

*Prosperity Fund*

GLOBAL FUTURE CITIES PROGRAMME

# ISKANDAR MALAYSIA

CITY CONTEXT REPORT



Foreign &  
Commonwealth  
Office

**UNHABITAT**  
FOR A BETTER URBAN FUTURE



*Prosperity Fund*

GLOBAL FUTURE CITIES PROGRAMME

# ISKANDAR MALAYSIA

CITY CONTEXT REPORT

December 2018

UNITED NATIONS HUMAN SETTLEMENTS PROGRAMME  
P.O. Box 30030, Nairobi 00100, Kenya  
www.unhabitat.org

**Funded by:** United Kingdom Foreign and Commonwealth Office (UK FCO)  
**Lead executive agency:** UN-Habitat: Urban Planning and Design Lab  
**Academic partner:** International Growth Center (IGC)  
**Professional partner:** United Kingdom Built Environment Advisory Group (UKBEAG)

### **Disclaimer**

The designations employed and the presentation of material in this report do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or regarding its economic system or degree of development. The analysis conclusions and recommendations of this publication do not necessarily reflect the views of the United Nations Human Settlements Programme or its Governing Council or its member states. Reference of this publication of any specific commercial products, brand names, processes, or services, or the use of any trade, firm, or corporation name does not constitute endorsement, recommendation, or favouring by UN-Habitat or its officers, nor does such a reference constitute an endorsement of UN-Habitat.

### **Acknowledgments**

City context report coordinators (Iskandar Malaysia) Charlotte Mohn, Stephanie Gerretsen, Riccardo Maroso (UN-Habitat)

#### **United Kingdom Foreign and Commonwealth Office (UK FCO)**

Project Management	Elizabeth Milsom
Kuala Lumpur Office	Carol Koh

#### **United Nations Human Settlements Programme (UN-Habitat)**

Project Coordination	Laura Petrella
Project Manager	Rogier van den Berg
Project Supervisors	Klas Groth, Naomi Hoogervorst

Local City Specialist	Mariana Mohamed Osman
-----------------------	-----------------------

#### **Urban Planning and Design LAB**

Niina Rinne, Jonathan Weaver, Sara Thabit, Gabriela Aguinaga, Dongni Niu, Riccardo Maroso, Charlotte Mohn, Ban Edilbi, Jean-Noé Landry, Katherine Cashman, Princesse Samba, Yabework Kifetew, Nadia Mourid, Yumi Neder, Stephanie Gerretsen, Shegufta Nawaz, Helen Yu, Francesco Tonnarelli

#### **The International Growth Center (IGC)**

Project Coordination	Astrid Haas
----------------------	-------------

#### **Contributors**

Priya Manwaring, Victoria Delbridge, Michael Blake, Oliver Harman, Shah Rukh, Sebastian Kriticos

#### **United Kingdom Built Environment Advisory Group (UKBEAG)**

Project Coordination and Strategic Advisor	Peter Oborn
Project Lead	Adrian Mallesom
Contributor and City Visiting Expert	Camilla Ween

# CONTENTS

<b>GLOBAL FUTURE CITIES PROGRAMME</b>	<b>4</b>
<b>Introduction</b>	<b>4</b>
About The Global Future Cities Programme	
Intervention Development and Validation	
The City Context Report	
<b>Iskandar</b>	<b>9</b>
General Context	
Problem Statement	
introduction to the Intervention	
<b>URBAN ANALYSIS</b>	<b>12</b>
<b>Spatial Analysis</b>	<b>12</b>
Land Usage	
Mobility System	
Unsustainable Trends	
Iskandar Malaysia Urban Observatory (IMUO)	
<b>Financial Analysis</b>	<b>18</b>
Municipal Capacity	
Financing Mechanisms for data	
<b>Legal Analysis</b>	<b>20</b>
Governance Structure and Planning Hierarchy	
Intergovernmental Transport and Planning Coordination	
Road Network Administration	
Interventions' alignment to existing plans and policies	
Legal framework for Data Management	
Short-term outcome	
Mid-term Outcome	
<b>INTERNATIONAL ALIGNMENT AND TECHNICAL RECOMMENDATIONS</b>	<b>23</b>
<b>Potential Impact</b>	<b>23</b>
<b>Contribution to Sustainable Urban Development</b>	<b>24</b>
Long-term Potential impact	
2030 Sustainable Development Goals	
New Urban Agenda Alignment	
Alignment with Cross-Cutting Issues and the Prosperity Fund	
<b>Success Factors</b>	<b>28</b>
Spatial Considerations	
Financial Considerations	
Legal Considerations	
<b>ENDNOTES</b>	<b>32</b>

# GLOBAL FUTURE CITIES PROGRAMME

## Introduction

### ABOUT THE GLOBAL FUTURE CITIES PROGRAMME

In 2015, the UK government created a new Cross-Government Prosperity Fund worth £1.3 billion from 2016-2021, in order to help promote economic growth in emerging economies. Its broad priorities include improving the business climate, competitiveness and operation of markets, energy and financial sector reform, and increasing the ability of governments to tackle corruption.

Emerging Economies still face considerable challenges such as uncontrolled urbanisation, climate change and high and persistent inequality which can lower long-term growth prospects. The Prosperity Fund supports the broad-based and inclusive growth needed to build prosperity and reduce poverty, but also make development overall more sustainable through the strengthening of Institutions and Improvement of the global business environment.

The Global Future Cities Programme (GFCP) is a specific component of the Prosperity Fund which aims to carry out targeted interventions to encourage sustainable urban development and increase prosperity whilst alleviating high levels of urban poverty. The programme will also create significant short and long-term business opportunities in growing markets, forecast to be regional growth hubs, including for UK exporters who are world recognised leaders in urban innovation.

The overall strategy of the Global Future Cities Programme is to deliver the Programme in two phases; a strategic development phase (2018), followed by an implementation phase (2019-2021). UN-Habitat, in collaboration with the International Growth Centre (IGC) and the UK Built Environment Advisory Group (UKBEAG), has been mandated by the UK Foreign and Commonwealth Office (UK FCO) to develop and undertake the strategic development phase. This in turn, will, inform and shape the implementation phase,

and collectively provide further evidence for the overall programme.

The Programme builds upon a coherent series of targeted interventions in 19 cities across 10 countries, to support and encourage the adoption of a more sustainable approach to urban development. In general, the proposed interventions aim to challenge urban sprawl and slum developments, thereby promoting more dense, connected and inclusive cities that in combination contribute to prosperity, achieving the Sustainable Development Goals (SDGs) and implementing the New Urban Agenda (NUA).

The Global Future Cities Programme builds upon three integrated pillars, that will address key barriers to prosperity, in selected cities:

- **Urban planning** – technical assistance for spatial restructuring (Public space, Heritage and urban renewal, Urban strategies and plans, Data systems for integrated urban planning);
- **Transportation** – technical assistance to support cities to develop integrated transport systems (Multi-modal mobility strategies and plans, Data systems for multi-modal mobility);
- **Resilience** – technical assistance to develop strategies to address the impact of climate change and ensure development is sustainable (Flood management plans and systems).

In order to capitalize on the proposed interventions and to ensure sustainability and impact in a longer-term perspective, the programme has a strong focus on technical support and institutional capacity development.

In many of the interventions, there is a particular focus on the potential of embedding smart/digital technology and data analysis platforms in urban governance and management processes. Integrating smart technologies is recognized as an instrumental area that significantly can improve the efficiency in the provision of key infrastructure services, enhance urban resilience, support evidence-based plans and strategies and promote integrated planning approaches across sectors.

### INTERVENTION DEVELOPMENT AND VALIDATION

Based on initial scoping studies and government-to-government engagement carried out by UK FCO, the UN-Habitat team worked with partner local authorities and wider stakeholders to corroborate their city development strategies, and to confirm, enhance and develop the intervention proposals.

In each city, a Local City Specialist, supported by the national and regional country offices of UN-Habitat



and in liaison with the FCO local posts, took the lead in identifying stakeholders in a series of bilateral meetings, interviews and focal group discussions. This has collectively gathered information and provided more detailed knowledge and information on the City's visions and goals.

Based on this initial phase, a Charrette (planning workshop) involved high-level decision-makers from the public and private sectors together with civil society representatives. This facilitated discussion on the proposed and possible alternative interventions, related individual interests, technical opportunities and constraints, as well as political objectives. The outcome of the Charrette provided clarity on where stakeholders stand in relation to the strategic potential of the discussed projects and it allowed for the mobilisation of support.

At the same time, the Charrette allowed for the technical teams to proceed with the development of a Terms of Reference, outlining the specific scope and activities of each intervention. A final Validation Workshop assured consensus on the proposed projects and document's endorsement by the authorities.

Parallel to preparing the Terms of Reference, an evaluation of the interventions was initiated, aiming to address its feasibility within the local strategic context, identify potential impact on prosperity barriers and to explore the optimal delivery models. This process resulted

in a set of City Context Reports as well as an analysis of the technical viability of the interventions. The analysis aimed at both informing the development of the Terms of Reference and the future implementation phase of the Programme.

## THE CITY CONTEXT REPORT

### Objectives

A City Context Report is provided for each city of the Global Future Cities Programme. It serves as a tool to frame the proposed Programme interventions within the characteristics and pre-conditions of each city.

The Report targets a variety of stakeholders in the Programme: administrators, city managers, policy makers, legislators, private sector actors, donors, and local as well as international researchers and knowledge generators. The Reports also provide UKFCO the contextual setting of each proposed intervention, and can in addition, be used by the Service Providers as an entry point for the implementation phase.

By addressing the specific challenges facing each city, the Report illustrates how the interventions can work towards inclusive prosperity and sustainable urban development. The benefits of each intervention, however, cannot be achieved without certain enabling conditions to ensure its success. Therefore, critical aspects for the delivery of the proposed interventions and its success from a long-term perspective are outlined. Using thematic

best practices and evidence from global learnings and research, contextualised recommendations are provided on the conditions necessary for the intervention to be viable and to reach a maximum impact.

Essentially, the City Context Report serves to ensure that all actors within the Global Futures Cities Programme are aware of the specific conditions to be considered in the delivery of the proposed interventions, on a case-by-case basis.

### Set-up and Scope

The first part of the City Context Report (General Overview) provides an overview of the Global Future Cities Programme and introduces the city from the perspective of the urban challenge which the proposed intervention intends to address.

The second part of the Report (Urban Analysis) more critically and technically analyses a selection of factors which need to be considered or to be in place for the intervention to succeed, addressing its feasibility, potential impact on prosperity barriers from a long-term perspective.

The third part of the Report (International Alignment and Technical Recommendations) presents short- and mid-term expected outcomes as well as long-term potential impacts. It further elaborates the contribution of the intervention to the achievement of the SDGs and the implementation of the New Urban Agenda as well as the programme objectives of the Prosperity Fund.

As the City Context Report is tailored directly to the Programme interventions, the analysis does not aim to comprehensively present all aspects of urban development. It does not elaborate on long term planning and transformation strategies, the effectiveness of policy or urban legislation, nor the entire municipal financial system. As such, it also excludes urban policy recommendations.

