# Sectoral Economic Developments and Prospects

## 3.1 Manufacturing sector

Through 2016 to 2017, the manufacturing sector continued to play an integral part in Penang's economy, and even more so in Malaysia's manufacturing sector. Penang has maintained its position as the second-largest contributor to Malaysia's manufacturing GDP through 2016–17 (Figure 3.1). However, growth rate in 2017 was sluggish at 5.7%, an increase of just 0.3 percentage points while other states had an increase of at least 1 percentage point increase in 2017 (Figure 3.2). In terms of manufacturing investments, Penang is also consistently the state of choice, receiving 17% of total approved investments in Malaysia for the 2017, and 8.1% in the first quarter of 2018 (Figure 3.3). Overall performance of the manufacturing sector is also trending positively, as evidenced by the continuous growth in the industrial production index (manufacturing) for 2015–17 (Figure 3.4). This bodes well for Penang given that the manufacturing industry is the biggest employer in Penang. Moreover, the manufacturing sector also recorded high levels of labour productivity compared to other economic sectors in 2014–17 (Table 3.1). The manufacturing sector is displaying positive labour productivity growth rates with little variance year on year. Compared to other sectors that display highly erratic growth rates, this indicates that labour productivity in the manufacturing sector is more organically driven as companies are increasingly able to incorporate the use of technologies in their production process.

**Figure 3.1 Top four contributing states to Malaysian GDP in manufacturing activity, 2015–17**
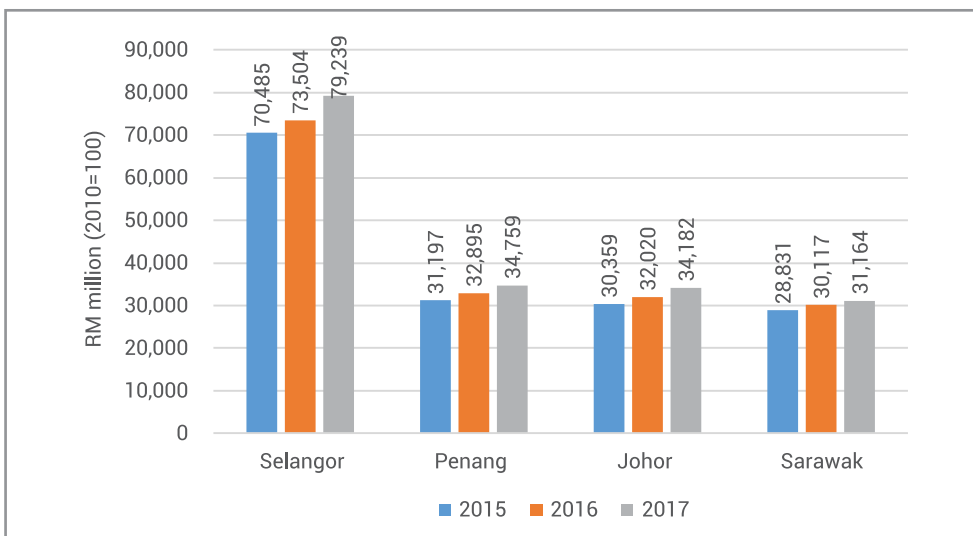


*Source: Department of Statistics, Malaysia.*

## Figure 3.2 Annual growth rates of GDP in manufacturing activity for selected states, 2015−17
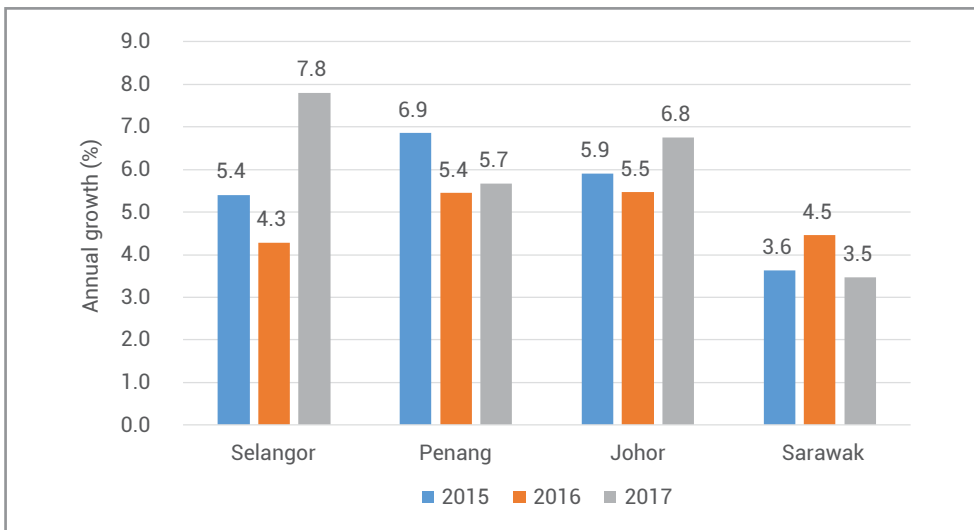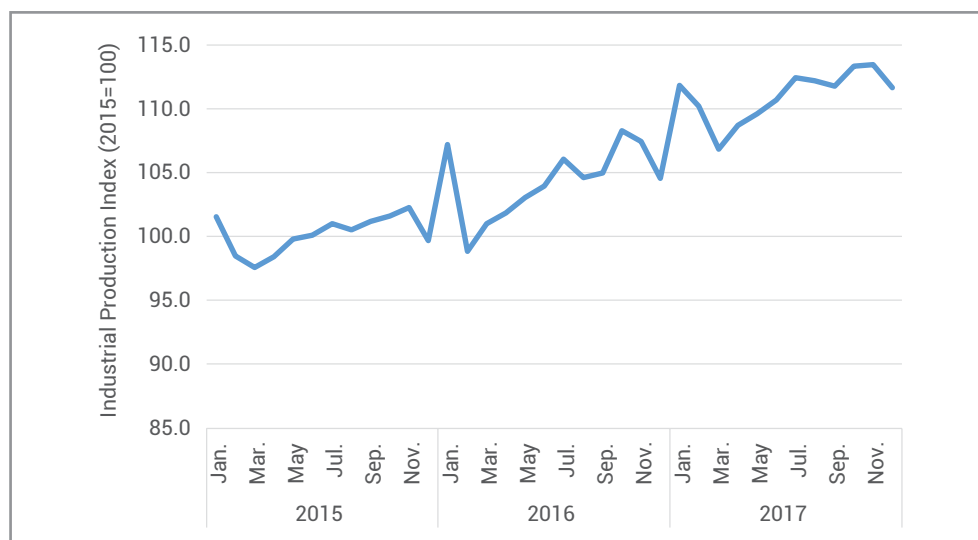


*Source: Department of Statistics, Malaysia.*

## Figure 3.3 Percentage of contribution to total capital investment in manufacturing projects by major states, 2015−18
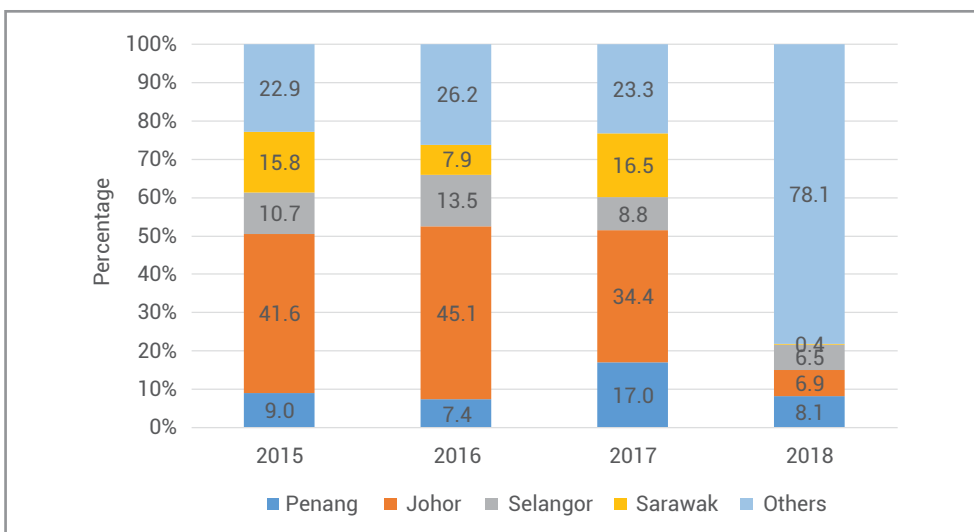


*Notes: i) Data for 2018 are up to March 2018.*
    *ii) Investment includes both domestic and foreign investments.*

*Source: Malaysian Investment Development Authority (MIDA).*

## Figure 3.4 Industrial Production Index (2015=100) for Malaysian manufacturing sector, 2015–17



*Source: Department of Statistics, Malaysia.*

## Table 3.1 Labour productivity by type of economic activity, Malaysia, 2014–17

| Year | Agriculture | | Mining and quarrying | | Manufacturing | | Construction | | Services | |
|---|---|---|---|---|---|---|---|---|---|---|
| | RM | Growth (%) | RM | Growth (%) | RM | Growth (%) | RM | Growth (%) | RM | Growth (%) |
| 2014 | 51,741 | 1.5 | 1,159,389 | 3.4 | 97,342 | 4.5 | 34,714 | 13.7 | 64,877 | 3.0 |
| 2015 | 53,908 | 4.2 | 984,885 | -15.1 | 102,633 | 5.4 | 35,723 | 2.9 | 66,750 | 2.9 |
| 2016 | 51,289 | -4.9 | 1,133,372 | 15.1 | 106,307 | 3.6 | 39,298 | 10.0 | 69,534 | 4.2 |
| 2017 | 51,988 | 1.4 | 1,210,832 | 6.8 | 110,858 | 4.3 | 40,242 | 2.4 | 73,030 | 5.0 |

*Source: Labour Productivity, Department of Statistics, Malaysia.*

Within the manufacturing sector, the E&E industry remained the mainstay of Penang's manufacturing activities. Through 2016–17, E&E continued to be the most highly invested manufacturing industry in terms of capital investment (Table 3.2). This amounted to 40% of total manufacturing investment in 2016, and increased to 62% in 2017. This is a testament to Penang's robust and dynamic E&E industry that continually demonstrates more room for growth and expansion. Furthermore, foreign investments consistently surpassed domestic investments, indicating that the industry is heavily driven by multinational enterprises (MNEs). Such an environment has in turn made the E&E industry arguably one of the most productive industries within the manufacturing sector[14], As proven by the 24th Productivity Report 2016/2017. In 2016, the E&E industry achieved the highest productivity growth rate at 9.6%, highest contribution of added value at 23%, and highest contribution to manufacturing exports at 44.6% (MPC, 2017).

[14] This is intuitive given that MNEs within Penang's E&E ecosystem are what Andrews et al. (2015) term as "frontier firms" – firms that operate at the global productivity frontier and are characterised by their profitability, patent activities and global reach.

**Table 3.2 Approved manufacturing investment by top four industries, Penang, 2016−17**

| Industry | (RM Million) | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | Domestic investment | | Foreign investment | | Total capital investment | |
| | 2016 | 2017 | 2016 | 2017 | 2016 | 2017 |
| Electronics and electrical products | 92.5 | 800.1 | 1,643.0 | 5910.0 | 1,735.5 | 6,710.1 |
| Scientific and measuring equipment | 35.2 | 293.9 | 948.1 | 1,475.4 | 983.3 | 1,769.3 |
| Transport equipment | 463.2 | 105.0 | 183.0 | 68.0 | 646.2 | 173.0 |
| Machinery and equipment | 176.7 | 219.6 | 17.6 | 204.3 | 194.3 | 423.9 |
| Chemical and chemical products | 45.0 | 319.5 | 8.0 | 476.6 | 52.9 | 796.0 |

*Source: Malaysian Investment Development Authority (MIDA).*

In terms of labour cost competitiveness, E&E was among the most competitive manufacturing industries, with high labour costs per employee and low unit labour cost. This indicates that employees in the E&E industry are rewarded with increased wages as productivity improves (Table 3.3). Similarly, the E&E industry reported a high capital productivity figure compared to other industries in the manufacturing sector. Given that capital productivity measures the utilisation of fixed assets such as machinery, office equipment, and transport, it provides a suitable proxy for the utilisation of technology. In this context, a high capital productivity score indicates that the E&E industry utilises high technological input (Figure 3.5).

**Table 3.3 Labour cost competitiveness by top four industries, Malaysia, 2016**

| Industry | Growth (%) | | |
| --- | --- | --- | --- |
| | Productivity | Labour Cost per Employee | Unit Labour Cost |
| E&E | 9.6 | 4.7 | -2.4 |
| Wood and wood products | 5.3 | 3.2 | -1.9 |
| Textiles | 5.1 | 2.3 | -2.6 |
| Wearing apparel | 3.4 | 7.8 | 4.3 |

*Source: Productivity Report 2016/2017, Malaysia Productivity Corporation.*

**Figure 3.5 Capital productivity by top four manufacturing industries, Malaysia, 2015−16**
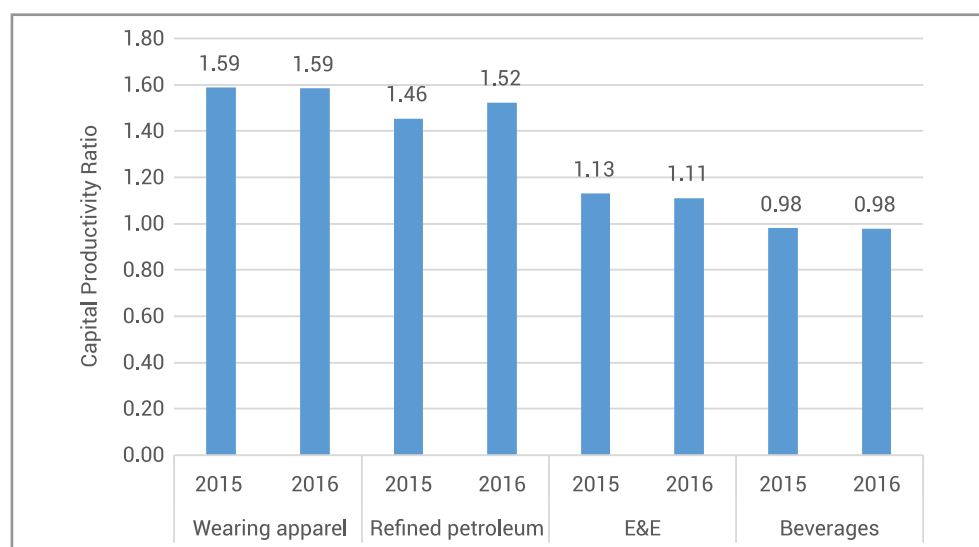


*Source: Productivity Report 2016/2017, Malaysia Productivity Corporation.*

Moreover, it is also observed that the E&E industry is well integrated into the global market through global value chains (GVCs). The latest input–output tables reported that 72.6% of intermediate inputs for the E&E industry are imported, while 27.4% of intermediate inputs are domestically produced. Specifically, the E&E industry is heavily dependent on the import of computer, electronic, optical products (55.7%), and electrical equipment (5.0%) (Table 3.4). The continuous growth of the E&E industry is forming the backbone of Penang's manufacturing sector.

The Penang state government has taken active steps to continue developing a dynamic manufacturing sector through two government agencies: InvestPenang (IP) and Penang Development Corporation (PDC). Through these two agencies, the state government has chosen two policy entry points (among many others): SME development and development of industrial parks, executed by IP and PDC, respectively. To develop SMEs in Penang, IP operates the SME Centre which provides subsidised rental space for light industry SMEs that cannot yet afford to have their own facility (Table 3.5). Such policies are crucial in promoting greater participation in the industry by domestic firms. Additionally, the state government has also promoted the development of industrial parks to reap the benefits of agglomeration by industries. To date, Penang is home to seven industrial parks: Bayan Lepas Industrial Park & Free Industrial Zones, Bukit Minyak Industrial Park, Mak Mandin Industrial Estate, Perai Industrial Park & Free Industrial Zone, Batu Kawan Industrial Park, Seberang Jaya Industrial Park, and Penang Science Park (Figure 3.6).

## Table 3.4 Sources of intermediate inputs for the E&E industry, Malaysia, 2010

| Industry | Contribution (%) | |
| --- | --- | --- |
| | Domestic | Imported |
| Agriculture | 0.01 | 0.04 |
| Mining | 0.04 | 0.04 |
| Food and beverages | 0.00 | 0.00 |
| Textiles | 0.00 | 0.04 |
| Wearing apparel | 0.01 | 0.00 |
| Wood | 0.42 | 0.06 |
| Petroleum refinery | 0.20 | 0.09 |
| Chemicals and chemical | 1.03 | 1.16 |
| Rubber and plastic products | 1.56 | 0.70 |
| Other non-metallic mineral products | 1.41 | 0.59 |
| Basic metals | 1.46 | 4.54 |
| Fabricated metal products | 1.41 | 0.93 |
| Machinery and equipment | 0.58 | 1.30 |
| Electrical equipment | 0.53 | 5.02 |
| Computer, electronic, optical products | 1.96 | 55.74 |
| Transport vehicles | 0.04 | 0.03 |
| Other manufacturing | 0.50 | 0.23 |
| Construction | 1.16 | 0.04 |
| Services | 14.99 | 2.05 |
| **Total** | **27.40** | **72.60** |

*Source: Productivity Report 2016/2017, Malaysia Productivity Corporation.*

## Table 3.5 Subsidised rental rates for local SMEs

| Renting option | Floor | Rental rate (sqft/month - RM) | |
|---|---|---|---|
| | | Year 1, 2, & 3 | Year 4, 5, 6 & 7 |
| Option 1: Empty Lot | Level 1 | 1.8 | 2.6 |
| | Level 2, 3 and 4 | 1.5 | 2.3 |
| Option 2: Fully furnished office unit | Level 4 | 3.5 | 4.4 |
| Option 3: Basic renovated unit | Level 1 | 3.1 | 3.9 |
| | Level 2, 3 and 4 | 2.8 | 3.6 |
| | | Year 1 - 4 | Year 5 - 6 |
| Option 4: GBS projects | Fully furnished | 4.3 | 5.1 |
| | Empty lot (1-4) | 2.3 | 3.1 |

*Source: InvestPenang.*
*Figure 3.6 Penang industrial areas*

## Figure 3.6 Penang industrial areas
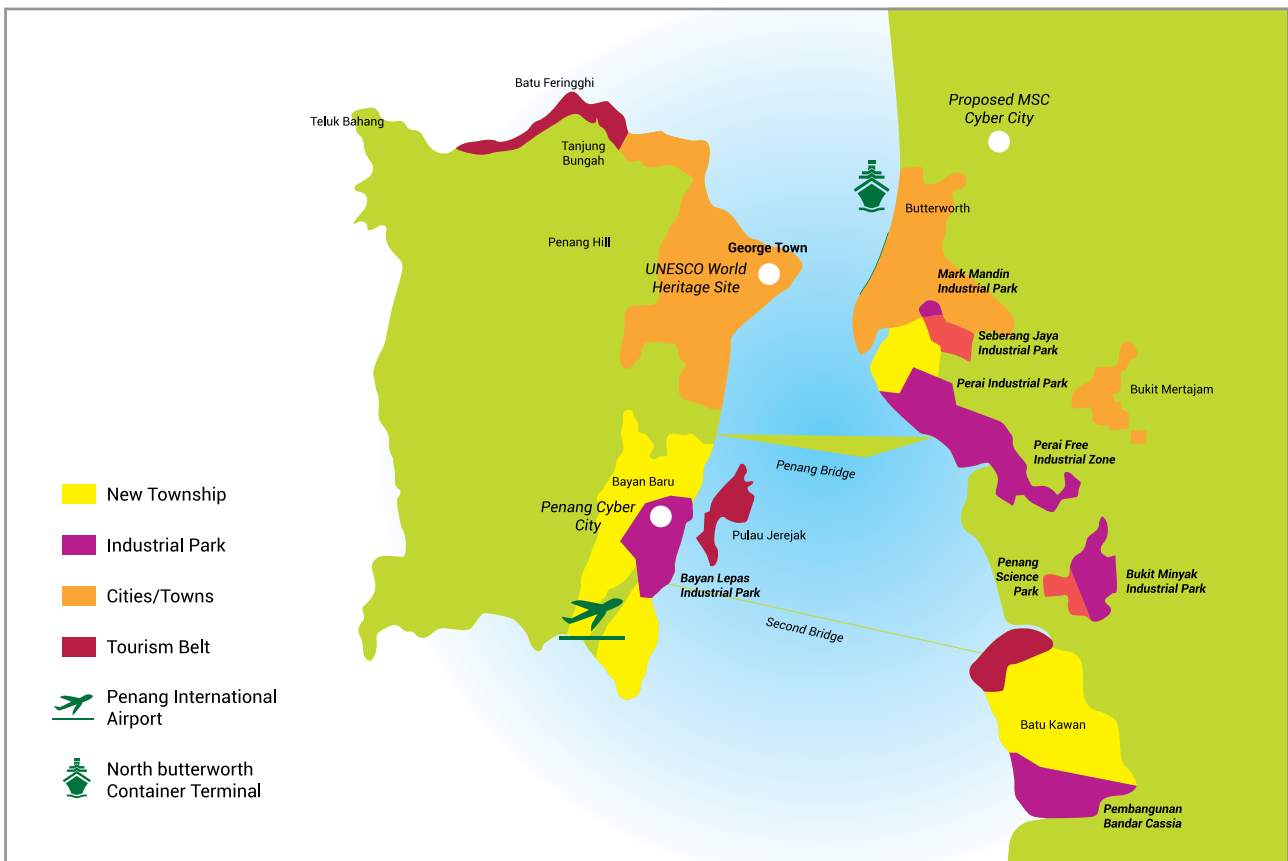


*Source: Penang Development Corporation.*

Moving forward, the manufacturing sector in Penang is set to embrace Industry 4.0 (See Box 3.1). While Penang's mainstay in E&E will definitely benefit from an exponential growth in global demand for electronic components, the next few years is crucial in determining Penang's comparative advantage and position in the global value chain. In the next few years, the manufacturing industry is poised to advance towards the importance of associated services under the Industry 4.0 umbrella. This is picked up in the section on GBS in this report.

**Box 3.1 Industry 4.0 and the future of Penang's manufacturing sector**
*by Timothy Choy, Socioeconomics & Statistics Programme*

Industry 4.0 refers to the use of digital technologies to create cyber-physical systems in the manufacturing industry (Figure 3.7).

**Figure 3.7 Evolution of manufacturing technologies**
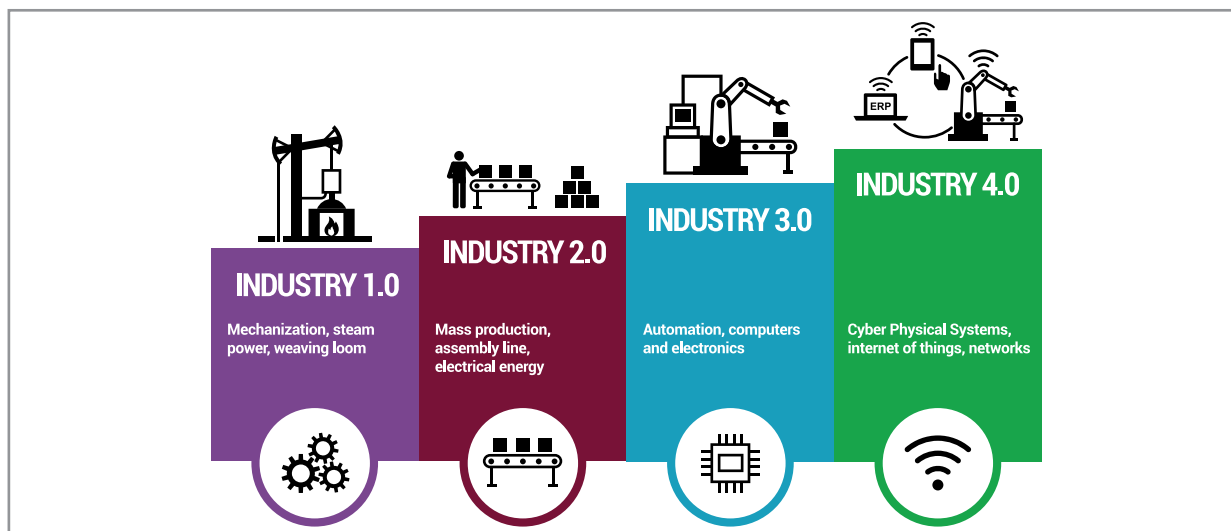


*Source: Simio (n.d).*

The outcome of which is an identical digital copy of the physical world. To make this happen, a variety of technologies and new business areas are clustered under the Industry 4.0 umbrella. These technologies include the internet of things (IoT), robotics, cloud computing, 3D printing, and big data analytics. As with each evolution of manufacturing technologies, dramatic changes in the industry would soon follow. Industry 2.0, for example, played a catalytic role in the phenomena of offshoring – one that Penang has been a beneficiary of. Similarly, the advent of Industry 4.0 will bring about disruptive changes to the manufacturing industry and, quite naturally, to Penang.

The biggest benefit that Industry 4.0 brings to Penang is perhaps its mainstay in demand for semiconductor components. Manyika et al. (2015) estimates the IoT industry to be worth between $3.9 trillion and $11.1 trillion in 2025. Unlocking this value, however, is heavily dependent on the ability of companies to integrate and analyse data from various IoT systems – 60% of potential value, to be exact. In order for this integration to take place, Industry 4.0 dictates that machines should be able to communicate with one another – they need to be "smart". That is, machines should be able to sense its environment, process and then communicate this data in a digital form. Fundamental to this ability are semiconductor components that act as a "brain" for smart machines. Additionally, the use cases for smart products is pervasive across every industry: healthcare, consumer appliances, automotive, and even within the manufacturing plants themselves. Penang's E&E industry is therefore well placed to be guaranteed a role in meeting the exponential surge in global demand for semiconductor components.

However, there is a need to review Penang's position in the value chain. The processes of manufacturing (from design to market) a product contribute a varying degree of value-add across different stages, resembling a "smile curve".[1] The goal is therefore to move up the value chain to capture more value from manufacturing activities. This is compelling for two reasons. First, the advent of Industry 4.0 has further lowered the contribution of value from fabrication activities. In *Manufacturing in the Digital Economy*; I argue that digital technologies under the Industry 4.0 banner has made mass customisation possible, thus shifting value towards the tail ends of the smile curve (i.e. R&D and marketing). 3D printing, for

example, has allowed nascent startups to print sophisticated mechanical parts that were previously exclusive only to large, technology intensive companies (Choy, 2017). Secondly, Penang's competitive advantage in fabrication activities will quickly erode in the future. Digital technologies are commonly characterised by their favouring of new entrants rather than incumbents. This is because the process of technology upgrading exerts far more inertia on an organisation than it does to begin using new technology (Hall and Khan, 2003). It is only a matter of time before another industrial cluster elsewhere supersedes Penang's competitive advantage.

Moving up the value chain, however, does not necessarily happen organically. Rather, fulfilling a number of pre-conditions would help nudge the industry further up the chain. These include:

**1. Adoption of digital technologies by domestic firms**
The biggest motivation for adopting digital technologies is the productivity gains that comes with it. More than just contributing to a reduction in cost in the long run, productivity gains also open up avenues for innovation and business expansion. This happens because employees would be freed up to do more productive work while repetitive and mundane work would be left to automation. Such productivity gains mark Penang's competitive advantage in the manufacturing industry. One can think of this as a competitive advantage in vertical specialisation. For example, although contract manufacturing (CM) is positioned as a low value-add activity in the fabrication process, CM activity itself forms another smile curve. Moving up this curve then will see the development of new and novel ways to perform CM activities.2 This, however, is conditional on the adoption of digital technologies by domestic firms.

