

# MELAKA

## Shifting Melaka's Mobility Modal Split



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Sustainability Outlook Diagnostic  
Supporting Report 5 Conference Edition

# **MELAKA**

## **Shifting Melaka's Mobility Modal Split**



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## Introduction

**Melaka's State Structure Plan 2035 envisions a comprehensive and integrated transport network** for the state. The plan involves increasing the capacity and quality of international seaport and airport infrastructure, along with rail connectivity. The plan proposes the construction of major ground transportation routes (high-speed rail, a west coast highway, and a Melaka outer ring road and inner ring road). The proposed port and airport expansions are aimed at improving Melaka State's outward transportation and make it comparable with those of Selangor and Penang states. The plan proposes a Bus Rapid Transit system (BRT) with the development of Transit-Oriented Development nodes. These investments in mobility infrastructure will boost Melaka's economic growth.

**New provision of infrastructure mobility and in particular the BRT lines with Transit-oriented Development (TOD) projects are an opportunity to reshape more efficiently Melaka's urban form and increase its economic density, which is a pre-condition for reaching the Structure Plan 2035 target of doubling GDP per capita and shifting to a service economy.** However, Melaka's fragmented urban form may limit economic growth as international studies suggest a robust link between economic density<sup>1</sup>, agglomeration economies, and increases in productivity, especially in services economies (which is the new driver of growth targeted for Melaka State). A strong opportunity of densification and reshaping of the urban form is the population increase forecasted at more than 70 percent and the housing stock increase also forecasted at more than 70 percent, of which 48,000 new units of affordable higher density housing will represent 30 percent. A more integrated planning providing these new housing units in complete mixed-use communities, with jobs, retail, amenities, social services such as education and health along BRT corridors and at major BRT nodes would reshape progressively Melaka urban form towards a polycentric pattern that will deliver better economic, social and environmental outcomes than the present flat pattern. First, this will foster agglomeration economies through a network of well-connected specialized economic nodes; second, integration of land use intensification and increases in accessibility with public transport will foster a modal shift towards public transport; third, this will decrease the share of transport costs in household expenditures, which is at present significantly higher than in other Asian cities; fourth, this will reduce the greenhouse gas emissions from transportation.

**Economic growth will translate into higher mobility demand that requires new investment and management to avoid potential negative externalities.** Travel vehicle demand across all modes in Malaysia more than tripled – from 13 million trips per day from 1991 to 40 million in 2010. Over a period of just 20 years, registration of private motorcycles and motorcars in Malaysia has also increased almost three-fold from 4.7 million in 1990 to 18.6 million in 2010. At the same time, data indicates public transport modal share to be falling, especially in urban areas where mobility demands are most intense. This surge of automobile travel has brought on negative externalities, such as congestion and pollution, as well as an increase in road accidents.

**Melaka is a car-oriented city and state where low density and fragmented urban form reduce physical proximity between where people live and work.** Barter (2004) indicates that Malaysian cities' heavy dependency on private vehicles may be caused by inefficient land use. Urban sprawl and ineffective urban transport mean that Melaka faces the combination of longer journey times for public compared to private transport, and highly congested roads and highways<sup>2</sup>. This raises issues both of economic efficiency and social inclusiveness. Additionally, the feasibility of public transport is undermined by low population densities. An estimated 90 percent of all trips are made by car (ADB 2017a) and 29.7 percent of Melaka's GHG emissions are attributable to on-road transportation (ICLEI 2016). The costs of traffic congestion are currently a serious problem.

<sup>1</sup> Measured either by GDP per square kilometer or by jobs per square kilometer.

<sup>2</sup> The recently completed World Bank advisory service on a national strategy for Malaysia's transport sector found that federal roads in nearly 50 percent of Malaysia's main urban areas are at or above capacity. The situation is less critical for State and local roads, but around a third of these still see heavy congestion.

Not surprisingly, when asked about top challenges to the efficient movement of people and freight, Melaka State firstly lists traffic congestion, along with inadequate and insufficient transport infrastructure in urban areas as another a top challenge, primarily in terms of public transport solutions and road maintenance.

**Therefore, effective provision of a first-class public transport system is a fundamental building block supporting Melaka's aspiration to become a high-income economy.** Such a system: moves people and goods; enables access to employment, education and entertainment; connects urban and rural areas. These are essential elements of not only economic growth but also of inclusiveness. The most effective way to create a greener and more efficient transportation system is to achieve a shift in travel behavior from car use towards sustainable transport modes, such as walking, cycling and public transport. This is in line with the goal set under the third thematic area of the Melaka Green City Action Plan: “increase opportunities for alternative modes of transportation and reduce GHG emissions resulting from vehicular use” (ADB 2014). More space for sustainable transport modes allows also the improvement of street design and public spaces – thus making Melaka more attractive.

**Integrating transport mobility in land use plans and enhance walkability should thus become a priority.** Despite an interest in Transit-Oriented Development (TOD) – that is a type of urban development that maximizes the amount of residential, business and leisure space within walking distance of public transport – this integration is not reflected in the Structure Plan 2035 (State of Melaka 2018). With an anticipated increase in population and housing stock of greater than 70 percent, there are strong opportunities for developing TOD solutions and associated land value capture instruments while enhancing walkability and livability.

**The integration of land use intensification, transit infrastructure provision, and economic policy with TOD will make Melaka State more competitive, with higher-quality neighborhoods, lower infrastructure costs, and lower CO<sub>2</sub> emissions per unit of GDP.** Melaka will have lower combined transportation and housing costs for its residents than other cities at similar levels of economic activity. Its residents will access most jobs and services easily through a combination of low-cost public transport, walking and cycling. Its core economic and population centers will be more resilient to natural hazards. Melaka will be able to finance improvements to public space, connectivity, and affordable housing by capturing value created through integrated land use and transport planning. Transit-oriented development (TOD) can play a major role in achieving Melaka vision.

This supporting report elaborates the following key messages regarding Melaka's urban mobility considerations:

**5-1** Focus on public transport and green mobility strategies

**5-2** Enhance Melaka's walkability

The following key actions are recommended for Melaka:

**5-A** Transform the public transportation industry

**5-B** Integrate public transport into a comprehensive strategy for a regional economic corridor

**3-C** Adopt transit-oriented development strategies

**5-D** Move towards a public transport modal share of 40 percent

**Box 1 SWOT**

The quadrants below summarize the strengths, weaknesses, opportunities, and threats (SWOT) analysis for Melaka's urban mobility considerations. An elaboration of each SWOT item is included in Annex B.

<p style="text-align: center;"><b>Strengths</b></p> <ol style="list-style-type: none"> <li>1. Geographical location in the Straits of Malacca</li> <li>2. High road infrastructure provision</li> </ol>	<p style="text-align: center;"><b>Weaknesses</b></p> <ol style="list-style-type: none"> <li>1. Transport Master Plan still in preparation</li> <li>2. Car dependent city with high car ownership</li> <li>3. Excessive road and parking space</li> <li>4. Low level of accessibility within the city; in particular to the World Heritage Site</li> <li>5. Very low modal share of public transport</li> <li>6. Transportation affordability issues</li> <li>7. Poor walkability and pedestrian facilities</li> <li>8. High share of transportation emissions in total emissions</li> </ol>
<p style="text-align: center;"><b>Opportunities</b></p> <ol style="list-style-type: none"> <li>1. Future High-Speed rail line between Singapore and Kuala Lumpur</li> <li>2. Create a TOD corridor between the future HSR station and city center</li> <li>3. Increase modal share of public transport and enhance industry structure</li> <li>4. Integrate transport and land use planning with TOD policies</li> <li>5. Enhance walkability across the city</li> <li>6. Pedestrianize the World Heritage Site</li> </ol>	<p style="text-align: center;"><b>Threats</b></p> <ol style="list-style-type: none"> <li>1. Pressure on transportation system of anticipated 25 million tourists</li> <li>2. Pressure of large-scale projects on traffic</li> <li>3. Car culture hindering bicycle use as well as the access of disabled persons and pedestrians</li> <li>4. High level of congestion</li> </ol>

## Key Message 5-1: Focus on public transport and green mobility strategies

### *Transport Sector Dynamics of Melaka State*

Melaka State has set the ambitious target of reducing GHG emissions from the transport sector by 40 percent by 2020 (ADB 2014). In 2013, transportation consumed 49.5 percent of total energy consumed in the State while road transportation emissions were responsible for 29.8 percent of total emissions (ICLEI 2016).

Malaysia's national objective is to achieve a land public transport modal share of 40 percent in urban areas, enhancing access in underserved rural areas, while increasing connectivity between geographies. At present, the modal share of public transport for commuting in Melaka is only 1 percent, compared to 62 percent in both Shanghai and Singapore (World Bank 2015a). Highly automobile dependent, the transport sector remains one of the largest contributors to environment decline across Melaka State. In addition to the large share of total GHG emissions, the sector suffers from significant congestion and poor service levels. There are other issues of tourism-related on-road traffic congestion, use of unsafe transport such as motorbikes and lack of parking spaces. These are gaining significant prominence in Melaka, both amongst residents and tourists. Interventions designed to reduce the share of total transport emissions are likely to have co-benefits associated with improved quality of life and environment; both significant drivers in the sustainable growth of Melaka's tourism economy.