However, the Report has the scope to illustrate the general capacity of the city for project delivery, and in this regard, make recommendations to support implementation of the interventions and reaching set goals. The City Context Reports will be part of knowledge management for the Programme to generate local information and data on the cities as well as identify gaps in knowledge, systems or governance.

### Methodology

#### Urban Analysis

The City Context Report provides a general analysis of the spatial, financial and legal conditions in the city that

can either facilitate or hinder the implementation and the long-term sustainability of the proposed interventions in transport, resilience and urban planning.

This framework follows UN-Habitat's three-pronged approach, recognising the three essential components for a successful and sustainable urbanisation: 1. urban planning and design; 2. urban economy and municipal finance; 3. urban legislation, rules and regulations.

Firstly, the spatial analysis describes the existing urban context specific to the intervention. Urban mobility systems, vulnerability of the built environment, spatial form and trends are considered as possible challenges in urban management that the intervention can address.

Secondly, the financial analysis aims to identify the mechanisms in place by which the intervention could be sustainably financed in the long-run. This section outlines the city's municipal capacity, existing regional, national and international financial ecosystem and existing financing mechanisms at the municipal level.

Thirdly, from a legal perspective, the Report critically analyses how the intervention could be facilitated or challenged by the vision of the city and its governance hierarchy. Enablers and obstacles resulting from any relevant legislation, as well as sectoral frameworks (e.g. strategies, policies, planning frameworks and development plans, detailed plans of relevance) are also described.

This approach aims to offer implementing partners, stakeholders and donors a general context of the city and, with it, demonstrate the appropriateness of the intervention from a spatial, financial and legal point of view, while at the same time informing about potential barriers and enablers for its implementation.

#### Potential Impact to the Program Objectives and the SDGs

The Report also outlines the potential impact of the interventions, based on the specific activities and outputs proposed. Impact can arise from a complex interaction of context-specific factors, rather than as result of a single action, which makes it difficult to empirically quantify longer-run effects that go beyond the identification of program outputs. An empirical, comprehensive impact assessment is therefore not part of the scope of this report.

Nevertheless, the report outlines potential benefits that are only achievable under certain preconditions and activities. Thereby, short-, medium- and long-term outcomes are defined with reference to a project-cycle approach, which considers all the project phases from



*Planning and Design through Building, to Operating and Maintaining.*

Short-term outcomes are directly achieved through the implementation of the technical assistance support, within the 2-3 years scope of the Global Future Cities Program.

Mid-term outcomes are only realised once the intervention is executed through either capital investment, implementation of pilot projects or the actual enactment of legal documents, plans or masterplans, within a possible timeframe of 3 to 7 years.

The broader long-term impact of the interventions is linked to the sustainability of the interventions in a 7-15 years timeframe and relates to the operation and maintenance phase of the project cycle.

The City Context Reports further connect potential impacts to the Programme's objectives, taking into account also the Cross-cutting issues at the core of UN-Habitat's mandate from the UN General Assembly. Consequently, the Programme's objectives are summarized into five principles:

- Climate Change;
- Gender Equality;
- Human Rights;
- Youth;
- Sustainable and Inclusive Economic Growth.

Cross-cutting issues are addressed with explicit reference to the 2030 Sustainable Development Goals (SDGs) and the New Urban Agenda, in an attempt to ensure that the proposed interventions are in line with the design, implementation, review and success of the 2030 Agenda for Sustainable Development. Consistent with UN-Habitat's mandate, the SDG 11 Sustainable Cities and Communities is linked with the urban dimension of the other 16 goals as an essential part of the localisation of the SDGs. In this way, interventions can support localisation processes, to support local ownership and ensure SDG integration in sub-national strategies and plans.

#### Technical Recommendations and International Best Practices

The interventions proposed in the various cities of the Global Future Cities Programme were grouped into clusters according to their thematic entry-point, as an elaboration of the thematic pillars of Urban Planning, Transport and Resilience.

These clusters are:

- Public space
- Heritage and urban renewal
- Urban strategies and plans
- Data systems for integrated urban planning
- Multi-modal mobility strategies and plans
- Data systems for multi-modal mobility
- Flood management plans and systems

Combining the international experience in urban policy and project implementation of UN-Habitat and the leading academic research of IGC, each cluster was analysed to offer evidence-based recommendations for a successful Implementation and a maximised impact of the intervention. Specific reference was given to implemented plans and international best practices.

The recommendations inform the Planning and Design phase which coincides with the timeframe of the Global Future Cities Programme, and always aim for long-term sustainability of the interventions.



Fig. 1. Johor Bahru (Source: Flickr)

# Iskandar

## GENERAL CONTEXT

Designated as a catalyst development corridor, Iskandar Malaysia is one of Malaysia's fastest growing areas in terms of population and economic activity. By 2025, the population is expected to have doubled from 1.6 million in 2006 to 3 million, whilst GDP is expected to grow at an annual rate of change of over 7%.<sup>1</sup> Established in 2006, Iskandar Malaysia was largely funded by the federal government's investment arm, Kazanah Nasional Berhad. As an initial start-up fee, the government provided 6.83 billion MYR to develop the region's infrastructure, while total investments are expected to reach 176 billion MYR. The objectives for Iskandar Malaysia's establishment were to strengthen Malaysia's economic competitiveness and improve the quality of life for its citizens.

Iskandar Malaysia covers approximately 2,300km<sup>2</sup> of land, which is roughly three times the size of Singapore and composes about 12% of the State of Johor.

The region is administered by five local authorities, namely Johor Bahru City Council (Majlis Bandaraya Johor Bahru (MBJB)), Johor Bahru Tengah Municipal Council (Majlis Perbandaran Pasir Gudang (MPJBT), Pasir Gudang Municipal Council (Majlis Perbandaran Pasir Gudang (MPPG), Kulai Municipal Council (Majlis Perbandaran Kulai (MPKu), and Pontian District Council (Majlis Daerah Pontian (MDP).

Under the 2007 IRDA Act (Act 664), the Iskandar Regional Development Authority (IRDA) was established as a federal government statutory body to oversee the development of Iskandar Malaysia. Act 664 assigns IRDA the power to facilitate the planning and implementation of spatial and economic development programmes in support of the vision for Iskandar Malaysia to become a strong and sustainable metropolis. IRDA liaises the administrative responsibilities among the federal and state governments and the five local authorities, while creating economic planning clusters and monitoring and aligning different sector developments. For this purpose,

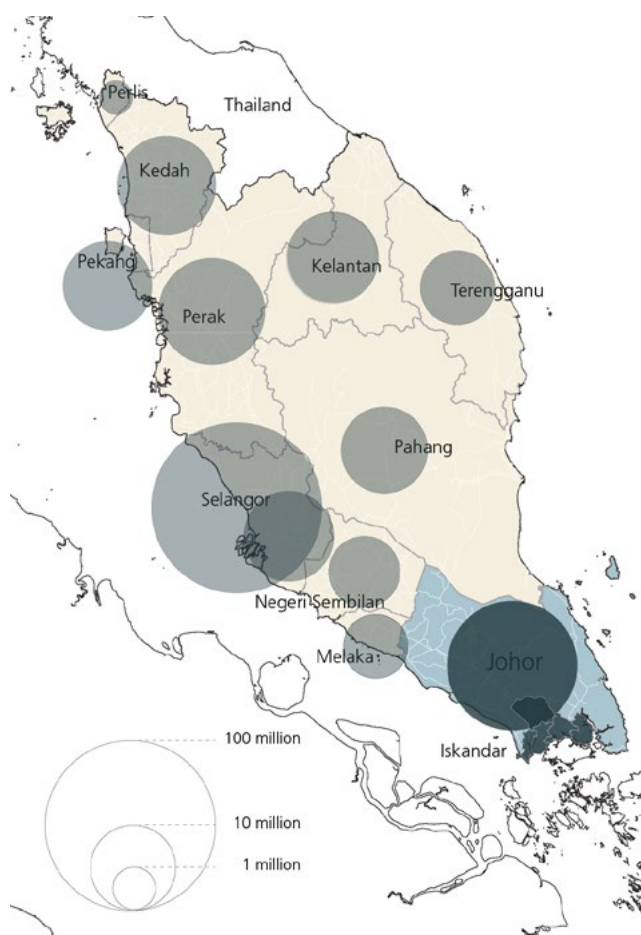


Fig. 2. Malaysian States by population

Indicator	2006	2025	Annual rate of change (%)
Population (Mil)	1.6	3.0	4.63
GDP per capita (PPP) in USD	14,790	31,100	5.78
Labour Force (Mil)	0.62	1.46	7.00
Employment (Mil)	0.61	1.43	7.00
Projected growth 2006 to 2025			

Fig. 4. Iskandar data (Source: Iskandar Malaysia Blueprint Agenda, Transport)



Fig. 3. Iskandar Malaysia's location within Johor State

IRDA has formulated a Comprehensive Development Plan (CDPii) and several sectoral blueprints, including the Transportation Blueprint 2010-2030 and the Low Carbon Society Blueprint for Iskandar 2025.

Due to its strategic geographical location, as the southern gateway to Malaysia and neighbouring Singapore, Iskandar Malaysia is well positioned to increase its transboundary economic activity. The economic corridor is expected to attract approximately 176 billion MYR (over 40 billion in 2018 USD) in foreign investment. The economic region is divided into five flagship zones. Each flagship zone is a priority area for major investments and new developments including industrial parks, education hubs, health parks, and so on. The five development zones are comprised of Johor Bahru City Council (JBCC), Nusajaya, Tanjung Pelepas, Pasir Gudang-Tanjung Langsat, and Senai Kulai. Figure 5 provides an overview of the primary activities and promoted economic clusters within each development zone.

<b>JBCC</b>	<ul style="list-style-type: none"> <li>• RIREBS – financial, real estate, and business services</li> <li>• Tourism – cultural and heritage tourism</li> </ul>
<b>NUSAJAYA</b>	<ul style="list-style-type: none"> <li>• Education</li> <li>• Healthcare</li> <li>• Tourism – destination tourism</li> <li>• RIREBS – real estate and business services</li> </ul>
<b>TANJUNG PELEPAS</b>	<ul style="list-style-type: none"> <li>• Transportation, distribution, and logistics</li> <li>• Petrochemical</li> </ul>
<b>PASIR GUDANG-TANJUNG LANGSAT</b>	<ul style="list-style-type: none"> <li>• Food Processing</li> <li>• Petrochemical, oil, and gas</li> <li>• Education</li> </ul>
<b>SENAI-SKUDAI</b>	<ul style="list-style-type: none"> <li>• Transportation, distribution, and logistics</li> <li>• Manufacturing</li> <li>• Education</li> <li>• Tourism</li> </ul>

Fig. 5. Iskandar Malaysia's flagship zones and promoted economic clusters  
(Source: Iskandar Regional Development Authority (IRDA), 2014)

## PROBLEM STATEMENT

By 2040, 95% of Iskandar Malaysia's population is expected to be urbanised.<sup>2</sup> However, Iskandar Malaysia's rapid economic and population growth are compromising sustainable urban development. Heavy real estate investments beyond the current housing demand is causing drastic levels of urban sprawl. Although the population is expected to double between 2016 and 2024, the population density is expected to drop from 20 to 12 persons per hectare.<sup>3</sup>

These unsustainable urban development patterns are putting immense pressure on Iskandar Malaysia's physical infrastructure. The mobility system both crossing into Singapore and throughout the rest of the region, is experiencing substantial levels of congestion. All major transportation corridors in Iskandar Malaysia are projected to be three times more congested and the volume on the roads is 1.5 times more than their carrying capacity load.<sup>4</sup> Relaxed loan approval processes, low interest rates, and subsidised petrol prices have lowered the barriers to private car ownership to the point where it is third highest in the world. Due to these and other more cultural factors, citizens opt to use private transport, which contributes to immense traffic congestion. In Iskandar Malaysia, private transport accounts for 70% of the overall transport.