**2. Investment in research and development (R&D)**
In an extended case study on industrial clusters in the United States by The Brookings Institution, one common success factor that seems to recur at every cluster is their core competency in research and development. Every successful industrial cluster is built around an institution that engages in some form of R&D, most commonly universities. The tech cluster in Austin, Texas, for example, builds on the foundations of the University of Texas at Austin, Texas A&M University, and several colleges and training institutes. Similarly, clusters around biotech, information technology, and pharmaceuticals in Pittsburgh, Pennsylvania builds on the research capabilities of the University of Pittsburgh and Carnegie Mellon University (Baily and Montalbano, 2017). This, however, is not so much the case in Penang. It is therefore imperative to build a vibrant R&D sector in order for the industry to move up the value chain. While Penang may not have a strong base of readily available research institutions, the private sector, and more so the MNCs can and should invest further in R&D.

To this end, the Penang state government is in the process of drafting the Penang Digital Transformation Masterplan that, among other things, seek to nudge industries towards Industry 4.0.

**References:**
Baily, M. N. and Montalbano, N. (2017). *Clusters and innovation districts: Lessons from the United States experience*. The Brookings Institute.
Choy, X. W. (2017). Manufacturing in the digital economy: The rise of regionalisation as an organisation strategy. *Fifth Annual Bank Negara Malaysia Economics Research Workshop*.
Hall, B. H. and Khan, B. (2003). Adoption of new technology, NBER Working Paper 9730. doi: 10.3386/w9730
Manyika, J., Chui, M., Bisson, P., Woetzel, J., Dobbs, R., Bughin, J. and Aharon, D. (2015). *The internet of things: Mapping the value beyond the hype.* McKinsey Global Institute.

**Notes:**
1.  The smiling curve was first introduced by Stan Shih, the founder of Acer Inc.
2.  See "Diagram 2" in The Malaysian Electrical & Electronics (E&E) Industry – At an Inflexion Point by Wong Siew Hai.

## 3.2 Services sector

### 3.2.1 Transportation and logistics

Transportation and logistics are both important components of economic development; research has shown that there is a positive correlation between investment in the infrastructure of transportation and economic development (Candemir and Celebi, 2017). In advancing the technology of transportation and transport networks, transportation costs, access, and connectivity can be greatly improved, opening up more areas for economic activity and development. Furthermore, enhanced transportation systems will benefit the logistics sector, which is a vital sector in supporting all sectors of the economy by facilitating international trade, reducing the costs of doing international business as well as raising the productivity and efficiency of the country's economy (World Bank, 2016). International trade is a key component in advancing Malaysia's, and by extension, Penang's economic development. After all, Malaysia recorded a 19.4% growth in total trade in 2017, amounting to total trade value of RM1.78 trillion. Penang, on the other hand, saw a 19.5% growth that brought in RM429,920 million in total trade value.

In addition to driving the logistics industry, transportation is, of course, the facilitator in the movement of Penang's citizens and all tourists and business visitors to Penang through land, air, rail, and water, which, in turn, drives economic activity in the state.

### Land

The main mode of public transportation in Penang is the public bus system operated by Rapid Penang. Unfortunately, the coverage provided are not all-encompassing. In 2018, the Penang state government announced the extension of the Congestion Alleviation Transport (CAT) plan. Originally offering two free bus routes (Central Area Transit, launched 2008 and Bridge Express Shuttle Transit, launched 2011), CAT will now add 12 more free routes throughout the island and the mainland (The Star Online, 2018). CAT acts as a feeder bus service linking commuters to Rapid Penang's main routes, with a focus on routes with hospitals, schools, government departments, markets, and shopping complexes (The Star Online, 2018).

Despite the CAT plan, connectivity and coverage still lack comprehensiveness, and Penang commuters still rely on private vehicles as their main mode of transportation. Motorcycles and passenger cars are the two primary vehicles on Penang's roads. There are more motorcycles than cars, with new motorcycles registrations more than quadrupling the new registrations of cars in the last quarter of 2017. Overall, new vehicle registrations in Penang saw a gradual decrease from 2016 to 2017, with the exception of Q4 2016 to Q1 2017, where the total number of new vehicle registrations increased by 1,045 registrations. There were also fluctuations in new registrations of passenger cars, hired cars, and lorries and vans.

Despite the decrease in new motor vehicle registrations, the state's road users continue to endure traffic congestion, especially during peak hours. The Penang state government has proposed the Penang Transport Master Plan (PTMP), which aims to improve the accessibility and efficiency of transportation in Penang (See Box 3.2).

### Table 3.6 Number of new motor vehicle registrations, Penang, 2016–17

| Vehicle | 2016 | | | | 2017 | | | |
|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Private motorcycles | 9,582 | 7,999 | 7,772 | 7,237 | 8,651 | 7,187 | 6,702 | 6,596 |
| Private passenger cars | 3,081 | 3,350 | 2,461 | 2,424 | 2,063 | 1,862 | 1,742 | 1,599 |
| Buses | 17 | 38 | 19 | 17 | 7 | 10 | 6 | 7 |
| Taxis | 21 | 51 | 15 | 15 | 7 | 8 | 6 | 7 |
| Hired cars | 5 | 12 | 20 | 10 | 11 | 21 | 15 | 3 |
| Lorries and vans | 516 | 645 | 609 | 630 | 649 | 593 | 560 | 725 |
| Others | 127 | 161 | 127 | 147 | 137 | 142 | 135 | 131 |
| **Total** | **13,349** | **12,256** | **11,023** | **10,480** | **11,525** | **9,823** | **9,166** | **9,068** |

*Source: Road Transport Department, Malaysia.*

## Box 3.2 Penang Transport Master Plan (PTMP)
*by Sri Ramasamy and Tan Lii Inn, Urban Studies*

There are more private vehicles than people in Penang, resulting in increasing traffic congestion and in reducing the availability of public transport services. With the rising population in Penang, there is an urgent need for intervention to manage and reduce the increasing traffic and congestion, where the state is also faced with a lack of transport options and limited power with regards to transport improvements.

The Penang state government has undertaken a series of initiatives including the formation of the Penang Transport Council in 2009; commissioning the PTMP Strategy from 2011–13, which formed the backbone of the state's transport master plan strategy; calling of Requests for Proposals (RFP); and implementing the PTMP and organising discussions with various governmental agencies and departments. These initiatives led to the design of the present PTMP's framework, comprising a holistic Public Transport Network and Highway Scheme which was approved and adopted by the Penang state executive council in December 2015.

The PTMP has suggested a series of physical and institutional recommendations, spanning both spatial and temporal scales to resolve the transport issues in Penang. Since 2013, a number of proposed transport components and networks of the PTMP have been updated and revised, considering findings from additional detailed studies, up-to-date information, and revised development plans and priorities. The PTMP recommendations were re-proposed in 2015 and the alternative proposal was approved by the Penang state government in 2016.

The key aims of the PTMP include:
- To adopt a holistic approach to resolving transportation challenges, and adopt a paradigm shift towards ensuring accessibility and "moving people, not cars".
- To make roads safe and accessible for all (pedestrians, cyclists, the elderly and disabled community).
- To move towards a public transport to private vehicle modal split of 40% public transport usage to 60% private vehicle.
- To ensure integration between transport systems and development plans and deliver a multi-modal transport system.
- To integrate the traffic management and transport plans of the island and mainland.

Three primary strategies have been identified to resolve transportation issues in Penang. These include:
- To improve management of existing highway network while building new roads.
- To improve the existing public transport system.
- To reduce future growth in private vehicle usage through travel demand management measures.

Additionally, the accessibility to employment opportunities can be improved with the reduction of public transport travel time. The PTMP envisions accessibility to improve by 25–40% in comparison to present travel times. Conversely, if no action to improve the transport system is taken over the next two decades, accessibility is predicted to deteriorate by 25%. The improved public transport network is designed to operate as a unified network, providing seamless and integrated public transport.

**References:**
Special Purpose Vehicle (SPV), the State Government of Penang.

Table 3.7 Number of KTMB passengers by station, Penang, 2012–16

| Station | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Butterworth | 84,191 | 69,274 | 60,975 | 64,173 | 536,896 |
| Bukit Mertajam | 61,163 | 55,176 | 36,860 | 41,812 | 362,336 |
| Nibong Tebal | 8,501 | 8,922 | 4,751 | 2,755 | 37,871 |

*Source: Malayan Railways Limited, Penang.*

### Rail

The only rail service that serves Penang would be the train services operated by Keretapi Tanah Melayu Berhad (KTMB), which runs through three stations: Butterworth, Bukit Mertajam, and Nibong Tebal, with connectivity to the rest of the towns in Peninsular Malaysia.

Butterworth station serves the most passengers, followed by Bukit Mertajam. Nibong Tebal has by far the fewest commuters. It is theorised that Butterworth is the most utilised station due to its connectivity to Kuala Lumpur and Padang Besar. Interestingly, there was a significant spike in number of passengers for all three stations from 2015 to 2016, with passengers for Butterworth and Bukit Mertajam growing by more than eight times, while Nibong Tebal's passengers increased by more than 13 times. These increases could be due to the establishment of the Electric Train Service (ETS) in mid-2015, which commutes passengers from Butterworth to Kuala Lumpur in just three hours

(The Star Online, 2014). In addition, KTM Komuter introduced a route from Butterworth to Padang Besar in 2016, contributing to the growth of passengers.

In terms of cargo handled by KTMB crossing though Penang, a value of RM69.5 million was recorded for 2016, an increase of RM6.3 million from 2015[15]. Containers held the highest monetary value (at RM43.6 million and 62.7% of the total share), followed by food and beverages. The other types of cargo carried by KTMB were land bridges, chemicals and steel rods.

### Water

The Penang Rapid Ferry service has been operating since 1894, making it the oldest ferry service in Malaysia. The service carries both pedestrians and vehicles, accommodating cars and motorcycles primarily on its lower deck, but sometimes on its upper deck as well. The ferry service also serves as a tourist attraction, in addition to its primary function of connecting the island to the mainland.

Table 3.8 Statistics on Penang's ferry service, 2012–16

| Type of passenger | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Pedestrians | 1,865,836 | 1,652,504 | 1,574,874 | 1,461,402 | 1,371,098 |
| Bicycles | 18,257 | 20,225 | 21,358 | 21,458 | 19,108 |
| Motorcycles | 1,318,968 | 1,275,287 | 1,223,480 | 1,207,602 | 1,010,535 |
| Cars | 799,062 | 784,913 | 762,772 | 684,703 | 528,758 |
| Lorries | 49,612 | 46,314 | 43,403 | 38,361 | 29,310 |
| **Total** | **4,051,735** | **3,779,243** | **3,625,887** | **3,413,526** | **2,958,809** |

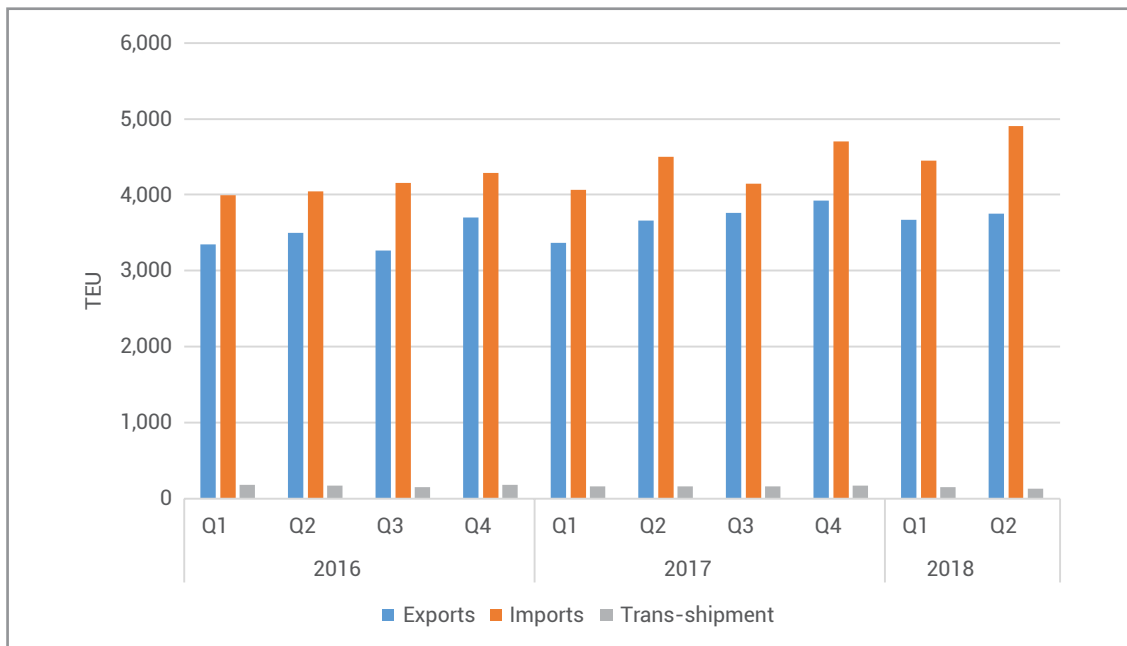*Source: Penang Port Commission.*

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[15]   Malayan Railways Limited, Penang.

Pedestrians remain the biggest users of Penang's ferry service, followed by motorcycles and cars. However, there is a steady decline in overall usage, as seen in Table 3.8. The number of users is decreasing from year to year, marking an approximate average decline of 5.6% from 2012 to 2015, with a significant decrease of 13.3% from 2015 to 2016. Bicycles were the anomaly as its number of users saw fluctuations, with increases from 2012 to 2015, followed by a decrease in 2016.

Penang Port is the oldest port in Malaysia. It is located along the Straits of Malacca, one of the most strategic and important shipping routes in the world. The port is also the main gateway for the northern states of Malaysia and the southern provinces of Thailand. It has the ability to handle all types of cargo and is fully equipped to provide efficient logistical support.

Domestic and foreign trade make up most of the total cargo and container throughput by Penang Port, with domestic trade sustaining a bigger share. As seen in Figure 3.8, the highest volume of imports was recorded in Q4 2017, while the highest volume of exports was observed in Q2 2018, totaling 3,925 and 4,909 twenty-foot equivalent units (TEUs), respectively. In comparing Q1 and Q2 across the three years, the best performance was in 2018, which recorded the highest imports and exports comparatively. There was an approximate growth of 9−9.4% for imports and exports of Q1 and Q2 from 2017 to 2018, with the exception of exports for Q2, where the growth rate was 2.5%. Additionally, at 4,909 TEUs of cargo, Q2 2018 saw the highest volume of imports across 10 quarters. The types of cargo handled by Penang Port includes liquid bulk, dry bulk, general cargo, and containerised cargo, with containerised cargo sustaining the highest percentage of overall cargo[16].

**Figure 3.8 Total cargo throughput by Penang Port, 2016−17**



*TEU: Twenty-foot equivalent unit*
*Source: Ministry of Transport, Malaysia & Penang Port Commission.*

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[16]   Penang Port Commission.

**Figure 3.9 Total container throughput by Penang Port, 2016−17**
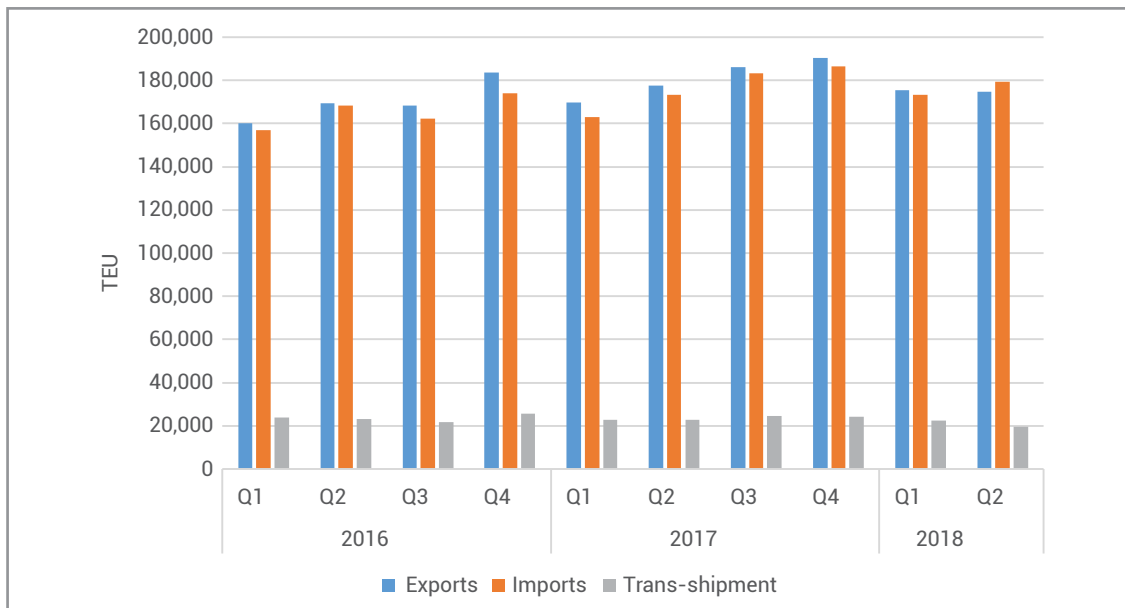


TEU: Twenty-foot equivalent unit
Source: Ministry of Transport, Malaysia & Penang Port Commission.

The same trend was observed for total container throughput. The highest volume of containers passed through Penang Port in each calendar year was found in the fourth quarter (with the exception of 2018, where data is not available as of time of writing). Q4 2017 was the highest performing quarter with the largest volume of imports and exports by container, totaling 190,405 TEUs in exports and 186,546 TEUs in imports. 2017 consistently outperformed 2016 in every single quarter, while Q1 2018 performed better in comparison to Q1 2017, but recorded a lower volume of exports in Q2 2018.

The commodities handled at Penang Port are varied, and includes palm oil, petroleum, chemicals and fertiliser, iron and steel, grains, sugar, machinery, processed timber, and more, with petroleum being the commodity throughput with the highest volume[17].

With regards to trade at Penang Port, the vessels engaged in international trade at Penang Port saw a decrease from 2012 to 2014, but increased steadily from 2014 to 2016[18]. In fact, 2016 recorded the highest number of departing vessels, with an annual growth rate of 27.7%, while its arriving vessels, with a growth rate of 31.3%, were the second highest in five years.

*Air*

Penang's airport first began operations as Bayan Lepas International Airport in 1935, effectively making it the oldest airport in Malaysia. After substantive expansion works were completed in 1979, the airport was renamed to Penang International Airport (PIA) and, to date, remains one of busiest airports in Malaysia, with the volume of passenger traffic ranking the third highest to Kuala Lumpur International Airport and Kota Kinabalu International Airport.

The air passenger trend for PIA experiences steady growth, with increases for domestic and international passengers in Q1 and Q2 in 2016−18. The number of international arrivals and departures had growth rates of 16.9% and 13.4%, respectively, for Q1 2018. The growth, however, underwent a slight decrease for the second quarter, where international arrivals grew by 12.6% and 16%. Overall, the fourth quarter had the highest volume of passengers for both 2016 and 2017, and it is anticipated the same trend will be observed for Q4 of 2018.

Domestic arrivals and departures outweighed international arrivals and departures, accounting for 54.7% of all passengers in the first half of 2018. However, international travelers recorded a higher growth rate of 16.3% compared to domestic passengers' growth rate of 8.4%.
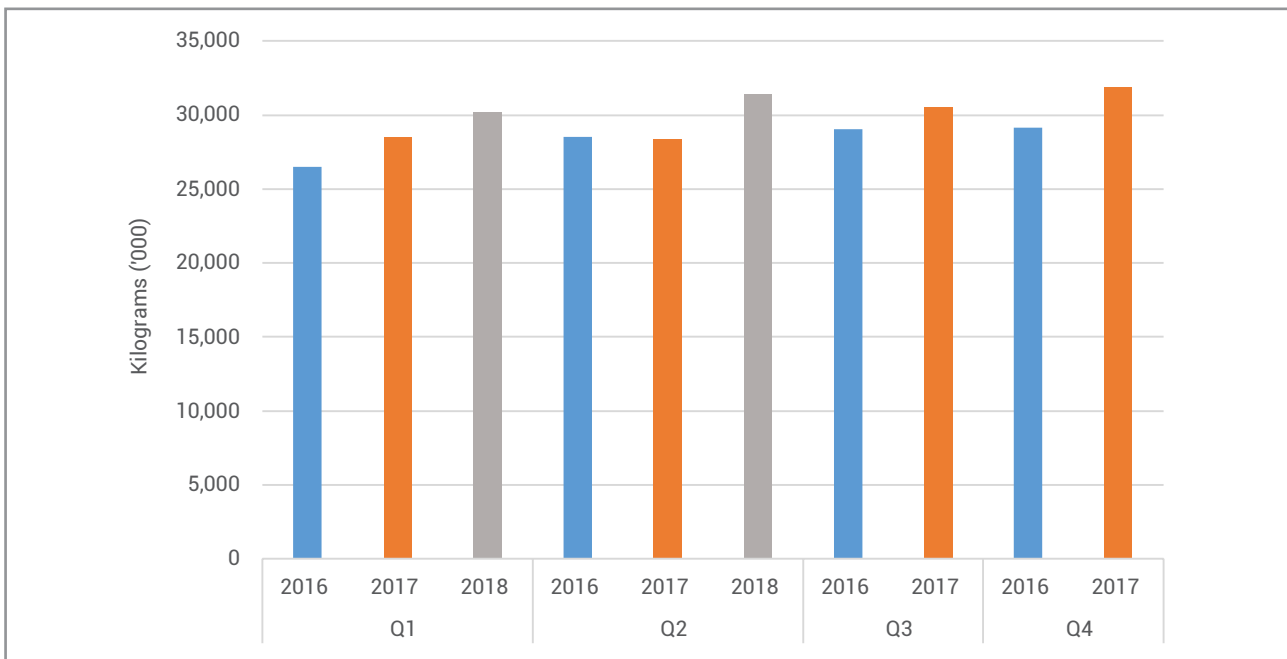
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17   Penang Port Commission, 2016.
18   Penang Port Commission, 2016.

**Figure 3.10 Total passengers handled by Penang International Airport, 2016−17**
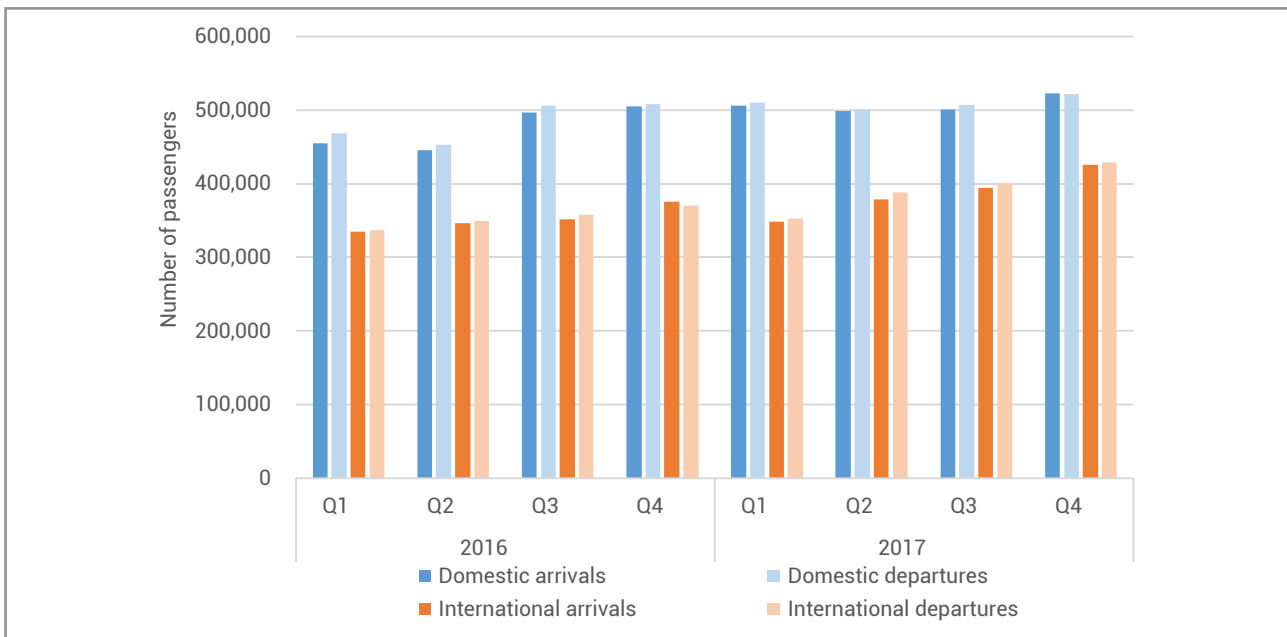


Source: Ministry of Transport and Malaysia Airports Holding Berhad (MAHB).

**Figure 3.11 Total cargo handled by Penang International Airport, 2016−17**



Source: Ministry of Transport and Malaysia Airports Holding Berhad (MAHB).

PIA is the third-busiest airport in terms of cargo traffic, after Kuala Lumpur International Airport and Kuala Lumpur International Airport 2 (KLIA2). Generally, the total volume of cargo handled by PIA grew in accordance by each quarter, with the exception of Q2 of 2017, where a slight decrease was recorded. Q1 and Q2 of 2018 saw a growth rate of 6.1% and 10.8%, respectively. International cargo sustained a significantly bigger share compared to domestic cargo. For the first two quarters of 2018, the total volume of international cargo amounted to 93.1% of total cargo handled at PIA.  This was expected, seeing Penang's standing as one of the main manufacturing hubs of Malaysia, with numerous multinational factories conducting their respective operations in the state.

The total commercial aircraft movements handled by PIA in the first two quarters of the year saw a 6.3% increase from 2017 to 2018, a decrease of 0.1% from the growth rate of previous years. Nevertheless, PIA is expected to see a steady increase in total commercial aircraft movements for the second half of 2018.

## 3.2.2 Water and electricity

### *Water*

Between 2015 and 2017, Penang had a slight increase in water consumption. Figure 3.12 indicates that water consumption is higher in Seberang Perai compared to Penang Island. This is proportionate to the population distribution ratio of Penang Island to Seberang Perai being 1:1.2.

In 2017, the state government announced plans to raise the water conservation surcharge (WCS) from RM0.48 to RM1 per 1,000 liters for usage of more than 35,000 liters per month. This is aimed at ensuring the optimum use of the state's shrinking water resources and as a means to discourage water wastage. In 2016, Penang recorded the highest domestic water consumption of 286 liters per capita per day −nearly 37% more than the national average of 209 liters.

Despite this move, Penang still has the lowest water tariff (Table 3.9) in Malaysia.