The low spatial density and high fragmentation of Melaka result in long commutes for work, and ultimately affect transport costs, which are high compared with other East Asian cities. The share of transport costs in Malaysian household income is 50 percent higher than in Hong Kong and Tokyo (World Bank et al. 2015). Attention should be paid to the needs of lower income groups; the recent EPU-UNDP study on housing issues in Malaysia highlights that areas of lower income housing in Malaysian cities are poorly served by public transportation, which disadvantages residents there (UNDP 2015).

Public transportation, Transit Oriented Development (TOD) planning and compact urban form are key policies for increasing transportation affordability by reducing both the number of trips and their cost. TOD is a planning and design strategy to achieve compact, mixed-use, pedestrian and bicycle-friendly urban development closely integrated with transit stations. It embraces the idea that locating amenities, employment, shops, and housing around transit hubs promotes the use of public transit and nonmotorized travel. Well-planned TOD at the city level is inclusive, because it focuses on ensuring access to jobs for all social groups through public transit. Balancing transportation demand and increasing proportion of population with convenient access to public transport reduce congestion and increase job opportunities while integrating labor markets and fostering productivity.

**A Transport Master Plan for Melaka is under preparation and is urgently needed.** Terms of Reference are prepared but the commencement of a study is waiting for availability of budget<sup>3</sup>. The previous National Land Transport Authority (SPAD) was working on a regional public transport plan. Melaka needs to develop transportation modeling with fine grain disaggregation of jobs and people location (present and anticipated) at traffic analysis zone<sup>4</sup> (TAZ) level with

<sup>3</sup> The Land Public Transport Commission (SPAD) was in charge of supervising and coordinating the development of public transport nationwide. A Regional Land Public Transport Masterplan for the Southern Region - including Melaka - was under preparation by SPAD. SPAD subsequently disbanded and certain responsibilities were transferred to the Land Public Transport Agency (APAD).

<sup>4</sup> A traffic analysis zone (TAZ) is the unit of geography commonly used in transportation planning models. For a typical metropolitan planning software, a zone of under 3000 people is common. The information for each TAZ often comprises the number of automobiles per household, household income, and employment. This information helps understanding trips that are generated and attracted within the zone.

origin/destination flows analysis. This transportation model should become a key instrument for the development of local land use plans.

**Private car ownership and usage is very high relative to the population of Melaka**, causing severe congestion during peak hours. Melaka has seen a surge in car and motorcycles ownership, which reflects both the car dependent urban sprawl and the city's increased prosperity. The average household in Melaka State has 1.4 cars and 1.9 motorcycles<sup>5</sup>. Per 1,000 persons, there are 408 cars (Asian Development Bank 2017a). Melaka is by no means an outlier here, with Malaysia having one of the world's highest rates of private car ownership. Between 2004 and 2011, car registrations increased by 58 percent and motorcycles by 36 percent. The weekend and other holidays bring additional tourist flows from around the region, particularly by road from Kuala Lumpur and Singapore, worsening congestion.

**The public transport modal share of 1–2 percent plays a marginal role in Melaka transport system<sup>6</sup> and public transport ridership is further declining rapidly.** It has seen a decrease of 30 percent for the first 6 months of 2017, partly due the low availability and unreliability of the bus fleet (ADB 2017a). Panorama is the sole provider of public transport services within the state and has a bus fleet of 63 available for service<sup>7</sup> (a Panorama bus is shown in image 1). Melaka is far from SPAD targets of a modal share of public transport of 24 percent in 2020 and 40 percent in 2030. Main users of public transport are elderly people, students, tourists and foreign workers. Public transport is usually not used for travel to and from work. Significant issues include the lack of marketing and promotions, along with limited information on the public transport route network and services on public sources. The accessibility and connectivity of bus stops is generally poor, which affect the riders' safety.

Image 1 Panorama Bus



Source: "JHY5461 - Laluan 08 (Melaka Sentral - Muar)" by TIB1218R CC BY-NC 2.0.

<sup>5</sup> 93 percent of households own a private vehicle; 54 percent of households own more than one car (ADB 2017a).

<sup>6</sup> Asian Development Bank 2017 a.

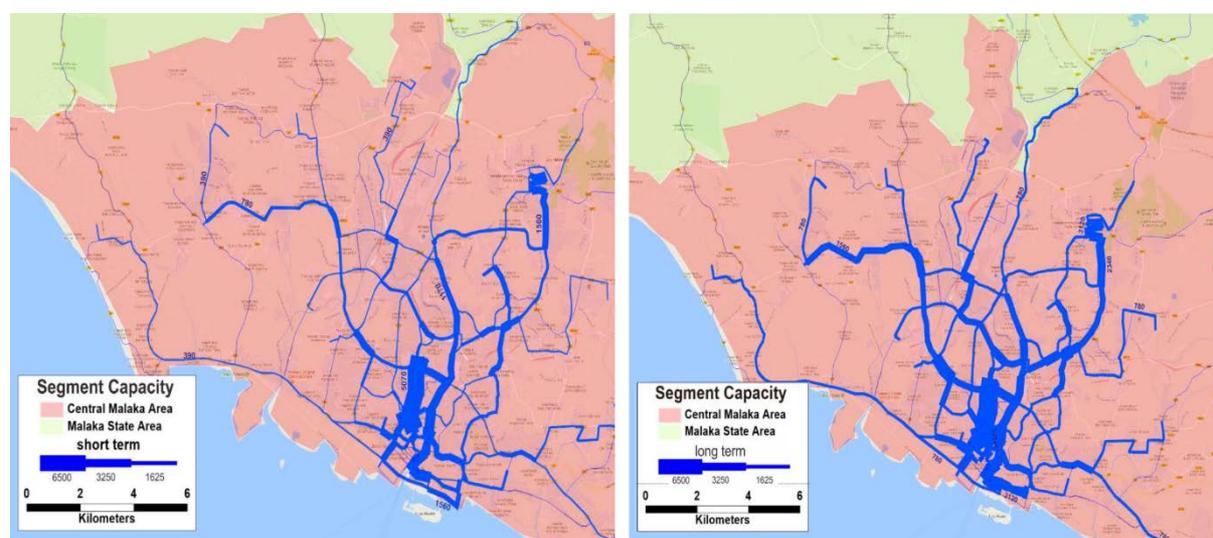
<sup>7</sup> However, only around 43 are available for daily operation. Panorama does not own a depot or maintenance facilities. Most buses are operating on the basis of a Lease Contract. The largest contract is with Scomi for 40 Chinese buses. 11 out of the 40 buses are currently out of services due to lack of spare parts and maintenance. There are 35 bus routes of which 26 are actually operated according data of Panorama. It is understood that the ridership at Panorama Bus company is around 9,000 passengers a day for a State population of 872,900, of which the majority live in Melaka Tengah (534,600). Panorama is the sole provider (Bruggeman 2017).

**The current bus route network has failed to provide sufficient services to some big communities.** Looking at the 500-meter radius from existing bus network, there are still developments not served by the bus service. All 20 bus routes ITDP surveyed (Asian Development Bank 2017 a) ended at Melaka Sentral, which is not the origin and destination for most of the passengers. This alignment discourages passengers to take the buses, and forces passengers to transfer at Melaka Sentral. The bus routes run very long distances, with an average distance of 34.5 km one-way, which creates very low-frequency service (maximum 3 buses per hour during peak hour per route).

**Changes over the past decade have led to consolidation of Malaysia public transport services through government-owned entities. However, transport industry structure continues to be a concern, with many operators sustaining losses.** For example, there is a shortfall of RM1.50 per bus per km as operating costs exceed revenue, leading to a funding gap of RM470 million per annum, nationally. A robust land public transport industry can still be public sector-operated – the key is not who operates it but how best to develop an industry that is structurally sound, and provides the right incentives to ensure high quality and highly efficient operations. Melaka State-owned company, Panorama, is transporting only around 9,000 passengers on a daily basis.

**Asian Development Bank’s analysis proposes 18 new bus routes to serve central Melaka (ADB 2017a).** ADB also proposes the following measures in the report: (1) Re-structure the bus routes to be more Melaka-central focused, i.e. reduce the travel distance per route; (2) Provide more direct service from residential to job and commercial centers, without having to transfer at Melaka Sentral bus Terminal; (3) Re-route more bus routes to go to the city center, focusing around Hang Tuah Plaza area; (4) Increase the frequency during peak hour to create a headway between 5 and 10 minutes per route, depending on the route. The analysis is shown in figures 1 and 2.

Figure 1 Proposed Bus Route Capacity for Short-Term (Left) and Long-term (Right)



*Note:* In the short term, with a 12-meter bus fleet, few road sections in Melaka Central area will have a passenger capacity of more than 5,000 passengers/hour per direction passing during peak hour, whereas in the long-run, with higher frequency services, the capacity on a few roads could increase up to 10,000 passengers/hour per direction. *Source:* ADB 2017a.

Figure 2 Proposed Bus Stops (Left) and Example Bus Bay (Right)



Source: ADB 2017a.

**Cycling as a mode of transport is very low**, although locals use bicycles outside the city center. No dedicated bicycle lanes exist in Melaka and a shared bicycle system with three stations operated by the municipality exists but is rarely used<sup>8</sup>.