The current inefficiencies of the mobility system are a cause of concern, economically, environmentally and socially. High reliance on private motorised transport infringes on productivity due to time and money lost travelling and moving goods. Greenhouse gas (GHG) emissions, particulate matter, air, and noise pollution are creating a stressful and unhealthy urban environment. Furthermore, a lack of accessibility and connectivity is heightening social exclusion particularly for those who cannot or do not drive.

Although Iskandar Malaysia is heavily investing in public transport, for example through the introduction of a Bus Rapid Transit (BRT) system and the development of a mobility planner application, there is a remaining need to optimise the road network. To prevent the continuation of road expansions, traffic needs to be managed and planned more effectively. Operational management and long-term planning require a reliable database that enables planners to find evidence-based solutions to the urbanisation challenges of Iskandar Malaysia.

## INTRODUCTION TO THE INTERVENTION

To respond to the challenges outlined above, two interventions are being proposed for Iskandar Malaysia, namely **Intervention 1: Implementation Strategy for Iskandar Malaysia's Smart Integrated Mobility Management System**, and **Intervention 2: Enabling Data Utilisation and Data Management for Evidence-Based Urban and Transport Planning**.

Intervention 1 comprises the development of an **Implementation Strategy for Iskandar Malaysia's Smart Integrated Mobility Management System (SIMMS)**, which belongs under the mandate of the Public Transport Corporation of Johor (PAJ). The Implementation Strategy for SIMMS, will be an evidence-based guide for the phased implementation

of all hardware and software components of SIMMS. Furthermore, the intervention will be supported by capacity building to ensure its sustainability, and by proposals for a regulatory framework and an operational/business model for SIMMS.

The proposed SIMMS will be designed to serve as a key foundation for a sustainable mobility system in Iskandar Malaysia by supporting day-to-day traffic operations as well as long-term transport planning. Once implemented, SIMMS will use real-time data collected and disseminated by a supporting hardware infrastructure of computer, electronics, and communication technologies, to manage road traffic in an integrated manner. SIMMS will link in with existing mobility applications, for example in public transport. It will provide traveller information to improve safety, increase the efficiency and optimise the utilisation of the overall road network. SIMMS will provide Iskandar Malaysia with additional capacity to monitor and thereby better manage the potential transportation and mobility impacts caused by rapid growth.

In addition to operational real-time management, SIMMS will also be designed to collect data to support evidence-based urban and transport planning. The intervention will examine the potential of utilising smart/digital technologies and data analysis to assess the impact of traffic movement on the environment and quality of life of residents. Assembled data will be shared with the Iskandar Malaysia Urban Observatory (IMUO) for analysis and utilisation in planning decision-making processes. By providing a shared mobility management platform, SIMMS will enable the IMUO, PAJ, different local authorities and operators to collaborate on using smart technology and data analysis to make the mobility system more user-centric through improved travel times, reduced travel costs, improved law enforcement and so forth.

The desired outcome of the intervention is to improve accessibility and connectivity for all by reducing trip lengths and costs, facilitate economic development, improve social equity and quality of life, promote greener mobility and trigger a modal shift away from private motorised transport.

In order to ensure the effective utilisation of the data collected by SIMMS, as well as through other sources, Intervention 2 is focused on **Creating Enabling Conditions for Data Utilisation and Management for Evidence-based Urban and Transport Planning**. The intervention will improve capacity in Iskandar Malaysia to use smart technologies and data analysis to inform future spatial and transportation plans. It connects directly with the Iskandar Malaysia Urban Observatory (IMUO) by creating a framework and

building the necessary capacity to enable the integrated use of data across sectors and authorities.

A comprehensive approach will be necessary that encompasses a broad set of enabling conditions including proposals for technical requirements, capacity building, regulatory and institutional frameworks, operational and business model and so forth. By creating conditions in which responsibilities are clearly assigned, and suitable channels of communication between data users and data providers have been established, the intervention will enable data-driven improvements to the planning process and its outcomes.

Once adequate frameworks have been designed, a major component of the intervention will be training and capacity building to enhance the knowledge and technical skills of relevant stakeholders. This is highly important to ensure the sustainable development of Iskandar Malaysia, as it will enable effective decision making in the growing mobility and urban planning challenges in the development corridor. Capacity building will also create opportunities for Iskandar Malaysia officers and related stakeholders to become advocates for the exemplary use of data and technology in evidence-based planning.

### Main Stakeholder

- Iskandar Regional Development Authority (IRDA)
- Public Transport Corporation of Johor (Perpandanan Pengangkutan Awam Johor (PAJ))

### Possible Project Partners

- Iskandar Malaysia Urban Observatory (IMUO)
- Malaysia Industry-Government Group for High Technology (MIGHT)
- Transport operators
- Local authorities
- Think City

### Thematic Cluster

- Multi-modal mobility strategies and plans
- Data systems for multi-modal mobility

### Keywords

Smart mobility, Mobility management, Inter-modality, Evidence-based planning, Data systems

# URBAN ANALYSIS

## Spatial Analysis

### LAND USAGE

Since the establishment of Iskandar Malaysia, there has been a substantial shift in the region's spatial pattern and urban landscape largely due to the influx of investments in the area.<sup>5</sup> For example, in 2006, only 13% of the region was considered an urban area. However, by 2010, the urban area expanded to 24%.<sup>6</sup> The rate of urban growth transformed former open spaces, agricultural-designated land, informal settlements, and so on into areas dedicated to public housing projects, commercial and industrial land uses, and recreational areas across the five flagship zones.

Moreover, in Iskandar Malaysia, the Urban Growth Boundary (UGB), which is a tool used to manage urban growth within designated boundaries among utilities and other development policies, composes 48% of the urban development and urban use for parks, open spaces, community facilities, infrastructure, etc. Currently, 64% of Iskandar Malaysia is composed of existing built-up area, 11% identified as a priority area for immediate development for new land uses,<sup>7</sup> and 25% is dedicated to a future urban footprint to make up an approximate 107,000 hectares. Urban sprawl in the city has and will continue to make it difficult for many parts of the city to be serviced and benefit from a collective transport system. At the same time, it also increases the risks for urban development to be centred around the private car and for continuous expansion of the road network.

### MOBILITY SYSTEM

#### Transportation agenda

Within Iskandar Malaysia's Blueprint Agenda, 649 initiatives were identified and divided into four categories of initiatives (e.g. policies, compliance to guidelines, programme/project implementation, awareness/

training) and then consolidated into 11 agendas, one of which is the transport agenda. The transport agenda seeks to increase network connectivity and public transport efficiency, improve public transport, regulate private transport, and improve the smart development of transit and land through transit-oriented development (TOD). A list of priority projects for 2015 listed in the Blueprint Agenda are compiled in Figure 7.

No.	Project	Description of Initiatives
1	Implementation of TOD	Policy and implementation guidelines
2	Logistics and facilities enhancement of logistic facilities	E-logistics framework
3	Bicycle lane in new road layout to promote healthy lifestyle	Pedestrianisation and bike sharing facilities
4	Water Taxis/Ferry	Conduct feasibility study on domestic water taxi
5	City bus coverage (BRT)	BRT Implementation Plan
6	Heavy Truck Zone and truck routes	Implementation of truck routes and zoning

Fig. 7. List of priority projects for Iskandar Malaysia's transportation agenda  
(Source: Iskandar Malaysia Blueprint Agenda)

### Public Transportation

Iskandar Malaysia's public transport network is based on the Integrated Land Use Blueprint Study in conjunction with the planned investments in road infrastructure, traffic modelling, and the predetermined road network through the economic zone. A masterplan prepared by IRDA, promotes a high quality, multi-modal transit system based on a BRT network, rail-based and water-based transport. Aligning transport with urban planning, the masterplan also focuses on TODs.

Presently, commuting by public transport throughout Iskandar Malaysia is inefficient due to the poor services and lack of a reliable schedule. The public transport service of the major city Johor Bahru is managed by a handful of private bus companies operating along the most profitable routes. Informal mini-buses feed main routes by operating ad hoc services, collecting 10 passengers at a time.<sup>8</sup>

With the implementation of the Bus Rapid Transit (BRT) system, IRDA aims to establish a more formal and efficient public transportation network throughout Iskandar. The BRT system would include bus lanes, transport terminals, various stations and interchange, integrated ticketing and mobile transaction system, etc. Throughout the five economic zones, eleven BRT corridors have been identified.

In addition to the BRT developments, IRDA has also initiated the implementation of a Mobility Management System. The regional authority recognises the importance of raising awareness and changing travel behaviour. Thus, the first component of the Mobility Management System is incorporating a mobility planner application that is primarily focused on improving public transport passengers' experience such as providing better information.

No.	BRT Routes
1	Skudai
2	Tebrau
3	Nusajaya
4	Pasir Gudang
5	Permas-Sri Alam
6	Tun Aminah-Tg. Kupang
7	Seelong-Kempas
8	Pulai-UTM
9	Mount Austin
10	Pekan-Nanas-Link2
11	Senai-Masai

Fig. 8. List of the eleven BRT corridors throughout Iskandar Malaysia  
(Source: Iskandar Malaysia Blueprint Agenda)

## Road Accessibility

Several major highways such as the North-South Expressway, which leads via Melaka to Kuala Lumpur, the Johor Bahru Causeway and the Second Link Expressway, connect Iskandar Malaysia to districts within the State of Johor and states across Malaysia. However, within Iskandar Malaysia and near the border crossing into Singapore, all major road corridors are experiencing high levels of traffic congestion, which is expected to triple, if nothing changes.

Urban highways and roads also experience high rates of traffic congestion with limited pedestrian provisions. The City of Johor Bahru is linked by a system of urban highways with minimal connectivity to ancillary developments.<sup>9</sup> Despite the improvements to current road networks and construction of new roads, several corridors are still negatively impacted by immense traffic congestion and reduced Levels of Service (LOS).

Affected corridors include Senai/Skudai-Johor Bahru City Centre corridor via Jalan Skudai, Pasir Gudang/Tanjung Langsat-Johor Bahru City Centre corridor via Jalan Tebrau/Pasir Gudang Highway, in addition to areas that are located outside of the Outer Ring Road.