## Figure 3.12 Water consumption in Penang, 2015−17
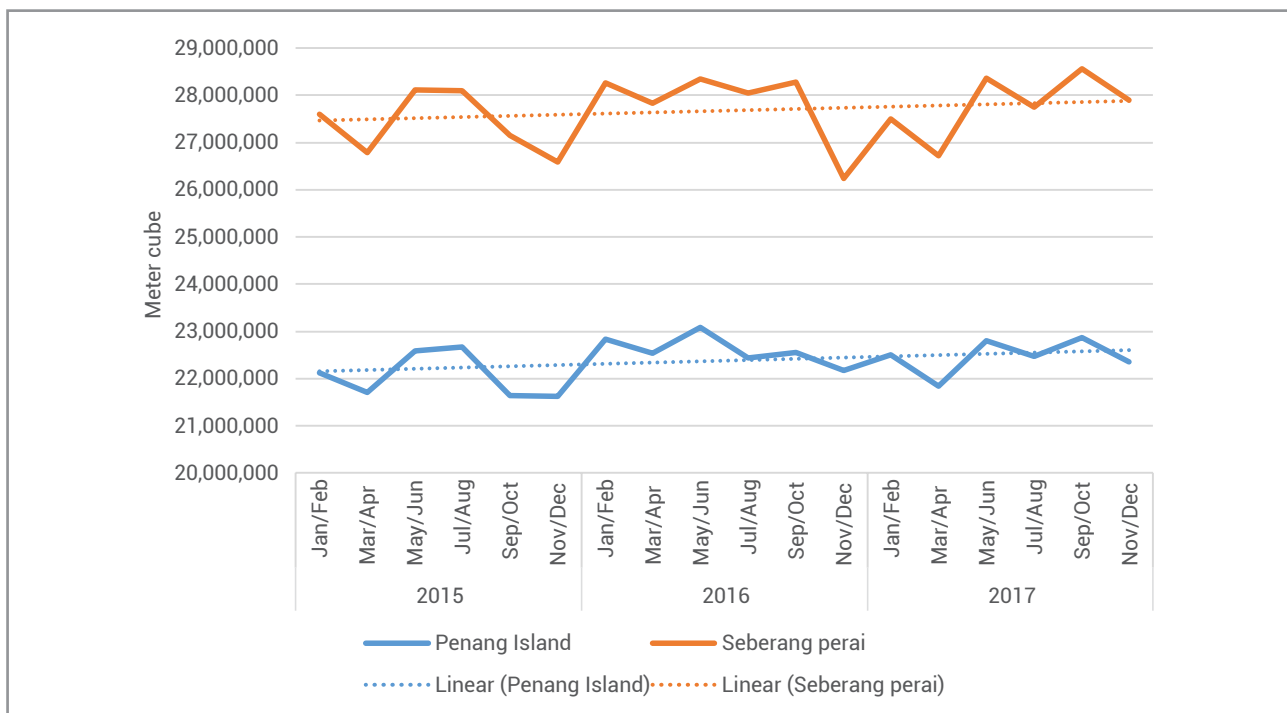


*Source: Perbadanan Bekalan Air (PBA).*

## Table 3.9 Residential water tariff in selected states (RM/m³), Malaysia

| | Minimum charge | Band 1 | Band 2 | Band 3 | Band 4 | Band 5 | Water conservation surcharge |
|---|---|---|---|---|---|---|---|
| Johor | 7.00 | 0.80 | 2.00 | 3.00 | - | - | - |
| Selangor/KL/Putrajaya¹ | 6.00 | 0.57 | 1.03 | 2.00 | - | - | - |
| Labuan | 7.00 | 0.70 | 1.20 | 1.70 | - | - | - |
| N. Sembilan | 5.00 | 0.55 | 0.85 | 1.40 | - | - | - |
| Malacca | 6.00 | 0.60 | 0.95 | 1.45 | - | - | - |
| Perak | 3.00 | 0.30 | 0.70 | 1.03 | - | - | - |
| Kedah | 6.00 | 0.50 | 0.90 | 1.30 | - | - | - |
| Kelantan | 4.50 | 0.45 | 0.97 | 1.42 | - | - | - |
| Terengganu | 4.00 | 0.42 | 0.65 | 0.90 | 1.00 | - | - |
| Pahang | 3.00 | 0.37 | 0.79 | 0.99 | - | - | - |
| Perlis | 4.00 | 0.40 | 0.70 | 1.10 | - | - | - |
| Penang | 2.50 | 0.22 | 0.46 | 0.68 | 1.17 | 1.30 | 0.48 |

*Notes:*
*Johor; Selangor/KL/Putrajaya; Labuan        0-20m³ (Band 1); >20 -35m³ (Band 2); >35m³ (Band 3)*
*N. Sembilan            0-20m³ (Band 1); >20 -35m³ (Band 2); >35m³ (Band 3)*
*Malacca    0-20m³ (Band 1); >20 -35m³ (Band 2); >35m³ (Band 3)*
*Perak      0-10m³ (Band 1); > 10-20m³ (Band 2); >20m³ (Band 3)*
*Kedah      0-20m³ (Band 1); >20 -35m³ (Band 2); >35m³ (Band 3)*
*Kelantan   0-20m³ (Band 1); >20 -35m³ (Band 2); >35m³ (Band 3)*
*Terengganu            0-20m³ (Band 1); >20 -40m³ (Band 2); 40 -60m³ (Band 3); > 60m³ (Band 4)*
*Pahang     0-18m³ (Band 1); 18 -45m³ (Band 2); > 45m³ (Band 3)*
*Perlis     0-15m³ (Band 1); 15.1 -40m³ (Band 2); > 40.1m³ (Band 3)*
*Penang     0-20m³ (Band 1); >20 -40m³ (Band 2); 40 -60m³ (Band 3);*
*> 60-200m³ (Band 4); > 200m³ (Band 5)*

*Source: National Water Services Commission (SPAN).*

### Electricity

Table 3.10 records the supply and demand for electric power while Table 3.11 displays tariff rates for domestic consumers. Power demand is increasing steadily year on year, with 2017 recording a 5.92% growth rate. It is also observed that power supply received a considerable boost, with a 44.10% growth in installed capacity for 2017, resulting in an excess capacity growth rate of 23.35%.

In the area of electricity and power generation, a theme of interest is the sustainability of electricity generation. With growing concerns over the environmental impact of climate change, many countries are turning to renewable energy sources. In a country such as Malaysia, the case for solar energy generation is hard to dismiss. This, however, has yet to be captured and capitalised (See Box 3.3).

## Table 3.10 Power demand and supply, 2006–17, Penang

| Year | Maximum demand | | Installed capacity | | Excess capacity | |
|---|---|---|---|---|---|---|
| | (MW) | Growth (%) | (MW) | Growth (%) | % | Growth (%) |
| 2010 | 1,283 | 19.46 | 3,213 | 0.00 | 60.10 | -9.76 |
| 2011 | 1,230 | -4.13 | 3,213 | 0.00 | 61.70 | 2.66 |
| 2012 | 1,280 | 4.07 | 3,303 | 2.80 | 61.20 | -0.81 |
| 2013 | 1,360 | 6.25 | 3,334 | 0.94 | 59.20 | -3.27 |
| 2014 | 1,508 | 10.88 | 3,456 | 3.66 | 56.40 | -4.73 |
| 2015 | 1,524 | 1.06 | 3,456 | 0.00 | 55.90 | -0.89 |
| 2016 | 1,622 | 6.43 | 3,456 | 0.00 | 53.10 | -5.01 |
| 2017 | 1,718 | 5.92 | 4,980 | 44.10 | 65.50 | 23.35 |

*Note: Excluding demand of 132 kV customers supplied via direct 132 kV connection.*
*Source: Penang Quarterly Statistics Q42017.*

## Table 3.11 Domestic tariff schedule

| Tariff category | Unit | Rates |
| --- | --- | --- |
| For the first 200kWh (1−200 kWh) per month | sen/kWh | 21.80 |
| For the next 100 kWh (201−300 kWh) per month | sen/kWh | 33.40 |
| For the next 300 kWh (301−600 kWh) per month | sen/kWh | 51.60 |
| For the next 300 kWh (601−900 kWh) per month | sen/kWh | 54.60 |
| For the next kWh (901 kWh onwards) per month | sen/kWh | 57.10 |
| Minimum monthly charge | RM | 3.00 |

*Source: Tenaga Nasional Berhad.*

### Box 3.3 Solar energy policies in Malaysia
*by Darshan Joshi, Penang Institute in KL*

Driven by recent technological developments and favourable policy environments, the cost of electricity generation from renewable energy (RE) sources have diminished drastically over the past decade. These changes are particularly noticeable for wind and solar energy, which exhibit the highest growth rates of all energy sources, and is to a large degree a manifestation of ever-increasing global concerns over climate change. The need to decarbonise our electricity grids has attained widespread acknowledgment in recent years, and has driven a shift in the focus of energy policies across much of the world from fossil fuels towards cleaner alternatives.

For many nations, the generation of electricity through RE sources is now cost-competitive with fossil fuel alternatives. The cost of solar photovoltaic (PV) modules has fallen by over 80% since 2009, and the cost of electricity generation through solar sources consequently fell by three-quarters between 2010 and 2017 (IRENA, 2017). These downward cost trends are projected to persist at current trajectories as the global deployment of RE amplifies over the coming decades, with onshore and offshore wind, as well as rooftop and utility-scale solar, expected to contribute greatly to the continuing proliferation of RE. The majority of the expansion in global solar capacity last year was driven by Asian countries, and moving forward, led by China and India, the continent is expected to improve on the 72 GW it added to total RE capacity in 2017.

While Malaysia has made strides in recognising the need to incorporate a larger share of renewable energy in electricity generation, this has yet to translate into effective action. By the end of 2015, RE capacity in Malaysia totalled 446 MW, less than half of the mandated target of 975 MW (KeTTHA, 2009), for an electricity capacity share of under 3%. Owing to poorly designed policy mechanisms, the overbearing influence of Tenaga Nasional Berhad (TNB), and issues related to corruption and cronyism, Malaysia's two cornerstone RE policies – the feed-in tariff (FiT) and net energy metering (NEM) – have failed to inspire the desired take-off of RE in Malaysia. A third, in large-scale solar (LSS), is showing tentative signs of promise after a shaky start, and it is imperative that progress with regards to this policy is closely monitored moving forward.

The mandate of boosting RE power generation is held by the Sustainable Energy Development Authority (SEDA). At its conception in 2011, SEDA was tasked with the implementation and administration of FiT and the concurrent Renewable Energy Fund (REF). FiT, comprised of long-term supply contracts between renewable energy power producers (REPPs) and distribution licensees (DLs) in the form of TNB (or Sabah Electricity Sdn. Bhd. [SESB] in Sabah), cover biogas, biomass, solar PV, and small hydro power producers. Under these contracts, REPPs receive per-kWh payments for generating and selling electricity to the utilities at guaranteed and favourable rates, allowing REPPs to make healthy and sustainable long-run returns on their high upfront-cost investments. FiT is financed by the REF, which itself derives funding from fixed-percentage surcharges on electricity bills paid by domestic consumers. These surcharges were set at 1% between 2012 and 2013, and 1.6% thereafter.

By the end of 2016, the FiT had added just under 421 MW of RE generation capacity to the national grid, despite the allocation of almost 900 MW worth of FiT quotas in the preceding five years. For solar PV, the added capacity totalled 223 MW. The biggest issues faced by the FiT were financial in nature; with rates offered to REPPs being overly-generous and electricity surcharge rates set low, the REF came under constant strain. This led to a policy change in 2016, with the announcement that the FiT would be phased out for solar PV participants in favour of net energy metering. NEM policies are widely used globally to foster private investment in solar technology and allow for the self-consumption of electricity generated by solar PV system users, as well as the selling of excess energy production to the DLs at a prevailing "displaced cost". This gives consumers a degree of self-sufficiency in electricity generation, reduces their reliance on importing electricity from the DLs, and leads to savings on utility bills. Consumers are also able to sell their excess energy to TNB, and in doing so claim "electricity credits" on current and future electricity bills.

Unfortunately, NEM in Malaysia has featured an essentially non-existent incentivisation structure. With a very low "displaced cost", a short rollover period of two years, and the stipulation of expiring credits, energy-efficient households that consistently amass electricity credits are forced to forfeit their credits to the relevant DL at the end of each two-year cycle. As of June 2018, and as a result of poor incentives, less than 14 MW of the available quota of 300 MW under the NEM had been taken up.

This chosen incentivisation structure serves only to protect the interests of TNB. As the quantity of self-generated electricity grows, the market share and profitability of TNB decreases. SEDA itself has stated that certain restrictions imposed on the NEM were designed to protect TNB's revenue – an admission which indicates that the NEM scheme is operating under the regulatory capture of TNB. Moving forward, it is important that the incentives offered to participants of NEM are radically overhauled. A liberalised electricity market, featuring a greater share of electricity generated by independent producers and a reduced reliance on energy-sector monopolists, represents an ideal setting for the RE revolution. SEDA, as well as the Ministry of Energy, should not allow well-meaning RE policies, such as NEM, to be unduly influenced by TNB.

Concurrent steps have been taken to move into the space of large-scale solar. After an inauspicious start to this policy, where contracts were directly awarded to politically connected companies with little or no experience in RE, two rounds of open-ballot events have been held. A total of just over 1 GW of large-scale solar capacity is expected to be connected to the grid by the end of 2020, and strong efforts must be made by the relevant authorities to ensure commercial operations deadlines are met.

Located on the Sun Belt and a beneficiary of high levels of solar irradiation, Malaysia is well-placed to take advantage of the ongoing revolution in solar energy. Studies on the potential of solar energy in Malaysia indicate that building-integrated solar PV alone can contribute at least 7,800 GWh of electricity to the grid (KeTTHA, 2009). The prospects for small- and large-scale solar plants are far greater, and there is consequently an enormous amount of unmet potential for solar power generation in Malaysia. It is certainly possible for Malaysia to strive towards a future where the majority of our energy needs are met by RE technologies, led by solar.

Unfortunately, the policies implemented to boost solar power generation have thus far failed to meet expectations. For small-scale solar electricity generation, net energy metering holds the greatest promise. This policy requires a radical overhaul of its incentivisation structure in order to encourage substantial uptake of the program, and would allow households the opportunity to contribute to the greening of the domestic electricity grid while making healthy returns on their investments in solar PV technology. At the same time, utility-scale solar plants are showing promising signs of making a large contribution to the country's power generation capacity. Combined, these two policy mechanisms can set Malaysia on the path to achieving a substantial decarbonisation of the national electricity grid.

## Table 3.12 Solar PV projects by state (in MW)

| State/Year | 2015 | 2016 |
|---|---|---|
| Perlis | 13.58 | 15.93 |
| Penang | 3.95 | 14.67 |
| Perak | 9.77 | 16.55 |
| Kedah | 5.41 | 11.52 |
| Kelantan | 5.62 | 7.20 |
| Terengganu | 7.31 | 10.31 |
| Selangor | 52.68 | 66.46 |
| K Lumpur | 1.34 | 2.74 |
| Pahang | 7.31 | 24.57 |
| N Sembilan | 34.41 | 40.74 |
| Malacca | 15.57 | 16.75 |
| Johor | 10.4 | 14.79 |

*Source: Peninsular Malaysia Electricity Supply Outlook 2017, Energy Commission.*

## Table 3.13 Solar energy statistics under Malaysian RE policies

| Policy | Feed-in Tariff (FiT) | Net Energy Metering (NEM) | Large-Scale Solar (LSS) |
|---|---|---|---|
| Policy period | 2012−16* | 2016−present | 2016−present |
| Solar capacity added | 283 MW | 13.56 MW | 1 GW** |
| Available quota | 333 MW | 300 MW | N/A |
| Key issues | 1) Overly generous tariff rates and insufficient funding, which have led to lack of fiscal sustainability. 2) Lack of transparency in contract awards, and allegations of cronyism in the awards process | 1) A non-existent incentivisation structure that fails to encourage uptake of the programme, largely due to the influence of TNB. | 1) In initial stages, a lack of transparency in contract awards. 2) Important that approved projects achieve commercial operations by stipulated deadlines; 450 MW due online by end-2018; 562 MW due online by end-2020 |

*Source: Annual reports (2011−16), Sustainable Energy Development Authority and Joshi (2018).*
*Notes: * FiT was discontinued for solar PV after 2016;*
*\*\*1 GW of LSS is expected online by the end of 2020.*

**References:**

IRENA. (2017). *Renewable Power Generation Costs in 2017*. International Renewable Energy Agency.

KeTTHA. (2009). *National Renewable Energy Policy and Action Plan (2009)*. Ministry of Energy, Green Technology and Water.

### 3.2.3 Global business services

Global business services (GBS) is an industry sector that focuses on managing most general administrative tasks and processes that happen at the back end of a business transaction. These include services like finance and accounting, procurement, human resources, IT, and customer services. The GBS industry, however, is now shifting from business process outsourcing (BPO) to knowledge process outsourcing (KPO) and information technology outsourcing (ITO). This has resulted in the GBS industry taking on more complex technology and venturing into advanced services like data analytics and IoT solutions that require highly skilled employees.

In 2016, the Malaysian GBS industry was reported to contribute RM18.4 billion in revenue (Figure 3.13), a 9.3% increase over the previous year. This growth rate is telling, given that Malaysia has been consistently ranked third among 55 countries in the A.T. Kearney Global Services Location Index (Table 3.14). Countries are ranked against three factors (financial attractiveness, people skills and availability, and business environment) that are deem crucial for service outsourcing decisions. A closer look at the scores, however, reveal opportunities for improvement to realise the full potential of the GBS sector. While Malaysia consistently ranks third overall, Malaysia has not been performing well in individual scoring categories. In fact, Malaysia has never ranked in the top three positions for each individual factors. This indicates that Malaysia's good overall performance may be due to the poor performance of other countries in certain individual factors or simply the result of being averagely good in all individual factors. In either case, it can be argued that greater effort needs to be invested to enhance Malaysia's position in each individual factor. The biggest gap is in the availability of skills, which show a lagging score behind China, which ranks third.

### Figure 3.13 Revenue of GBS sector in Malaysia
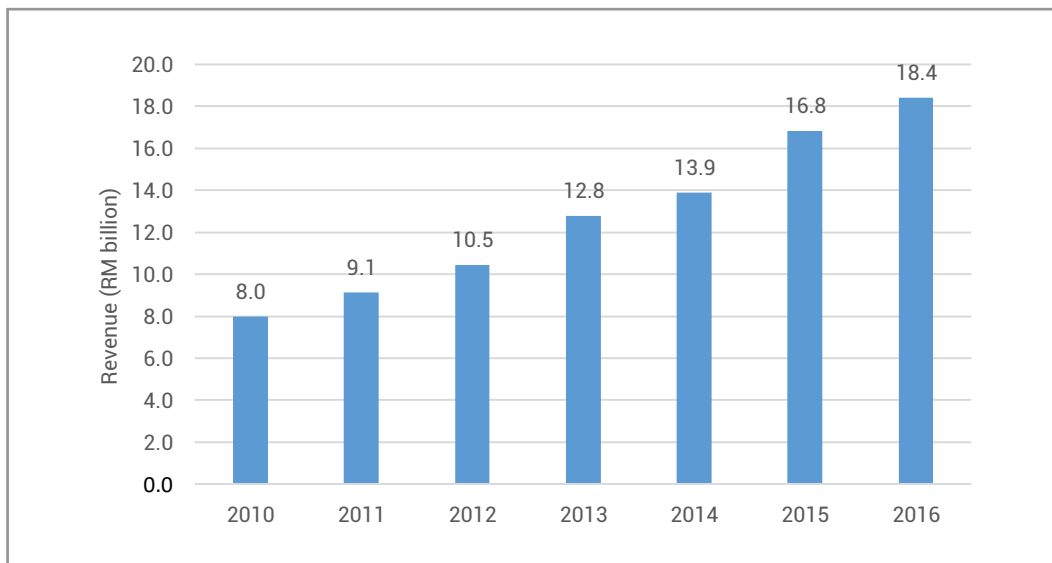


*Source: Beyond Borders, Malaysia Digital Economy Corporation (2015).*

### Table 3.14 A.T. Kearney Global Services Location Index Score for top three countries and Malaysia

| Year | Rank | Overall | | Financial attractiveness | | Business environment | | People skills and availability | |
|------|------|---------|------|--------------------------|------|----------------------|------|-------------------------------|------|
| 2014 | 1st  | India     | 7.04 | Vietnam   | 3.30 | Germany              | 2.39 | United States | 2.88 |
|      | 2nd  | China     | 6.15 | Sri Lanka | 3.30 | United States        | 2.15 | China         | 2.71 |
|      | 3rd  | Malaysia  | 5.99 | Egypt     | 3.20 | United Arab Emirates | 2.05 | India         | 2.54 |
|      |      |           |      | Malaysia  | 2.72 | Malaysia             | 1.84 | Malaysia      | 1.43 |
| 2016 | 1st  | India     | 6.96 | Sri Lanka | 3.37 | United States        | 2.11 | United States | 2.88 |
|      | 2nd  | China     | 6.49 | Indonesia | 3.23 | Poland               | 1.90 | China         | 2.71 |
|      | 3rd  | Malaysia  | 6.05 | India     | 3.22 | Malaysia             | 1.89 | India         | 2.55 |
|      |      |           |      | Malaysia  | 2.75 |                      |      | Malaysia      | 1.42 |
| 2017 | 1st  | India     | 7.07 | Sri Lanka | 3.42 | Singapore            | 2.31 | India         | 2.83 |
|      | 2nd  | China     | 6.31 | Egypt     | 3.37 | New Zealand          | 2.20 | United States | 2.83 |
|      | 3rd  | Malaysia  | 5.99 | Pakistan  | 3.35 | Australia            | 2.19 | China         | 2.69 |
|      |      |           |      | Malaysia  | 2.92 | Malaysia             | 1.72 | Malaysia      | 1.47 |

*Source: A.T. Kearney Global Services Location Index (2014, 2016, and 2017).*

The shift towards greater automation is also seen in the sector. According to KPMG (2017), one in three jobs will be converted to software, robots, and smart machines by 2025. The continuous development of blockchain technology is also slated to radically disrupt the way GBS services such as legal and financial practices, and supply chain management are delivered, which may lead to the redundancy of human personnel. Additionally, the GBS sector is also poised to see exponential growth emanating from the spillover effects of Industry 4.0 in the manufacturing sector, given the blurring of lines between the manufacturing and services sectors. A traditionally recognised manufacturing company like Dell, for example, is progressively building their brand as an IT solutions service provider. This is definitely good news for Penang given that the state is host to many global business centres belonging to various MNCs. With the rising demand for services like cyber security and data analytics, the presence of global business centres in Penang will serve to attract relevant talent and contribute to building a talent pool that is indispensable in the digital economy.

The Malaysian government has taken the initiative to award MSC statuses to eligible companies. Through this, companies can benefit from the Bill of Guarantees (BoG), which consist of 10 sub-bills that are shown in Table 3.15.

### Table 3.15 Bill of Guarantees

| Bill of Guarantees (BoG) | Details | |
|--------------------------|---------|---|
| BoG 1 | To provide a world-class physical and information infrastructure | |
| BoG 2 | To allow employment of local and foreign knowledge workers | |
| BoG 3 | To ensure freedom of ownership by exempting companies with MSC Malaysia Status from local ownership requirements | |
| BoG 4 | To give the freedom to source capital globally for MSC Malaysia infrastructure, and the right to borrow funds globally | |
| BoG 5 | To provide competitive financial incentives namely Pioneer Status (100 percent tax exemption) for up to 10 years or an Investment Tax Allowance for up to five years and no duties on the importation of multimedia equipment | |
| BoG 6 | To become a regional leader in Intellectual Property Protection and Cyberlaws. | |
| BoG 7 | To ensure no censorship of the Internet | |
| BoG 8 | To provide globally competitive telecommunications tariffs | |
| BoG 9 | To tender key MSC Malaysia infrastructure contracts to leading companies willing to use MSC Malaysia as their regional hub | |
| BoG 10 | To provide a high-powered implementation agency to act as an effective one-stop super shop | |

*Source: Malaysia Digital Economy Corporation (n.d.).*

## Table 3.16 Tier definition for companies with MSC status

| TIER | Details |
|---|---|
| Tier 1 | MSC designated premises – Enjoy 10 BoG privileges |
| Tier 2 | Other commercial premises – Enjoy 8 BoG privileges (forgo BoG1 and BoG8) |
| Tier 3 | Outside of Cybercities / Cybercentres:<br><br>• Enjoy 6 BoG privileges (BoG 3,4,6,7,9, and 10)<br>• Forgo BoG 1 and 8 – Tier 3 companies located outside of Cybercities and Cybercentres forgo the guarantee of world-class physical and information infrastructure and the provision of a globally competitive telecommunications tariffs<br>• Enjoy partial BoG2 – Tier 3 companies can employ foreign knowledge workers for key positions only (maximum 20 workers)<br>• Enjoy partial BoG5 – Tier 3 companies will enjoy income tax exemption of 70% under Section 127(3)(b) of Income Tax Act 1967 for a period of five years and no duties on the importation of multimedia equipment. |

*Source: Malaysia Digital Economy Corporation (n.d.).*

As of 2016, Penang is home to more than 50 GBS companies, creating over 10,000 jobs and serving customers both globally and more specifically in the Asia-Pacific region. A major portion of GBS companies in Penang are involved in information technology, software development, and finance and accounting. Penang is also home to the MSC initiative, with an array of MSC Malaysia status companies and an MSC Malaysia Cybercity accolade. Officially known as the Penang Cybercity (PCC), PCC encompasses the Bayan Lepas Industrial Park and its vicinity, which consists of nine office buildings (Figure 3.14).

## Figure 3.14 Penang Cybercity
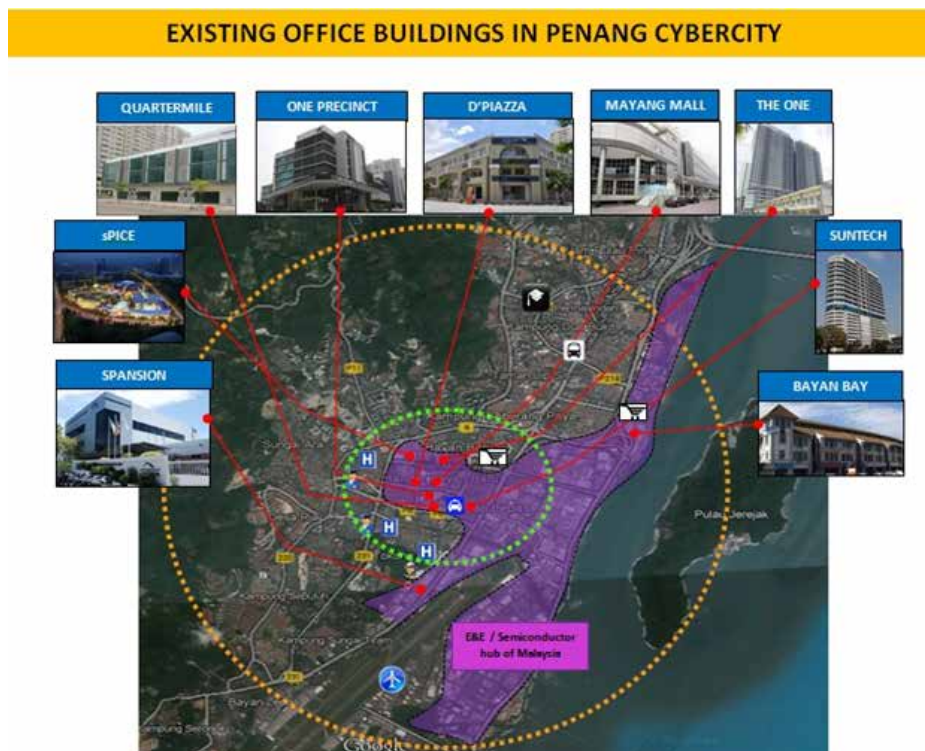


*Source: InvestPenang (n.d.).*

In 2017, an MSC tier one office space was launched at GBS@Mayang. This is the product of a RM10 million refurbishment effort by the Penang state government on what was formerly known as Mayang Mall. Since its launch, GBS@Mayang has been home to a US-based Jabil Global Business Centre, as well as Austrian crystal jewelry maker Swarovski's Global Business Services Centre for Asia. Projecting further expansion in the GBS sector, the state government has also began constructing GBS by the Sea, a 400,000 square foot MSC tier 1 office space that is due to be completed in 2020.