**Road safety is an increasing cause of concern for Melaka citizens.** In 2012, the number of road accidents was approximately 14,720, an increase of 4.5 percent on the previous year. The number of fatalities has remained mostly constant at around 235 deaths per year (Asian Development Bank 2014). Roads in Melaka are increasingly unsafe due to little traffic management, use of unsafe transport modes such as motorbikes and significant lack of parking space. There is a clear lack of pedestrian facilities and crossings throughout the city, with priority given to on-road transportation in most cases.

<sup>8</sup> The low use may be related to the access to the system (necessity to register at a website). A number of hotels and guesthouses provide bicycles for their guests. Bicycles are used mainly by guests from Europe. It is understood that the Chinese company OFO introduced a dockless bike-sharing service in Melaka early August. According to press info, Of0 has placed 500 cycles in the downtown area, with a further 1,500 set to be deployed by the end of August.

Image 2 Melaka's Lack of parking and space for pedestrians



Source: "View From Menari Taming Sari" © Steve Swayne, permission required for reuse.

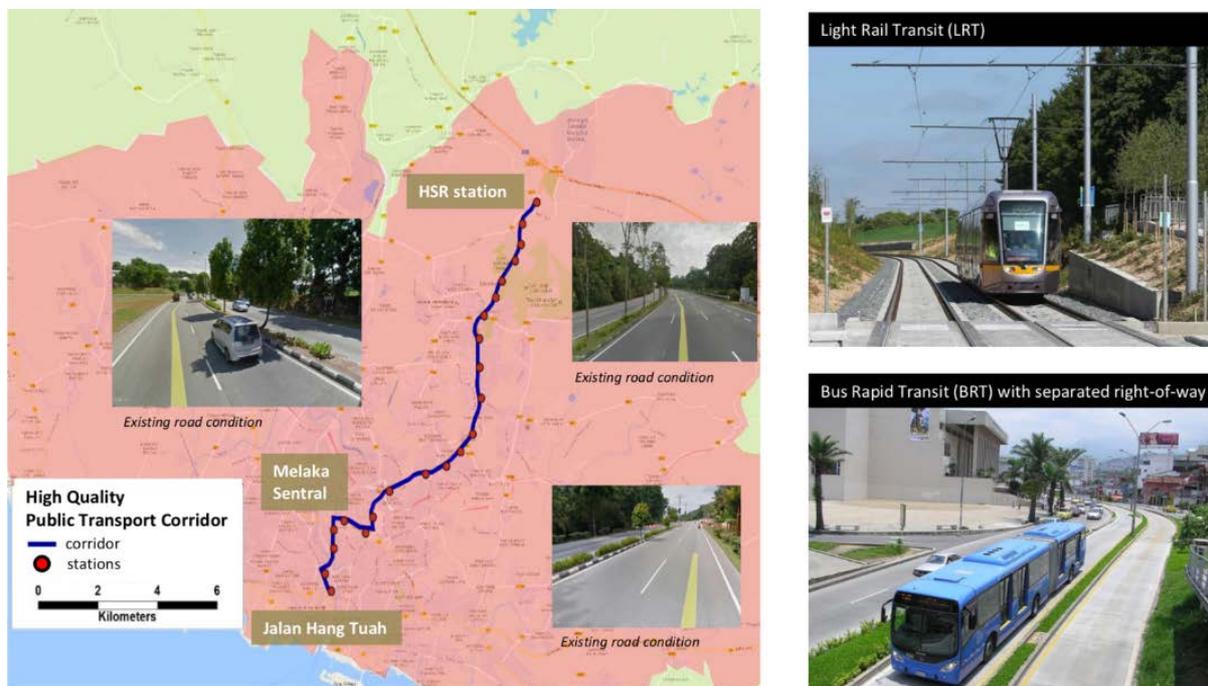
The high number of tourists has a significant impact on Melaka's transportation system, particularly on the use of road infrastructure and public space. Tourism is a very important sector for Melaka's economy, but has its downside regarding transportation. On weekend days and public holidays, Melaka experiences significant traffic congestion as a result of domestic visitors arriving by car.

Various large-scale projects currently under development in Melaka will generate significant additional traffic, including:

- *Melaka Gateway Project*: The Melaka Gateway is an off-shore development on artificial islands in front of the coast of Melaka and comprises 246 ha. The first phase is currently under construction. Part of the development is an International Cruise Terminal with a capacity for 4 large cruise ships at the same time. The project is expected to generate an additional 2 million visitors annually when completed. Access to Melaka Gateway is likely to become critical as traffic has to pass through Melaka city to reach the development and thus will put even more pressure on the already congested road network. The capacity of the access bridge(s) also has its limitations. A high-quality public transport connection is yet not foreseen in the project and access bridge(s) does not have facilities for cycling, pedestrians and public transport. A Green Transportation Plan for the Gateway is needed to mitigate the negative environmental impact of the large increase of traffic volume.
- *Hang Tuah Commercial Centre*: This project is intended to redevelop the Hang Tuan area north of Melaka river and can be envisaged as a Central Business District for Melaka. The high-density area could favor service provision by public transport provided that suitable infrastructure is made available.

**A high-quality transport corridor between the future HSR station and Melaka is needed.** In 2013, Malaysia and Singapore agreed to build a High-Speed Rail (HSR) link between Kuala Lumpur and Singapore. Opening of the line is now planned for year 2031. With 2.5 hours travel time between Singapore and Kuala Lumpur, the HSR will increase the accessibility of Melaka, both nationally and internationally. High Speed Rail will divide by two travel time between Kuala Lumpur and Singapore compared to car and conventional train options and reduce travel time by 40 percent compared to air travel. Faster communication is expected to have a major impact on economic growth with the increase of tourists and workers. The HSR terminal will be located in Ayer Keroh and integrated as a transport hub with the provision of buses. Bus Rapid Transit transportation and commuting facilities are envisioned to improve the public transport system in Melaka State. This approach will encourage the use of public transport by residents or tourists as the main transport mode. Although the opening of HSR will take place only in 2031, a vision on a future transport connection is urgent in order to make physical reservations along the Ayer Keroh - Melaka corridor. Examples of a transport corridor for Melaka are shown in figure 3.

Figure 3 Base Options for a High-quality Transport Corridor HSR Station in Melaka



Source: ADB 2017a.

**Moving forward, Melaka Structure Plan 2035 envisions several lines of Bus Rapid Transit system (BRT) with the development of TOD nodes.** Bus rapid transit (BRT) will significantly improve capacity and reliability over the traditional Melaka bus system. The road sections envisaged are illustrated in the figure below. The new Melaka BRT system will include dedicated bus routes and give priority to buses at intersections where buses can interact with other vehicles; along with design features to reduce delays caused by boarding or departing passengers, or purchasing fares.



**BRT development in Melaka is an opportunity for TOD policies that encourage high-density, mixed-use development, balanced development with jobs close to homes, and walkable streets. These TOD policies are vital to reduce private car use and increase the financial viability of public transport.** Compact growth enables to make the best use of land, allow for more efficient provision<sup>[1]</sup><sub>SEP</sub> of facilities, and maximize the use of transport infrastructure. By building more homes and amenities around major public transport stations, residents can benefit from greater convenience to public transport and ready amenities nearby. This translates to greater travel convenience, lower car usage, and more social interaction and bonding. Even though living environments are likely to become denser, quality living environments can continue to be planned for. There can be more ground level open spaces and parks with good design and landscaping.

**Related to TOD, land value increases created by improved accessibility can be captured by the Melaka government to further finance provision of public transport infrastructure, enhancement of the public realm, and affordable housing.** Value capture finance (VCF) represents an innovative means of maximizing a city's assets. It is a finance mechanism which not only shares the risks and costs of urban development between public and private actors, but also the rewards. VCF sees some of the costs associated with making urban development succeed internalized within the balance sheets of the developments themselves. Public goods are consequently provided by urban development without the proportional draw on the public resources which would otherwise finance them. This potentially means that value capture is an attractive idea to the public sector (as it provides additional resources for public goods) and for the private sector (as it ensures that the value created by development is at least partly locally re-invested rather than being more broadly dispersed). TOD offers a variety of land-value capture opportunities for recouping the financial costs of mass transit development such as through joint development at stations; tax-increment financing; and selling air rights in up-zoned areas. However, experience suggests that it is not easy to avoid conflicts of interest between financial gains for the public sector and safeguarding the interests of area residents. Timing issues are also critical: the construction schedule of the transit station and the adjacent public infrastructure needs to be carefully coordinated with market demand and therefore, the release and development of land parcels around it.

Key lessons from TOD projects are shown in box 2 and information regarding how other cities in Malaysia are adopting TOD strategies is provided in box 3.

**Box 2 Lessons from TOD success stories**

TOD is a high-value complement to mass transit development. Compact, mixed-use, high density development around key mass transit stations can have the dual benefits of creating a ridership base that enhances the economic and financial viability of the mass transit investment and compounding the accessibility benefits a mass transit system can bring to a city's residents. The following are four lessons drawn from examples of successful TOD from around the world.

**1. Realizing TOD requires coordinated efforts across multiple sectors and a series of inter-linked development phases, where attention to detail is crucial.** TOD should ideally be an integral element in a city's master plan. An urban design scheme for TOD would be contextual and consider various dimensions including integration with and access to the transit station, supporting a right mix of land uses and density, and the creation of a walkable, human scale environment around it. Getting TOD right is often about getting the details right: for example, planners in Singapore often reserve direct pedestrian links to the entrances/exits of stations, guiding pedestrian circulation through sheltered walkways.