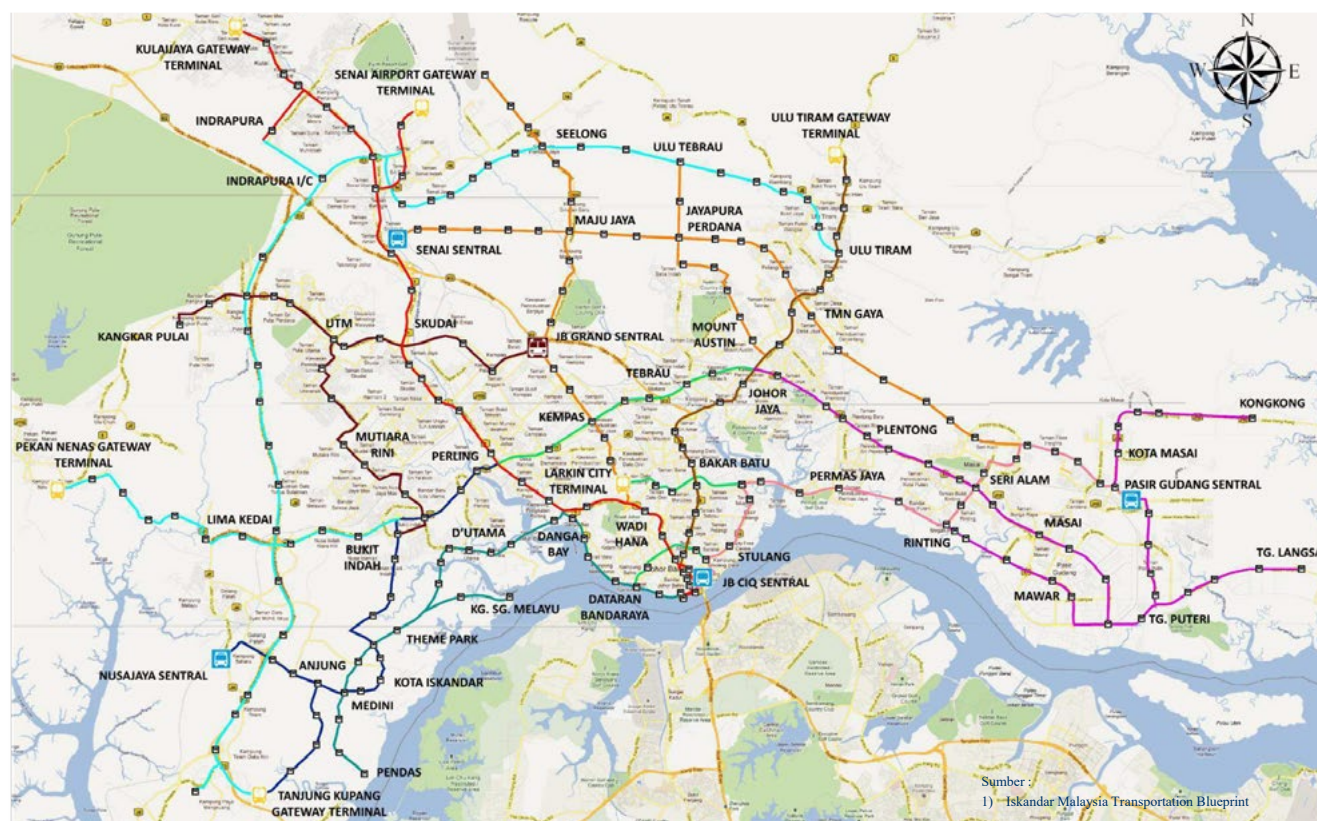


Fig. 9. Proposed BRT lines throughout Iskandar Malaysia (Source: Pelan Induk Pengangkutan Awam Negeri Johor, 2015-2045)

While expanding the road network is one option to ease congestion and serve new developments, it comes at a high financial and environmental cost. Thus, Iskandar Malaysia is exploring more sustainable options including the optimisation of the road network by managing traffic better, integrating multiple modes, and building extensions only in locations where evidence suggests a clear necessity. The strategies for private transportation as outlined in the Transportation Blueprint 2010-2030 for Iskandar Malaysia include:

- i. Optimising the road network by creating clear road hierarchies, optimising the existing capacity and mitigating congestion and establishing traffic restricted zones.
- ii. Establishing roads for people, not vehicles, through people-friendly road design standards and policies, executing and practicing transit priority via Intelligent Transport Systems (ITS), and reducing the convenience and speed of auto-use within cordon areas.
- iii. Managing road/ traffic demand by integrating transit with convenient park and rides, instituting traffic management and restrains, and road pricing, and establishing a mobility management programme.

The region also seeks to enhance public transport, improve the transit industry capacity and encourage transit patronage. The Integrated Land Use Blueprint identified the location of transit nodes where potential primary and secondary transition points<sup>10</sup> should be ideally located to stimulate growth and integrate alternative land uses within the areas of focus. Primary transit nodes are located within Kulai, Senai, Kempas, Nusjaya, Johor Bahru City Centre, and Pasir Gudang.

### Mobility Management System and Intelligent Transport System (ITS)

While Iskandar Malaysia has made first steps towards smart mobility management in public transport through the ongoing development of an online platform for mobility planning, gaps are still apparent in road traffic management. Although some of the physical ITS infrastructure exists, such as the E14 which is equipped with unused VMS (variable-message signs), CCTV, and even a control centre building; Iskandar Malaysia does not currently have the technical capacity to operate ITS or a mobility management system.

### Light-Rail Transit

After conducting feasibility analyses and considering the population of Johor Bahru and Iskandar, the government decided to introduce BRT in lieu of MRT (mass rapid transit) and LRT (light-rail transit) due to the higher costs in implementing these projects. Furthermore, Johor

Bahru and Iskandar Malaysia cannot yet be compared to other cities in Southeast Asia with a more extensive transit network such as Singapore and Kuala Lumpur because the current population of approximately 1.5 million people cannot yet sustain an MRT or LRT. Nevertheless, the BRT will have elements of LRT and MRT systems which will make the services faster than regular bus services.

While Iskandar Malaysia has limited light-rail, in 2024, the Johor Bahru-Singapore Rapid Transit System (RTS Link) will begin passenger service connecting Singapore with Johor Bahru. The RTS will connect Johor Bahru Sentral with intercity rail services to Singapore's Woodlands North and will further connect with Thomson-East Coast Line (TEL). The rail link is projected to reduce congestion along the border crossings.<sup>11</sup> Figure 3 illustrates the linkage rail linkage between Johor Bahru and Singapore.

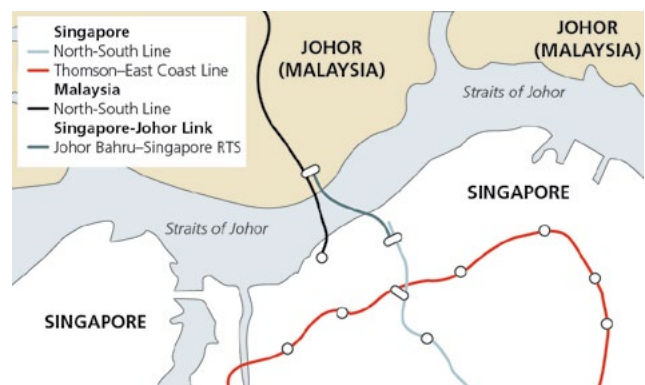


Fig. 10. Potential Light Rail Transit (LRT) between Johor Bahru and Singapore, 2024

### Cross-border movement

Iskandar Malaysia is strategically located as an economic corridor that is separated by a 1-km sea channel, but also linked by two bridges which allows thousands of people to flow between financially thriving Singapore and Johor Bahru. Daily, about 400,000 people commute in both directions, although this is often based on varying need and purpose.<sup>12</sup> For example, during the weekday persons travel to Singapore for better wages and employment opportunities while on the weekends, it is typical for Singaporeans to cross into Malaysia for cheaper goods and entertainment as they possess a higher purchasing power.<sup>13</sup>

Public transport from Johor Bahru to Singapore exists but services are not always reliable. Commuting by private car in and out of Singapore can also be inconvenient due to the required user charges to enter Singapore, which are often too expensive for those living in Iskandar. In addition to bus transit and pedestrianisation, the LRT is

expected to increase the cross-border public transport model split from the current 35% to 70%.

## Freight Transport

In 2018, the World Bank ranks Singapore 7th and Malaysia 41st in the International Logistics Performance Index (LPI). With approximately 200 million Twenty-Foot Equivalent Unit (TEU), used to measure shipping cargo capacity, passing annually through the Straits, and Singapore's capacity of 50 million TEU, there is a huge opportunity for Iskandar Malaysia to expand its freight output.<sup>14</sup>

However, inadequate infrastructure to support the three main seaports namely Johor Port, Port of Tanjung Pelepas (PTP) and Tanjung Langsat Port, and the Senai Airport limits the potential of Iskandar Malaysia and causes substantial disturbance to the mobility network.

The sea ports alone generate more than 3,000 lorry trips per day. Furthermore, urban freight trips are causing congestion due to lack of loading areas in narrow urban streets, poor routing of heavy goods vehicles (HGVs) through central parts of Johor Bahru, and a lack of inter-modality for freight.<sup>15</sup> At the already congested border crossings within Singapore, nearly 6,000 light and heavy goods vehicles travel between the two countries every day.<sup>16</sup>

## UNSUSTAINABLE TRENDS

### Low Public Transport Ridership

By 2030, if nothing new is achieved in terms of public transport, the public ridership in Iskandar Malaysia will decline by 5%, from 15% to 10%.<sup>17</sup> In 2007, survey research was conducted in Malaysia analysing people's public transport behaviour.<sup>18</sup> Based on the Malaysian ridership survey, results demonstrated that respondents are more likely to use a car as their mode of transport due to shorter overall travel time (44%) and because the more convenient and desirable routes lack public transportation services (34%).

Furthermore, respondents stated that they are discouraged in using public transport because of high traffic congestion and numerous delays (37%) and limited parking spots (24%). Finally, the likelihood of respondents' transitioning in their mode of transport from car to public bus, light rail, etc., is contingent on public buses arriving on schedule (37%), increasing the number of more accessible routes (30%), and lowering the transport fare (28%). Figures 11 through 13 detail a few of the more relevant survey results that inform the likelihood in transforming respondents' public transport behaviour.

As this reveals, encouraging public transport requires a multifaceted approach. Whilst IRDA is investing in the extension of the public transport network and improvements to the user experience through online mobility planning, the management of road traffic is equally important. Unless a comprehensive approach is taken in which traffic is managed effectively to avoid congestion and free up space for public and non-motorised transport, a modal shift away from the private motorised vehicle will not be achieved easily.