Moving forward, the GBS sector is poised to display positive growth. This, however, may not necessarily translate to equal growth in employment given the rise of automation and other digital technologies. The integration of robotic process automation (RPA), virtual agents (VA), and artificial intelligence (AI) will require GBS hubs to have such expertise available. A crucial point of intervention to address this is the need for a bigger pool of highly skilled workers who are able to utilise such technologies, and in the future contribute to the development of such technologies.
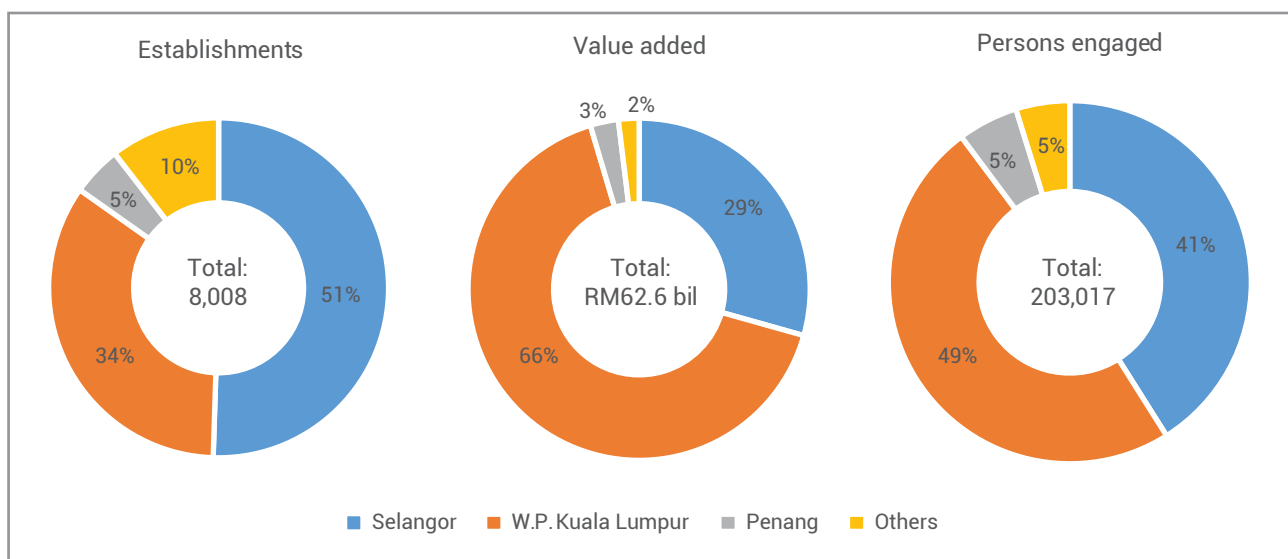
## 3.2.4 Information and communication

According to the Department of Statistics Malaysia, information and communication services comprise of:
i.    Activity of publishing
ii.   Motion picture, video, and television programme production; sound recording; and music publishing
iii.  Programming and broadcasting
iv.   Telecommunication services
v.    Computer programming, consultancy, and related activities
vi.   Information services

Figure 3.15 gives a snapshot of the sector in relation to other states in Malaysia. As can be seen, the information and communication services sector in Malaysia is predominantly congregated in three states: Selangor, Kuala Lumpur, and Penang.

**Figure 3.15 Selected measures of ICT sector for top three states, 2015**



*Source: Economic Census 2016 (Information and Communication Services), Department of Statistics, Malaysia.*

According to the Economic Census 2016, Penang contributed an average of 4% to Malaysia with a total of 379 establishments at RM1.6 billion worth of value added, while engaging 10,948 persons in the sector. The overwhelming contribution of Selangor and Kuala Lumpur, however, indicates that Penang has the potential to act as a secondary city where this sector is concerned. Table 3.17 illustrates the contribution of selected states by sub-sector. While Selangor is far ahead in this sector, both Penang and Johor have been showing signs of growth due to the emerging trend in literature and creative arts like publishing of books, production of arts, independent film making, and music publishing (See Box 3.4).

The digital economy requires the use of computers and, more importantly, an internet connection. To this end, Penang has fared relatively well with 87% of businesses recording ICT usage and 80.4% for internet usage (Figure 3.16). Similarly, SMEs in Penang also report equally high levels of ICT and internet utilisation. However, web presence usage among businesses (34.9% for all companies and 25% for SMEs) remain low.

## Table 3.17 Principal statistics by sub-sector for selected states, 2015

| TIER | | Pub.[1] | Mo.[2] | Prog.[3] | Telco.[4] | Comp.[5] | Info.[6] |
|---|---|---|---|---|---|---|---|
| Number of establishment | Penang | 43 | 31 | N/A | 37 | 222 | 46 |
| | Johor | 41 | 36 | N/A | 46 | 140 | 22 |
| | Selangor | 409 | 571 | 20 | 627 | 2,113 | 305 |
| Number of persons engaged | Penang | 1,315 | 619 | N/A | 866 | 7,743 | 405 |
| | Johor | 577 | 617 | N/A | 303 | 1,546 | 182 |
| | Selangor | 10,025 | 5,299 | 1,099 | 14,344 | 43,870 | 8,696 |
| Value added (RM '000) | Penang | 81,414 | 54,673 | N/A | 246,355 | 1,250,005 | 32,385 |
| | Johor | 44,003 | 83,023 | N/A | 19,860 | 130,958 | 41,729 |
| | Selangor | 1,674,287 | 709,010 | 137,460 | 7,701,606 | 6,620,625 | 1,527,036 |

*Note: 1 - Activity of publishing; 2 - Motion picture, video and television production, and sound recording and music publishing; 3 - Programming and broadcasting; 4 - Telecommunication services; 5 - Computer programming, consultancy, and related activities; and 6 - Information services*

*Source: Economic Census 2016 (Information and Communication Services), Department of Statistics Malaysia.*

## Figure 3.16 Usage of computer, internet, and web presence for all companies and SME by selected states, 2015
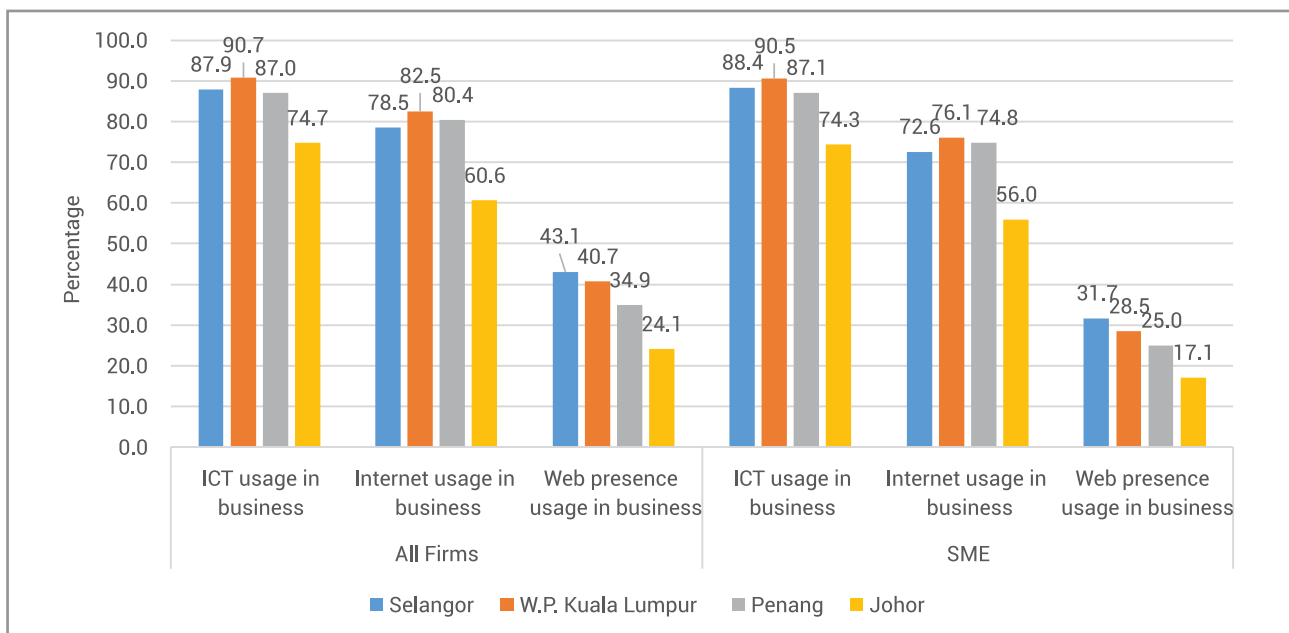


*Source: Economic Census 2016 (Usage of ICT by Business and e-Commerce), Department of Statistics Malaysia.*

This indicates that businesses are not capitalising on digital technologies. Web presence, for example, unlocks a business' potential to instantly become a global micro-company through the booming e-commerce industry, or at the very least reach customers and suppliers beyond their confined geographical location. Table 3.18 captures the purpose of internet usage among businesses where an overwhelming majority of respondents indicate that they use the internet merely for sending or receiving email (70.6%) and internet banking (41.3%). Other purposes that require greater integration into businesses operations with the promise of delivering higher value like providing customer service and delivering products online have yet to be utilised.

The importance of internet access is evidenced by its prevalent use by both businesses and households alike. In 2015, 74.8% of businesses use fixed broadband while 28.5% use mobile broadband. Likewise, in Q4 2017 Penang saw recording a broadband penetration rate of 130.2% per 100 inhabitants. The importance of an internet connection is also highlighted in its cost competitiveness; Malaysians are required to pay more for lower speeds when compared to neighboring countries (See Box 3.5).

## Table 3.18 Purpose of internet usage, 2015

| Purpose of internet usage | Percent (%) | |
| --- | --- | --- |
| | Overall | SMEs |
| Sending or receiving email | 70.6 | 71.2 |
| Internet banking | 41.3 | 41.2 |
| Getting information about goods and services | 38.9 | 38.5 |
| Posting information or instant messaging | 36.6 | 36.9 |
| Getting information from government organisations | 23.5 | 23.2 |
| Telephoning over the internet | 18.6 | 18.6 |
| Interacting with government organisations | 16.5 | 16.2 |
| Internet or external recruitment | 10.8 | 10.1 |
| Providing customer service | 10.3 | 10.0 |
| Accessing other financial services | 9.9 | 9.3 |
| Delivering products online | 5.7 | 5.2 |
| Staff training (e-learning application) | 2.5 | 2.4 |
| Others | 12.5 | 6.2 |

*Source: Economic Census 2016 (Usage of ICT by Business and e-Commerce), Department of Statistics Malaysia.*

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**Box 3.4 The arts as a contributor to the information and communication sector**
*by Timothy Choy, Socioeconomics & Statistics Programme*

The arts scene in Penang, contrary to other economic sectors, seldom receive equal publicity and attention. The arts however is what gives life to people after a long day at work. It is what brings families together on a weekend of activities. It is what powers the economy outside of conventional huge office complexes and multinational companies that Penang is known for. It is an avenue for independent creatives to discover their economic potential. It is what helps realise Penang's "work, live, and play" aspirations.

Lonely Planet in 2016 encapsulates this by describing Penang as "the crucible of an artsy modern Malaysia for its versatile exhibition spaces showcasing avant garde art, film, music and dance." The George Town Festival and George Town Literary Festival are cases in point. These festivals not only allow a showcase and celebration of an ever-growing underground movement that is becoming more mainstream, but also as a signal that Penang is ready for more – the culmination of which is the production and publishing of original expressions of art that contribute to the information and communication sector and as a lifestyle attraction for Penangites at large.

Penang songbirds Bhizu and Dasha Logan, for example, are names that are no longer foreign to Malaysians in the music industry. Local bands like Volatile are also making a name for themselves in the industry, with the launch of their latest album, *It's About Art* in August this year (2018). Other names like Acidic Bunch and Charlie and The Lions are carving out niche areas in song covers and wedding singing respectively. Besides producing their own music, such bands and artists also contribute heavily to the ever-growing demand for live performances which energise the city and in turn serves as a launch pad to build their music profile.

In the area of publishing, Penang-based publishers like Areca Books, Entrepot Publishing, and Clarity have been instrumental in contributing to the dynamism of the local literary scene. Such publishers provide an avenue for writers to publish niche and more colloquial titles, whose value would be less appreciated by large-scale publishers. Additionally, Clarity has also used publishing to give space to works of art. Streetart Notebook: George Town by Ernest Zacharevic is one such example. A collection of street art and murals by Zacharevic, the book also features his photography of George Town through images of everyday people doing everyday things. *Penang Monthly*, a publication of Penang Institute, on the other hand caters to the average Penangite with bits of everything that is going on in Penang ranging from hidden bars to stories of seemingly ordinary Penangites that are doing big things that positively impact the community.

And yet, there is still huge unrealised potential in this sector. Bad Wolves, an arts group keen to turn Penang into a creative hub, sees this. Through their events and workshops on songwriting, verse writing, and poetry, Bad Wolves wants to brand Penang as the place to learn and create original works in poetry, music, and stand-up comedy. The Penang state government has also taken the initiative to support this sector through funding and grants. Additionally, the state government has begun work on a RM30 million Penang Arts District that aims to be the creative hub of Penang's contemporary arts and culture.

## Box 3.5 Internet subscription: Pay more for less speed
*by Jonathan Dason, Socioeconomics & Statistics Programme*

Fixed broadband is typically the choice of internet connection for business entities. In 2015, 74.8% of businesses used fixed broadband, as compared to 28.5% using mobile broadband.

Akamai's State of the Internet Q1 2017 report ranks Malaysia 10th out of the 15 countries ranked within the Asia-Pacific region in terms of fixed-line connection speed (Figure 3.17). Globally, Malaysia is ranked 62nd out of 149 qualifying countries, recording an average speed of 8.9 Mbps.

### Figure 3.17 Principal statistics of speed for Asia Pacific

| Global Rank | Country/ Region | Q1 2017 Avg.Mbps | QoQ Change | YoY Change | Global Rank | Country/ Region | Q1 2017 Avg.Mbps | QoQ Change | YoY Change |
|---|---|---|---|---|---|---|---|---|---|
| 1 | South Korea | 28.6 | 9.3% | 1.7% | 1 | Singapore | 184.5 | n/a | 26% |
| 4 | Hong Kong | 21.9 | -0.2% | 10% | 4 | Hong Kong | 129.5 | n/a | 17% |
| 7 | Singapore | 20.3 | 0.8% | 23% | 5 | South Korea | 121.0 | n/a | 17% |
| 8 | Japan | 20.2 | 3.1% | 11% | 8 | Thailand | 106.6 | n/a | 53% |
| 16 | Taiwan | 16.9 | 7.9% | 14% | 13 | Taiwan | 94.7 | n/a | 14% |
| 21 | Thailand | 16.0 | 20% | 49% | 14 | Japan | 94.5 | n/a | 12% |
| 27 | New Zealand | 14.7 | 14% | 40% | 35 | New Zealand | 70.8 | n/a | 42% |
| 50 | Australia | 11.1 | 9.6% | 26% | 43 | Indonesia | 66.1 | n/a | -40% |
| 58 | Vietnam | 9.5 | 15% | 89% | 50 | Malaysia | 64.1 | n/a | 38% |
| 62 | Malaysia | 8.9 | 9.1% | 40% | 61 | Vietnam | 59.0 | n/a | 73% |
| 68 | Sri Lanka | 8.5 | 17% | 58% | 62 | Sri Lanka | 57.3 | n/a | 62% |
| 74 | China | 7.6 | 20% | 78% | 64 | Australia | 55.7 | n/a | 27% |
| 77 | Indonesia | 7.2 | 6.7% | 59% | 86 | China | 45.9 | n/a | 48% |
| 89 | India | 6.5 | 17% | 87% | 88 | Philippines | 45.0 | n/a | 50% |
| 100 | Philippines | 5.5 | 20% | 57% | 97 | India | 41.1 | n/a | 62% |

*Source: Akamai's State of the Internet Q1 2017 Report.*

A further breakdown in the report also show that uptake for higher broadband speeds in Malaysia is lagging behind neighboring countries (Figure 3.18). Adoption for 10 Mbps, for example, sees Malaysia scoring 32% while neighbouring Thailand is at 72%. This is less than ideal given that higher broadband speeds will be crucial for businesses to transition to digital technologies, like real time monitoring and big data analytics.

## Figure 3.18 Broadband adoption rates by speed (4 Mbps, 10 Mbps, and 15 Mbps) in Asia Pacific

| Global Rank | Country/ Region | % Above 15 Mbps | QoQ Change | YoY Change | Global Rank | Country/ Region | % Above 10 Mbps | QoQ Change | YoY Change | Global Rank | Country/ Region | % Above 15 Mbps | QoQ Change | YoY Change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | South Korea | 69% | 7.8% | -0.4% | 1 | South Korea | 85% | 3.1% | 1.7% | 1 | South Korea | 69% | 7.8% | -0.4% |
| 4 | Hong Kong | 54% | 2.8% | 13% | 3 | Japan | 73% | 1.0% | 11% | 4 | Hong Kong | 54% | 2.8% | 13% |
| 5 | Japan | 52% | 3.3% | 20% | 4 | Singapore | 72% | -2.1% | 9.8% | 5 | Japan | 52% | 3.3% | 20% |
| 6 | Singapore | 51% | -1.4% | 20% | 5 | Thailand | 72% | 26% | 83% | 6 | Singapore | 51% | -1.4% | 20% |
| 13 | Thailand | 43% | 56% | 186% | 6 | Hong Kong | 71% | 1.0% | 8.1% | 13 | Thailand | 43% | 56% | 156% |
| 19 | Taiwan | 38% | 16% | 17% | 15 | Taiwan | 65% | 9.9% | 14% | 19 | Taiwan | 38% | 16% | 17% |
| 27 | New Zealand | 32% | 26% | 111% | 31 | New Zealand | 52% | 17% | 60% | 27 | New Zealand | 32% | 26% | 111% |
| 47 | Australia | 19% | 21% | 90% | 48 | Vietnam | 37% | 48% | 656% | 47 | Australia | 19% | 21% | 90% |
| 52 | Malaysia | 14% | 28% | 339% | 50 | Australia | 36% | 16% | 54% | 52 | Malaysia | 14% | 28% | 339% |
| 57 | Vietnam | 11% | 69% | 1,222% | 52 | Malaysia | 32% | 17% | 179% | 57 | Vietnam | 11% | 69% | 1,222% |
| 58 | India | 10% | 38% | 436% | 62 | China | 20% | 84% | 880% | 58 | India | 10% | 38% | 436% |
| 63 | Philippines | 6.2% | 72% | 509% | 64 | India | 19% | 30% | 28.5% | 63 | Philippines | 6.2% | 72% | 509% |
| 69 | Indonesia | 5.0% | 16% | 520% | 68 | Indonesia | 18% | 22% | 496% | 69 | Indonesia | 5.0% | 16% | 520% |
| 70 | China Sri | 5.0% | 122% | 1,146% | 78 | Philippines | 11% | 53% | 330% | 70 | China | 5.0% | 122% | 1,146% |
| - | Lanka | 11% | 101% | 556% | - | Sri Lanka | 22% | 54% | 399% | - | Sri Lanka | 11% | 101% | 556% |

*Source: Akamai's State of the Internet Q1 2017 Report.*

In terms of pricing, Figure 3.19 shows a comparison of monthly broadband price by countries. Malaysia's pricing schedule lie on the higher end, with comparable countries offering similar speeds at lower prices. This affects the affordability of internet connections in Malaysia given that Malaysia also has a lower GDP per capita than regional peers like Singapore and South Korea. The average Malaysian would have to use a bigger portion of their income for a similar internet connection compared to the average Singaporean with the same level of income. Figure 3.20 presents the current tariff schedule.

## Figure 3.19 Monthly broadband price points (US dollar) in selected countries, 2017
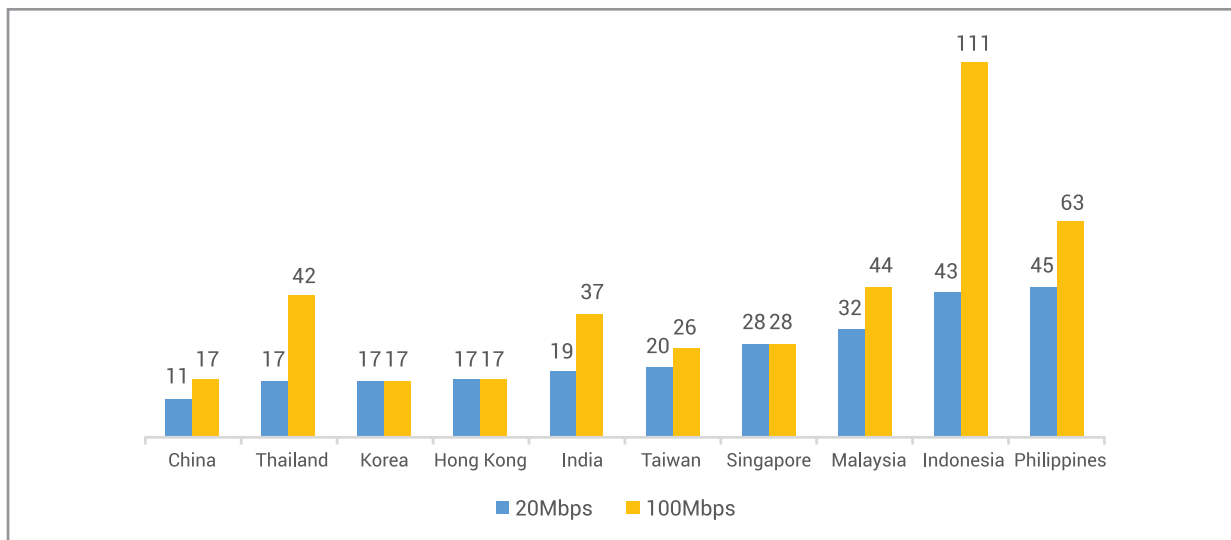


*Source: Equity Research Telecommunication Services, Credit Suisse (2017).*

### Figure 3.20 Current tariff schedule in Malaysia, 2016

| TIER | 2Mbps | 10Mbps | 20Mbps | 30Mbps | 50Mbps | 100Mbps | 1GBps |
|---|---|---|---|---|---|---|---|
| Telekom Malaysia - bundle | 130 | 179 | 179 | 179 | 229 | 329 | n.a. |
| Time Dotcom - bundle | 188 | 188 | 238 | 288 | n.a. | n.a. | n.a. |
| Maxis - bundle | 188 | 188 | 238 | 288 | n.a. | n.a. | n.a. |
| Time Dotcom - broadband | 149 | 149 | 149 | 149 | 149 | 149 | n.a. |
| Maxis - broadband | 139 | 139 | 179 | 179 | 219 | 299 | n.a. |
| Symphonet - broadband | 98 | 98 | 98 | 128 | 138 | 148 | n.a. |

*Source: Equity Research Telecommunication Services, Credit Suisse (2017).*

The case for lower prices accompanying faster internet speeds in Malaysia has been widely made. The newly elected federal government has announced their decision to double internet speeds at half the price (the Sun daily, 2018).

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Akamai. (2017). *Akamai's State of the Internet Report*. Akamai.
the Sun daily. (23 May, 2018). *Govt looking at doubling internet speed at half the price: Gobind*. Retrieved from News: http://www.thesundaily.my/news/2018/05/23/govt-looking-doubling-internet-speed-half-price-gobind

### 3.2.5 Tourism

The tourism sector has always been an integral part of Penang's economy. As a key tourist destination, the state attracts millions of tourists annually, with its scenic beaches, diverse cultures, and delicious local food among the main attractions. The inauguration of George Town as a UNESCO World Heritage Site in 2007 heightened Penang's appeal as a holiday destination. In 2016, Lonely Planet (O'Hare and Delgrossi, 2016) named George Town as one of its best travel destinations in 2016. The following year, CNN (Hetter et. al., 2017) listed Penang as one of the 17 best places to visit.

Tourism in Penang has expanded into several sub-sectors such as medical tourism, cruise tourism, and eco-tourism. The constant evolution of Penang's tourism sector has contributed to the state's overall economic development by stimulating economic activities, contributing to the growth of employment opportunities, as well as creating a positive impact on income and production. As a service industry, tourism is able to generate and increase foreign income earnings that spur continuous economic growth (Lee and Chang, 2008).

PIA is the main entry point for travelers and tourists to Penang. The airport experienced passenger growth from 2016 to 2017 for both domestic travelers and international passengers. Domestic arrivals saw a 6.7% growth while domestic departures recorded a 5.4% growth (Table 3.19). While domestic passengers outnumbered international travelers, the latter experienced higher increases in total number of travelers. International arrivals increased by 9.9% while the number of international departures improved by 10.9%.

### Table 3.19 Total arrivals and departures at Penang International Airport, 2016−17

| Year | Arrivals | | | Departures | | |
|---|---|---|---|---|---|---|
| | Domestic | International | Total | Domestic | International | Total |
| 2016 | 1,901,878 | 1,407,785 | 3,309,663 | 1,936,020 | 1,415,542 | 3,351,562 |
| 2017 | 2,029,596 | 1,546,741 | 3,576,337 | 2,041,292 | 1,570,220 | 3,611,351 |

*Source: Ministry of Transport and Malaysia Airport Holdings Berhad (MAHB).*

**Table 3.20 Total international arrivals and departures in Penang by country, 2016–17**

| Country | 2016 | | | 2017 | | |
|---|---|---|---|---|---|---|
| | Arrivals | Departures | Total | Arrivals | Departures | Total |
| Singapore | 608,637 | 617,980 | 1,226,617 | 660,736 | 681,188 | 1,341,924 |
| Indonesia | 411,713 | 403,716 | 815,429 | 424,665 | 422,245 | 846,910 |
| Thailand | 120,953 | 122,803 | 243,756 | 209,120 | 213,662 | 422,782 |
| Hong Kong | 145,227 | 145,664 | 290,891 | 150,340 | 148,099 | 298,439 |
| China | 50,786 | 55,139 | 105,925 | 66,103 | 68,356 | 134,459 |
| Taiwan | 29,557 | 29,101 | 58,658 | 35,590 | 34,089 | 69,679 |
| Saudi Arabia | 145 | 0 | 145 | 0 | 2,296 | 2,296 |
| Vietnam | 28,823 | 28,984 | 57,807 | 187 | 285 | 472 |
| Myanmar | 11,944 | 11,928 | 23,872 | - | - | - |
| Japan | - | 227 | 227 | - | - | - |
| **Total** | **1,407,785** | **1,415,542** | **2,823,327** | **1,546,741** | **1,570,220** | **3,116,961** |

*Source: Malaysia Airport Holdings Berhad (MAHB).*

There are 10 countries with flights available directly to and from PIA. It must be noted that Table 3.20 does not include all international tourists to Penang, as a huge percentage of travelers from countries not listed above would have transited through Kuala Lumpur International Airport. Indonesia, Thailand, Singapore, China, Hong Kong, and Taiwan were the six countries showing significant increases of passengers from 2016–17.

The majority of travelers originated from Singapore – the only country to surpass 1 million passengers as per Table 3.20 – and this was consistent for both 2016 (43.5% of total) and 2017 (43.1% of total). Indonesia follows, with that country's travelers accounting for 28.9% and 27.2% of total travelers in 2016 and 2017, respectively. Most of Indonesia's travelers (78.6%) originated from Kuala Namu International Airport in Medan, and their main purpose of travel was for medical purposes. Thailand came in third for 2016, but was overtaken by Hong Kong in 2017.

Swettenham Pier, established in 1904, also represents one of the major entry points for tourists into Penang. In 2017, there was a drop in total number of vessels calling at the pier, but there was also a significant increase of 24.8% in total number of passengers (Table 3.21). The number of international cruises and transit international cruises, as well as their number of passengers, both increased significantly over 2016. Cruise to nowhere ships saw a decrease of 199 vessels, yet there was a surprising increase of passengers.

**Table 3.21 Number of vessels and passengers at Swettenham Pier, 2016–17**

| Type of vessel | 2016 | | 2017 | |
|---|---|---|---|---|
| | Number of vessels | Number of passengers | Number of vessels | Number of passengers |
| Cruise to nowhere | 1,170 | 589,859 | 971 | 598,328 |
| International cruise | 8 | 18,664 | 69 | 69,277 |
| Transit international cruise | 136 | 213,581 | 202 | 358,529 |
| Total | 1,314 | 822,104 | 1,242 | 1,026,134 |

*Source: Penang Port Commission and Penang Global Tourism.*

**Table 3.22 Number of hotels by district and rating, Penang, 2016**

| District | Hotels | | | | | |
|----------|--------|--------|--------|--------|--------|--------|
|          | 1-star | 2-star | 3-star | 4-star | 5-star | Total  |
| Timur Laut | 12 | 37 | 42 | 42 | 12 | 145 |
| Barat Daya | 1 | 5 | 4 | 4 | 2 | 16 |
| Seberang Perai Tengah | - | 3 | 5 | 2 | 1 | 11 |
| Seberang Perai Utara | - | 3 | - | - | - | 3 |
| Seberang Perai Selatan | - | 2 | - | - | - | 2 |
| **Total** | **13** | **50** | **51** | **48** | **15** | **177** |

*Source: Penang Geographical Information System (PEGIS).*

There are numerous options for accommodation for travelers to Penang, with hotels being one the key choices. Most hotels in Penang ranged from a two-star rating to a four-star rating, with 15 hotels achieving the top rating of five stars (Table 3.22). The hotels are densely concentrated on the island, which houses 90.1% of Penang's hotels. Of these hotels, 81.9% are situated in Timur Laut, the key administrative district and the centre of the island. Timur Laut is also home to the George Town World Heritage Site and other popular tourist attractions such as Gurney Drive, Bukit Bendera, the Botanical Gardens, and Kek Lok Si temple. Timur Laut would be especially preferable to free and independent (FIT) travelers due to the district's accessibility.