**2. Successful TODs require not only the city's support of high density, mixed use development around transit, but also prioritizing the development of these areas over others in the metropolitan area.** In the best scenario, this priority is reflected in an urban growth pattern that mirrors the mass transport network, as in Curitiba, with little or no development outside the system.

**3. The transit accessibility of successful TODs has to be higher than auto accessibility.** Achieving this requires a number of deliberate actions: for example, Singapore's transport and land use policies promote greater convenience and lower cost for public transport than driving; London and Boston reduced the amount of parking spaces in downtown buildings to prioritize public transport.

**4. Implementing successful TOD requires strong legal backing, sound financial planning and appropriate timing.** At a technical level, it is necessary to formulate detailed development control guidelines and enforce such guidelines in a manner that is transparent and consistent, yet not perceived to be overly burdensome. The legal environment is critical and defines the role that the government plays beyond providing access to infrastructure and appropriate zoning. Financing considerations are also important.

Source: Huang and Mehndiratta 2014.

**Box 3 Malaysian cities, such as Johor Bahru and Penang, have begun to promote TOD**

The Iskandar Regional Development Authority (IRDA) has developed plans to enhance regional and local public transport systems by initiating several projects, for example the high-speed rail network linking South Johor Economic Region (SJER) to Kuala Lumpur and the Light Rail Transit. Likewise, the current Penang State transport master plan also emphasizes TOD and transit corridors as a priority for the George Town conurbation.

Source: World Bank 2015 a.

*Horizontal Analyses*

**Share of transportation energy consumption (49.5 percent) and emissions (29.8 percent) in Melaka vary in comparison with other cities.** The transport sector in Da Nang consumed 45 percent of total energy use in the city<sup>9</sup> and accounted for 46 percent of citywide GHG emissions in 2010 (World Bank 2013). Transport emissions in Recife accounted for 45 percent of total emissions in 2012 (UN-Habitat 2012).

**Private vehicle ownership is considerably higher in Melaka and Malaysia than in comparator cities.** In 2010, Malaysia had a population of 28.3 million with 17.4 million private vehicle automobiles, equating to 614 automobiles per person (Noresah Mohd Shariff 2012). Izmir for example in 2012 had 94 vehicles per 1,000 inhabitants (Izmir Metropolitan Municipality 2012). The city is continually expanding its mass transportation system to provide a comfortable, safe and fast alternative to the private mode of transport. For example, Izmir's ferries and piers are built to increase the share of maritime transport and the city also hosts the Turkey's longest rail network (Izmir Metropolitan Municipality 2015). Information regarding Singapore's care-lite initiative can be found in box 4.

**Box 4 Singapore mobility targets: A "Car-Lite" Singapore**

The rail network and bus services in Singapore have been continuously enhanced to make public transport a more convenient way to travel. This is complemented by measures to control car ownership and usage. For its 2013 Land Transport Master Plan, Singapore continues to work towards its vision of a "People-Centered Land Transport System", focusing on "Enhancing Your Travel Experience". Singapore works on three areas that are important for commuters: More connections, better service, and livable and inclusive community.

**Figure 6 Enhancing Travel Experience in Singapore**



Source: LTA 2013.

With a denser rail network and extensive bus services, Singapore aims at travelling seamlessly and efficiently around the city. Cycling and walking will become popular forms of getting around in Singapore neighborhoods and regions. Electric car-sharing and driverless car trials will be conducted in parts of Singapore. More car-free spaces will be created in housing estates and the city, such as the Civic District, where roads are temporarily or permanently closed for public activities

**Where Singapore is today**

- Rail network extended to about 180 km today;

<sup>9</sup> To increase the tremendously low modal share of public transport, one of the World Bank's Sustainable Urban Energy and Emissions Planning (SUEEP) projects has proposed to double the number of bus lines to encourage bus use and expand the higher quality public transport services (World Bank, 2015 b).

- During rush hours on weekdays, at least 4 out of 5 buses run every 10 minutes or less. In 2012, Singapore announced the Bus Service Enhancement Program which will add 1,000 new buses and 80 new bus services to ease commuter crowds and shorten waiting times<sup>10</sup>;
- >100 km of cycling paths built since 2009; and
- Carbon Emissions-Based Vehicle Scheme for more environmentally friendly vehicles implemented.

### ***What Singapore targets to be by 2030***

By 2030, Singapore targets at having 75 percent of journeys during peak hours made via public transport up from 64 percent in 2013; at doubling its urban rail length between 2013 and 2030 from 180 km to 360 km; and at increasing during the same period the proportion of households within 10-min walk of a train station from 58.5 percent to 80 percent. By 2030, Singapore's rail system will be more extensive than the one in Hong Kong, and comparable to New York City's network.

Figure 7 Singapore's Mobility Vision by 2030



Source: LTA 2013.

Singapore also aims at developing a comprehensive cycling network spanning more than 700 km by 2030, with supporting infrastructure and a code of conduct to promote safe cycling within and across towns.

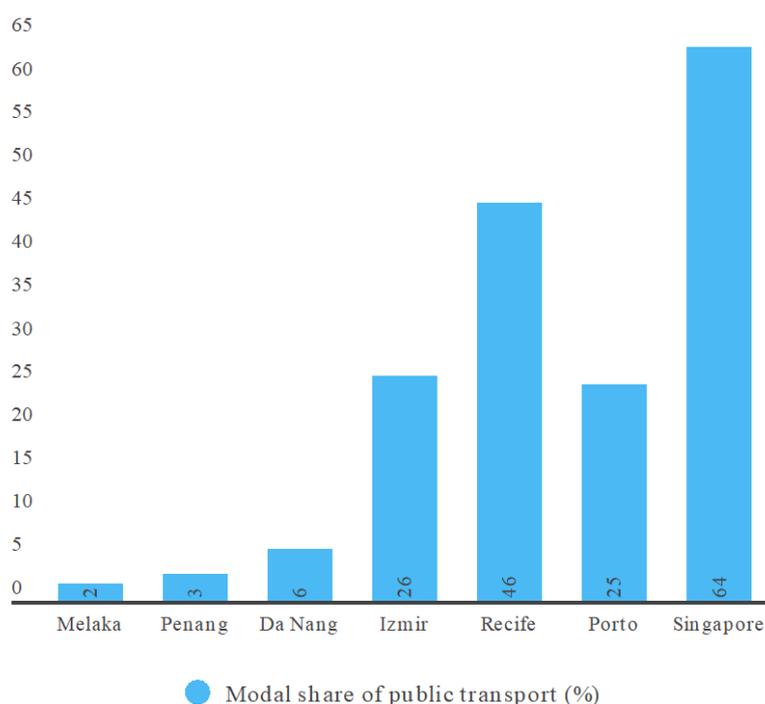
### ***Transportation options for a livable and inclusive community***

In a densely built city-state, the impact of the transport on quality of life is important. Singapore is developing its transportation system by encouraging the use of low carbon and environmentally friendly vehicles, as well as the construction of noise barriers and other efforts to reduce noise levels. In the longer term, Singapore's Land Transport Authority will work with planning and development agencies to provide more vibrant public spaces where the presence of automobiles will be reduced. Singapore also pays close attention to the specific needs of accessibility to public transport for people with reduced mobility (LTA 2013).

**The modal share of public transport in Melaka is significantly lower than in comparator cities, except Penang and Da Nang.** Recife has a much higher public modal share at 46 percent, and in Singapore 64 percent of journeys during peak hours are made via public transport. Da Nang and Penang State have similar low modal shares at 6 percent (UN Habitat, 2015) and 3 percent, respectively. Penang has an 8 percent public transport modal share when school and private buses are included (Pejabat Setiausaha Kerajaan Negeri Pulau Pinang).

<sup>10</sup> In 2012, the Land Transport Authority (LTA) provided users with the MyTransport.SG application to help them optimize their journeys. This application includes real-time information on the arrival of buses, the direction of MRT stations, bus stops and taxi stations, as well as cycle routes. Sheltered lanes to public transport nodes will be further included, as well as updates on crowd levels on bus and train platforms, and information on car-sharing ports.

Figure 8 Modal Share of Public Transport in Melaka and Comparator Cities



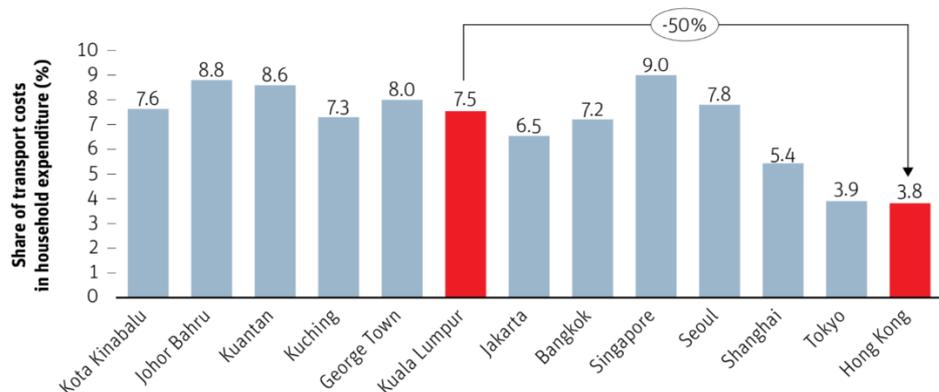
Source: Urban Morphology and Complex Systems Institute. Data source: ADB 2017b and World Bank.