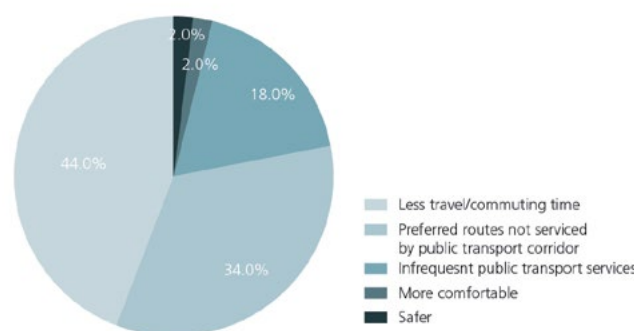


Fig. 11. Factors for private transport usage.  
(Source: Kamba et. al, 2007)

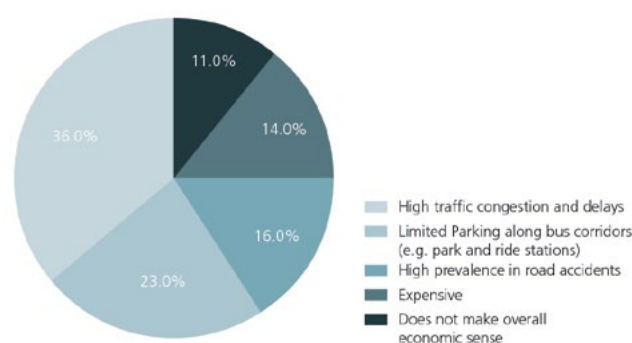


Fig. 12. Factors discouraging the use of public transport.  
(Source: Kamba et. al, 2007)

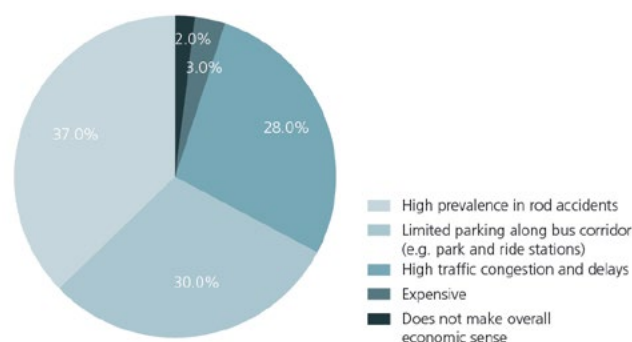


Fig. 13. Factors for transitioning to public transport.  
(Source: Kamba et. al, 2007)

## Gated-Communities and Urban Sprawl

The type of housing being implemented in Iskandar Malaysia is another factor that has contributed to private motorised vehicle dependency. For example, Nusajaya is a new city development with a population of 500,000 and is largely known as a big cluster of greenfield urban development with low-density, gated communities. Unoccupied housing and urban sprawl are compromising the feasibility of public transport provision due to insufficient travel demand.

Furthermore, gated communities contribute to privatised and inaccessible roads adding to the unlikelihood that these areas will be reached by local bus and train systems. In Iskandar Malaysia there is a heightened need and desire for gated communities due to the greater sense of security that they provide. Security issues have been largely responsible for splintered urbanism, car-based urban development and the heavy privatisation of land and services.<sup>19</sup>

## Increasing Private Car Ownership

In comparison to other cities in the region such as Singapore and Kuala Lumpur, Iskandar Malaysia does not yet have an efficient public transport system due to the region's low-density and suburbanisation. In addition to cultural factors that deter locals from using the public transport system, Malaysia has a strong commitment and allegiance to automotive companies including Proton, Perodua, and Naza.<sup>20</sup> Low interest rates, a relaxed loan approval process, and heavily subsidised petrol prices, have made it easier and cheaper than ever before to own a car or a motorcycle. Auto-ownership is growing drastically from 500 to more than 800 cars per 1,000 population by 2025.<sup>21</sup>

## ISKANDAR MALAYSIA URBAN OBSERVATORY (IMUO)

Currently, IRDA is limited in its ability to improve urban and transport planning due to the insufficient data available to monitor social indicators and outcomes.<sup>22</sup> Data is collected and owned by different departments within IRDA. This suggests that data, including GIS data, is not shared nor consolidated across departments and cross-analysed to inform policy outcomes.<sup>23</sup> This means that the level of available data is inadequate, thus creating greater challenges in establishing targeted development programmes.

To overcome some of these challenges by building a robust data and knowledge management system, UNDP and IRDA are currently developing the Iskandar Malaysia Urban Observatory (IMUO). IMUO will form one of 14 Urban Observatories in Malaysia that allow for data sharing between federal, state and local levels.

The proposed interventions aim to tap into and support the development of the IMUO. Data collected through SIMMS will be shared with the IMUO to allow for more accurate assessments of travel and freight demands and inform improvements to the mobility system. Maintaining a data and knowledge system contributes to longer-term planning, improves decision-making, and establishes a more technical system and process for mobility management.



Fig. 14. Johor Bahru Night Market (Source: Charlotte Mohn, UN-Habitat)

## Financial Analysis

### MUNICIPAL CAPACITY

As a priority development region, Iskandar Malaysia attracts significant investment from both the national government and foreign entities. In July 2018, IRDA had attracted 263.95 billion Malaysian Ringgit (MYR) (around 64 million USD) in committed investments, 154.14 billion MYR of which has already been realised. 39% of the total cumulative committed investments derived from Foreign Direct Investment (FDI), with the rest coming from national and state transfers. The Comprehensive Development Plan of Iskandar Malaysia projects that the IRDA will need 176 billion MYR in total investment to achieve the goals of 16 key projects by 2025.

In 2015, Iskandar Malaysia dedicated 56.8 million MYR to roads and highways, 2.5 million MYR to transportation, 24 million MYR to creative outlets, and 7 million MYR to public housing initiatives. However, even if revenues are increasing, there is a widening gap between expenditures and revenues. This is mainly due to a 10% reduction in government grants from 50 million MYR in 2014 to 45 million MYR in 2016. The reduction of national transfers mean that the city must now seek new funding sources in order to finance and maintain new capital expenditures, which involves enhancing its own source revenues.

### FINANCING MECHANISMS FOR DATA

Establishing a foundation for the Smart Integrated Mobility Management System will require investments both for procurement and implementation to ensure long-term maintenance and operation. As it is difficult to raise associated taxes and fees for this type of intervention, the city will need to identify internal revenues or national transfers to fund the project.

Iskandar Malaysia has been selected as a pilot for smart city projects in Malaysia. This ensures that there is national buy-in to improve data management in the city, which can help attract funds from the national government.

National priorities seem to be aligned with the area of focus of the intervention as transport is one of the main expenditure priorities from the national government. Overall development spending increased by 3%, primarily due to an expenditure increase in transport and education sectors. Direct spending in the transportation sector increased from 7.8 billion MYR in 2016 to 10.4 billion MYR, a 33.3% increase. Furthermore, the general administration sector recorded an expenditure increase of 81.4%, from 3.4% and 1.6 billion MYR in 2016 to 2.9 billion MYR, used primarily for ICT projects.

Additionally, the Johor State budget has allocated funds for transport data. The 2018 Johor State budget has a large allocation for transport infrastructure projects, as well as data-related capacity building. Transport Oriented Development (TOD) plans will have a total cost of 445 million MYR in addition to leveraging resources from PPP's. The 1st phase will start in 2018 with the allocation of 19 million MYR with the construction of a bus terminal, parking area, food court, new market and new retail area. Large transport infrastructure projects are budgeted for, which at the completion, will have a total cost of more than 1 billion MYR. There is a Master Fund in the District and Land Office, which is known as the Johor Training and Specialist Fund, with a budget allocation of 5 million MYR. This amount can be allocated towards data-related capacity building.

There is potential to involve the private sector within this intervention, by examining innovative ways of utilizing the data generated, either through direct procurement or in the form of a public-private partnerships. Efficiency gains are possible by engaging the private sector as various companies may contain systems and technologies in providing solutions to help set up the financing for the data system.

The city is accustomed to undertaking contracts with the private sector as the entire public transport system is operated by several private companies with an overarching PPP, called the Public Transport Cooperation of Johor (PAJ). Given PAJ's central role in the system in that the organization already provides some mobility data management, the Iskandar Malaysia city government may consider expanding their role. For example, PAJ could be engaged to set up a broader system as well as being contracted for its longer-term operation and maintenance. PAJ itself will need to examine cost

sharing strategies with private sector companies. Since PAJ is able to financially strategise other organisations, Iskandar Malaysia, as a result, does not have to engage in multiple small contracts with each of the private sector providers.

IRDA encourages the use of PPPs for development projects in Iskandar, highlighting the role of strategic collaboration between public and private sector in the region's development. It collaborates with the main federal-level bodies involved in identifying and implementing PPP initiatives and assists investors in accessing funding for PPPs under the Malaysian Facilitation Fund. Additionally, PPPs schemes have been used as a tool to finance public projects in Malaysia since the Ninth Malaysian Plan in 2006 and were emphasized in the latest development plan (Tenth Malaysian Plan).

The government created the Public Private Partnership (PPP) Unit under the Prime Minister's Department to manage the Facilitation Fund, an initiative encouraging large strategic investments by the private sector. Previous projects undertaken in Iskandar Malaysia are mainly related to infrastructure development, including

the construction of a Coastal Highway Southern Link ("CHSL"), connecting two main highways in the region. The region's BRT project is also financed partly with public funding, 1 billion MYR is allocated from the federal government, and 1.6 billion MYR is expected from private investment.

To repay loans as well as fund the operation and maintenance of the data management system, it is vital to establish a permanent funding stream. In some cases, there is the possibility of applying a fee system, however, as indicated earlier, this is not a viable option for this transport intervention. Furthermore, most user fees only cover for 35% to 65% of the operations of any system.

Given that the current initiatives in Iskandar Malaysia do not charge the use of public transport, this suggests that in the short-term it will be difficult to obtain revenues through transport fees. Within the medium to long-term, if user fees are re-instituted, there may be a case of overcoming potential political resistance and the overall revenue stream will not be very high.



Fig. 15. Pedestrians in Johor Bahru (Source: Charlotte Mohn, UN-Habitat)

## Legal Analysis

### GOVERNANCE STRUCTURE AND PLANNING HIERARCHY

Spatial development and planning in Malaysia involve three levels of government: federal, state and local authorities. Development is guided by five-year national, state and local plans, which, in the case of Iskandar Malaysia, all are operational until 2020. The mandates of the different levels of government are outlined in the Federal Constitution, as follows:

The Federal Government develops the medium and long-term strategic and physical plans (e.g. Outline Perspective Plans and Malaysia Plans, as well as the National Physical Plans). The Outline Perspective Plan provides a foundation for a broad national focus while the National Physical Plan provides a long-term strategic framework for national spatial planning and includes measures required to shape the direction and pattern of land use, biodiversity conservation, and future development in Peninsular Malaysia.

The State Government prepares the State Structure Plan, which details policies and strategic proposals at the state level with respect to the development and use of land in urban and rural areas. The State Government of Johor prepares proposals for the Iskandar Malaysia Development Region.

The five Local Authorities in Iskandar prepare their respective Local Plans or Local District Plans. The Town and Country Planning Act (Act 172) of 1976, which delineates many of the local authority functions, provides more frequent revisions to local level plans to reflecting the changing local needs.

### INTERGOVERNMENTAL TRANSPORT AND PLANNING COORDINATION

Three institutional entities play key roles in transport and urban planning in Iskandar Malaysia, related to the proposed interventions; MIGHT, IRDA and the PAJ.

