.[95] The system offers a range of urban mobility benefits, such as improved traffic flow and reduced congestion, leading to lower carbon emissions.

The system also enables data-driven decision making for future mobility planning[96] and serves as a prototype for other cities embarking on the development of intelligent transport management systems.

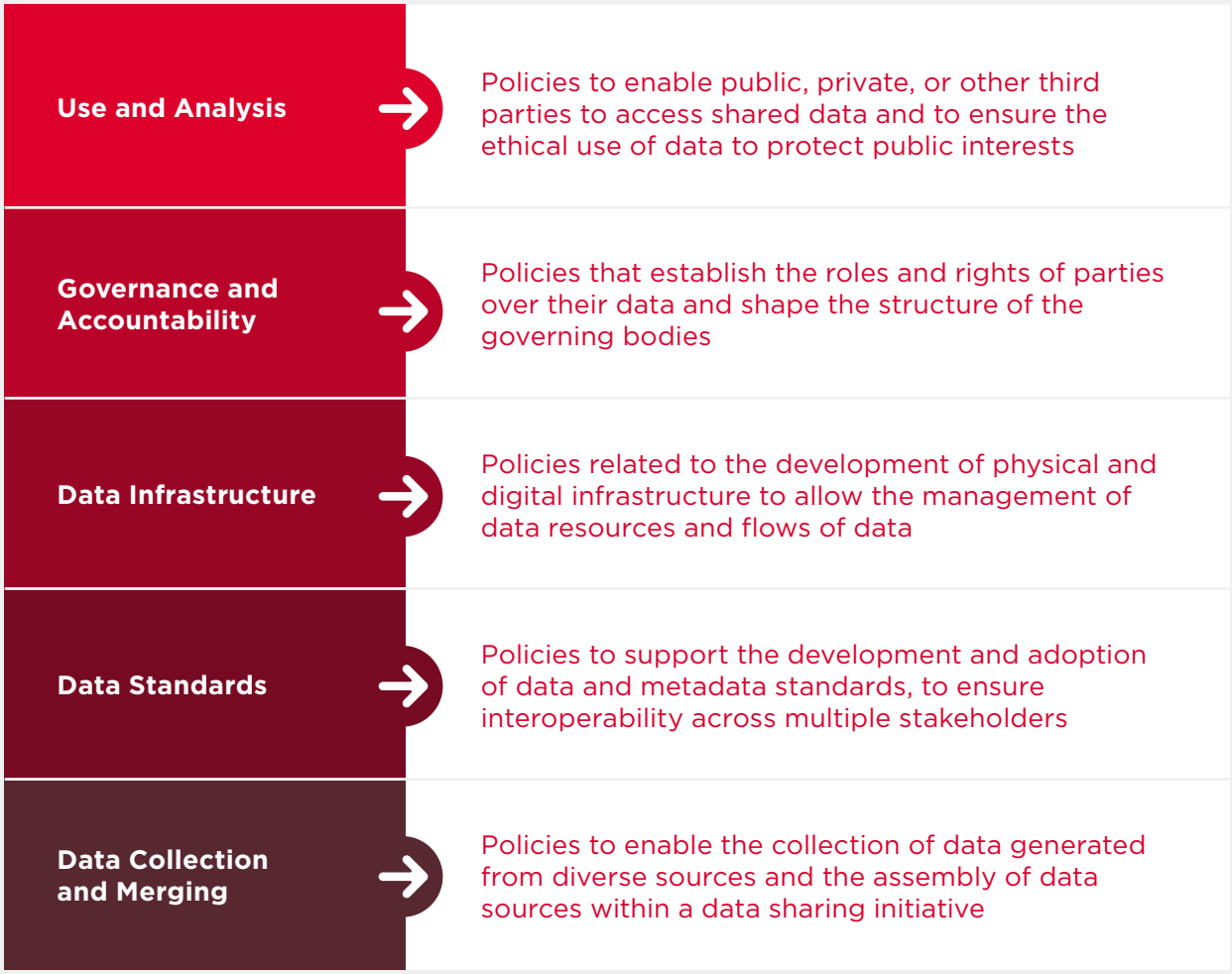
91. See: GTFS Static overview.
92. Ibid.
93. Shepard, S. (25 March 2021). "Mobility Data-sharing and Standards: Openness or Monopolies?" Autonomy Paris.
94. Ibid.
95. Koh, C. (5 November 2020). "How Malaysian cities can build back better after COVID-19". Intelligent Transport.
96. Ibid.

Regulations and data-sharing frameworks

Data-sharing frameworks and guidelines are essential to building the confidence of companies to share data. Where these are absent or unclear, companies are concerned they may inadvertently breach a data privacy law and be reluctant to share their data.

The SuM4All initiative has developed a framework that specifically guides public-private data-sharing partnerships for urban mobility (Figure 18). The framework calls for clear policies linked to five stages of data sharing: use and analysis; governance and accountability; data infrastructure; data standards; and data collection and merging.

Figure 18: SuM4All policy framework for data-sharing public-private partnerships in urban mobility (simplified)



Source: SuM4All, Sustainable Mobility: Policy Making for Data Sharing.

Recognising the challenges of public-private data sharing and trust issues, Singapore's industry regulators introduced the Trusted Data Sharing Framework in 2019 to build trust with companies and their customers to enable data sharing, drive innovation and improve public services. The framework presents specific use cases and partnerships between private companies and the public sector, serves as a reference tool and helps reassure companies that they are not breaching the PDPA.