**There are multiple examples globally of public transport operators being able to achieve positive margins and acceptable returns.** Major bus operators across the world are registering average operating margin of 9 percent<sup>11</sup>, while other examples among rail operators, such as the Mass Transit Railway (MTR) in Hong Kong, register operating margin of 36 percent thanks to the Rail + Property model of Transit-Oriented Development. International examples suggest collaborations with businesses that have synergies with public transport, e.g., advertisement, retail and property development – to further enhance the industry structure, ultimately reducing the tax payer's burden. For example, non-farebox (NFB) revenues offer great opportunities to increase overall profitability, fundamentally changing the attractiveness of the industry. Data indicates that in the mid-2000s, 11 percent of overall revenues for operators in Asia consisted of NFB revenues. Japanese private rail operators led the way in capitalizing on the NFB opportunity – with property development, retail and other NFB sources making up over 75 percent of revenues (SPAD 2012).

**In general, transportation in Malaysia is less affordable than in other East Asian cities.** For example, the share of transport costs in household expenditure in Kuala Lumpur is 59 percent higher than in Hong Kong and Tokyo, and the share of transport costs in household income in Kuala Lumpur is 50 percent higher than that of Hong Kong and Tokyo (Baker and Lee 2015). An underlying driver of high transport costs is the spatial expansion and urban sprawl of Malaysian cities. This is reflected in the population density gradients by distance from the city center, a result of the relatively flat spatial form of Malaysian cities compared to East Asian cities.

<sup>11</sup> Bus operators examined were: First Group (Greyhound), Arriva, National Express, Stagecoach, Comfort Delgro, GoAhead, KMB, Jiangxi Changyun and Nanjing Zhongbei. Recent available financial data were used (2009-2011). Source: SPAD (Land Public Transport Commission) 2012.

Figure 9 Percentage of Transport Costs in Household Income: 50 Percent Higher in Kuala Lumpur than in Hong Kong



Source: Baker and Lee 2015. Data source: Oxford Economics 2012.

Key lesson from the horizontal comparison is that excessive urban land expansion in Melaka has had significant negative impacts on transportation and that there is a need for both increased compactness and integration between land use and transport planning. Benefits of integrated transportation planning with a significant shift toward public transport will be a reduction of energy consumption and emissions with associated environment improvement, a reduction of congestion, and an improvement of affordability of transportation and access to jobs for the poorest communities.

Image 3 Melaka’s car-focused urban form



Source: © Joy S. Swainson, permission required for reuse.

## Key Message 5-2: Enhance Melaka's walkability

*Walkability is a key feature of sustainable cities and neighborhoods. The pedestrian potential is a measure of the friendliness of a place to walk. Walking has health, environmental and economic benefits. Walkability is an important concept in sustainable urban design. Factors affecting walkability are diversity and closeness of destinations near home, land use mix, residential and job density, street connectivity and design, place making of the public spaces, trees and landscaping, frequency and variety of buildings. Other factors influencing walkability include access to transit, presence and quality of footpaths, buffers to moving traffic, and pedestrian crossings, aesthetics, air quality, shade or sun in appropriate seasons, street furniture, traffic volume and speed. Reid Ewing and Robert Cervero's five D's of the built environment—density, diversity, design, destination accessibility, and distance to transit—heavily influence an area's walkability (Ewing and Cervero 2010). There is room for improvement in Melaka as demonstrated by the analyses below.*

**The walkability in Melaka is poor due to the absence of pedestrian walkways and the road-side parking.** Cars are used even for short distances and those who walk are forced to use the road space as walkways under arcades are often blocked. The presence of cross walks is limited, and these are often not very well marked and respected. Overall, the quality of public spaces in most areas is poor.

Figure 10 Melaka is a car-oriented city where parking occupies a disproportionate amount of space



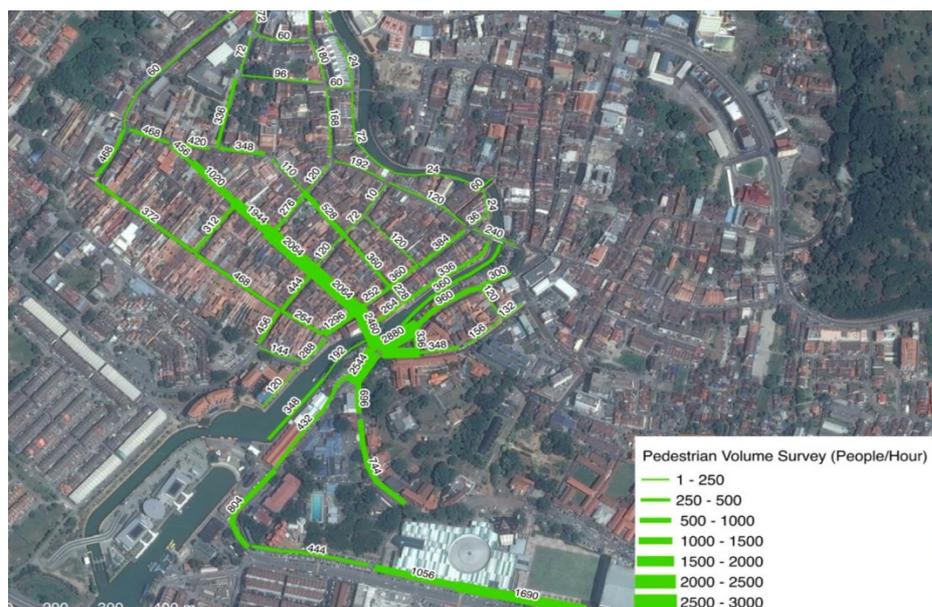
Note: Public space is of poor quality and dominated by cars with 50 times more space for cars than for pedestrians as shown in the figures.



Note: Parking consumes disproportional public space at some locations as shown in the figures.  
Source: ADB 2017b.

**The increasing number of tourists visiting the Heritage Area make it more difficult to move around by walking due to the limited space and lack of proper pedestrian facilities.** The volume of pedestrians reaches over 2,000 per hour in the area's Jonker Street. There is a clear discrepancy between the number of pedestrians and the space available for those who walk. Most side pavements are only 1-2 meter-wide and 40 percent of the streets in the main heritage area have no walkways at all (ADB 2017 a).

Figure 11 Melaka Heritage Area Pedestrian Volume



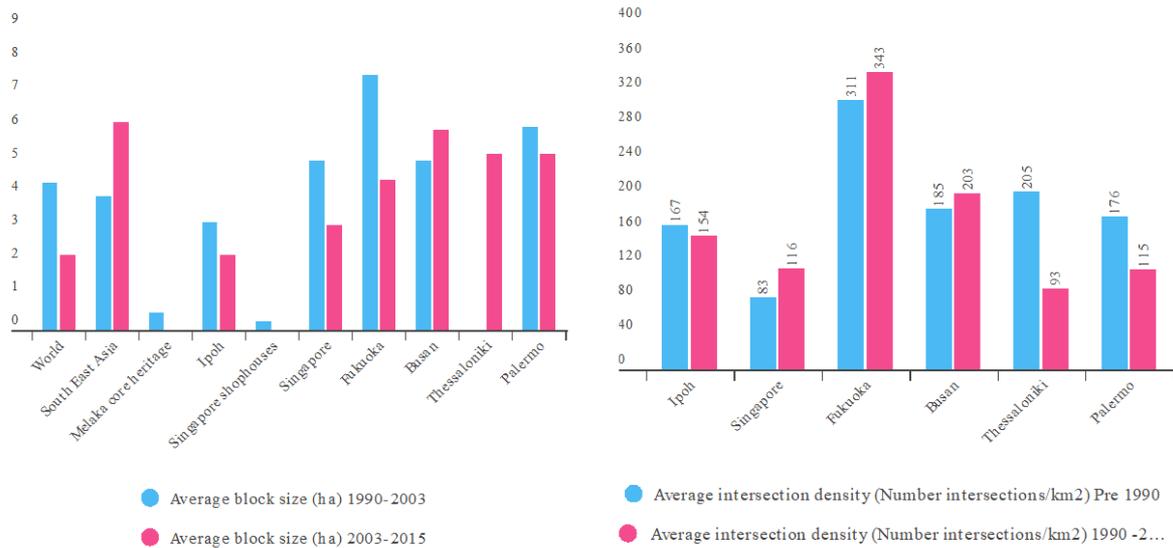
Source: ADB 2017a.

#### *Horizontal Analysis: Compared Accessibility and Connectivity of Street Networks*

Walkability is influenced by the width of roads, and by their connectivity measured by block size and by the density of intersections (number of street crossings per square kilometer<sup>2</sup>). When data were not available for Melaka, Ipoh which has a comparable size and urban fabric has been used as a proxy for Melaka's values.

**Average blocks in Melaka's recent extensions and other Malaysian cities (exemplified here by Ipoh extension 1990-2003) are more than 6 times larger than in Melaka's core heritage zone, reflecting a significant increase in average block size. This is predominately characteristic of recent growth in South East Asian cities.** While the world has seen average block-size halved between the extensions of the period 1990-2003 (4.39 ha) and those of the period 2003-2015 (2.25 ha), South-East Asian cities have experienced an increase of 50 percent of their average urban block sizes from 3.98 ha to 6.2 ha. In the most sustainable cities, the recent period has seen a reduction of block sizes: for example, Ipoh, Singapore and Fukuoka have reduced the size of their recently built urban blocks, with the most significant decrease in Singapore (- 40 percent) from 5.06 ha to 3.14 ha.