The other side of the island, Barat Daya, hosts 16 hotels. In contrast, 9.0% of Penang's hotels are found in Seberang Perai, with the majority found in Seberang Perai Tengah. There are only five two-star hotels in Seberang Perai Utara and Seberang Perai Selatan. It is clear that development in the tourism sector has been prioritised for the island. Nevertheless, the state government has been giving more attention to Seberang Perai in developing certain sub-sectors of tourism, such as eco-tourism.

Beside hotels, budget hotels and guest houses are other popular options for tourist accommodations (Table 3.23). Timur Laut again has the majority of guest houses, budget hotels, motels, and hostels because of the district's accessibility to renowned tourist attractions. However, 42% of Penang's budget hotels are found in Seberang Perai, with 36.9% situated in Seberang Perai Tengah and Seberang Perai Utara. Seberang Perai also hosts a bigger percentage of homestays (72.3%). In contrast, there are no homestays officially recorded in Timur Laut.

**Table 3.23 Number of other tourist accommodations by district and type, Penang, 2016**

| District | Motel | Guest house | Hostel | Serviced apartment | Budget hotel | Homestay |
|----------|-------|-------------|--------|--------------------|--------------|----------|
| Timur Laut | 4 | 46 | 5 | 1 | 100 | - |
| Barat Daya | - | 5 | - | 1 | 5 | 3 |
| Seberang Perai Tengah | - | 4 | - | - | 34 | 2 |
| Seberang Perai Utara | 2 | 1 | - | - | 31 | 2 |
| Seberang Perai Selatan | 3 | 1 | - | - | 6 | 4 |
| **Total** | **9** | **57** | **5** | **2** | **176** | **11** |

*Source: Penang Geographical Information System (PEGIS) and Ministry of Tourism and Culture, Penang.*

Figure 3.21 Average hotel occupancy rate for Penang, 2016–17
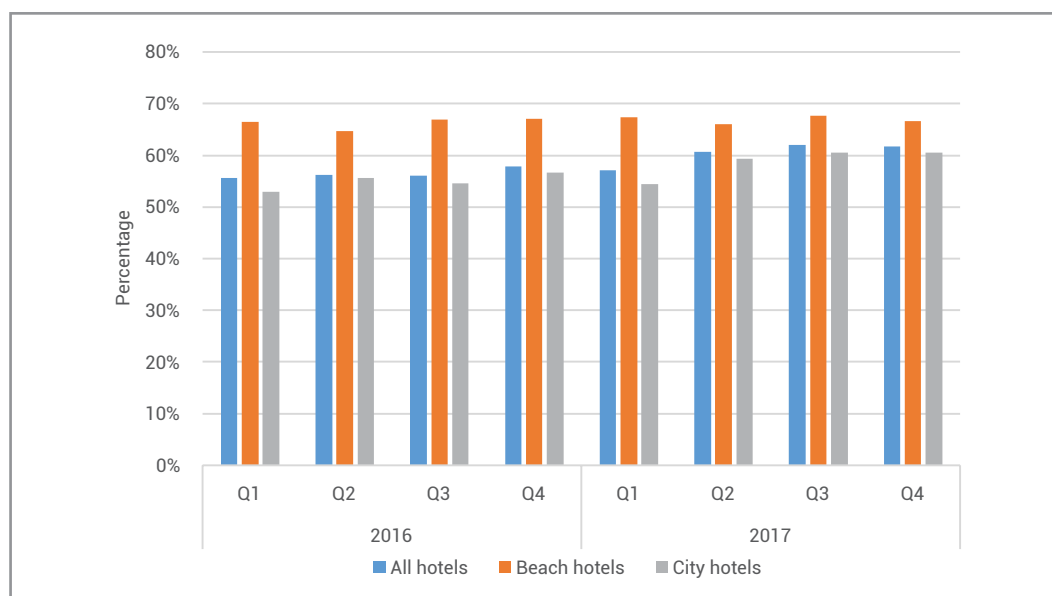


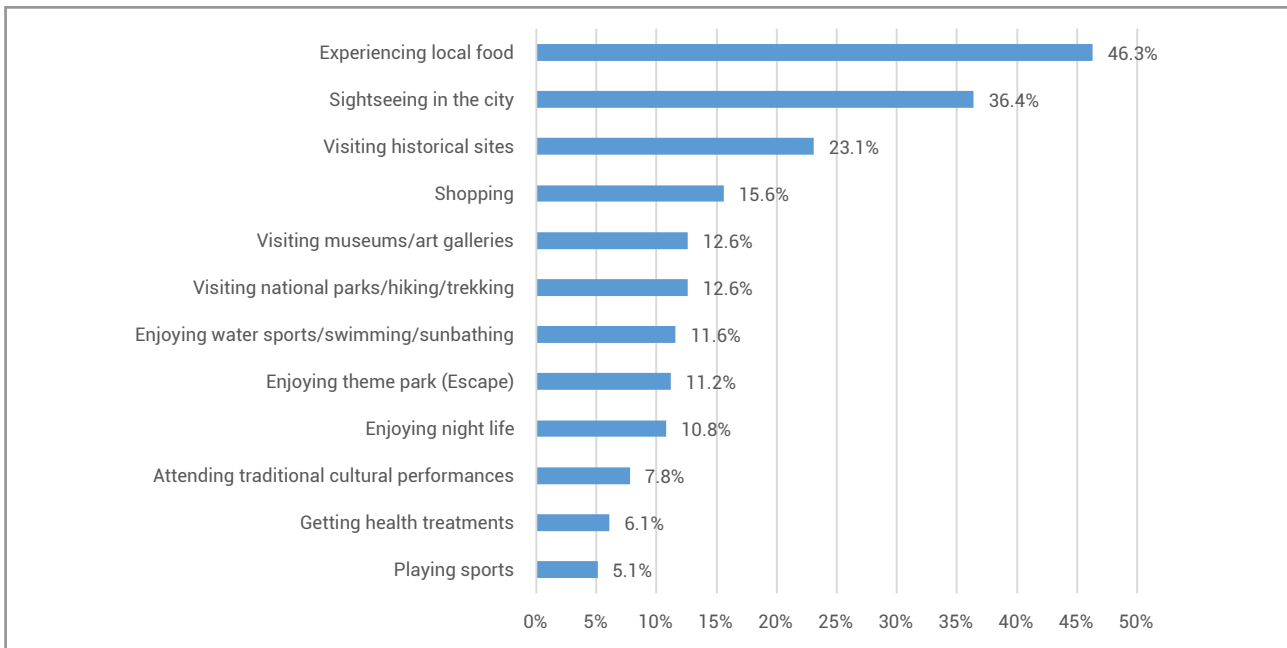*Source: Malaysian Association of Hotels, Penang Chapter.*

Compared to 2016, 2017 had higher occupancy rates for all hotels across all quarters, with the largest discrepancy of 5.9% in Q3 (Figure 3.21). Occupancy rates in 2017 showed an increasing trend from Q1 to Q3, but then decreased in Q4. Concurrently, Q3 2017 recorded the highest occupancy rate for the year. In contrast, there was a decline in occupancy rates from Q2 to Q3 2016, with the highest occupancy rate achieved in Q4.

As Figure 3.21 shows, occupancy rates for beach hotels fluctuated between 66% and 67.7% across all quarters for 2017. However, 2016 saw occupancy rates decreasing by 1.9% in the first half, before steadily increasing again. There were also higher occupancy rates in general in 2017 compared to 2016, with the fourth quarter being the only quarter where 2016 performed better. The difference in beach hotel occupancy rates was smaller compared to the overall rate.

For 2016, the city hotels' occupancy rates fluctuated across all four quarters, increasing from Q1 to Q2, then decreasing, before increasing to 56.7% to record the best-performing quarter for the year. Nevertheless, 2017 outperformed 2016 in every quarter, as per average occupancy rates of all hotels. Similar to the overall occupancy rates, the largest difference was found in Q3, at 5.9%. There was an increasing trend in 2017 from Q1 to Q3, with the rates for Q4 identical to Q3. Overall, beach hotels registered a higher occupancy rate compared to city hotels, with occupancy rates reaching 60% and above for both years.

Figure 3.22 Activities by selected tourists in Penang, 2016



| Activity | Percentage |
|---|---|
| Experiencing local food | 46.3% |
| Sightseeing in the city | 36.4% |
| Visiting historical sites | 23.1% |
| Shopping | 15.6% |
| Visiting museums/art galleries | 12.6% |
| Visiting national parks/hiking/trekking | 12.6% |
| Enjoying water sports/swimming/sunbathing | 11.6% |
| Enjoying theme park (Escape) | 11.2% |
| Enjoying night life | 10.8% |
| Attending traditional cultural performances | 7.8% |
| Getting health treatments | 6.1% |
| Playing sports | 5.1% |

*Note: The survey consisted of responses from 4,767 tourists (2,370 international tourists and 2,397 domestic tourists) aged 18 and above who spent a minimum of one night in Penang, from March to December 2016.*
*Source: Penang Tourist Survey 2016, Penang Global Tourism.*

Based on a survey conducted by Penang Global Tourism (PGT), experiencing the local culinary delights emerged as the top tourist activity in Penang, with 46.3% of respondents citing it as a top priority (Figure 3.22). Sightseeing in George Town and exploring the historical sites of Penang came in second and third, with 36.4% and 23.1% of respondents, respectively, categorising these as essential activities. Tourists also indulged in the retail sector, with 15.6% of respondents citing shopping as one of their main activities. Museums, art galleries, national parks, and the Escape theme park attracted an equal share of tourists. The study also revealed that the majority of tourists surveyed saw Penang as a World Heritage Site (36.4%), with an almost equal percentage associating the state with its food and local cuisine (34.6%).

Figure 3.23 Proportion of expenditure by selected tourists, Penang, 2016
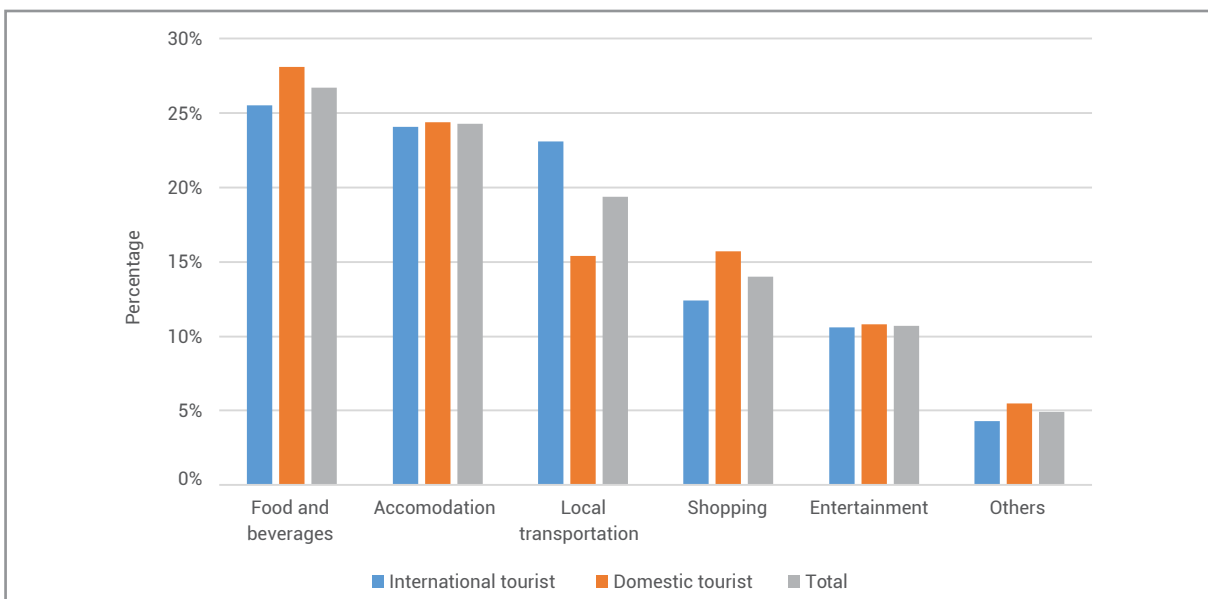


*Note: The survey consisted of responses from 4,767 tourists (2,370 international tourists and 2,397 domestic tourists) aged 18 and above who spent a minimum of one night in Penang, from March to December 2016.*
*Source: Penang Tourist Survey 2016, Penang Global Tourism.*

The 2016 Penang Tourist Survey also captured the spending patterns of the respondents (Figure 3.23). A large proportion of spending went towards food and beverages (26.7%), followed by accommodation (24.3%). The spending pattern of international tourists and domestic tourist in these categories did not differ significantly, with domestic tourists spending marginally more on food and beverages. International tourists spent more on local transportation (23.1%), while the majority of domestic tourists[19] travelled to Penang with their own personal vehicles. However, domestic tourists spent more on shopping, as shopping accounted for 15.7% of their total expenditure, compared to the 12.4% for international tourists.

*Heritage tourism*

With the inauguration of George Town as a World Heritage City by UNESCO in 2008, heritage tourism has emerged as one of the sub-sectors of Penang's tourism that has generated substantial economic impact for the state. Heritage tourism is defined by the World Tourism Organisation as the motivation for individuals to travel in a bid to experience different cultures and heritage that could be experienced through festivals or other cultural events.

Long before George Town is recognised as a historical site, Penang has placed importance in heritage conservation since the early 1970s (Lim and Pan, 2017). Penang Heritage Trust was established in 1986, with a key focus on preserving the heritage of Penang. After George Town's inscription, George Town World Heritage Incorporated (GTWHI) was formed to support local governments and local communities in conserving the tangible and intangible heritages of the site.

As shown by Figure 3.22, experiencing the culture, history, and heritage of George Town and Penang are among the main activities enjoyed by tourists to Penang. Penang Heritage Trust organises educational and cultural walks for tourists, bringing them through various historical sites such as the Clan Jetties, Fort Cornwallis, and Little India, with the aid of experienced guides.

As heritage tourism flourishes, local businesses stand to benefit economically from the increased consumption of their products and services. The state's labour force is also positively affected, as more employment is generated in terms of tour

guides, service providers, and others. The spending by heritage tourists on accommodation, food and retail – as with all other tourists – contributes greatly to the state's tourism revenue.

Heritage tourism is able to play an important role in preserving and shaping community identities. In developing heritage tourism in a particular area for the purpose of satisfying tourists' demands, awareness, understanding, and appreciation of existing cultural identities in local communities could be further reinforced and defined (Cela et al., 2015). However, one must be mindful that commercialisation does not override the communities' existing culture and heritage. The gentrification of George Town has been a great concern to heritage conservationists, as with the commercialisation of the Clan Jetties. The state government, local communities, and other stakeholders need to play their respective parts in striking the correct balance between preserving heritage and developing heritage tourism.

*Ecotourism*

Defined by the International Ecotourism Society as a form of "responsible travel", ecotourism prioritises touring natural, undisturbed places of nature, designed to contribute towards the protection and preservation of the environment. Ecotourism is generally carried out on a smaller scale compared to other forms of tourism. This allows it to have minimal impact on the environment and surrounding activities. This form of tourism also generates funds for ecological conservation, and will be able to economically empower the local indigenous communities within the natural reserves (Pociovalisteanu and Niculescu, 2010). With flora, fauna, environment sustainability, and local culture being the focal points of ecotourism, eco-tourists will also be able to gain a deeper appreciation for nature.

The 2016 Penang Tourist Survey found that 11.6% of the tourists surveyed ranked visiting national parks, hiking, and trekking as their main priority in Penang. Penang is home to centuries-old natural rainforests, and which are part of the forested land in Penang classified as Permanent Reserved Forests (PRFs). PRFs also covers peat swamps and mangroves. The management of PRFs requires the application of sustainable forest conservation and principles. Penang's PRFs has enabled the state to become a main destination for eco-tourists.

[19]  The 2016 Penang Tourist Survey found that 57.7% of domestic tourists surveyed travelled to Penang via their own personal vehicles.

The island hosts a number of beautiful nature spots such as Penang National Park, Penang Hill, and the Botanical Gardens. Oher attractions such as The Habitat at Penang Hill, Entopia, and ESCAPE are designed with the preservation of nature as a focal point of their development. On the mainland, bird watching as an ecotourism activity has been promoted in Teluk Air Tawar-Kuala Muda, which houses tens of thousands of water birds comprising more than 200 species of birds.

Penang's mangrove forests is also a focal point of ecotourism. The protection of the mangroves is beneficial for the local communities that rely on fishery in the mangroves as a source of livelihood. The vibrancy of the mangroves and its communities, in turn, highlights their potential as an ecotourism destination. Additionally, mangrove forests have been recognised as a viable tool in coastal defense strategies, where they play a role in reducing wind and swell waves. This then helps to limit flooding and damage to the coastal infrastructure during heavy storms (McIvor et al., 2012).

Ecotourism brings in economic opportunities such as nature guides, boatmen, homestay operators, and food and beverage operators. These are avenues that could provide employment and income for the local communities. However, as is the case with heritage tourism, a careful balance between economic benefits and preservation of nature must be struck. The development of ecotourism should prioritise long-term sustainability over short-term economic profits that lead to negative impacts on the natural environment.

### Cruise tourism

Cruise tourism is a form of travelling which involves a holiday on a cruise ship, with planned itineraries and activities on the cruise ship itself. Passengers often get explore the ports and cities where the cruise ship calls.

Cruise tourism has always been integral to Penang's tourism industry, and this sub-sector has been experiencing significant growth. As Table 3.21 shows, there has been a substantial increase of 88.2% in the number of international and transit international cruise ships that had docked at Swettenham Pier from 2016 to 2017. The number of passengers also saw an impressive increase of 84.2%. In fact, in 2017 Swettenham Pier dethroned Port Klang as the port that received the most cruise

ships in Malaysia (Lee, 2017).

Swettenham Pier has the advantage of a very strategic location. The pier is located within the UNESCO Heritage Zone and is close to George Town, with popular tourist areas such as Armenian Street, Beach Street, and the Clan Jetties within distance. With cruise liners usually docking at Swettenham Pier for an average of eight to 12 hours, this gives passengers ample time to enjoy what Penang has to offer. The spillover effects of cruise tourism lead to new opportunities for business and employment.

However, there are considerations of sustainability for cruise tourism. First and foremost, the cruise liners generate waste – wastewater (from toilets, sinks, and showers) and solid waste that pollute coastal areas and damage the marine ecosystem (Brida and Zapata, 2010). Likewise, as with ecotourism and heritage tourism, the recent boom of cruise tourism also has significant impact on local communities and their culture, where they face the danger of over-commercialisation. Sustainable cruise tourism can be achieved by establishing policies to protect the community and the environment.

### Medical tourism

Private hospitals in Penang were already involved in treating foreign patients before the term "medical tourism" was coined. Hospital Lam Wah Ee, Penang Adventist Hospital, Loh Guan Lye Specialists Centre, and Mount Miriam Cancer Hospital were established more than 40 years ago.

Penang Centre of Medical Tourism (PMED) and Malaysia Healthcare Travel Council (MHTC) are two medical tourism-related coordinating bodies at the state and national level, respectively. They collect market intelligence, and assist and facilitate marketing efforts to promote their members' services. Table 3.24 shows the Penang medical institutions that are affiliated with these two organisations. Most medical tourism-promoting institutions are located in Timur Laut, concentrated near the Pulau Tikus-Gurney township area.

In 2015, healthcare travellers[20] contributed 31.6% (RM407.2 million) of gross revenue from private hospitals in Penang, or 0.53% equivalent to Penang state GDP. This shows the significant contribution of medical tourism to the Penang economy, especially to the private healthcare sector.

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[20] "Healthcare travellers" is a catch-all term comprising health tourists, foreign works/expatriates (residents), and general tourists who fell sick during their vacation.

### Table 3.24 Medical institutions in Penang which are promoting medical tourism (as of August 2018)
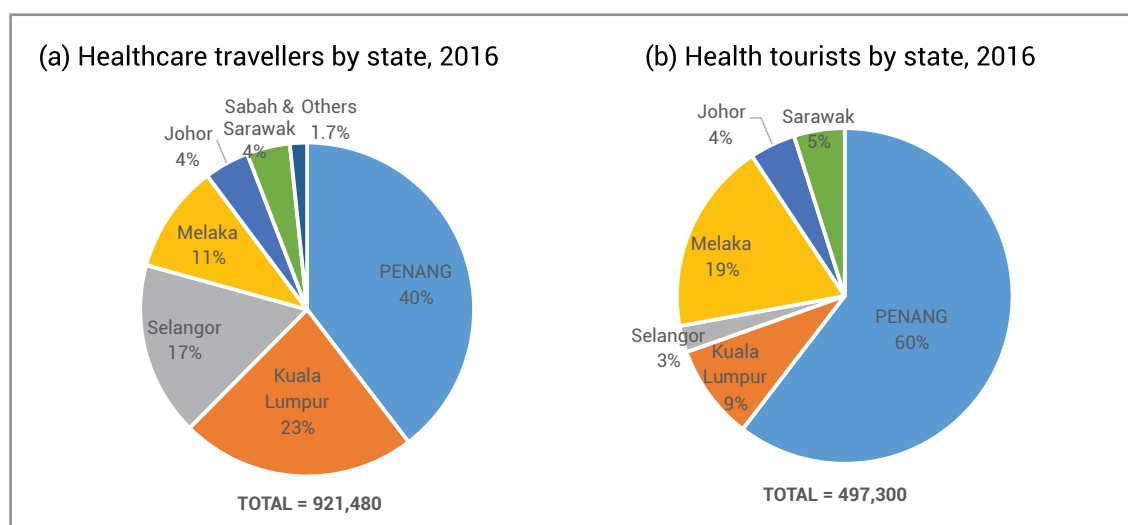
| Penang Centre of Medical Tourism (PMED) | Malaysia Healthcare Travel Council (MHTC) |
|---|---|
| **Members**<br>Bagan Specialist Centre<br>Genesis IVF & Women's Specialist Centre<br>Gleneagles Penang<br>Island Hospital<br>KPJ Penang Specialist Hospital<br>Lam Wah Ee Hospital<br>Loh Guan Lye Specialists Centre<br>Mount Miriam Cancer Hospital<br>Optimax Eye Specialist Hospital<br>Pantai Hospital Penang<br>Penang Adventist Hospital<br><br>**Associate members**<br>Spinecare Chiropractic<br>PS Healthcare PLT<br>Clinic Hypnotheraphy Practitioners<br>Klinik Pergigian A. Marina | **Elite members**<br>Gleneagles Penang<br>Island Hospital<br>Loh Guan Lye Specialists Centre<br>Penang Adventist Hospital<br><br>**Ordinary members**<br>Genesis IVF & Women's Specialist Centre<br>KPJ Penang Specialist Hospital<br>Pantai Hospital Penang<br>TMC Fertility & Women's Specialist Centre (Penang) |

*Source: Penang Centre of Medical Tourism and Malaysia Healthcare Travel Council.*

Out of 921,480 healthcare travellers who utilised Malaysia's private healthcare services in 2016, Penang accounted for 40% (Figure 3.24a), comparable to the Klang Valley (23%+17%), the Greater Kuala Lumpur region which includes most of the populated urban areas in Selangor.

However, if we only consider health tourists with the sole intention of travelling to seek healthcare treatment, Penang dominated with about 60% of all health tourists (300,400 visitors) in Malaysia in 2016 (Figure 3.24b). The number of health tourists in Penang was about five times those who visited the Klang Valley. Health tourists also comprised 10.3% of all foreign visitors[21] to Penang in 2016.

### Figure 3.24 Preferred medical tourism destination in Malaysia, 2016



(a) Healthcare travellers by state, 2016 — PENANG 40%, Kuala Lumpur 23%, Selangor 17%, Melaka 11%, Johor 4%, Sarawak 4%, Sabah & Others 1.7%. TOTAL = 921,480

(b) Health tourists by state, 2016 — PENANG 60%, Melaka 19%, Kuala Lumpur 9%, Sarawak 5%, Johor 4%, Selangor 3%. TOTAL = 497,300
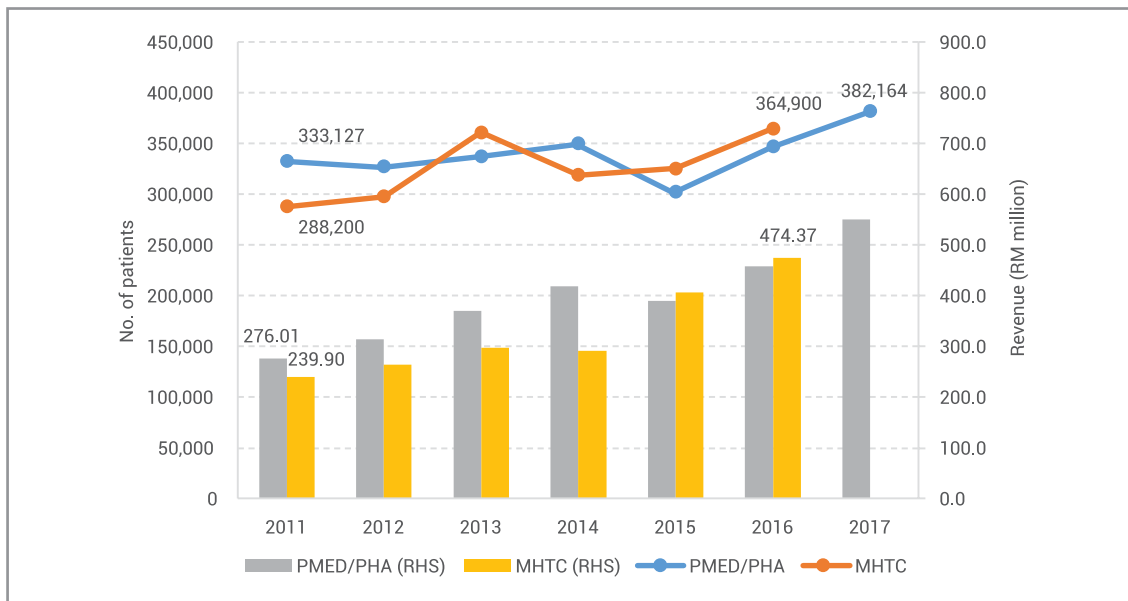
*Source: Malaysia Healthcare Travel Council.*

[21]  2.91 million foreign visitors arrived in Penang in 2016. *Source: Hotel Guests statistics, Tourism Malaysia*

PMED and MHTC reported a moderate increase in the number of healthcare travellers in Penang, from 4.2% to 26.6% over six years (2011–16), as well as a substantial surge in patient revenue from 66.0% to 97.7% (Figure 3.25). In terms of percentage share among healthcare travellers to Penang, health tourists increased their contribution from 75.9% in 2011 to 82.3% in 2016 (Figure 3.26). The growth of health tourists to Penang is equivalent to 16,360 patients per year (compound annual growth rate of 6.56%) during this period.

Among Penang's health tourists in 2015, 97% came from Indonesia. The proportion of Indonesian health tourists did not change much from 2011, at 95%. This highlights the major nationality base of health tourists in Penang (and in Malaysia, since Penang took the lion's share of 60%). There were 251,100 Indonesian health tourists flocking to Penang in 2015.

**Figure 3.25 Number of healthcare travellers and revenue generated for the medical tourism sector in Penang**



Note: Discrepancy in reported numbers by PMED and MHTC is due to inclusion of different number of medical institutions.
Source: Penang Centre of Medical Tourism and Malaysia Healthcare Travel Council.