These frameworks provide valuable guidance on building confidence in public-private data-sharing partnerships for urban development more broadly, and in the transport sector specifically. MAMPU in Malaysia has recently drafted a national data-sharing framework to facilitate data-sharing partnerships that is in the process of being approved. In addition, the Ministry of Transport may begin drafting a data-sharing framework for transport to build confidence in data-sharing partnerships in the sector. The intention to draft the framework was announced in 2020, but no further progress has been reported.

As more data-sharing partnerships for sustainable development and smart city development are formed, debates and conversations on the ethical use of data are becoming more and more relevant, with cybersecurity a central concern. While Malaysia ranks 8th out of 194 states in the International Telecommunication Union (ITU) 2021 Global Cybersecurity Index, private companies still have concerns, in part because the PDPA does not apply to government agencies and leaves private companies fully liable for data breaches.

However, a data breach not only has legal ramifications, but also impacts consumer trust. Data that companies hold on their customers must be deidentified, randomised and aggregated in quite specific ways to prevent identification.

3. Conclusion and recommendations

Given Malaysia's policy objectives to improve urban mobility and decarbonise the transport sector using digital technologies and big data, the following policy actions are recommended for the Ministry of Transport in collaboration with other federal, state and local authorities in charge of transport planning to enable evidence-based policymaking.

Objectives and capacity assessments	Regulations and frameworks	Coordination and stakeholder engagement	Partnerships and sustainable business models	Technical	Safety and Cybersecurity
Set clear, measurable transport objectives at the city level.	Establish a mobility data-sharing framework.	Increase coordination between federal, state and local agencies so there is clear ownership of policy agendas.	Be proactive in initiating data-sharing partnerships with companies depending on data needs, alignment of interests and due consideration of business models.	Launch transport data platforms at the city level, having assessed the capacity of local authorities.*	Continue to invest in cybersecurity and maintain the highest standards while building public trust in how their data is used for urban planning.
Conduct an infrastructure needs assessment at the city level.	Establish a data-sharing framework for public-private data-sharing partnerships to give private companies the confidence to share their data.	Empower state and local governments to drive transport planning.	Be clear on data governance when forming a PPP and on the data and infrastructure management plan once the partnership ends.	Promote interoperability and define common standards for transport data.	Ensure that all partnerships adhere to data protection standards. Data shared for big data analytics must be deidentified, randomised and anonymised.
Conduct a citizen engagement exercise for urban mobility to ensure transport objectives align with the needs of urban residents, especially the needs of women, people with disabilities, the elderly and lower-income segments.	Establish a regulation such as the PDPA for the public sector to give public sector officials more confidence to share data with clarity on legislation.	Identify and engage with private sector players who hold data for transport planning or technical experts who have the know-how to clean, integrate, map and analyse this data for insights.	Establish clear responsibilities for standardising, processing and delivering data insights for the various organisations/ consortium partners.	Ensure that partners have the technical expertise to process and analyse data.	
Identify key public and private sector data sources and data holders for urban mobility planning.		Establish collaboration with public transit providers and secure their buy-in to share data for urban planning with local authorities.	Ensure that successful pilots can be scaled with long-term financing.		
Assess the state of current technology and existing data-sharing initiatives for transport planning.			Ensure that political changes will not derail agreements and partnerships.		
Assess data analytics capacity in transport-related government departments and public transit operators to identify what upskilling is required.					

*The type of platform (open data or accessible only to authorised users) needs to be established based on the mobility objectives.

Malaysia has been proactive in adopting a wide range of digital and frontier technologies to ensure that cities are able to cope with rapid urbanisation, remain competitive and offer prosperity to urban residents.

In response to the challenge of high rates of private car ownership and unsustainable transport in cities, there are numerous data collection efforts to support more evidence-based urban planning, as well as the adoption of smart technologies and alternative fuels to decarbonise urban mobility. Malaysia's greatest challenges in improving urban mobility is the complex and uncoordinated top-down management of the transport system. Currently, many actors need to work in alignment to ensure better urban planning. Legacy infrastructure that is car-centred makes public, micro and active mobility modes difficult to integrate and low-density urban settlements difficult to serve with public transport.

If Malaysian states and cities were more empowered to develop integrated transport systems, the coordination challenges could be simplified and enable more agility in sharing, integrating and using data for transport policymaking. Working with data holders and strong technical partners will also accelerate the development of data platforms – if regulations are conducive and data-sharing frameworks have been drafted to provide guidance.

Even cities that are at the early state of adopting new mobility solutions can begin to plan how they can integrate and use technology and data better for mobility planning. It is imperative to do so both due to the profound knock-on effects that urban mobility has on health, safety, air pollution and the quality of life of urban residents and also on the costs to the city in productivity losses and health costs of poorly developed urban mobility systems. More efficient mobility systems lead to better and more equitable access to jobs and education. And evidence from advanced smart cities in Europe and elsewhere indicates that investments in green mobility, a shift to public transport and a reduction in private car use have yielded manifold returns in cost savings as well as urban well-being. Malaysia's transition to a high-income economy will be challenging unless it ensures its urban mobility systems, which impact more than two-thirds of its population, are sustainable, efficient, equitable and safe, and its cities need to act now to invest in this transformation.

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Collaborative Research in Engineering, Science and Technology

Universities

Universiti Teknologi Malaysia

Universiti Tenaga Nasional

Private companies

Digi

Maxis

Celcom

Forest Interactive

Socar Mobility Malaysia Sdn Bhd

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AsiaMobiliti

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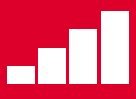
GSMA Head Office
1 Angel Lane
London
EC4R 3AB
United Kingdom
Tel: +44 (0)20 7356 0600
Fax: +44 (0)20 7356 0601