Figure 12 Average Block Size in Melaka Heritage Zone and Comparator Cities (left). Average Density of Intersections in Malaysian cities (Ipoh is used here as a proxy for Melaka) and Comparator Cities (right)



Source: Urban Morphology and Complex Systems Institute. Data source for comparators: Angel et al. 2016.

On average, Melaka and Ipoh present connected street patterns that are above the sustainability target of at least 100 intersections per km<sup>2</sup>, as recommended by UN-Habitat. Ipoh street intersection density has only slightly decreased in the recent expansion areas from 1990 and remains above Singapore. Singapore has increased its intersection density attributed to its compact urban form policy, while sprawling European cities such as Thessaloniki and Palermo have experienced a significant decrease of intersection density in the recently built suburbs. Japanese cities are outliers with extremely dense street patterns. Further information regarding Singapore's walking initiatives is found in box 5.

**Box 5 Safe and pleasant walking for everyone in Singapore**

Sustainable Singapore Blueprint survey shows that more than 3 in 4 Singaporeans are willing to walk for up to 10 minutes to neighborhood amenities or to MRT stations.

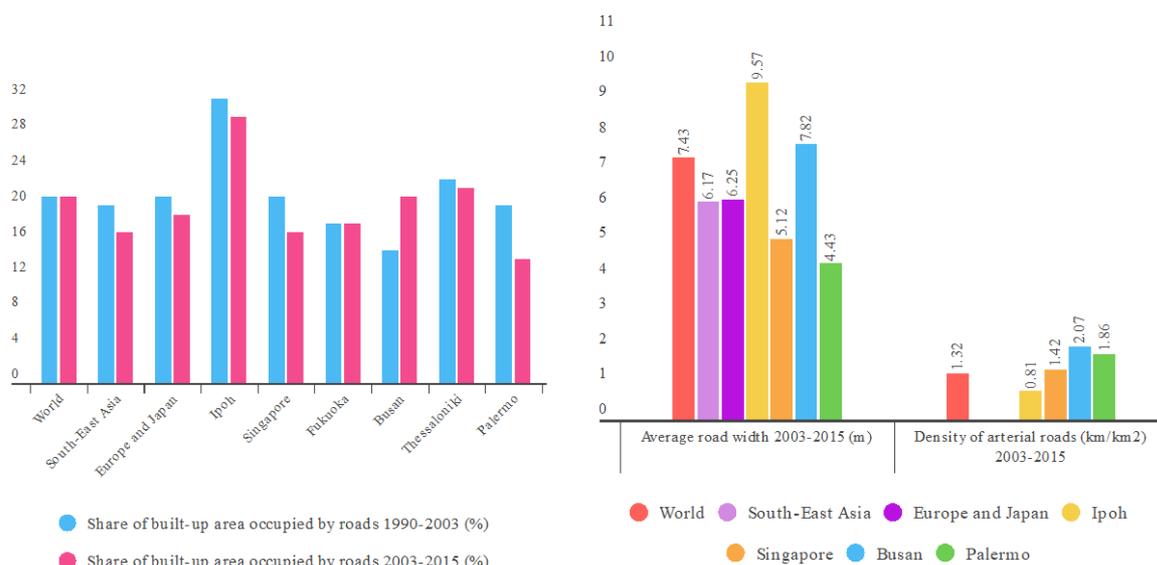
Today, HDB housing estates are safe and enjoyable pedestrian environments with a comprehensive network of sheltered footpaths that also connect HDB blocks to transport nodes, shops, amenities and recreational facilities nearby. Seats along the pedestrian routes as well as directional signs have been installed to enhance the walking experience. In the short term, Singapore is implementing the following initiatives:

- As part of the new Walk2Ride program, more than 200 km of sheltered walkways will connect neighborhood facilities and amenities by 2018, four times the 46 km in 2013. Sheltered walkways provide resting areas, signposts and walking route maps.
- The Green Man Plus program allows more time for seniors and less mobile residents to cross the road at crosswalks. It is being implemented at more than 500 pedestrian crossings in 2015. About 40 pedestrian bridges will be progressively installed with lifts.
- Today, all MRT stations and bus interchanges have at least unobstructed access, and almost all bus stops are barrier-free. Starting in 2015, wherever possible, LTA will progressively improve the remaining bus stops that have more complex site constraints to be barrier-free.

Source: Ministry of the Environment and Water Resources and Ministry of National Development 2014.

Roads occupy about 30 percent of the land in Malaysian cities – a share 50 percent higher than the world and South-East Asia average – and they are wider in Malaysian cities than in comparator cities. The share of built-up area occupied by roads has generally been reduced in South-Asian cities in more recent expansion – for example by 20 percent in Singapore. However, Malaysian cities present the highest share among comparator cities. Ipoh is a good proxy for Melaka as it presents the same type of urban fabric. The indicator is 76 percent higher from Ipoh’s recent 2003 – 2015 expansion than in Singapore during the same period. This is partly explained by wider roads (50 percent wider on average in Malaysia than in South-East Asian, European and Japanese cities) and a lower density of arterial roads<sup>12</sup> (43 percent lower in Ipoh than in Singapore), as shown in the chart above right. These differences in blocks and street widths impact negatively on Melaka’s walkability.

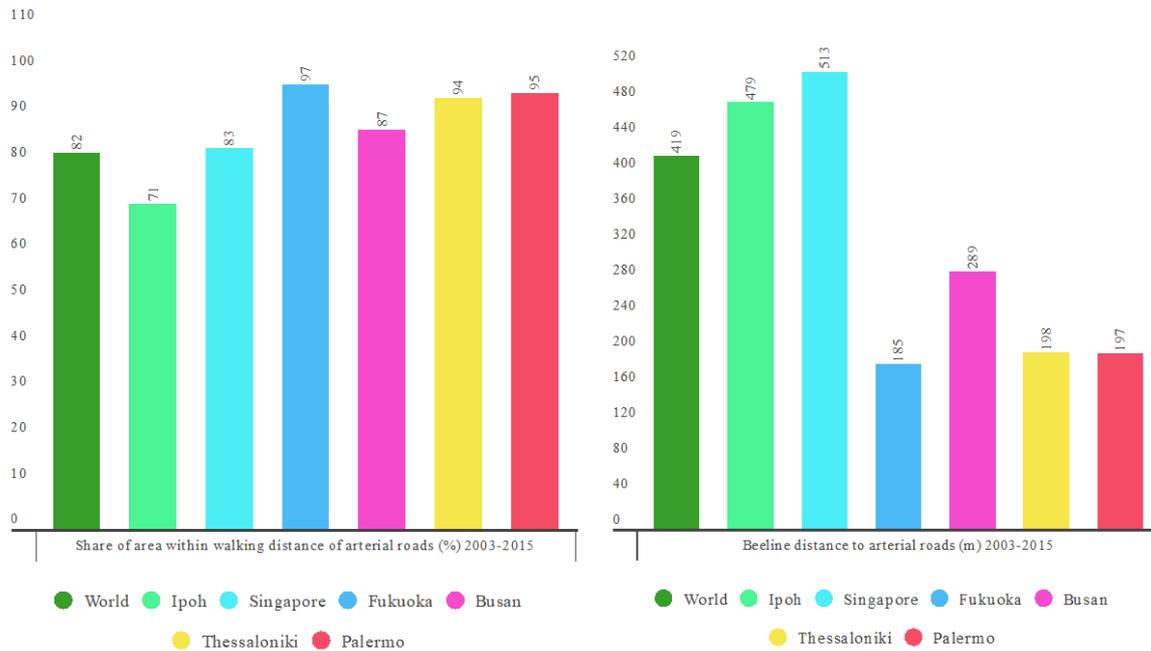
Figure 13 Share of Built-up Area Occupied by Roads in Malaysian (Ipoh is a good proxy for Melaka’s values) and Comparator Cities (left) and Average Road Width 2003-2015 and Linear Density of Arterial Roads in Malaysian and Comparator Cities (right)



Source: Urban Morphology and Complex Systems Institute. Data source: Angel et al. 2016.

<sup>12</sup> The average density of all arterial roads is measured in linear kilometers of arterial roads/square kilometers of urban extent).

Figure 14 Comparison of Cities' 2003-2015 Share of Area within Walking Distance of All Arterial Roads<sup>13</sup> in Extensions (left) and Beeline Distance to All Arterial Roads<sup>14</sup> in Extensions (right)



Source: Urban Morphology and Complex Systems Institute. Data source for comparators: from Angel et al. 2016.

The share of urban area within walking distance to arterial roads is about 70 percent in Malaysian cities, significantly smaller than the world average and of comparator cities. For example, cities like Fukuoka, Thessaloniki and Palermo have almost all their urban area within walking distance to an arterial road. As a result, with the exception of Singapore, average beeline distance to an arterial road is more than double in Malaysian cities to that observed in the comparator cities with impacts on accessibility.