### Malaysian Industry-Government Group for High Technology (MIGHT)

MIGHT plays a national coordinating role. As a public-private partnership (PPP) at the federal level, MIGHT deals with all technology-related interventions and funding coming into Malaysia. It decides on where funding is allocated and monitors the projects once implemented, in addition to when it is operational. MIGHT also provides knowledge expertise and advice on investment projects, including the FCO Global Future Cities Programme.

### Iskandar Regional Development Authority (IRDA)

IRDA, a federal government statutory body, is the main planning and coordinating authority in the Iskandar Malaysia development region. Yet, IRDA does not possess the legal mandate to enforce plans. IRDA was established under the IRDA Act of 2007, and mandated to facilitate the planning, promotion, and processing of investments in both transport and urban planning. It also plays a coordinating role in ensuring consistency and integration of all levels of government and their respective plans. Coordination committees at the federal, state and local levels involve different divisions of IRDA to ensure alignment in planning. Furthermore, the chairman of the IRDA also holds a senior position in the Johor State government, contributing to collaboration and coordination between the two institutions.

IRDA facilitates the alignment of federal, state and local level plans through the Comprehensive Development Plans (CDP). The latest CDP (CDPii), approved by the State Planning Committee, is a business plan for the economic corridor (development region) of Iskandar Malaysia for 2014-2025. The CDP ii accounts for all physical development plans relevant to its jurisdiction (i.e. Iskandar Malaysia Development Region), including federal, state and local plans, and ensures all plans are aligned.

As outlined in the Federal Constitution, the state and local governments have the final authority over project decisions. As the mandate that enforces plans lies with Johor State and the five local governments, IRDA, although a federal-level body, must report to both the local and state authorities who have decision-making power. Consequently, strategic objectives require local authority and state buy-in, which is an important factor to consider for the proposed intervention. IRDA, for example, has limited authority in regulating and approving various transportation projects. UNDP reported that the lack of buy-in from local authorities was a barrier to ensuring the appropriate data collection and usage in the Iskandar Malaysia Urban Observatory project (IMUO).

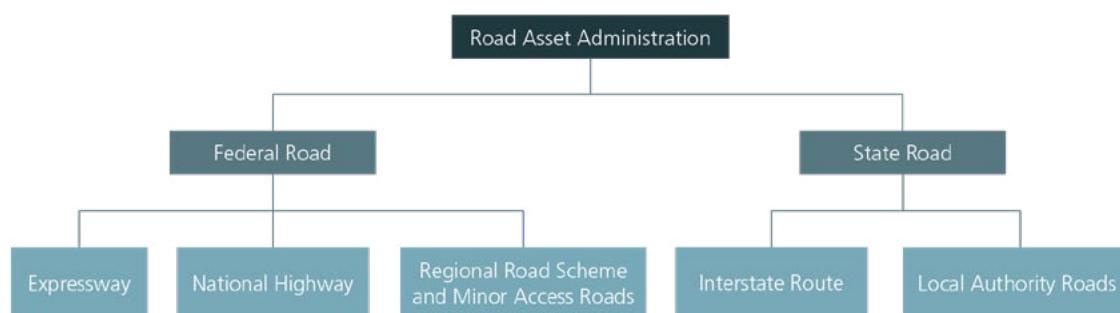


Fig. 16. Road Network Administration in Malaysia (Source: Regional Land Public Transport Master Plan)

### Public Transport Corporation of Johor (PAJ)

PAJ is the main transport authority in the state and will be the host of the Mobility Management System. PAJ is a private company entirely owned by the Johor State Secretary. It manages and coordinates the public transport system in the state, most of which is operated by private companies. PAJ also guides infrastructure provision that are in sync with Johor State's Public Transport Master Plan (PIPJ) and is already responsible for housing and managing mobility data for the Iskandar Malaysia Development Region.

PAJ also must coordinate with the Land Public Transport Commission (SPAD), which plans, regulates and enforces land-use policy, transit-oriented development and urban infrastructure across multiple levels of government. They set the rules for public transport management at the local level.

### ROAD NETWORK ADMINISTRATION

Depending on location, the roads throughout Malaysia are Roads that are either influenced and upgraded by the local or state authorities, as shown in Figure 15. Federal roads include expressways (tolled), national highways, regional road schemes and minor access roads, whereas state roads include intra-state and local authority roads.

At a federal level, roads are planned, designed, constructed and maintained by the Ministry of Work (MOW), in accordance to Ministerial Function Act 1969. State roads are the responsibility of the Department of Work (Jabatan Kerja Raya (JKR)). The Malaysia Highway Authority (MHA) administers all highways and expressways, while other federal and state roads are administered by JKR. In addition, local roads are administered by the respective local authorities.

### INTERVENTIONS' ALIGNMENT TO EXISTING PLANS AND POLICIES

The interventions are well aligned with the Iskandar Malaysia Transportation Blueprint and the Smart City Framework, both of which highlight the region's plans and commitment towards smart mobility interventions.

#### Iskandar Malaysia Transportation Blueprint

The Blueprint was commissioned by IRDA (and endorsed by the state) to assist in developing a world class transportation system in Iskandar Malaysia. It includes strategies for both private and public transport in urban areas, placing a substantial emphasis on smart mobility, green technologies and public transportation for Transit Oriented Development (TOD).

#### Iskandar Malaysia Smart City Framework

The Smart City Framework, endorsed by the Prime Minister of Malaysia at the 2nd intercession Global Science and Innovation Advisory Council (GSIAC) meeting in Kuala Lumpur in 2014, sees the Iskandar Malaysia region as a pilot for smart city projects in Malaysia. In total, 35 programmes have been identified, classified into 6 dimensions - one of which is smart mobility.

The focus of the smart mobility dimension lies in enhancing public transport and associated ICT infrastructure. In support of this, the budget speech of 2018 from the Johor State government, also announced that the goal is for the Johor State to operate with the optimisation of big data. The State of Johor is envisioned as global data hub and Iskandar Malaysia as 'the New Millennial Economy'.

## LEGAL FRAMEWORK FOR DATA MANAGEMENT

Legal frameworks for data protection and sharing exist on a federal/state/local level, and with several institutions are working on data standards, management and coordination. On a federal level, the Personal Data Protection Act 2010 came into force at the end of 2013. The Act, amongst other obligations, requires organisations to set up the types of personal data they collect as well as how it is processed and used. With regards to transport specifically, data standards are being developed by the Highway Planning Division of the Ministry of Works (KKR).

On a regional level, the intervention will link in with the Iskandar Malaysia Urban Observatory (IMUO), an existing data management initiative, managed through the collaboration between IRDA, United Nations Development Program (UNDP), and the Malaysian Administrative Modernisation and Management Planning Unit (MAMPU). The IMUO was formed to address the lack of consistent and reliable data for evidence-based spatial planning and policy making, by creating a central data centre, a knowledge hub, a monitoring and assessment centre and technical services that help to monitor programmes and provide capacity building in implementing policies at the local level.

The greater objective of the IMUO project is to initiate planning that is tailored to the needs of vulnerable groups and the bottom 40% of income groups, which is in line with the 11th Malaysia Plan.

In alignment with the IMUO, IRDA signed two Memorandums of Understanding (MoUs) to enable data sharing and to improve the quality of officially-collected data. The first is between IRDA and PLANMalaysia (the Federal Department of Town and Country Planning) and the second is between IRDA and the Department of Statistics Malaysia (DOSM).<sup>24</sup>

# INTERNATIONAL ALIGNMENT AND TECHNICAL RECOMMENDATIONS

## Potential Impact

The potential impact analysis outlines the main benefits that can be potentially attained through the Global Future Cities Programme in each city. The impact analysis covers three phases: short, medium and long-term. Given that impact can arise from a complex interaction of context-specific factors, rather than as result of a single action, an empiric impact assessment is out of the scope of this report.

The short-term refers to the outcomes that can be achieved through the implementation of the technical assistance support within the 2 to 3-year scope of the Global Future Cities Programme. Mid-term outcomes are only achievable once the intervention is executed either through capital investments or the legal validation of key policies and plans. Long-term impact of the interventions is linked to the sustainability of the interventions in a 7 to 15-year timeframe and is related to operations and maintenance.

### SHORT-TERM OUTCOME

One of the main challenges of the city is the lack of coordination and integration of statutory and non-statutory plans. In the short-term, the capacity-building component of the interventions, will positively impact the municipal technical and managerial capacity while increasing citizens' inclusion in planning and decision-making processes.

Developing clear communication channels and data sharing frameworks between SIMMS, which will fall under the mandate of the PAJ, and the IMUO will promote better coordination and cooperation between different levels of government and with different public departments. The process of developing the Implementation Strategy for SIMMS and the Creation of Enabling Conditions for Data Utilisation and Data Management will increase possibilities for the development of evidence-based, integrated

plans, frameworks and approaches to promote more sustainable, resilient, and socially inclusive cities.

The interventions will include the clear costing of the hard and soft infrastructure necessary for SIMMS and data utilisation/ management. A phased prioritisation and implementation roadmap will increase Iskandar Malaysia's ability to better plan sustainable financing and investment frameworks.

Finally, the increased availability of data for evidence-based decision-making will also improve the ability to plan economic growth in an inclusive and sustainable manner. It will improve create professional opportunities in data analysis and the mobility sector, while also enabling efficiency gains in urban and transport planning.

### MID-TERM OUTCOME

By improving the monitoring, management and real time operation of the mobility network, the interventions will optimise the road network efficiency. SIMMS will thereby contribute to freeing-up road space for the delivery of more convenient and reliable public transport and better integration of alternative transport modes.

SIMMS together with the adequate enabling conditions for data utilisation for planning, will provide an evidence base to improve the mobility network. Informed and integrated transport and urban planning can contribute to safer, more comfortable and convenient options for transit, for example, through better connections among transport modes, and between transit stops and key destinations along the most congested corridors. Improved road safety and security, and reduced congestion, air and noise pollution, will positively impact the environment and create a more liveable region.

The availability of quality, accessible, timely and reliable data disaggregated by income, sex, age, ethnicity,

disability and geographic location, is reflected in the planning and delivery of a mobility system that can monitor, analyse and target the needs of marginalised and vulnerable groups. In the mid-term, this can improve connectivity and accessibility across Iskandar Malaysia. A reduction in travel times and costs can improve access to social, medical and other facilities, as well as to employment opportunities. Groups who are most likely to benefit, are for example low-income communities, the elderly and women who on average tend to have more complex travel patterns due to their combined caregiving and economic responsibilities.

### LONG-TERM POTENTIAL IMPACT

In the long-term, strengthened capacities of civil servants are expected to connect mobility planning to sustainable urban transformation and resilience. Employment opportunities and additional capacity is expected to be built in data analytics, data management and smart technologies at the PAJ, the IMUO, among bus operators and in the transport and urban planning sector more generally. This will contribute to the effective delivery of comprehensive urban plans that enhance linkages between spatial, economic and social development.

The optimisation of infrastructure through ITS and evidence-based planning, will allow for financially and environmentally sustainable urban development. Freight, private and public transport will all be managed more efficiently in terms of real time operations and long-term planning for adequate infrastructure provisions. Sustainable and comprehensive planning for freight movements, for example through lane enforcements and better routing, will lead to improved road safety and efficiency gains in terms of time and cost of transport. Iskandar Malaysia will have the capacity to exploit its economic potential as Malaysia's southern gateway without compromising the quality of life of its citizens.