**Figure 3.26 Number and proportion of health tourists among healthcare travellers in Penang**
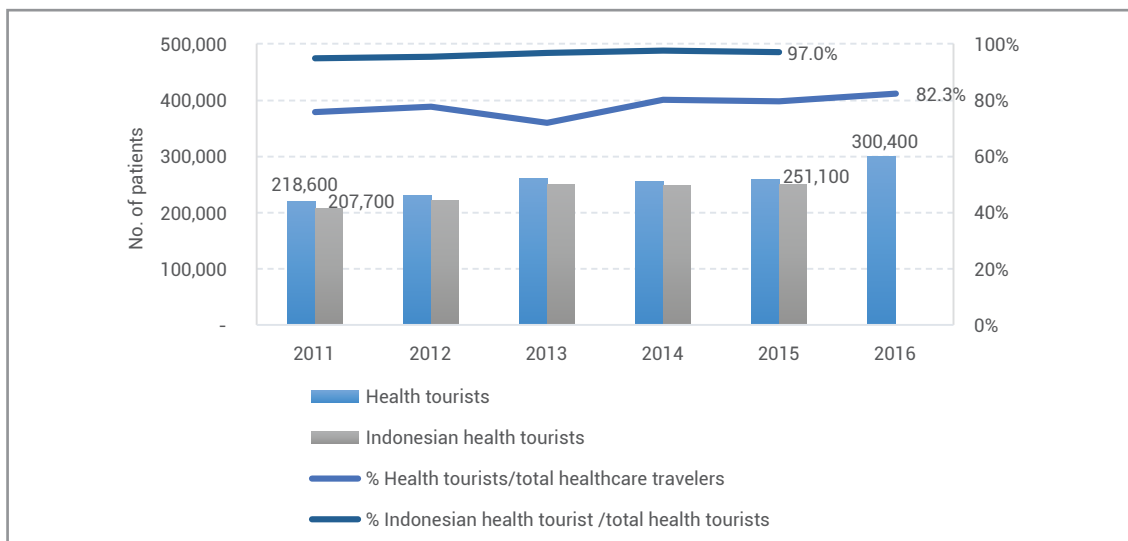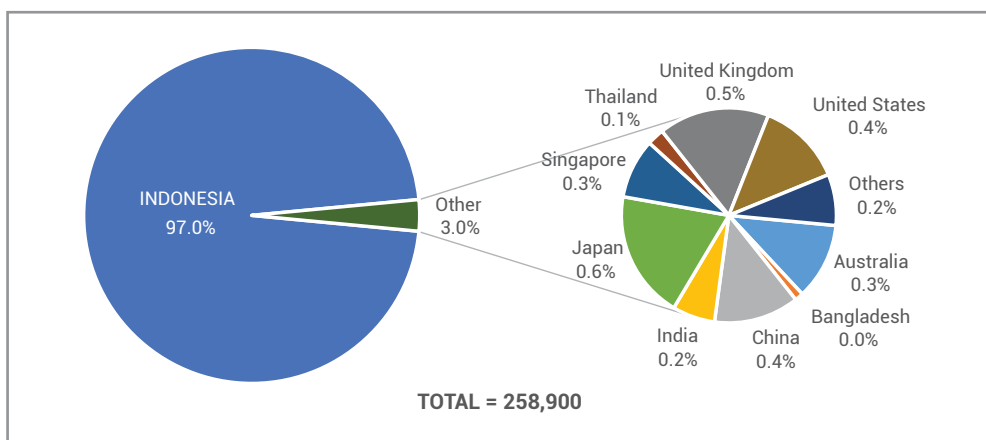


Source: Malaysia Healthcare Travel Council and authors' calculation.

Besides Indonesians, health tourists from other nationalities only accounted for 3% of the total in 2015. The largest of these were the Japanese (1,500 or 0.6%), followed by the British (1,300 or 0.5%), Americans, and Chinese (both at 1,000 or 0.4%) (Figure 3.27). However, in terms of revenue per patient, Indonesian and Australian health tourist paid an average of RM1,360 and RM1,330 per person, respectively, in 2015, followed by Singaporeans (RM1,140 per person).
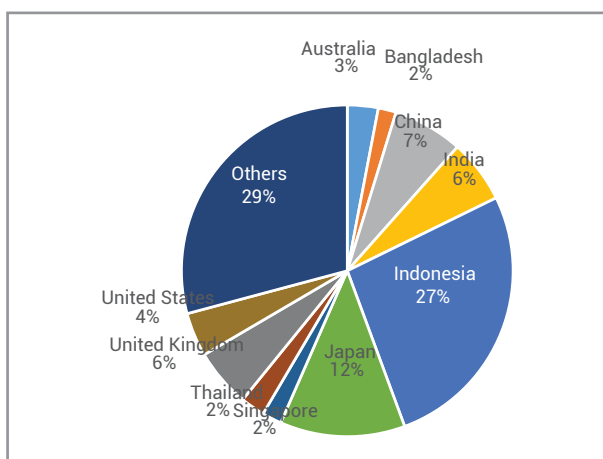
Among foreign nationalities[22] residing in Malaysia, Indonesians were still the largest group to use private healthcare services in Penang, but only account for 27% of the total of 16,800 individuals in 2015 (Figure 3.28). This number is about 15 times smaller than the size of health tourists who came directly from their home country. The Japanese were second at 12% or 7,700. The Japanese – and other nationalities – instead had more foreign residents than health tourists using Penang's private healthcare facilities in Penang.

## Figure 3.27 Health tourists in Penang by nationality, 2015



*Source: Malaysia Healthcare Travel Council and authors' calculation.*

## Figure 3.28 Foreign resident patients in Penang, 2015



*Source: Malaysia Healthcare Travel Council and author's calculation.*

[22] Healthcare travellers also include residents from foreign nationalities. A sizeable population of foreign workers, expatriates, students are residing in Penang and Malaysia. They, too, were using the private healthcare facilities while they were here in the country.

### Education tourism

Education tourism has been determined as a growing sub-sector of tourism for Penang. The concept of education tourism can be classified as "education first" or "tourism first", as defined by Ritchie (2003, cited in McGladerry and Lube, 2017). For example, the primary purpose of a secondary school field trip to another country may be education, but students will inevitably partake in tourist-related activities.

Education tourism in Penang is more connected to the private higher education sector. The state government had established Penang Centre of Education Tourism (PCET) to promote Penang as an education destination for prospective international students, by increasing awareness and recognition of the state's education industry, both regionally and internationally.

PCET currently has 14 members – among them, KDU University College and Penang Medical College – and five associate members, and PCET serves to strengthen the credibility of these colleges. In conjunction with the colleges themselves, PCET promotes education in Penang by partaking in education fairs in other countries.

According to PCET, popular courses chosen by international students include, but are not limited to, hospitality, tourism, business and administration, marketing, and accounting. In addition to the usual standards of full degrees, diplomas and graduate diplomas, the colleges are also able to customise short-term courses for student exchange programmes. These exchange courses combine education and travel, giving students the opportunity to travel and experience the Penang's culture, in addition to receiving an education.

Indonesian students account for a significant proportion of the market – a spillover effect of medical tourism. As education tourism in Penang is semi-dependent on word of mouth, it is surmised that medical tourists, who are attracted to the environment and livability of the state, opted for or recommended Penang as a tertiary education prospect for their family and friends. The countries of origin of other international students in Penang include Thailand, Myanmar, China, India, and South Korea.

Education tourism creates an economic impact for Penang through the education investment made by international students. Furthermore, in a bid to remain competitive in the education market, private higher education institutes in Penang will focus on improving the courses offered and the quality of the education provided. Higher-quality education will produce more high-skilled graduates, creating a workforce with more qualified workers.

### MICE (meetings, incentives, conferences, and exhibitions) tourism

With the globalisation of business and international trade, business and event tourism, or MICE (meetings, incentives, conferences and exhibitions) tourism, as it is more popularly known, is a rapidly expanding sub-sector of tourism that can generate substantial returns to the economy. MICE tourism involves the travel of individuals and/or a delegation to participate in meetings, congresses, exhibitions, and conferences in an official or professional capacity. The growth of MICE tourism enables the growth of the hospitality sector, as well as transportation and other auxiliary services of the host destination (Getz and Page, 2015).

Rich in culture and heritage and renowned for its food, Penang is a highly attractive destination for MICE travellers. The Setia SPICE Convention Centre in Bayan Lepas is fully equipped to host international events with thousands of participants. Furthermore, Penang has many five-star hotels capable of handling large-scale international conferences, in addition to providing world-class accommodation for MICE tourists. The Penang Convention and Exhibition Bureau (PCEB), an agency established by the state government to promote MICE tourism, stated that MICE has become a significant contributor to Penang's tourism revenue, registering an estimated economic impact (EEI) of more than a billion ringgit in 2017.

**Figure 3.29 Percentage of events and EEI by type of event, Penang, 2016 and 2017**
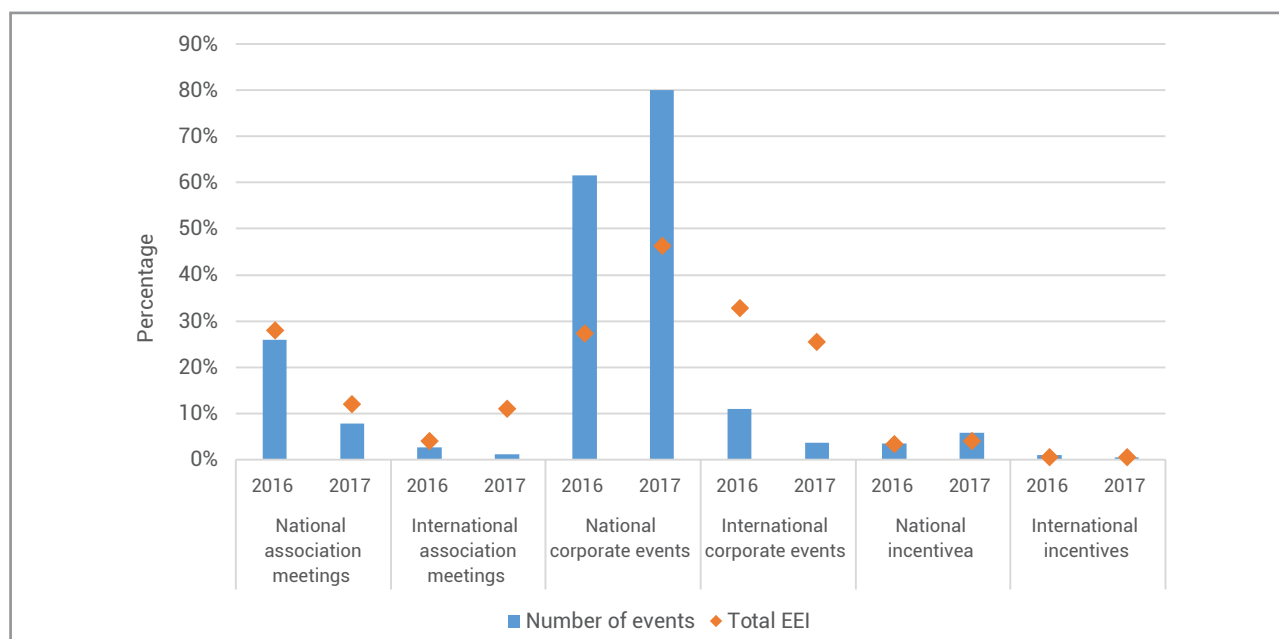


Source: Penang Convention and Exhibition Bureau Annual Report for 2016 and 2017.

From hosting 1,251 events in 2016 to 2,511 events in 2017, the total number of events held in Penang had recorded an increase of more than 100% over the two-year period, while the EEI had a growth of 24% (Figure 3.29). National events increased by 119.6%, while international events had a decline of 11.7%. However, despite the decrease in events, the total EEI of international events increased by 12.5%. The EEI of national events increased by 32.0%.

National corporate events held the biggest share in number of events for both years, seeing a growth of 18.5%, and contributed the biggest percentage of EEI (46.3%) for 2017. However, the number of national association meetings and the corresponding EEI both saw a drop of 18.1% and 15.8%, respectively.

Despite the small percentage share for number of events, international association meetings, and international corporate events, their contribution towards overall EEI was quite high. For instance, the percentage of events for international association meetings decreased by 1.5% in 2017, but the generated EEI increased by 5.9%. The same trend can be observed for international corporate events for both years – the EEI generated was high comparative to the percentage of events. International incentives were the smallest contributor towards number of events and EEI for both years.

Table 3.25 Percentage of events and EEI by type of event and sector, Penang, 2017

| Sector | National | | International | |
|---|---|---|---|---|
| | Events % | EEI % (RM mil) | Events % | EEI % (RM mil) |
| Government | 8.2% | 7.2% | 0.0% | 0.0% |
| Industry | 12.8% | 7.4% | 1.8% | 0.9% |
| Economics | 6.4% | 4.7% | 0.3% | 1.2% |
| Commerce | 4.0% | 3.4% | 0.4% | 26.4% |
| Corporate | 24.6% | 8.7% | 1.0% | 3.5% |
| Management | 8.5% | 5.5% | 0.4% | 0.4% |
| Education | 6.6% | 5.4% | 0.0% | 0.0% |
| Culture and ideas | 0.4% | 1.3% | 0.2% | 2.5% |
| Science | 0.0% | 0.0% | 0.1% | 0.1% |
| Technology | 3.6% | 4.1% | 0.2% | 0.2% |
| Medical sciences | 3.7% | 2.9% | 0.3% | 0.7% |
| Social sciences | 0.3% | 0.3% | 0.0% | 0.0% |
| Mathematics and statistics | 0.2% | 1.2% | 0.0% | 0.0% |
| Transport and communications | 1.1% | 0.5% | 0.2% | 0.0% |
| Sports and leisure | 1.0% | 0.5% | 0.3% | 0.1% |
| General | 4.3% | 2.3% | 0.2% | 0.3% |
| Others | 7.7% | 6.9% | 1.0% | 1.3% |
| **Total** | **93.6%** | **62.3%** | **6.4%** | **37.7%** |

*Source: Penang Convention and Exhibition Bureau Annual Report for 2017.*

Breaking down the number of events held and EEI by sector in 2017, it is found that national corporate events sustained the biggest percentage in number of events (24.6%), while international events in the commerce sector, despite accounting for a 0.4% share, contributed the highest percentage of EEI (26.4%) (Table 3.25). National industry events came in second in percentage of events held. National events in government, industry, and corporate sectors were among the top generators of EEI, ranging from 7.2% to 8.7%, respectively. National events accounted for 93.6% of total events, producing an EEI of 62.3%. However, 37.7% of overall EEI was contributed by international events, despite the small percentage of events held.

Table 3.26 Percentage of events and EEI by type of event and country, Penang, 2017

| Country of origin | Association | | Corporate events | | Incentives | |
|---|---|---|---|---|---|---|
| | % Events | % EEI (RM mil) | % Events | % EEI (RM mil) | % Events | % EEI (RM mil) |
| Southeast Asia | 6.9% | 7.9% | 34.0% | 4.0% | 6.9% | 0.2% |
| Asia Pacific | 3.8% | 13.9% | 9.4% | 61.1% | 10.7% | 2.8% |
| Middle East | 0.6% | 0.0% | 1.3% | 0.1% | 4.4% | 0.1% |
| United Kingdom | 0.0% | 0.0% | 2.5% | 0.4% | 2.5% | 0.3% |
| Europe | 1.3% | 0.4% | 2.5% | 0.3% | 0.6% | 0.1% |
| United States | 1.3% | 2.6% | 2.5% | 0.1% | 0.6% | 0.1% |
| Australia | 0.0% | 0.0% | 3.8% | 0.6% | 0.0% | 0.0% |
| Others | 3.1% | 4.0% | 1.9% | 1.2% | 0.0% | 0.0% |
| **Total** | **17.0%** | **28.9%** | **57.9%** | **67.7%** | **25.2%** | **3.4%** |

*Source: Penang Convention and Exhibition Bureau Annual Report for 2017.*

For international events, as organisers for 44.8% of all international events, Southeast Asian countries were the biggest event contributors in terms of volume, with Singapore hosting 92.8% of events. In terms of EEI (Table 3.26), however, Asia Pacific was by far the biggest contributor, accounting for 77.8% of total EEI. The biggest share was claimed by India, which generated an EEI of RM190 million by holding a five-day conference with more than 18,000 participants, while China held the second-largest share at 33.6% (RM97.4 million).

The economic impact from MICE tourism in Penang is significant. business travellers spend substantially more than free and independent travellers. The rise of MICE tourism also helps the growth of SMEs involved in hospitality, catering, logistics, printing and designing, and others, where employment and income opportunities will increase. With international events, there are also returns of investment in the form of knowledge procurement and innovation enhancement through exposure to global best practices. These benefits will impact the economy in ways that stretches beyond tourism revenue from direct spending.

*Prospects*

The tourism sector in Penang is predicted to sustain its continual growth, generating substantial economic revenue for the state. Penang's growing reputation as a tourist destination will continue to attract tourists to experience all that Penang has to offer.

Heritage and cultural tourism will benefit from the ongoing restoration of George Town and the development of boutique hotels. In addition, it is envisaged that the annual George Town Festival and George Town Literary Festival will continue to bring in delegates and participants that will contribute to the revenue of heritage tourism.

The focus of the state government in developing certain areas in Seberang Perai as destinations for eco-tourists will significantly boost ecotourism. The Air Itam Dalam Educational Forest, Pulau Burung, mangrove forests of Kuala Bekah, and Teluk Air Tawar-Kuala Muda are among the sites targeted to be developed and promoted as destinations for bird watchers. Seberang Perai has the potential to become the main eco-tourism hub for Penang, and should be developed as such.

The prospects for growth in cruise tourism is extremely positive. Swettenham Pier has been primed for further development, with Royal Caribbean Cruises partnering with Penang Port Commission in a 40/60 joint venture to upgrade and improve the cruise terminals at the pier. The project will see major extensions of the existing berths to accommodate the docking of larger international cruise ships, resulting in more cruise tourists at the shores of Penang.

Given Penang's competitiveness in the region, the steady growth in medical travellers and revenue generated in medical tourism is expected to continue. The opening of an oncology centre in Adventist Hospital, extensive upgrades undertaken by Gleneagles Medical Centre, and planned extensions to Island Hospital will improve Penang's private healthcare services. Indonesian health tourists will continue to be the biggest contributor to this sub-sector.

Penang is highly competitive as an education hub, with reputable and respected private higher education institutions offering quality learning opportunities. Although tuition costs are competitive to private higher education institutions in Kuala Lumpur, the cost of living in Penang is relatively lower. Moreover, Penang hosts a large number of MNCs that are able to provide internships, as well as offering opportunities for future employment. The prospects for growth in education tourism are considerably bright.

MICE tourism has made significant contributions to Penang's tourism revenue. Penang continues to attract international events such as the World Seafood Congress, which Penang won the bid to host in 2019, and is expected to lift Penang's status as a MICE destination. It was found that the share of revenue generated by international events was substantial in comparison to the much smaller number of events. There should be more focus in promoting Penang as a destination for international organisations to hold their meetings and conferences, as international events are proven to be a huge generator of income. With the expected completion of Penang Waterfront Convention Centre (PWCC) in 2021, MICE tourism is anticipated to experience exponential growth in the coming years.

There are other sub-sectors in Penang's tourism sector with the potential to grow. For instance, sports tourism, where tourists travel to participate in sports-related activities, has been gaining ground in Penang. The state hosted the first Asia-Pacific Masters Games (APMG) in September 2018, where participants took part in sporting events at various venues in Penang, including the Setia SPICE Convention Centre.

Wedding tourism represents another sub-sector that has been gaining traction. According to PGT, couples have travelled from Singapore, Hong Kong, China, and Australia to stage wedding photoshoots at various sites in Penang, mostly in the UNESCO World Heritage Site or the beaches of Batu Feringghi. PGT has formed a committee to promote Penang as a destination for weddings and wedding photography to cultivate this sub-sector for further development.

Overall, the prospects for growth for Penang's tourism is highly positive as individual tourism subsectors are expected to continue expanding significantly in terms of number of travellers involved as well as revenue generated.

## 3.2.6 Education

Education has long been identified and recognised as one of the fundamental factors of economic development, and as a determinant for long-term economic growth. The government's investment in education, from pre-school education to tertiary education – including skills and vocational training – is equitable to human capital investment. As the foundation of human capital development, education is vital to improving labour productivity and cultivating the technical and intellectual capabilities of the work force. In addition to securing economic progress, education also plays an important role in ensuring social progress, as it is a key to improving income inequality.

Primary and secondary schools in Penang has been categorised into several types, as seen in Table 3.27. As it is the most populated district in the state, Timur Laut hosts the largest number of schools, accounting for 29.6% of all schools in Penang. The majority of Chinese national-type primary schools are stationed here as well, with the district's Chinese 37 schools accounting for 41.1% of all primary schools of the said type.

**Table 3.27 Number of schools by district and type, Penang, 2017**

| Type | Timur Laut | Barat Daya | Seberang Perai Utara | Seberang Perai Tengah | Seberang Perai Selatan | Total |
|---|---|---|---|---|---|---|
| **Primary** | | | | | | |
| National schools | 30 | 23 | 43 | 32 | 21 | 149 |
| Chinese national-type | 37 | 14 | 16 | 16 | 7 | 90 |
| Tamil national-type | 5 | 2 | 4 | 6 | 11 | 28 |
| Special education | 2 | 0 | 0 | 1 | 0 | 3 |
| Government-assisted religious | 0 | 0 | 0 | 1 | 0 | 1 |
| Private | 2 | 1 | 1 | 0 | 0 | 4 |
| **Secondary** | | | | | | |
| National and national-type | 31 | 11 | 22 | 24 | 14 | 102 |
| Technical | 1 | 0 | 0 | 0 | 0 | 1 |
| Religious national | 2 | 0 | 1 | 0 | 1 | 4 |
| Special education | 1 | 0 | 0 | 0 | 0 | 1 |
| Religious boarding | 0 | 0 | 1 | 1 | 0 | 2 |
| Government-assisted religious | 1 | 1 | 4 | 5 | 0 | 11 |
| Vocational colleges | 1 | 1 | 1 | 1 | 1 | 5 |
| Private | 6 | 0 | 1 | 2 | 0 | 9 |
| **Other** | | | | | | |
| Special model schools | 0 | 0 | 1 | 0 | 0 | 1 |
| International schools | 5 | 3 | 0 | 0 | 1 | 9 |
| Expatriate schools | 1 | 0 | 0 | 1 | 0 | 2 |
| **Total** | **125** | **56** | **95** | **90** | **56** | **422** |

*Source: Penang State Education Department and Malaysian Educational Statistics 2017, Ministry of Education.*

Seberang Perai Utara comes in second with 22.5% of schools situated in the district, even though Seberang Perai Tengah is the more populated mainland district. Seberang Perai Utara has more primary schools – especially national primary schools – compared to Seberang Perai Tengah, but the situation is reversed for secondary schools. Government-assisted religious schools are also concentrated in these two districts, accounting for 81.8% of schools.

The districts with the fewest schools are Barat Daya and Seberang Perai Selatan. However, the biggest percentage of Tamil-type national primary schools are found in Seberang Perai Selatan. Barat Daya also accounts for 33.3% (three schools) of the state's international schools, but the majority are found in Timur Laut, with 55.6% of international schools operating in the district.

A decline can be observed for total number of enrolments for most types of primary and secondary schools in Penang. Government-assisted religious schools – for both primary and secondary – as well as vocational, international, and expatriate schools are the only schools to see constant growth in number of enrolments from 2015 to 2017. Vocational schools saw a significant increase in enrolments from 2015 to 2016; enrolments continued to increase in 2017, albeit at a much lesser rate.

In fact, national and national-type secondary school enrolments saw a decrease of 3.2% from 2016 to 2017. There were significant decreases in enrolments from the total number of primary enrolments to secondary enrolments across national-type public and religious schools. There was a decrease of 11.8% in 2016, while 2017 had an even bigger decrease of 15.1%.

This is concerning because the data suggest that there is a significant drop-out rate for students transitioning to secondary school. Some primary school students may have moved out of Penang or opted for private or international schools for secondary education, but the increase in the number of students in private schools and international schools did not come close to making up for the discrepancies. Further analysis will be needed to study the reasons for the decrease of secondary students in national and national-type schools.

## Table 3.28 Number of enrolments for primary and secondary schools by type, Penang, 2015−17

| Type of school | 2015 | 2016 | 2017 |
|---|---|---|---|
| **Primary** | | | |
| National schools | 78,557 | 78,778 | 78,523 |
| Chinese national-type | 48,285 | 47,570 | 46,187 |
| Tamil national-type | 5,528 | 5,481 | 5,264 |
| Special education | 370 | 359 | 358 |
| Government-assisted religious | 108 | 110 | 114 |
| Private | 1,290 | 916 | N/A |
| **Secondary** | | | |
| National and national-type | 104,549 | 102,703 | 99,440 |
| Technical | 599 | 561 | 552 |
| Religious national | 2,614 | 2,631 | 2,452 |
| Special education | 133 | 133 | 133 |
| Religious boarding | 1,310 | 1,282 | 1,232 |
| Government-assisted religious | 3,224 | 3,363 | 3,467 |
| Vocational college | 2,692 | 3,397 | 3,498 |
| Private | 627 | 566 | N/A |
| **Other** | | | |
| International schools | 3,408 | 4,158 | N/A |
| Expatriate schools | 248 | 267 | N/A |
| **Total** | **253,542** | **252,275** | **241,220** |

*Note: Data for 2017 have yet to be made available for private schools, international schools, and expatriate schools.*
*Source: Malaysian Education Statistics 2015−2017, Ministry of Education, and Social Statistics Bulletin 2016−2017, Department of Statistics.*

**Table 3.29 Number of intake, enrolment, and graduates for Penang-born students in public universities by field of study, 2016−17**

| Field of study | 2016 | | | 2017 | | |
|---|---|---|---|---|---|---|
| | Intake | Enrolment | Graduates | Intake | Enrolment | Graduates |
| General programmes | 10 | 30 | 27 | 2 | 2 | 0 |
| Education | 344 | 1,415 | 515 | 414 | 1,461 | 375 |
| Humanities and the arts | 587 | 1,972 | 445 | 643 | 2,075 | 387 |
| Social sciences, business, and law | 2,744 | 8,453 | 2,588 | 2,879 | 8,620 | 2,087 |
| Science, mathematics, and computing | 1,155 | 3,791 | 876 | 1,387 | 3,933 | 876 |
| Engineering, manufacturing, and construction | 1,917 | 6,638 | 1,544 | 1,932 | 6,747 | 1,424 |
| Agriculture and veterinary | 155 | 483 | 106 | 118 | 427 | 64 |
| Health and welfare | 500 | 2,077 | 417 | 517 | 2,050 | 433 |
| Services | 306 | 786 | 222 | 302 | 846 | 143 |
| **Total** | **7,718** | **25,645** | **6,740** | **8,194** | **26,161** | **5,789** |

*Source: Ministry of Higher Education, Malaysia.*

For tertiary education, there are two public universities in Penang: Universiti Sains Malaysia (USM), which is situated in Timur Laut, and Universiti Teknologi Mara (UiTM) in Seberang Perai Tengah. In addition, there are 32 private higher education institutes in the state. Other options for tertiary education include institutes of teacher education (two), community colleges (six), and polytechnic schools (three).

In examining the trend for the field of study chosen by Penang-born students in all public universities for 2016 and 2017, it is observed that social sciences, business, and law garnered the most enrolments and produced the most graduates (Table 3.29). This field accounted for close to 33% of total enrolments and more than 35% of total graduates for both years.

The next preferred field of study was engineering, manufacturing, and construction, which accounted for close to 30% of Penang-born students. Intake and enrolments were also on the rise from 2016 to 2017, as with science, mathematics, and computing – the third most popular choice for field of study. Penang-born students were least interested in agriculture and veterinary, and services, with the former recording declining intake and enrolments (with a percentage decrease in 2017), but the latter seeing an increase for enrolments in 2017.

Graduates from the field of social sciences, business, and law made up the biggest proportion of overall Penang-born graduates for both 2016 and 2017; however, there was a decrease in the number of graduates in 2017 (Figure 3.30). Expectedly, graduates from engineering, manufacturing, and construction, as well as science, mathematics, and computing, produced the second- and third-most graduates, respectively, with both fields seeing an increase of 2.1% and 1.5% for 2017. Health and welfare graduates also increased in 2017, while other fields experienced a decrease. Humanities and the arts managed to maintain its percentage of graduates (6.7%) for both years.