Key lesson from the horizontal comparison is that recent evolution of car orientated road patterns in Melaka is reduces walkability. It includes larger blocks and larger roads with a reduction in the number of people within walking distance to arterial roads compared to traditional street patterns and to comparator cities. There is room for reversing this evolution by providing more pedestrian oriented streets with an adequate design comprising provision of sidewalks and street furniture.

<sup>13</sup> Share of the urban extent within walking distance (625m) of all arterial roads.

<sup>14</sup> Average beeline distance to all arterial roads (meters).

## Recommended Actions

The Federal Government of Malaysia has acknowledged that a further growth in private car use and the construction of more road infrastructure, is unsustainable in the long term, both from economic and environmental perspective. It is recognized that urban sprawl hampers the development of efficient public transport and therefore TOD should become the standard for new developments. Melaka will continue to grow with huge and ambitious urban development to 2040. The number of tourists will also continue to grow. As a result, pollution, emissions, noise and safety concerns related to road transportation will increasingly become an issue. The growth of car traffic is not sustainable on the long term as an extension of road capacity in Melaka city center is no option. The accessibility, attractiveness and environment of Melaka may become in danger. Therefore, there is a need for a strategy and action plan to work towards a public transportation system which will move people seamlessly from local to regional and international scale.

**Melaka’s transport choices can generate positive as well as negative externalities as the city grows; as such, transport is best addressed as part of an integrated urban strategy that can cater to various user groups and anticipate long-term needs.** The World Bank’s advisory service on a national transport strategy for Malaysia (World Bank 2015a) recommends a conurbation-level lead urban transport agency as the “integrator” for strategic planning, policy formulation, and infrastructure and services planning. This supporting report overall recommends Melaka adopt a paradigm shift towards ensuring accessibility and “moving people not cars”, which means:

- Integrating public transport in a comprehensive strategy of regional economic corridor with a High-Quality Public Transport Corridor (BRT or LRT) between the new High-Speed Rail station and Melaka City. This integrated Transport Planning (ITP) must be focused on coordinated delivery of trunk infrastructure (i.e. road and HSR) in a way that ensures integration with the municipal infrastructure.
- Coordinating land use planning and transport with TOD. TOD will bring together people, jobs, and services in a way that make it efficient, safe, convenient and attractive to travel on public transport and improve access to opportunities to support Melaka’s economic growth agenda.
- Moving towards a private vehicle to public transport modal split of 40((( (public transport usage): 60 percent (private car usage).
- Developing pedestrian friendly design. Pedestrian Oriented Design (POD) focused on the design of public space and provision of services and facilities will encourage convenient safe walking with access to public transport and associated development.

The following are recommended next steps for Melaka to shift its mobility focus. A suggested action plan is included in table 1.

### Focus on public transport and green mobility strategies

**5-A Transform the public transportation industry.** Melaka’s state-owned company, Panorama, is transporting approximately 9,000 passengers daily and has an estimated market share of around 1 percent. To achieve a significant growth in passenger ridership, Panorama needs to be transformed into a modern and professional public transport company that is customer oriented, focused on growth and managing its business in an efficient manner. It needs a sound business plan that sets out the investment and funding need as well as financial projections for the next 5 years.

**5-B Integrate public transport into a comprehensive strategy for a regional economic corridor**

The High-Speed Rail will start to operate in 2031 with a station projected 15 kilometers from Melaka City. To fully reap the economic benefits of HSR between Singapore and KL, Melaka will need transportation integration of different transportation modes into an integrated corridor. There is an urgent need to create planning and development guidelines which safeguard the corridor in order to avoid such corridor becomes impossible or can be only realized at high cost in the future (ADB 2017a).

**5-C Adopt transit-oriented development strategies.** Efficient land use through TOD and compact growth that gives priority to new developments along established public transport routes may help Melaka reduce distance to employment. It is important not to impose low-density caps where infrastructure can support increased density. The 70 percent forecasted growth in the housing stock, if it is well coordinated with planned along BRT lines and nodes (and if it is provided under the form of complete mixed-use communities, with jobs, retail, amenities, social services such as education and health), will be the driver of a progressive transformation of Melaka toward a polycentric spatial structure.

Spatial analysis conducted in supporting report 4 has shown that there is almost enough land area in the empty land intermingled with built land to implement an infill strategy along BRT corridors and around BRT nodes. This empty land within the urban extent represents today about half of the existing housing land and about 40 percent of present planned housing is single-story houses.

The opportunity of fragmented sprawl with a lot of empty space is that sprawl repair planning techniques allow a transforming urban space by infill. There are thus many opportunities for infill and densification within the present urban fabric if Melaka puts in place mechanisms for infill growth such as those in Singapore instead of providing an excessive amount of developable land outside the present urban extent.

Staging this transformation would require identifying and densifying in priority the most connected and most central nodes within the BRT network, using for example World Bank's 3V framework for transforming urban space with Transit-Oriented Development (Salat and Ollivier 2017). Based on an observation of methodologies applied in different countries, this methodology outlines a typology to facilitate TOD implementation at the metropolitan and urban scale in various contexts. The 3V Framework equips policy and decision makers with quantified indicators to better understand the interplay between the economic vision for the city, its land use and mass transit network, and urban qualities and market vibrancy around its mass transit stations. Such a methodology can help Melaka develop a coherent vision, policies, and strategy to leverage the value created through enhanced connectivity and accessibility.

**5-D Move towards a public transport modal share of 40 percent.** Transportation infrastructure investments and service provision policies will 'drive' how urban transportation demand will be met by different modes. Analyses done in similar contexts, such as Da Nang (JICA 2010), clearly indicate that car use control and bus fleet expansion and level of service improvement are key to a shift toward public transport. The provision of public transport infrastructure and services could be accompanied by tax incentives to encourage the use of public transport and reduce the use of private vehicles. This would help reduce congestion and transport costs in Melaka State. Tax instruments are mainly price-based

and take advantage of market mechanisms. Examples of these instruments include: congestion charges, emission and/or pollution taxes or fees (e.g. carbon tax, sulfur tax), fuel taxes (for example, any excise tax on fuels), vehicle taxes (for example, ownership, license or registration fees) and subsidies (subsidies for clean fuels, efficient vehicles and public transport). These instruments should reduce private car travel demand and encourage commuters to use public transport; replace polluting fuels (e.g. petroleum products) with clean fuels (e.g. ethanol, hydrogen, compressed natural gas) and encourage the public to use fuel-efficient vehicles (Baker and Lee 2015). Reaching a target of 40 percent modal share for public transport in Melaka implies:

- 1) ***Reducing future growth in private vehicle usage through introducing travel demand management measures***
  - a) Review the operation of existing on-street controlled parking areas;
  - b) Introduce more controlled parking areas throughout the State's built-up areas;
  - c) Change the current approach to approving off-street car parking provision in new non-residential developments;
  - d) Move away from the use of 'Traffic Impact Assessments' to assess the appropriateness of new developments, moving instead to a system based around 'Transport Related Development Contributions' and 'Transport Accessibility Audits'; and
  - e) Introduce travel demand management measures in the longer term to encourage mode shift from private vehicles to public transport, including providing free bus services for certain congested areas during peak hours.
  
- 2) ***Significantly improving the current public transport systems***
  - a) To increase the market share of public transport in Melaka State, huge improvements and investments are required. This means an expansion of the bus route network, increase of bus frequencies and improved quality of public transport services.
  - b) The bus routes system needs redesign, expansion, and higher frequencies. There is an urgent need to create an efficient bus routes system in Melaka, with the aim to connect residential areas with jobs and commercial places in order to boost ridership.
  
- 3) ***The shift towards public transport should be supported by higher passenger convenience, effective routing with bus priority measures, and bus management system and information system:***
  - a) Improvement of bus stops: location, facilities, design, accessibility, connectivity, with, in particular: location near residential areas, commercial and office buildings, schools and hospitals; connectivity and better access; improvement of walkway environments with direct and shaded walkways; sufficient density with bus stops every 400 m; visibility; passenger information system to inform on bus routes and estimated bus arrival time.
  - b) Effective routing in the city center, with the possibility of introducing bus priority measures<sup>15</sup> at locations where they are needed, together with bus network restructuring.
  - c) Bus management system and information system. Panorama Melaka has only limited IT systems available to support and manage their daily operations. Although all buses are equipped with GPS, the information collected is not fully utilized to

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<sup>15</sup> There is no bus priority measure currently being applied in Melaka. In the bus network restructuring scenario proposed by ADB, bus frequency will be increased significantly, and on some segments, the frequency will reach up to 78 buses per hour per direction in the short term, and 108 buses per hour per direction in the long term. If this is implemented without any bus priority measure, in the long run, it will create bottlenecks for bus service.

optimize the operations. Panorama Melaka does not yet provide real-time information to their passengers about their services. This means that passengers are not informed about actual departure times, delays and disruptions and the upcoming bus stops when travelling by bus. If Panorama will grow over the next years, an integrated Bus Management and Information System is needed, including an IT package with the aim of improving: (1) management of operations; and (2) passenger information through the use of IT systems in order to increase the attractiveness and efficiency of the services provided.

- 4) ***Marketing and promotion of public transport should be developed.*** Easy access to information about public transport services on offer is essential to attract passengers to use the service. Information can be provided before a journey (pre-trip), at the bus stops and stations and during travel in the bus. The website of Panorama Melaka has been recently improved but is not up to international best practice standards. A map of the public transport routes does not exist. Bus stops do not provide information about the routes and the time-table. A dedicated mobile application for public transport is not yet available. With a huge number of tourists and visitors to Melaka it is worth to develop marketing and promotion activities with the aim to increase the number of public transport passengers.