In the long-term, all these achievements will lead to a reduction of energy consumption, air pollution, and GHG emissions, and to the sustainable development of a healthy and economically vibrant urban environment for the citizens.

## Contribution to Sustainable Urban Development

### 2030 SUSTAINABLE DEVELOPMENT GOALS

The Global Future Cities Programme aims to contribute to the implementation of the 2030 Agenda for Sustainable Development, while mobilising efforts to end all forms of poverty, fight inequalities, and tackle climate change, and thus ensuring no citizen is left behind.

### SUSTAINABLE CITIES AND COMMUNITIES



The overall objective of the intervention is aligned with SDG 11, which aims to “make cities and human settlements inclusive, safe, resilient and sustainable”. More specifically, it contributes to the adoption and implementation of integrated policies and plans towards the provision of “access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons” (SDG11.2).

Moreover, as part of the interventions a capacity building programme aims to train state and local governments, as well as other stakeholders, to conduct participatory, integrated, and sustainable transport and urban planning and management (SDG 11.3).

## CAPACITY BUILDING



SIMMS and the creation of enabling conditions for data utilisation, will increase the capacity of the stakeholders to manage and analyse data (SDG 17.18). Improved knowledge sharing, expertise and technology (SDG 17.16) will enhance revenue generation and promote the participation of the private sector (SDG 17.1).

## INCREASED RELIABILITY AND RESILIENCE



Affordable and accessible mobility will help to optimise infrastructure, increasing reliability, sustainability and resilience (SDG 9.1).

## INCREASED ECONOMIC GROWTH



By making Iskandar Malaysia a more accessible and vibrant region, the interventions enhance access to job opportunities (SDG 8.5) and support productive activities, decent job creation, and entrepreneurship (SDG 8.3).

## INCREASED RESILIENCE



The interventions, and the resulting ability to integrate urban and transport planning, will also support Iskandar Malaysia's efforts to address climate change by promoting mechanisms to effectively monitor and lower GHG emissions (SDG 13.2).

## PROMOTING WELL-BEING



Safer, greener, and more accessible transport will ensure healthy lives and promote well-being by improving air quality (SDG 3.9) and reducing road traffic accidents (SDG 3.6).

## NEW URBAN AGENDA ALIGNMENT

The New Urban Agenda is an action-oriented document that sets the global standards of achievement in sustainable urban development, adopted by Member States during the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) held in Quito, Ecuador, in 2016. It sets the framework for sustainable urban development globally for the coming 20 years, outlining how cities should be planned and managed to best promote sustainable urbanisation.

The New Urban Agenda encourages UN-Habitat and others 'to generate evidence-based and practical guidance for the implementation and the urban dimension of the SDGs in close collaboration with Member States, local authorities, major groups and other relevant stakeholders, as well as through the mobilization of experts.'

The Global Future Cities Programme is directly related to UN-Habitat's draft Action Framework for the implementation of the New Urban Agenda (AFINUA). This framework is categorised as follows: (1) national urban policies; (2) urban legislation, rules and regulations; (3) urban planning and design; (4) urban economy and municipal finance and (5) local implementation.

The combination of SIMMS and the creation of enabling conditions for data utilisation and data management for planning, will support the development of planning and design processes that are evidence-based, integrated and participatory (AFINUA key item 3.1). The interventions will help to design and the implement systems that ensure social, economic, and safe physical access to quality basic services by all (AFINUA key item 4.5).

Opportunities to use data collected through SIMMS to plan transit-oriented developments (ToDs) along the main corridors, for example, will also promote sustainable density and mixed-use developments (AFINUA key item 3.4), offering the chance to employ land value capture and sharing mechanism (AFINUA key item 5.5). The implementation of a better mobility system and its integration with long-term planning through data sharing with the IMUO will provide the basis for fostering inclusive local economic development (AFINUA key item 4.4) that capitalises on Iskandar Malaysia's international potential in freight without compromising citizens' life quality and sustainable urban development.

### ALIGNMENT WITH CROSS-CUTTING ISSUES AND THE PROSPERITY FUND

The Global Future Cities Programme seeks to achieve higher rates of sustainable and inclusive growth while increasing long-term investments in sustainable urban projects. Moreover, it will provide greater awareness, capability and confidence while establishing regulatory frameworks resulting in higher incentives for partnerships and financial mechanisms.

The four Cross-Cutting Issues of UN-Habitat, as identified in the Strategic Plan 2014-2019, are mainstreamed to ensure that all UN-Habitat work targets those with the most need and promotes socially and environmentally sustainable cities.<sup>25</sup> The interventions in Iskandar Malaysia were designed with a specific focus on environmental safeguards, youth, gender equality, and human rights.

The generation of data through SIMMS and the analysis and utilisation of disaggregated data at the IMUO will support public policies that meet the practical and strategic interests of vulnerable groups. This will

contribute to gender and social equality, increasing knowledge of related issues, addressing the scarcity of gender mobility data and statistics, and exploiting the synergies between urban and mobility planning for the benefit of marginalised and vulnerable groups.

The reduced travel times and costs will improve the conditions of low-income groups, due to more accessible public services and facilities, and greater access to employment opportunities. Moreover, the process of capacity building with data-related expertise will support the creation of new job opportunities that are more easily accessible for the youngest generations.

The interventions have the potential to optimise Iskandar Malaysia's road network in terms of capacity and efficiency leading to a progressive minimisation of traffic congestion, GHG emissions, air, and noise pollution.



Fig. 17. The night market at Johor Bahru (Source: Charlotte Mohn, UN-Habitat)

Potential Benefit	Short term	Medium term	Long term	SDG Alignment		New Urban Agenda	Programme Objectives and Cross-cutting issues
				GOALS	TARGETS	AFINUA KEY ITEM	1. Climate change; 2. Gender equality; 3. Human Rights; 4. Youth; 5. Sustainable and inclusive economic growth
Increased local capacity for evaluating and monitoring the impact of urban plans, policies, and strategies.				11, 17	11.3, 17.16, 17.18	3.1, 5.1	Climate change; Gender equality; Human Rights; Youth
Increased capacity to prioritize strategies and improved tools for decision making based on informed demographic, economic, cultural, environmental and other holistic projections.				11, 17	11.a, 17.18	1.1, 3.1	Climate change; Gender equality; Human Rights; Youth; Sustainable and inclusive economic growth
Integrated plans, frameworks and approaches to promote more sustainable, resilient, and socially inclusive cities				11, 13, 16	11.3; 13.2; 16.7	2.1, 2.3, 5.1, 5.3, 5.4	Climate change; Gender equality; Human Rights; Youth
Better Governance & Integrated Management of cities including better coordination and cooperation between different levels of government.				17	17.14; 17.15	1.4, 1.6, 2.5	Climate change; Human Rights; Sustainable and inclusive economic growth
Increased ability to better plan inclusive economic growth in a sustainable, climate smart manner.				13, 17	13.2, 17.1	4.1, 4.3, 4.5, 5.5	Climate change; Human Rights; Youth; Sustainable and inclusive economic growth
Increased efficiency of public transport				9, 11	9.1, 11.2	3.3, 4.5	Climate change; Sustainable and inclusive economic growth
Increased efficiency, quality, and reliability of public infrastructure				9, 12	9.1, 11.3	4.2, 5.3, 5.4	Climate change; Human Rights; Sustainable and inclusive economic growth
More secure, safe, and accessible public transport, particularly for women and elder.				3, 11	3.6, 11.7	3.3, 5.4	Gender equality; Human Rights; Youth
Increased mobility and accessibility for poor women and men and other vulnerable groups (elderly, youth, disabled)				9, 11	9.1, 11.2	3.3, 5.4	Gender equality; Human Rights; Youth
Increased ability to access employment and services, particularly for women and lower income groups				8	8.3, 8.5	4.4, 4.5	Gender equality; Human Rights; Youth; Sustainable and inclusive economic growth
Increased citizen participation in developing municipal plans and decision making processes.				11, 16	11.3, 16.7	3.1, 4.5, 5.6	Gender equality; Human Rights; Youth
Integrated plans, frameworks and approaches to promote a more sustainable, resilient, and socially inclusive city				11, 13, 16	11.3, 11.b, 13.2, 16.7	3.4, 4.5, 5.4	Climate change; Gender equality; Human Rights; Youth
Improved servicing of informal settlements & peri-urban areas				1, 11, 16	1.4, 11.6, 16.6	4.5, 5.3, 5.4	Climate change; Gender equality; Human Rights
Increased quality of life, including the promotion of economic equality and poverty reduction.				8	8.1, 8.5	3.5, 4.4, 4.5	Gender equality; Human Rights; Youth; Sustainable and inclusive economic growth
Lower costs of transporting goods and increased efficiency of the transportation system				9, 12	9.1; 12.2	3.3, 4.5, 5.1	Climate change; Sustainable and inclusive economic growth
Strengthened municipal finances and increased municipal capacity for revenue generation				17	17.1	3.4, 4.3	Sustainable and inclusive economic growth

Fig. 18. Potential Impact and Programme Objective Alignment

## Success Factors

The following statements are considered success factors, based on international best practices, for the interventions in Iskandar Malaysia in order to achieve maximum impact in line with the goals of the Prosperity Fund, the Global Future Cities Programme and the cross-cutting issues. The success factors are divided into spatial, financial, and legal and aim to address potential barriers for the long-term sustainability of the interventions.

### SPATIAL CONSIDERATIONS

#### Capacity Development

Knowledge and human capacities must be developed alongside new data technologies. In parallel with the investments in SIMMS, capacity has to be built in terms of data management and analysis within urban and transport planning departments, IRDA, the PAJ, and the IMUO. Capacity development will ensure that data collected through SIMMS can be used for evidence-based urban and transport planning in addition to real-time operational management.

#### Use of Data in Different Transport Modes

Increasing the amount and availability of interoperable mobility data from different transport modes is imperative for the successfulness of an integrated mobility management system. Most transport data sets can be used and applied for other purposes, including the improvement of individual modes of transport as well as multi-modal mobility management.

Institutional barriers and legal requirements should be addressed to avoid the restriction of travel data to only one mode of transport or even one operator.

#### Use of Data for Multiple Planning and Operational Purposes

Using transport data efficiently also means successfully allowing their re-use in areas beyond the original purpose of collection, within transport planning and operational processes. Open data policies have proven to be successful in many cities with a developed ICT culture by allowing data owners and users to benefit from new data sources.

Data sharing policies, and eventually open-source data policies, can make information interoperable. Yet, this requires specific legal frameworks, the development of data governance, the growth of a collaborative culture, and appropriate privacy protection.

#### Balance Demand and Supply-Side Interventions

State-of-the-art data applications can be grouped into two main categories, depending on the end user:

- Demand-side looks at customer experience in the form of advanced data provision, new sales channels, trip planning and service rating
- Supply-side transport data includes metrics related to vehicle movements, technological performance, service availability, timetable reliability and pricing when relevant

From a technological point of view, most of these applications can be fed by the same data sources, such as sensors in vehicles (e.g. cameras, boarding and alighting or weighting devices and so on), public transport fare payment records when digital technologies are involved in payments or ticket validation, and digital signs of personal electronic devices, which includes mobile phones, smart phones, other consumer electronics devices with online communication and personal vehicles equipped with GPS tracking.