Figure 3.30 Percentage of Penang-born graduates in public universities by field of study, 2016–17
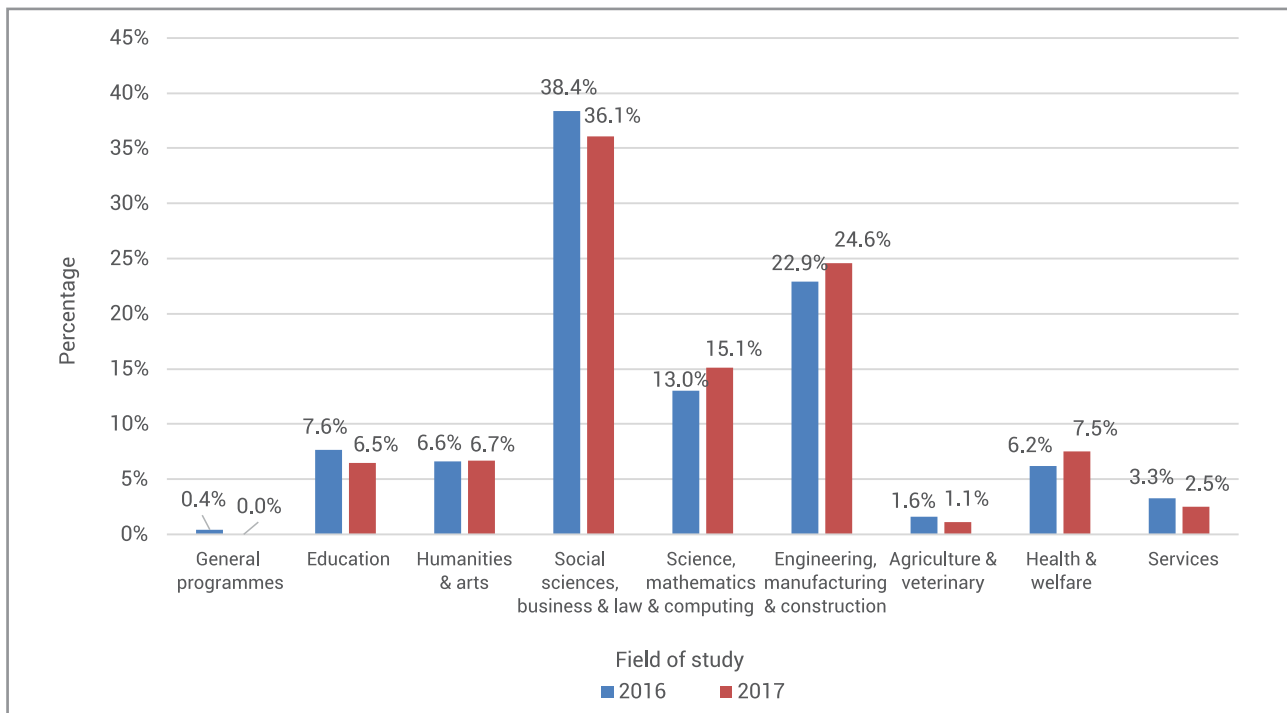


*Source: Ministry of Higher Education, Malaysia.*

Female students in tertiary education has consistently outnumbered males. In 2017, 64.4% of all Penang-born enrolments in public universities were female versus 35.6% of male students. The percentage of female Penang-born students is marginally higher than the national average of 61.9% for 2017.

In considering gender parity in different fields of study among Penang-born students, the trends for enrolments and graduates are almost identical: the percentage of female students was vastly higher than their male counterpart across all fields, with the exception of engineering, manufacturing, and construction. Even so, the discrepancy was considerably smaller compared to other fields: male enrolments and graduates stood at 55.6% and 54.0%, respectively, with their female counterparts standing at approximately 10% behind. The biggest gender disparity was found in education, where female enrolments were 74.6%, and with female graduates reaching 76.8%.

As Penang moves towards Industry 4.0, there is a pressing need to revolutionise the work force and produce high-skilled workers in the field of science, computing, and technology. Education is the vital component in ensuring the creation of these workers. The global work force has been transformed by technological advancements, and the education sector, specifically the tertiary sector, has to take up the challenge of preparing students for the changing landscape. The education system needs a more flexible and adaptable system to enable effective educating for Industry 4.0 and beyond. The digitisation of manufacturing signifies that there needs to be a shift of emphasis towards the field of ICT and future technologies, especially for tertiary studies. There is a need to ensure that the Penang work force can adapt to and apply the relevant technologies in order to create a highly productive labour force.

### 3.2.7 Public safety and security

Public safety perception is often one of the key indices in measuring quality of life. Countries and places with low crime rates and strong public safety systems are generally regarded as more desirable to live in. In most economies, the ability of a city to attract talent and investment can be directly correlated to the city's level of public safety (Blair, 1998). Good public safety helps foster social trust and interaction which, in turn, encourages the growth of business and investments, contributing to economic development and vitality.

Figure 3.31 Number of police stations, community police stations, and police beats in Penang by district, 2016
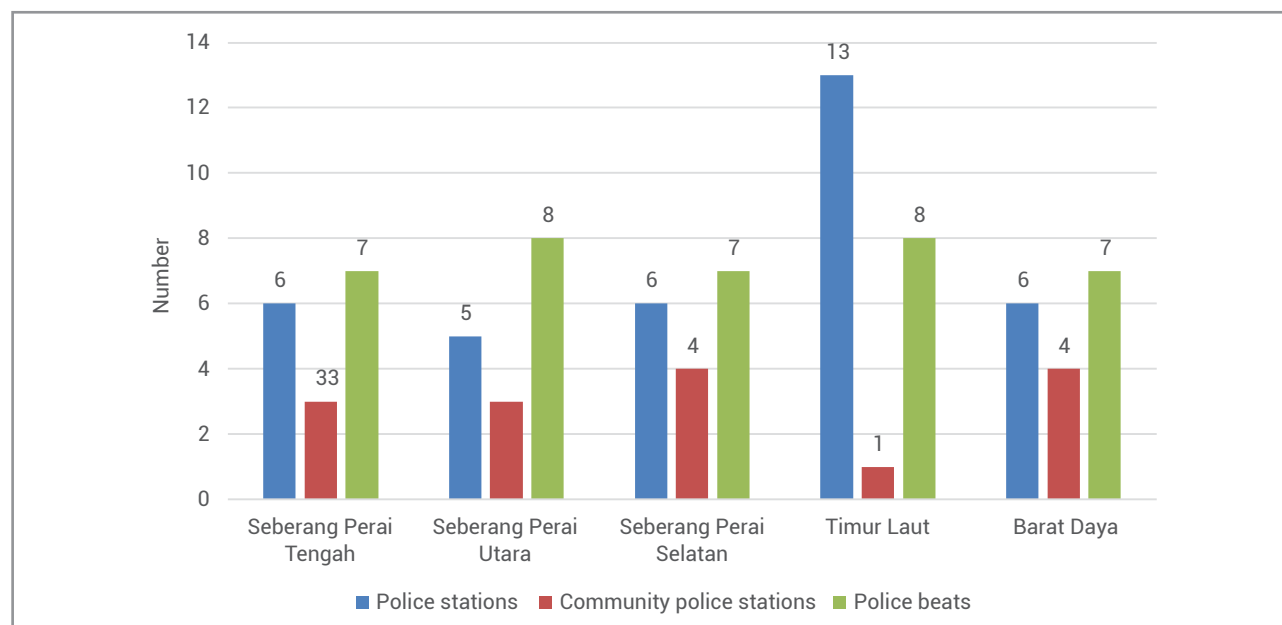


*Source: Royal Malaysian Police, Penang.*

Public safety is measured in terms of number of crimes committed or detected, incidents that affect the safety of the people, and the appropriate emergency response. Policemen, firefighters, and emergency management personnel are responsible for protecting the society and its people from harm, in addition to maintaining public order and safety.

*Law enforcement, crime, and drug addiction*

Timur Laut, which is Penang's most densely populated district, has the most police stations. The other districts share a similar number of police stations. However, there is only one community police station in Timur Laut compared to other districts, which have at least three community police stations each. The number of police beats is constant across all five districts.

For 2016, Penang was ranked sixth in terms of crimes committed (6,116 cases), accounting for 5.5% of all crime in Malaysia. Selangor recorded the highest number of crimes (32,222 cases), followed by Kuala Lumpur (16,989 cases) and Johor (7,440 cases).

Table 3.30 Number of violent crimes by category, Penang, 2012−16

| Crime category | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Murder | 47 | 37 | 54 | 33 | 28 |
| Rape | 124 | 117 | 93 | 77 | 66 |
| Molest | 100 | 88 | 97 | 84 | N/A |
| Gang robbery with arms | 3 | 6 | 4 | 4 | 2 |
| Gang robbery without arms | 609 | 730 | 545 | 575 | 407 |
| Robbery with arms | 0 | 0 | 1 | 2 | 1 |
| Robbery without arms | 169 | 169 | 190 | 199 | 224 |
| Blackmail | 78 | 124 | 124 | 85 | N/A |
| Crime threat | 462 | 511 | 490 | 492 | N/A |
| Riot | 236 | 214 | 182 | 177 | N/A |
| Injury* | 350 | 338 | 327 | 323 | 313 |
| **Total** | **2,178** | **2,334** | **2,107** | **2,051** | **1,041** |

*Note: *As according to Section 324-326 of the Penal Code.*
*Source: Royal Malaysian Police, Penang.*

Overall, there has been a reduction in total cases for violent crimes from 2012 to 2015, although there was a spike from 2012 to 2013. Due to the lack of data for some crimes, 2016 has not been taken into consideration for the overall picture. Gang robberies without arms was the crime most committed in Penang across all years.

In individual categories, murder, rape, molestation, gang robbery (with and without arms), riot, and injury cases have decreased over the five-year period, despite fluctuations in certain years. In contrast, there has been an increase in crime rates for robbery (with and without arms), blackmail, and crime threat. It should be noted that armed robbery cases were very few.

Property crimes saw a decline from 2012 to 2016, with the exception of general theft which saw an increase from 2015 to 2016. Motorcycle theft was the most common property crime, accounting for 47.4% of property crimes in 2016, while heavy vehicle theft had the fewest cases, accounting for 2.2% of property crimes in 2016.

The overall reduction of all property crimes and for some categories of violent crimes suggest that public safety in Penang improved somewhat; however, with increases noted in robbery, blackmail, and crime threat cases, there needs to be more vigilance from law enforcement personnel.

**Table 3.31 Number of property crimes by category, Penang, 2012−16**

| Crime category | 2012 | 2013 | 2014 | 2015 | 2016 |
|----------------|------|------|------|------|------|
| Theft | 1,259 | 1,089 | 1,126 | 969 | 1,012 |
| Car theft | 671 | 716 | 642 | 494 | 446 |
| Motorcycle theft | 3,582 | 3,364 | 2,966 | 2,488 | 2,412 |
| Van/lorry/heavy machinery/bus theft | 164 | 212 | 166 | 154 | 110 |
| Snatch theft | 280 | 165 | 245 | 231 | 191 |
| House break in and theft | 1,127 | 994 | 1,126 | 1,151 | 919 |
| **Total** | **7,083** | **6,540** | **6.271** | **5,487** | **5,090** |

*Source: Royal Malaysian Police, Penang.*

**Table 3.32 Number of drug addicts aged 15−40 years old by state, Malaysia, 2014−17**

| State | 2014 | 2015 | 2016 | 2017 |
|-------|------|------|------|------|
| Johor | 1,605 | 2,074 | 2,086 | 1,703 |
| Kedah | 2,149 | 2,484 | 3,286 | 2,271 |
| Kelantan | 1,236 | 1,740 | 2,781 | 3,092 |
| Malacca | 611 | 656 | 687 | 479 |
| Negeri Sembilan | 702 | 811 | 864 | 801 |
| Pahang | 1,560 | 1,729 | 1,963 | 1,637 |
| Perak | 1,964 | 2,235 | 2,016 | 1,157 |
| Perlis | 435 | 675 | 620 | 571 |
| **Penang** | **1,931** | **2,978** | **3,566** | **2,353** |
| Sabah | 832 | 797 | 892 | 921 |
| Sarawak | 760 | 601 | 477 | 398 |
| Selangor | 1,508 | 2,329 | 2,423 | 1,858 |
| Terengganu | 480 | 842 | 1,402 | 1,690 |
| W.P. Kuala Lumpur | 1,078 | 891 | 1,087 | 1,108 |
| W.P. Labuan | 16 | 31 | 70 | 78 |
| W.P. Putrajaya | 15 | 29 | 44 | 33 |
| **Total** | **16,882** | **20,902** | **24,264** | **20,150** |

*Source: Ministry of Home Affairs, 2017.*

Penang leads the country for most number of drug addicts from 2015–16. In 2017, Penang was ranked second overall in number of total drug addicts, despite a decrease of 1,213 drug addicts from 2016–17. Selangor and Johor, states with a similar socioeconomic profile to Penang, had much lower numbers of drug addicts. Drug rehabilitation centres play a central role in the process of aiding addicts on the road of their recovery, and more resources should be allocated to these centres, in the bid to rehabilitate and reduce drug addicts.

*Road accidents and safety*

Timur Laut consistently recorded the most number of accidents from 2012 to 2016, followed by Seberang Perai Tengah, with the number of accidents rising year to year, excluding 2013–14. Although Barat Daya has fewer road accidents, saw a constant increase in road accidents across the five-year period. Seberang Perai Selatan had the fewest road

accidents, but also recorded an increase over the same period.

The data also shows that cars were involved in the majority of accidents, accounting for 68.1% of total road accidents in Penang for 2016. Motorcycles ranked second, accounting for 21.2% of total accidents for 2016.

Evidently, with the increasing number of road accidents, road safety is still a major issue in Penang. In addition to road safety campaigns, measures such as the increase in traffic cameras and CCTVs need to be taken into consideration.

The Penang State Exco for Local Government, Housing, and Urban and Rural Planning announced that Penang will have 1,041 CCTV units installed by May 2019, with 911 units on the island and 130 units on the mainland (Mok, 2018). There are currently 680 units installed in Penang.

**Table 3.33 Number of road accidents by administrative district, Penang 2012–16**

| Administrative district | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Seberang Perai Tengah | 11,059 | 11,314 | 11,075 | 11,500 | 12,218 |
| Seberang Perai Utara | 5,102 | 5,322 | 5,142 | 5,252 | 4,111 |
| Seberang Perai Selatan | 3,713 | 3,771 | 3,695 | 3,813 | 4,647 |
| Timur Laut | 14,229 | 14,863 | 14,513 | 14,685 | 15,759 |
| Barat Daya | 3,748 | 4,091 | 4,322 | 4,669 | 5,509 |
| **Total** | **37,851** | **39,361** | **38,747** | **39,919** | **42,244** |

*Source: Bukit Aman Traffic Department; Royal Malaysian Police, Penang.*

**Table 3.34 Number of deaths and injuries reported in road accidents, Penang, 2012–16**

| Type of accidents | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Death | 400 | 381 | 378 | 390 | 411 |
| Serious injuries | 157 | 147 | 178 | 178 | 230 |
| Minor injuries | 244 | 94 | 194 | 178 | 294 |
| **Total deaths/injuries** | **801** | **622** | **750** | **746** | **935** |

*Source: Bukit Aman Traffic Department; Royal Malaysian Police, Penang.*

*Fire and safety*

There are 17 fire stations in Penang. In 2016, the highest number of firefighters was found in Timur Laut, while Seberang Perai Selatan had the fewest. This is in line with the population share and density of the districts.

The number of fire cases has been fluctuating over the 2012–16 period. Fire cases decreased from 2014 to 2015, but increased significantly in other years. Crank calls increased significantly in 2014, but saw declines in other years. The number of deaths resulting from fires in Penang was low across the years; however, there were more injuries recorded, with obvious increases in 2014 and 2016.

The number of fires related to vehicles and gas were consistent throughout the five-year period, with small fluctuations observed. Fires involving buildings, however, increased steadily while fire cases related to machinery and tools decreased. Forest fires and bush fires spiked dramatically in 2014 and 2016, which could be attributed to the drought in 2014, which saw fires in Penang Hill and Bukit FRU (The Star, 2014) needing days to be extinguished. Similarly, in 2016 the northern states in Malaysia, including Penang, went through a dry spell (The Star, 2016), which potentially contributed to the significant rise in forest and bush fires.

**Table 3.35 Number of firefighters by administrative district, Penang, 2012–16**

| Administrative district | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Seberang Perai Tengah | 198 | 198 | 199 | 190 | 188 |
| Seberang Perai Utara | 155 | 155 | 155 | 143 | 147 |
| Seberang Perai Selatan | 50 | 50 | 50 | 44 | 48 |
| Timur Laut | 231 | 231 | 231 | 214 | 210 |
| Barat Daya | 120 | 120 | 121 | 108 | 102 |
| **Total** | **754** | **754** | **756** | **699** | **695** |

*Source: Fire and Rescue Department, Penang.*

**Table 3.36 Fire statistics for Penang, 2012–16**

| Type | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Fire cases | 1,754 | 2,046 | 3,593 | 2,718 | 3,480 |
| Crank calls | 13 | 49 | 207 | 141 | 132 |
| Deaths | 3 | 1 | 7 | 3 | 4 |
| Injuries | 17 | 7 | 36 | 18 | 34 |

*Source: Fire and Rescue Department, Penang.*

**Table 3.37 Number of fire cases by type, Penang, 2012–16**

| Type | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Buildings | 291 | 377 | 330 | 406 | 426 |
| Vehicles | 229 | 213 | 205 | 219 | 236 |
| Machinery tools | 168 | 160 | 173 | 115 | 97 |
| Petrol chemicals | 1 | 0 | 1 | 0 | 2 |
| Gas | 93 | 95 | 91 | 79 | 84 |
| Forests, bushes, etc. | 325 | 390 | 1,717 | 871 | 1,372 |
| Stalls | 10 | 9 | 6 | 9 | 8 |
| Others | 597 | 786 | 1,070 | 1,019 | 773 |
| **Total** | **1,714** | **2,030** | **3,593** | **2,718** | **2,998** |

*Source: Fire and Rescue Department, Penang.*

### 3.2.8 Healthcare

Penang is well-known for its medical excellence, not only in the northern region of Peninsular Malaysia but also among neighbouring countries, especially Indonesia. Penang is still the leading state for medical tourism in Malaysia, accounting for 60.9% of all health travellers in 2016. The private healthcare sector made considerable contributions to Penang's economy.

*Economic contribution*

The gross output value of private health services in Penang is RM1.86 billion, equivalent to 2.4% of the state's GDP in 2015 (Figure 3.32 and Table 3.38). The sector's growth from 2010 to 2015 was 43.5%, nearly matching the state's GDP growth of 43.8% in the same period, as shown in Figure 3.32. However, the growth of gross output value for Penang was still slower than the national average and selected states, as shown in Table 3.38. The same is observed with private hospital growth for Penang, which was

only an increase of 23.3% in gross output value from 2010 to 2015. Hospital revenue comprised 69.2% of the total health services revenue in Penang in 2015, declining from 80.5% in 2010 (Table 3.39). A decline in the proportion of hospital-based revenue was also observed for many other selected states (-1.8% to -8.57%) and the national average (-4.1%), but none were as severe as Penang (-11.31%).

"% Value added/ Value of gross output" would be a good indicator of profitability or finance efficiency. In 2010, Penang (45.5%) used to surpass the national average (41.0%) and was only behind hospitals in Kuala Lumpur (47.4%), but in 2015, Penang's profitability (40.3%) declined by 5.2%, dropping the state behind the national average (42.4%), while hospitals in Malacca improved markedly from 31.3% in 2010 to 43.6% in 2016 (Table 3.39). However, private hospitals in Penang still contributed significantly to the total value of gross output for Penang at 69.2% in 2015, equivalent to RM1.29 billion.

**Figure 3.32 Value of gross output of health services for Penang, 2010−15**
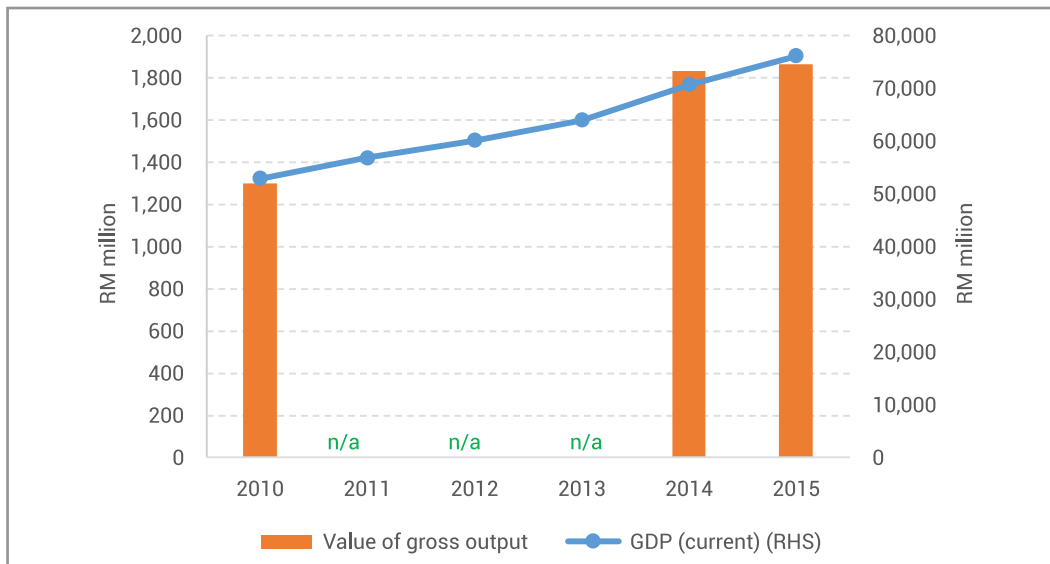
## Table 3.38 Principal statistics of health services by selected states, 2010 and 2015

| | No. of establishments | | | No. of persons engaged (during December of last pay period) | | | Value of gross output, RM million | | | % Value added/ value of gross output | | | % Value of gross output/ state GDP | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2010 | 2015 | % Change | 2010 | 2015 | % Change | 2010 | 2015 | % Change | 2010 | 2015 | % Change | 2010 | 2015 | % Change |
| Penang | 517 | 909 | 75.8% | 9,219 | 11,143 | 20.9% | 1,299 | 1,864 | 43.5% | 47.8% | 45.6% | -2.2% | 2.5% | 2.4% | -0.01% |
| Selangor | 1617 | 2,779 | 71.9% | 20,630 | 25,912 | 25.6% | 2,555 | 4,428 | 73.3% | 44.9% | 48.5% | 3.6% | 1.4% | 1.7% | 0.24% |
| F.T. Kuala Lumpur | 937 | 2,022 | 115.8% | 13,318 | 20,169 | 51.4% | 2,378 | 3,740 | 57.3% | 48.6% | 47.7% | -0.9% | 2.1% | 2.1% | 0.01% |
| Malacca | 275 | 418 | 52.0% | 3,936 | 4,558 | 15.8% | 508 | 761 | 49.8% | 41.5% | 51.0% | 9.5% | 2.1% | 2.1% | 0.05% |
| Johor | 842 | 1,254 | 48.9% | 7,729 | 9,967 | 29.0% | 963 | 1,548 | 60.7% | 41.8% | 45.5% | 3.7% | 1.3% | 1.5% | 0.15% |
| Perak | 642 | 911 | 41.9% | 6,081 | 7,298 | 20.0% | 636 | 1,013 | 59.3% | 48.0% | 46.5% | -1.5% | 1.5% | 1.6% | 0.15% |
| Kedah | 372 | 496 | 33.3% | 3,342 | 4,479 | 34.0% | 333 | 5171 | 55.1% | 40.3% | 45.5% | 5.1% | 1.2% | 1.4% | 0.13% |
| MALAYSIA | 6,739 | 11,018 | 63.5% | 77,742 | 101,056 | 30.0% | 10,052 | 6,218 | 61.3% | 45.8% | 47.2% | 1.4% | 1.2% | 1.4% | 0.18% |

*Source: Economic Census 2011-16, Department of Statistics Malaysia.*

## Table 3.39 Principal statistics of hospital services by selected states, 2010 and 2015

| | No. of establishments | | | No. of persons engaged (during December of last pay period) | | | Value of gross output, RM million | | | % Value added/ value of gross output | | | % Value of gross output (hospital services/total health services) | | | % Value of gross output/ state GDP | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2010 | 2015 | % Change | 2010 | 2015 | % Change | 2010 | 2015 | % Change | 2010 | 2015 | % Change | 2010 | 2015 | % Change | 2010 | 2015 | % Change |
| Penang | 6,539 | 7,316 | 11.9% | 6,539 | 7,316 | 11.9% | 1,046 | 1,290 | 23.3% | 45.5% | 40.3% | -5.2% | 80.5% | 69.2% | -11.31% | 70.9% | 65.7% | -5.27% |
| Selangor | 10,477 | 11,338 | 8.2% | 10,477 | 11,338 | 8.2% | 1,547 | 2,438 | 57.6% | 39.0% | 44.9% | 5.9% | 60.5% | 55.1% | -5.49% | 50.8% | 43.8% | -7.03% |
| F.T. Kuala Lumpur | 7,057 | 9,663 | 36.9% | 7,057 | 9,663 | 36.9% | 1,461 | 2,231 | 52.7% | 47.4% | 44.9% | -2.5% | 61.4% | 59.7% | -1.80% | 53.0% | 47.9% | -5.08% |
| Malacca | 2,378 | 2,426 | 2.0% | 2,378 | 2,426 | 2.0% | 329 | 428 | 30.0% | 31.3% | 43.6% | 12.3% | 64.8% | 56.2% | -8.57% | 60.4% | 53.2% | -7.19% |
| Johor | 2,704 | 3,901 | 44.3% | 2,704 | 3,901 | 44.3%2 | 514 | 749 | 45.8% | 34.0% | 39.6% | 5.6% | 53.4% | 48.4% | -4.95% | 35.0% | 39.1% | 4.15% |
| Perak | 2,702 | 3,244 | 20.1% | 2,702 | 3,244 | 0.1% | 326 | 528 | 62.0% | 38.6% | 37.5% | -1.1% | 51.3% | 52.2% | 0.85% | 44.4% | 44.5% | 0.02% |
| Kedah | 1,390 | 1,921 | 38.2% | 1,390 | 1,921 | 38.2% | 186 | 253 | 36.3% | 34.1% | 37.4% | 3.3% | 55.7% | 49.0% | -6.75% | 41.6% | 42.9% | 1.30% |
| MALAYSIA | 37,273 | 46,362 | 24.4% | 37,273 | 46,362 | 24.4% | 5,995 | 9,007 | 50.2% | 41.0% | 42.4% | 1.5% | 59.6% | 55.5% | -4.10% | 47.9% | 45.9% | -2.07% |

*Source: Economic Census 2011−16, Department of Statistics Malaysia.*

### Healthcare facilities

The number of private hospitals dropped from 26 in 2008 to 19 in 2016, while the number of public hospitals stayed the same (Table 3.40), with a total of six in both Penang Island and Seberang Perai. Both public and private hospital distribution can be seen in Figure 3.33. There is at least one public hospital in each district (Seberang Perai Tengah district has two), but the private hospitals are mostly concentrated in Timur Laut; only a handful are in Barat Daya, Seberang Perai Tengah, and Seberang Perai Utara. The bed strength of both private and public hospitals were nearly similar in 2016 (Table 3.40). Public primary care facilities had been stagnant throughout this aforementioned period, while private clinics had a moderate increase, and greatly outnumbered public facilities.