### Enhance Melaka's walkability

- 5-E **Enable walkability.** Promoting walkability is a key element to making public space more vibrant, reducing congestion and stimulating the local commercial economy. Walking is by far the most environmentally-friendly way to move around in a city. Walking allows more opportunities for interaction with neighbors and is good for health. Active street life encourages people to walk or cycle, while an accessible, dense and interconnected network of streets offers shopping and services within walking and cycling distance. High density and mixed land use make proximity to work, home and services possible. The proximity reduces dependency on the automobile and thus alleviates congestion, air pollution and resource depletion.

### *Conclusion*

**Transforming a city for cars into a city for people will accelerate economic growth.** The provision of public transport infrastructure and services should be increased to encourage the use of public transport and reduce reliance on private vehicles. Transforming a city for cars into a city for people will make Melaka more attractive for tourists and ease the way moving around. This would help reduce congestion and transport costs. This would also save land for environmental protection and productive uses, while reducing environmental impacts. Beyond satisfying a growing demand, the development of public transport in Melaka will play a catalytic role in accelerating and shaping economic growth. Provision of effective public transport services has the potential of opening up new growth clusters, enhancing the attractiveness of existing clusters, and driving urban revitalization. Reducing the car pressure on the public realm and creating more and better attractive public spaces through greening and beautification will enhance the livability of the city for all its residents.

Table 1 Recommendations Action Plan for Melaka’s Mobility Mode Split

Item	0–4 Years	5–9 Years	10 or more Years
<b>5-A Transform the public transportation industry</b> <b>Lead:</b> <ul style="list-style-type: none"> <li>State-level Taskforce</li> </ul>	<b>2 years</b>		
<b>5-B Integrate public transport into a comprehensive strategy for a regional economic corridor</b> <b>Lead Agencies:</b> <ul style="list-style-type: none"> <li>PLANMalaysia Melaka and UPEN</li> </ul>		<b>10 years</b>	
<b>5-C Adopt transit-oriented development strategies</b> <b>Lead Agencies:</b> <ul style="list-style-type: none"> <li>PLANMalaysia Melaka and Land Public Transport Agency</li> </ul>		<b>10 years</b>	
<b>5-D Move towards a public transport modal share of 40 percent</b> <b>Lead:</b> <ul style="list-style-type: none"> <li>State-level Taskforce</li> </ul>			<b>More than 15 years</b>
<b>5-E Enable walkability</b> <b>Lead:</b> <ul style="list-style-type: none"> <li>State-level Taskforce, assisted by PLANMalaysia Melaka</li> </ul>		<b>10 years</b>	

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## Annex A: List of Indicators Analyzed

During the Melaka Sustainability Outlook Diagnostic process, the indicators listed in the Measuring Framework of the Urban Sustainability Framework (GPSC, World Bank 2018) were referred to. Urban Mobility references the Enabling Dimension 1 regarding Integrated Urban Planning and Governance. Table 2 records Melaka's status compared to each indicator. A legend of the possible statuses is included in Table 3.

**Table 2 Summary of Indicators Referenced to Analyze Melaka's Urban Mobility**

<b>1.8 Transport and Mobility Integrated with Land Use</b>	<b>Status</b>
Proportion of population that has convenient access to public transport, by sex, age, and disability status	Missing
Balanced transportation demand: Jobs-to-housing ratio	Missing at disaggregated level
Number of jobs accessible in 20, 30, and 45 minutes from different city locations	Missing
Proportion of the population living within 20 minutes of everyday services (grocery stores, clinics, etc.)	Missing
Share of population having access to public transport within 15 minutes by foot	Missing
Average commuting time and distance from residence to work	Missing
Road congestion: Average travel speed on primary thoroughfares during peak hours	Missing
Traffic demand is managed	Adequate
Motorization rate: Number of vehicles per capita	Adequate
Transport modal share in commuting	Adequate
Length and surface coverage of roads per square kilometer, split between wealthy and deprived areas	Missing
Kilometers of road dedicated exclusively to public transit per 100,000 population	Missing
Kilometers of bicycle path per 100,000 population	Missing
Total walkway kilometers of dedicated pedestrian paths per 100,000 inhabitants	Missing
Transportation affordability index	Missing
Transportation fatalities per 1,000 population	Missing
Resilience of transport systems, interruption of public transport systems in case of disaster	Missing

**Table 3 Indicators Legend**

<b>Status</b>	<b>Description</b>
Adequate	The current data is adequate to measure and monitor the dynamic observed.
Outdated	The current data and statistics dates from five years ago or longer and needs to be updated.
Missing	Statistics are currently unavailable.
Needs Revisiting	Information exists, but may no longer be adequate to measure the situation effectively. Revisiting the statistical definition of the indicator and the data collection is needed.

## Annex B: Additional SWOT Information

### Strengths:

#### 1. Geographical location along the Strait of Malacca

Melaka's geographical location is a strong asset. As the main shipping channel between the Indian Ocean and the Pacific Ocean, the Strait of Malacca is one of the most important shipping lanes in the world. The strait links major Asian economies such as India, Thailand, Indonesia, Malaysia, Philippines, Singapore, China, Japan, Taiwan, and South Korea. It is the busiest strait in the world, carrying about 25 percent of the world's traded goods, including oil, Chinese manufactured products, and coal. About a quarter of all oil carried by sea passes through the Strait, mainly from Persian Gulf suppliers to Asian markets.

Located at a strategic position in the strait and between fast growing Kuala Lumpur and Singapore, an established global city and one of the command centers and waypoints of the global economy, Melaka has the vocation to become a hub of international trade, provided it invests in its port, rail and road infrastructure. Moreover, the HSR between Kuala Lumpur and Singapore will divide by two the travel time between the two major cities (at 2.5 hours against 5 hours today), reinforcing Melaka's position.

#### 2. High road infrastructure provision

Melaka has a well-developed network of federal roads and envisions several major connecting highways in its State Structure Plan 2035 (Commuter, West Coast Highway, Melaka Outer Ring Road and Inner Ring Road). This is an asset for Melaka trade and for boosting its economic growth.

### Weaknesses:

#### 1. Transport Master Plan still in preparation

As a result, there is not yet transportation modeling with fine grain disaggregation of jobs and people location (present and anticipated) with origin/destination flows analysis. This prevents building an integrated land use and transportation plan.

#### 2. Car dependent city with high car ownership

The average household in Melaka State has 1.4 cars and 1.9 motorcycles.

#### 3. Excessive road and parking space

Roads in Melaka occupy 30 percent of land area.

#### 4. Low level of accessibility within the city; in particular to the World Heritage Site

The volume of pedestrians reaches over 2,000 per hour in the area's Jonker Street. There is a clear discrepancy between the number of pedestrians and the space available for those who walk.

#### 5. Very low modal share of public transport

This modal share is one of the lowest in Asia at around 1 percent.

#### 6. Transportation affordability issues in Malaysian cities

The share of transport costs in household expenditure in Kuala Lumpur is 59 percent higher than in Hong Kong and Tokyo, and the share of transport costs in household income in Kuala Lumpur is 50 percent higher than that of Hong Kong and Tokyo.

#### 7. Poor walkability and pedestrian facilities

The walkability in Melaka is poor due to the absence of pedestrian walkways and the road-side parking and due to larger blocks in new developments than in comparator cities.

#### **8. High share of transportation emissions in total emissions**

59 percent of Melaka's Emissions are Caused by Road Transportation.

### **Opportunities:**

- 1. Future High-Speed rail line between Singapore and Kuala Lumpur creates the opportunity of developing a TOD corridor between the future HSR station and city center**  
The High-Speed Rail will start to operate in 2031 with a station projected 15 kilometers from Melaka City. To fully reap the economic benefits of HSR between Singapore and KL, Melaka will need transportation integration of different transportation modes into an integrated corridor.
- 2. Increase modal share of public transport and enhance industry structure**  
An increase up to 40 percent of modal share of public transport is targeted. This will bring the opportunity to restructure bus routes and enhance transport industry structure with a sound Business Plan that sets out the investment and funding needs, as well as financial projections for the next 5 years.
- 3. Integrate transport and land use planning with TOD policies**  
Related to TOD, land value increases created by improved accessibility can be captured by Melaka government to further finance provision of public transport infrastructure, enhancement of the public realm, and affordable housing.
- 4. Enhance walkability across the city and pedestrianize the World Heritage Site**  
Promoting walkability is a key measure to make public space vibrant, reduce congestion and stimulate the economy and local interactions.

### **Threats:**

- 1. Pressure on transportation system of anticipated 25 million tourists**  
Tourism is a very important sector for Melaka's economy, but has its downside regarding transportation. On weekend days and public holidays, Melaka experiences significant traffic congestion as a result of domestic visitors arriving by car.
- 2. Pressure of large-scale projects on traffic**  
Various large-scale projects currently under development in Melaka will generate significant additional traffic, including: Melaka Gateway Project and Hang Tuah Commercial Centre.
- 3. Car culture hindering bicycle use as well as the access of disabled persons and pedestrians**  
In 2012, the number of road accidents was approximately 14,720, an increase of 4.5 percent on the previous year.