To ensure the efficiency of the interventions in Iskandar Malaysia, it is a crucial precondition that the demand and supply sides of the mobility sphere have balanced access to new data sources. In practice, this often implies that data should be made available for various departments of the same transport organisation or even be shared between multiple agencies within the region. Without these channels for shared information, it may often be the case that the impact of improved service provision (supply-side) on customer experience (demand-side) remains hidden and, therefore, it will not be possible to measure the interventions' effectiveness.

At the same time, matching multiple sources of data (e.g. data fusion) can exponentially increase the utilisation of demand data, establishing a more comprehensive

picture of ridership patterns rendering causal inference, forecasting, and other statistical analyses that are more robust.

To capitalise these benefits, the interventions were designed to be directly supportive of using, managing, and sharing data by supporting the efforts of UNDP and IRDA to develop the IMUO into a tool for sustainable urban planning.

### Awareness

Trust in data-based applications must be achieved. Lack of trust on the operators' and/ or the users' side can become a barrier in leveraging the long-term outputs of data interventions. In this regard, a participatory approach throughout the lifecycle of the interventions and awareness campaigns on the collection of data and its purpose can be of value.

### Integrated Transport Planning

To achieve the full potential of the interventions, enabling conditions need to be put in place to promote integrated transport planning. It is essential to design mobility systems that follow user demand and attract an adequate number of passengers. Some suggestions include:

- Transport planning should be coordinated with land-use policy and density;
- A clear governance structure should be enacted;
- Non-motorised or active mobility systems should be an integral part of transport plans; and
- Transport plans should be linked to Iskandar Malaysia's development prospects in order to manage future demand.

### Monitoring and Benchmarking

The quality of urban transport services is often focus of local political debates, as it affects the everyday life of almost all members of the urban community. The measurement and benchmarking of service provision efficiency is crucial in achieving an efficient allocation of resources available for development. It shapes the direction of public debates with objective and comparable performance metrics.

New trends in transport benchmarking emphasise the importance of customer-focused performance metrics, for example, the evaluation of service quality through the actual experience of travellers. Transport data applications enable the recovery of passenger experience in large quantities, which is a key prerequisite of effective policy decisions.

## FINANCIAL CONSIDERATIONS

### Private Sector Engagement

Iskandar Malaysia is accustomed to undertaking contracts with the private sector as the entire public transport system is operated by several private companies with an overarching PPP, called the Public Transport Cooperation of Johor (PAJ).

Given PAJ's central role in the system as well as the fact that it already provides some mobility data management, IRDA may consider expanding their role. For example, PAJ could be engaged to set up a broader system as well as be contracted for longer-term operations and maintenance. This can be achieved by bundling the implementation, operation, and maintenance of SIMMS into a longer-term contract.

PAJ itself may also benefit from cost sharing with private sector companies. With PAJ's engagement, there is no need to engage in multiple smaller contracts with each of the private sector providers.

Complementing the financing perspective, there may be other reasons to get the private sector and PAJ, involved:

- Private sector firms may have systems and technologies already in place and therefore also solutions in setting up a new system; and
- They could potentially bring in experience that can be adapted to the local context.

When setting up the PPP it is very important that the public and the private sector assess their risk capacity. Furthermore, managing the ITS and ICT contracts can be challenging for IRDA and the various local authorities as they require specialised knowledge to set up.

### **Understanding how to analyse and therefore utilise the data from SIMMS will be particularly important when securing funding.**

Better data and data analysis capacity can result in higher revenue streams as efficiency improvements can be made within the system. For example, improvements in the origin-destination matrices can increase the decision-making processes in operating the system more efficiently.

This will also depend on whether the technology system will have access to all the data. The Government of Malaysia's current initiatives to decrease data prices and increase the infrastructure available for high-speed broadband will provide extra support in addressing these issues.

## Intergovernmental Funds Transfers

Most integrated mobility management systems include funding from national governments or loans from national development banks:

- In Brazil, funding derives from the Brazil Development Bank's Investment Maintenance Programme, which is loaned directly to local government;
- In India, most urban mobility projects are funded by state government rather than the cities themselves; and
- In Colombia, the Integrated Mass Transit System is funded via co-financing grants from central government's Ministry of Transport.

Many of these funds are earmarked for the capital investment into integrated systems rather than the financing for operation and maintenance, which is left to local governments.

Given the fact that Iskandar Malaysia has been selected as a pilot for smart city projects in Malaysia, there is national buy-in, and therefore funds to improve data and data management throughout the region. This includes the Johor State budget that has dedicated funds for transport data related capacity building projects.

## Development Partners Engagement

Other financing options, in terms of loans and grants are available from international development partners including the Asian Development Bank or the World Bank. Engaging development partners is especially useful when it comes to capacity building as these organisations may have some technical assistance funds to support these initiatives.

For example, UNDP is already supporting the Iskandar Malaysia Urban Observatory, and is running the so-called Green Technology Application for the Development of Low Carbon Cities (GTALCP) programme, which aims to implement low carbon initiatives to showcase a clear and integrated approach to low carbon development in Iskandar Malaysia and four other Malaysian cities.

## Dedicated Funding Stream

Farebox recovery (e.g. public transport, road toll or parking fees) can be one potential funding stream. In some Asian and Latin American cities operations of transportation systems are fully covered by the user fees. In most cases, user fees only cover 35%-65% of the operations of any system but given the current initiatives in Iskandar Malaysia, in order to encourage the use of public transport by not charging for it, this would mean

that in the short-term there will be no new revenue streams.

In the medium to long-term if user fees are re-instituted, it will probably be at a lower level to overcome potential political resistance, suggesting that the overall revenue stream will not be very high.

## Land Value Capture

The outcomes of well-executed integrated urban planning can increase land value. Ensuring that land value capture instruments are in place will enable Iskandar Malaysia to finance and fund further mobility and urban planning projects.

## LEGAL CONSIDERATIONS

### Open Data Policies

Data sharing and open data policies and regulations are essential in ensuring that the data is interoperable and shared among different operators and agencies. This is a necessary condition to maximise all the potential gains of the interventions regarding the promotion of integrated transport planning.

Additionally, open data policies allow the use of data by entrepreneurs for new innovative projects, which can enhance small and medium-sized enterprises. Moreover, open data policies are essential in ensuring transparency and allowing citizens to monitor the performance of the transport system and hold governmental authorities accountable.

If the public sector is involved, open data policies can avoid the creation of monopolies through which the public sector can only contract the service providers that have access to the information.

### Privacy Law

Whether data sharing or open data policies are adopted, it is of utmost importance to ensure that privacy is protected, the data is sufficiently anonymised, and securely stored. This is an essential step in assuring that the collection of data from travellers and other users is not used in a manner that infringes citizens' rights or for purposes the citizens are unaware of.



# ENDNOTES

- 1 Comprehensive Development Plan ii (CDPii) and Iskandar Malaysia Blueprint Agenda – Transport, v2.
- 2 IRDA, unpublished information, (2018).
- 3 IRDA, unpublished information, (2018).
- 4 Rizzo, A., & Glasson, J. (2011). Conceiving transit space in Singapore/Johor: a research agenda for the Strait Transnational Urban Region (STUR). *International Journal of Urban Sustainable Development*, 3(2), 156-167.
- 5 Barau, A. & Qureshi, S. (2015). "Using agent-based modelling and landscape metrics to assess landscape fragmentation in Iskandar Malaysia. *Ecological Processes* 4(8): 1-12.
- 6 Barau, A. & Qureshi, S. (2015). "Using agent-based modelling and landscape metrics to assess landscape fragmentation in Iskandar Malaysia. *Ecological Processes* 4(8): 1-12.
- 7 The immediate potential development areas are designated as "preferred areas for future development" and as vacant land, often larger land parcels used for agriculture, located between existing neighborhoods and other developed areas (Integrated Land Use Blueprint Study, 2017).
- 8 Rizzo, A., & Glasson, J. (2011). Conceiving transit space in Singapore/Johor: a research agenda for the Strait Transnational Urban Region (STUR). *International Journal of Urban Sustainable Development*, 3(2), 156-167.
- 9 Rizzo, A., & Glasson, J. (2011). Conceiving transit space in Singapore/Johor: a research agenda for the Strait Transnational Urban Region (STUR). *International Journal of Urban Sustainable Development*, 3(2), 156-167.
- 10 Primary transit nodes are those that are found along rail infrastructure or major public transport terminals such as intercity bus routes. Secondary transit nodes are located within priority public transport corridors such as through employment centers and high-density residential areas (Integrated Land Use Blueprint, 2017).
- 11 "Johor Bahru – Singapore RTS to Commence Passenger Service by 2024." *RaillyNews*. Aug. 2, 2017. Accessed by <http://www.raillynews.com/2017/johor-bahru-singapore-rts-commence-passenger-service-december-2024>.
- 12 Future Cities Catapult, Smart Sustainable Transport in Iskandar Malaysia.
- 13 Rizzo, A., & Glasson, J. (2011). Conceiving transit space in Singapore/Johor: a research agenda for the Strait Transnational Urban Region (STUR). *International Journal of Urban Sustainable Development*, 3(2), 156-167.
- 14 IRDA, Transportation Blueprint 2010-2030 for Iskandar Malaysia.
- 15 IRDA, Transportation Blueprint 2010-2030 for Iskandar Malaysia.
- 16 Regional Land Public Transport Master Plan, 2017 (confidential).
- 17 IRDA, Transportation Blueprint 2010-2030 for Iskandar Malaysia.
- 18 Kamba, A. N., Rahmat, R. A. O. K., & Ismail, A. (2007). Why do people use their cars: a case study in Malaysia. *Journal of Social Sciences*, 3(3), 117-122.
- 19 Abdelfatah, A. S., Shah, M. Z., & Puan, O. C. (2015). Evaluating the sustainability of traffic growth in Malaysia. *Journal of Traffic and Logistics Engineering*, 3(1).
- 20 Rizzo, A., & Glasson, J. (2011). Conceiving transit space in Singapore/Johor: a research agenda for the Strait Transnational Urban Region (STUR). *International Journal of Urban Sustainable Development*, 3(2), 156-167.
- 21 IRDA, Transportation Blueprint 2010-2030 for Iskandar Malaysia.
- 22 UNDP (2016), Designing Urban Observatory Governance.
- 23 UNDP (2016), Designing Urban Observatory Governance.
- 24 More information can be found here: <http://iskandarmalaysia.com.my/iskandar-malaysia-making-inroads-realising-smart-city-initiatives-line-cdp-ii-2>
- 25 UN-Habitat Cross-Cutting Report 2017.

---



UNITED NATIONS HUMAN SETTLEMENTS PROGRAMME  
P.O. Box 30030, Nairobi 00100, Kenya  
[www.unhabitat.org](http://www.unhabitat.org)

**UN-HABITAT | LAB**  
urban planning and design