## Table 3.40 Number of healthcare facilities in Penang, 2008−16

| Type of facilities | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|
| Public hospitals | 6 | 7 | 7 | 7 | 6 | 6 | 6 | 6 | 6 |
| Private hospitals | 26 | 27 | 26 | 23 | 23 | 23 | 20 | 17 | 19 |
| **Total hospitals** | **32** | **34** | **33** | **30** | **29** | **29** | **26** | **23** | **25** |
| Public beds | 1,930 | 2,677 | 2,677 | 2,677 | 1,947 | 1,947 | 1,947 | 2,046 | 2,130 |
| Private beds | 1,937 | 2,084 | 2,053 | 2,022 | 2,042 | 2,276 | 2,179 | 1,644 | 2,176 |
| **Total beds** | **3,867** | **4,761** | **4,730** | **4,699** | **3,989** | **4,223** | **4,126** | **3,690** | **4,306** |
| Health clinics (public) | 26 | 26 | 27 | 29 | 29 | 30 | 30 | 30 | 30 |
| Community clinics (public) | 62 | 62 | 62 | 60 | 60 | 60 | 60 | 60 | 60 |
| Maternal and child health clinics (public) | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Medical clinics (private) | - | - | - | 477 | 473 | 480 | 491 | 508 | 525 |
| Dental clinics (private) | - | - | - | 114 | 121 | 125 | 127 | 139 | 144 |

*Source: Health Indicators 2008−17, Department of Statistics Malaysia.*

**Figure 3.33 Hospital distribution in Penang, 2017**



*Source: Penang Institute.*

Penang has relatively more hospitals per population compared to other states. In 2016, there were 1.46 hospitals per 100,000 population in Penang, while the national average was only 1.07 (Figure 3.34). Only Kuala Lumpur had more, at 2.29. However, the number of hospitals per 100,000 population dropped in all states from 2010 to 2016, mainly due to a reduction of private hospitals.

The number of beds are generally close correlated to the number of hospitals. In 2016, Penang had 250.7 beds per 100,000 population, lower than the frontrunner Kuala Lumpur (439.3), as well as Perak (264.0) and Malacca (251.2) (Figure 3.35). Penang used to have relatively more beds in 2010. While Penang recorded a decline in the number of beds per 100,000 population in 2010–16, Kuala Lumpur, Malacca, and Perak had increases instead. This trend should worry locals who want to use Penang's private healthcare services, given that increasingly more beds may be in greater demand by medical travellers in the coming years.

**Figure 3.34 Number of hospitals per 100,000 population, 2010 and 2016**
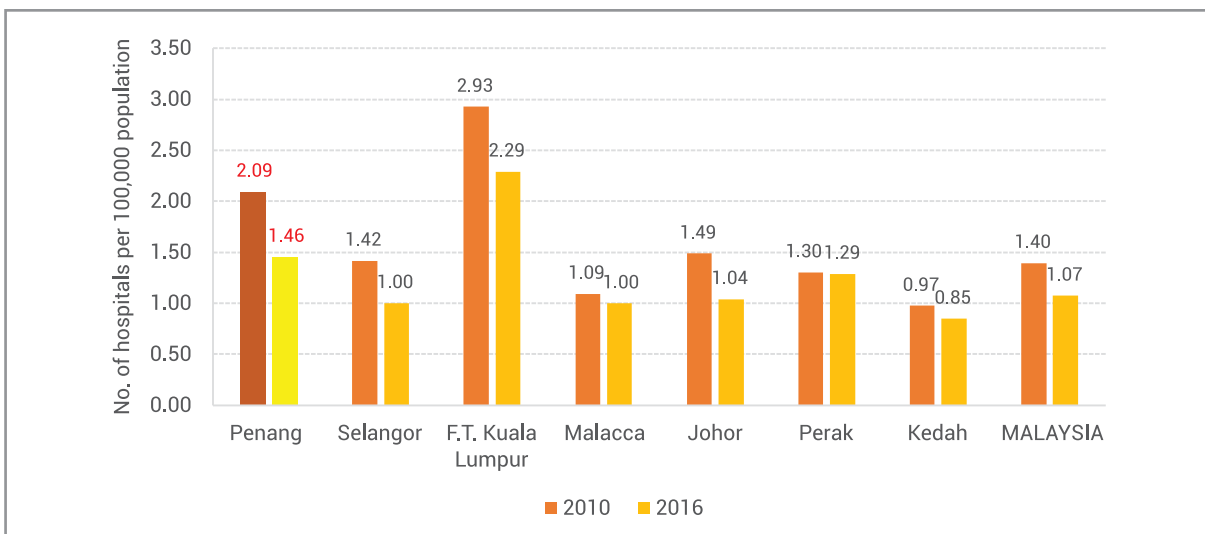


*Source: Health Indicators, Ministry of Health Malaysia, Department of Statistics Malaysia and authors' calculations.*

**Figure 3.35 Number of beds per 100,000 population, 2010 and 2016**
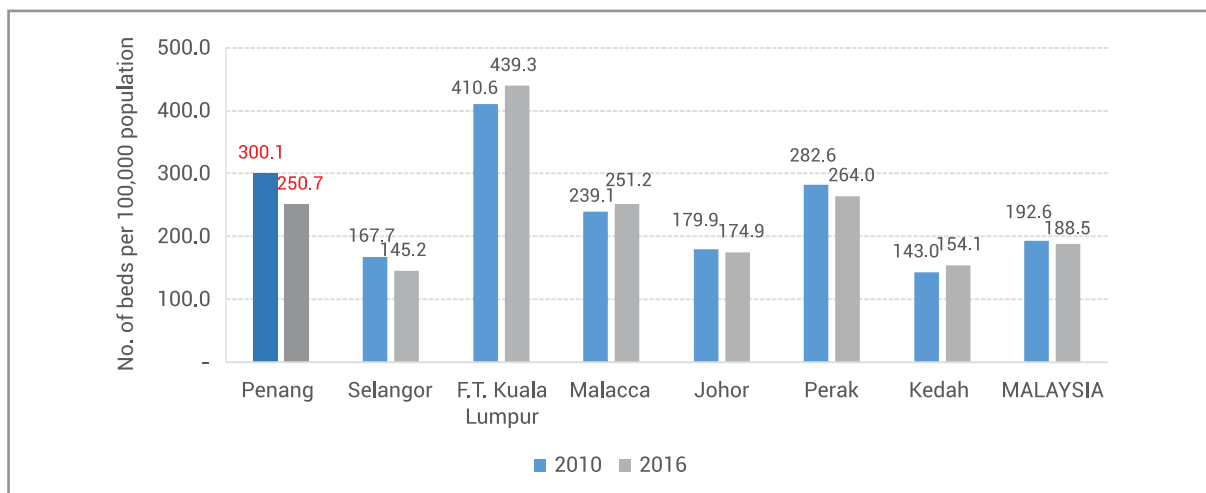


*Source: Health Indicators, Ministry of Health Malaysia, Department of Statistics Malaysia and authors' calculations.*

There are currently only six public hospitals in Penang, and inpatient departments are rather crowded. In 2016, the bed occupancy rate (BOR) for Hospital Pulau Pinang was at 72.4%, Hospital Seberang Jaya at 82.42%, Hospital Bukit Mertajam at 70.91%, and Hospital Kepala Batas at 90.23%[23] (Figure 3.36). The BOR for the two non-specialist hospitals Balik Pulau and Sungai Bakap were 52.66% and 51.29%, respectively. However, private hospitals in Penang had a large range of BOR, averaging at 54.5%. This indicates that private hospitals still have the capacity to take in more patients, especially health travellers. Otherwise, the beds would be considered under-utilised.

**Figure 3.36 Bed occupancy rates in Penang by sector, 2016**
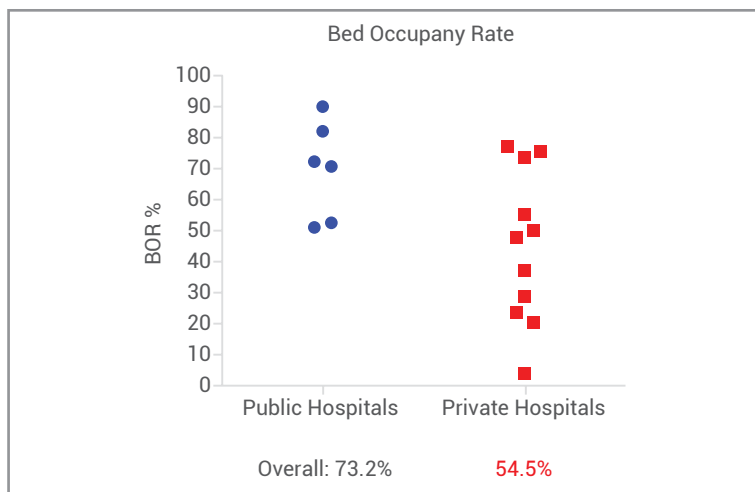


*Source:  Health Facts 2016, Department of Health Penang.*

[23]  According to the Ministry of Health's Annual Report 2014, Hospital Seberang Jaya was categorised as major specialist hospital while Hospital Bukit Mertajam and Hospital Kepala Batas were minor specialist hospitals.

*Healthcare demand and utilisation*

Since 2010 (when such data have been available) private hospitals in Penang have had more inpatients than public hospitals (Figure 3.37). The gap was widest in 2014, where private hospitals had about 36,000 more inpatients than all six public hospitals combined. However, the trend has started going the opposite direction since 2014, with a noticeable decrease in the number of inpatients for private hospitals but a gradual increase for public hospitals – perhaps a result of the difficult economic situation during this period.

Nonetheless, Penang is the only state with more private hospital admissions than public hospitals (Figure 3.38). Kuala Lumpur and Penang both had the largest private hospital admission rates in 2016

at 92 per 1,000 population, compared to the average of 34 per 1,000 population in the country. As for public hospital admissions, Penang only had a rate of 77 per 1,000 population, lower than the national average of 86 per 1,000 population.

As for outpatient attendance, the only reliable data available are for government hospitals. Attendance for public hospitals increased 12.3% from 1,453,359 in 2011 to 1,631,735 in 2016 (Figure 3.39). The increase is also reflected in the population-adjusted figures, which peaked in 2015, with about 962 people going to government hospitals out of 1,000 people. Day care is a form of hospital admission that encapsulates day procedures. The annual figures for day care attendance hovered around 50,000 to 58,000 (or 30 to 35 per 1,000 population) from 2012 to 2016 (Figure 3.40).

### Figure 3.37 Hospital admissions in Penang by sector, 2011–16
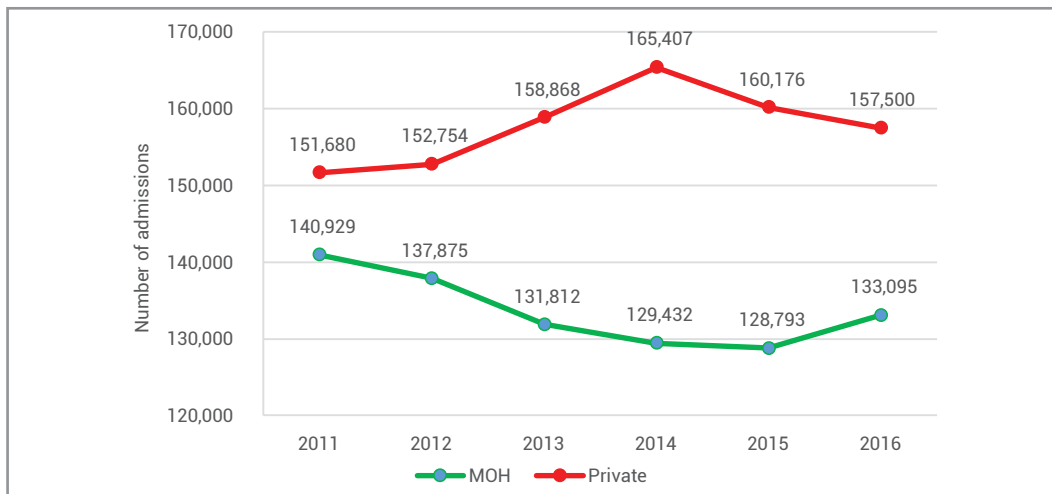


*Source: Health Indicators, Ministry of Health Malaysia.*

### Figure 3.38 Hospital admissions per 1,000 population by sector and selected states, 2011–16
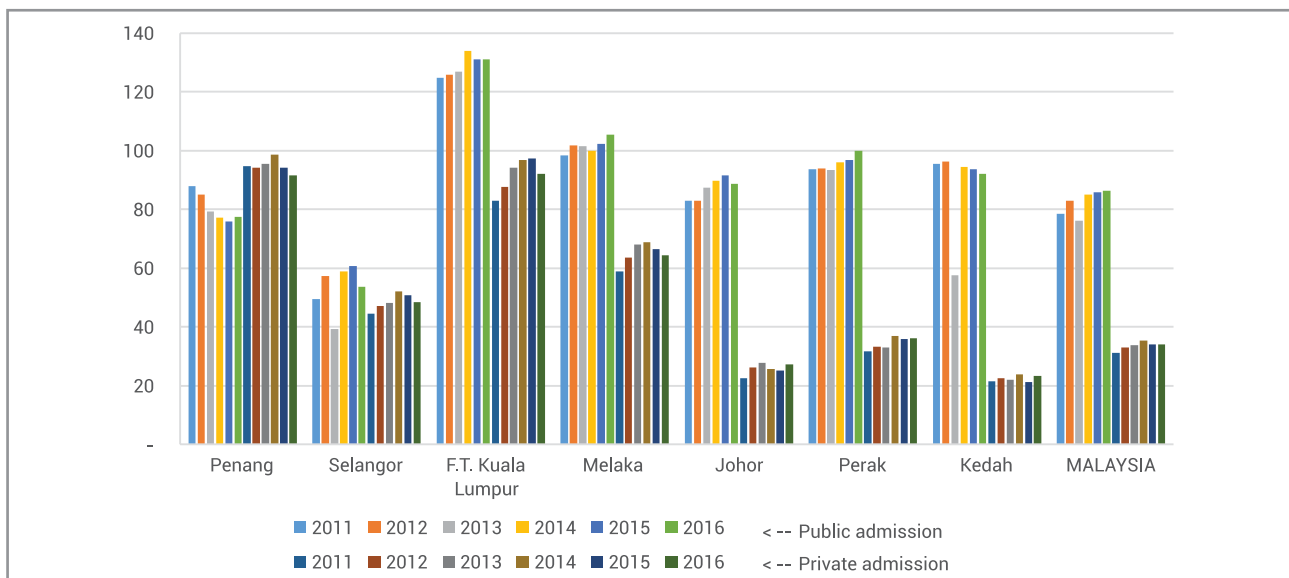


*Source: Health Indicators, Ministry of Health Malaysia, Department of Statistics Malaysia and author's calculation.*

Figure 3.39 Outpatient attendance of government hospitals in Penang, 2011−16
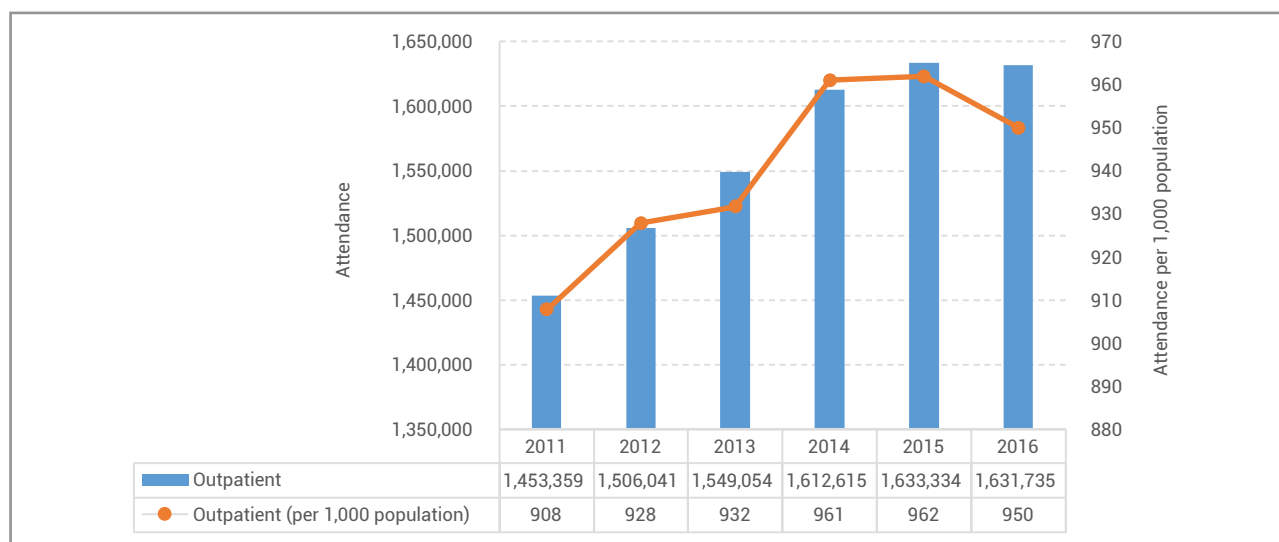


| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|
| Outpatient | 1,453,359 | 1,506,041 | 1,549,054 | 1,612,615 | 1,633,334 | 1,631,735 |
| Outpatient (per 1,000 population) | 908 | 928 | 932 | 961 | 962 | 950 |

*Source: Health Indicators, Ministry of Health Malaysia, Department of Statistics Malaysia and author's calculation.*

Figure 3.40 Day care attendance of government hospitals in Penang, 2012−16
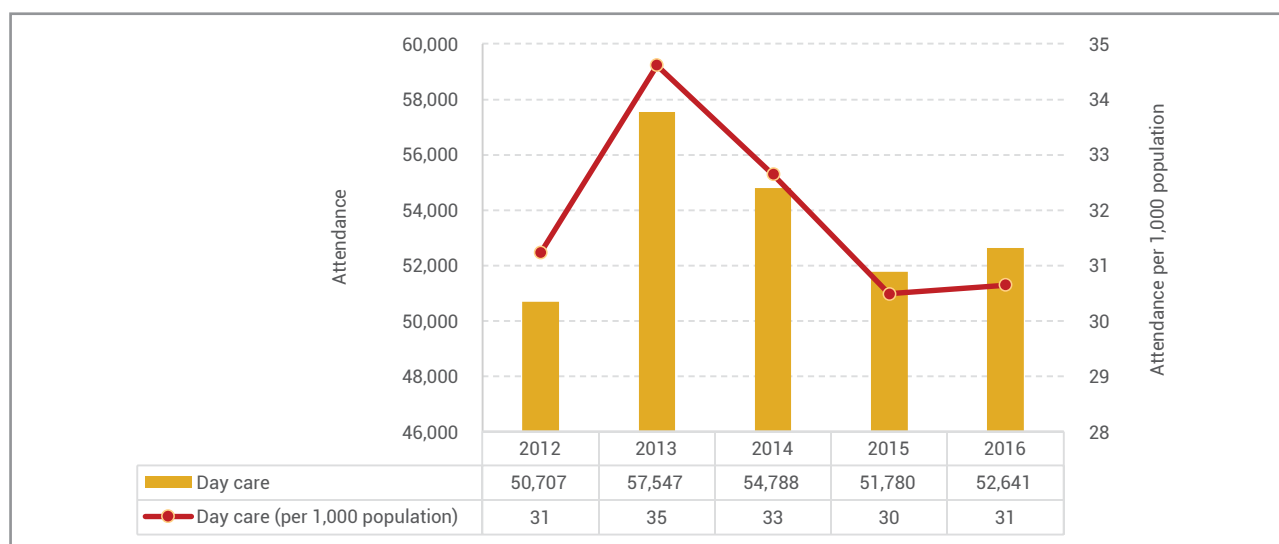


| | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Day care | 50,707 | 57,547 | 54,788 | 51,780 | 52,641 |
| Day care (per 1,000 population) | 31 | 35 | 33 | 30 | 31 |

*Source: Health Indicators, Ministry of Health Malaysia, Department of Statistics Malaysia and authors' calculation.*

Public admissions to government hospitals in Penang declined slowly beginning in 2012 (137,875), bottoming out in 2015 (128,793) before rising in 2016 (133,095) (Table 3.41). The general medicine department had the most inpatients (32,434) in 2016, follow by obstetrics and gynaecology (O&G, 29,132). Across the board, there has been a decline in admissions in all respective departments except general medicine, which saw an increase instead.

In terms of major communicable diseases reported in Penang, dengue fever is a major health threat, peaking in 2015 with 5,830 incidents (Table 3.42). There were more hand, foot, and mouth cases than dengue fever in 2016 (3,019 cases), while tuberculosis and food poisoning are constant public health issues in Penang (with each more than 1,000 cases every year).

On non-communicable diseases, diabetes incidences is used as a reference (Table 3.43). It is found that 97.2 person out of 1,000 population (or approximately 1 in 10) had diabetes health issues in 2016. About half of the patient load came from Timur Laut alone. The district had also the highest incidence rate at 129.3 per 1,000 population, compared to the neighbouring Barat Daya, whose incidence rate stood at 63.5 (Table 3.43).

## Table 3.41 Admission to government hospitals in Penang by discipline, 2012−16

| Department | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| General medicine | 27,406 | 27,702 | 28,541 | 30,278 | 32,434 |
| General surgery | 14,633 | 14,007 | 13,256 | 12,636 | 12,570 |
| Orthopaedics | 12,030 | 12,377 | 10,235 | 9,962 | 9,325 |
| O&G | 31,365 | 29,196 | 29,978 | 28,244 | 29,132 |
| Paediatrics | 27,797 | 17,373 | 16,648 | 14,840 | 25,503 |
| Others | 24,644 | 31,154 | 30,774 | 32,833 | 24,131 |
| Total | 137,875 | 131,809 | 129,432 | 128,793 | 133,095 |

*Source: 2016 Annual Report, Penang State Health Department, Malaysia.*

## Table 3.42 Number of cases for major communicable diseases reported in Penang, 2012−16

| Disease | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Dengue fever/Dengue hemorrhagic fever | 791 | 1,053 | 3,141 | 5,830 | 2,756 |
| Tuberculosis (all forms) | 1,245 | 1,230 | 1,252 | 1,283 | 1,385 |
| Measles | 245 | 153 | 53 | 11 | 7 |
| HIV infections (all forms) | 137 | 111 | 110 | 103 | 105 |
| Food poisoning | 360 | 556 | 2,227 | 497 | 609 |
| Hepatitis B | 40 | 21 | 13 | 33 | 20 |
| Syphilis (all forms) | 87 | 95 | 57 | 63 | 57 |
| Malaria | 37 | 39 | 37 | 17 | 3 |
| Hand, foot and mouth disease | 1,579 | 1,205 | 1,449 | 758 | 3,019 |
| Typhoid and paratyphoid fever | 2 | 6 | 6 | 8 | 4 |
| Leptospirosis | 128 | 98 | 192 | 140 | 43 |
| Influenza | 216 | 785 | 380 | 642 | - |

*Source: 2016 Annual Report, Penang State Health Department, Malaysia.*

## Table 3.43 Diabetes patient load in Penang by district, 2016

| District | Attendance of diabetes patients | Active patients in district until 2016 | Newly registered case of Type 2 DM | Incident per 1,000 population |
|---|---|---|---|---|
| Timur Laut | 71,556 | 15,238 | 1,989 | 129.3 |
| Barat Daya | 14,285 | 4,489 | 703 | 63.5 |
| Seberang Perai Utara | 33,489 | 9,849 | 1,313 | 104.3 |
| Seberang Perai Tengah | 31,610 | 8,027 | 1,236 | 77.4 |
| Seberang Perai Selatan | 16,230 | 3,997 | 656 | 76.8 |
| Total | 167,170 | 41,600 | 5,897 | 97.2 |

*Source: 2016 Annual Report, Penang State Health Department, Malaysia.*

### Healthcare workforce

Figures 3.41 (a) to (c) show the healthcare workforce (doctors, nurses, and pharmacists) in Penang from 2008 to 2016. The three respective categories of health practitioner to population ratio has been improving throughout this period. For example, the doctor to population ratio in Penang was at 1:817 in 2008, before improving eight years later to 1:554 (Figure 3.41a) – lower than the national average of 1:632 in 2016. The distribution pattern of doctors in Penang suggests a rise in the number for doctors in both the public and private sectors. In 2013, the ratio of doctors in public and private sectors was almost 2 to 1.

However, there are more nurses in the private sector than the public sector (Figure 3.41b), possibly reflecting the healthcare demand (or patient load) trend such as the one shown in Figure 3.37. Yet, private healthcare providers are often heard lamenting the shortage of qualified nurses because of brain drain to other states or countries[24]. In 2016, there were 3.35 nurses to assist a doctor in the private sector in Penang, compared to only 1.83 nurses to a doctor in the public sector. This suggests a significant difference between both sectors; the public sector must hire more nurses to meet the World Health Organization's recommendation of having at least 2.5 nurses assisting one doctor at all times.

Penang had more pharmacists in the private sector than the public sector in 2008, but this is no longer the case as of 2016 (Figure 3.41c). The ratio of pharmacists to the Penang population was 1:2,013 in 2016, lower than the national average of 1:3,013. Regardless of sector differences, a typical core healthcare workforce team in Penang was 1 lead doctor with 2.4 nurses, and 3.6 doctors for every pharmacist.

### Figure 3.41 Healthcare workforce in Penang, 2008−16

a) Number and ratio of doctors to population in Penang



| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|
| Public | 955 | 1,171 | 1,281 | 1,483 | 1,693 | 2,189 | 2,178 | 1,831 | 1,939 |
| Private | 975 | 960 | 938 | 982 | 1,019 | 1,063 | 1,103 | 1,118 | 1,167 |
| Ratio (1:x) | 817 | 740 | 692 | 646 | 594 | 501 | 502 | 564 | 554 |
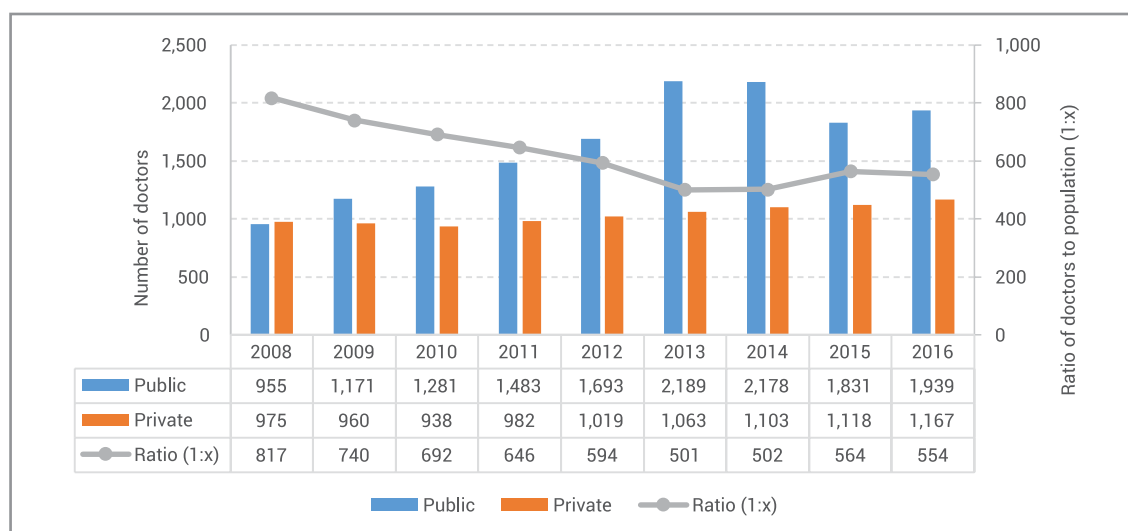
*Source: Health Indicators, Ministry of Health Malaysia.*

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[24] "Malaysia to face a nursing shortage by 2020", MIMS Today, 6 January 2017, https://today.mims.com/malaysia-to-face-a-nursing-shortage-by-2020

## b) Number and ratio of nurses to population in Penang

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|
| Public | 2,367 | 2,495 | 2,461 | 2,683 | 2,752 | 2,904 | 2,993 | 3,393 | 3,542 |
| Private | - | - | - | 2,801 | 3,244 | 3,608 | 3,771 | 3,924 | 3,911 |
| Ratio (1:x) | - | - | - | 291 | 269 | 250 | 243 | 227 | 231 |
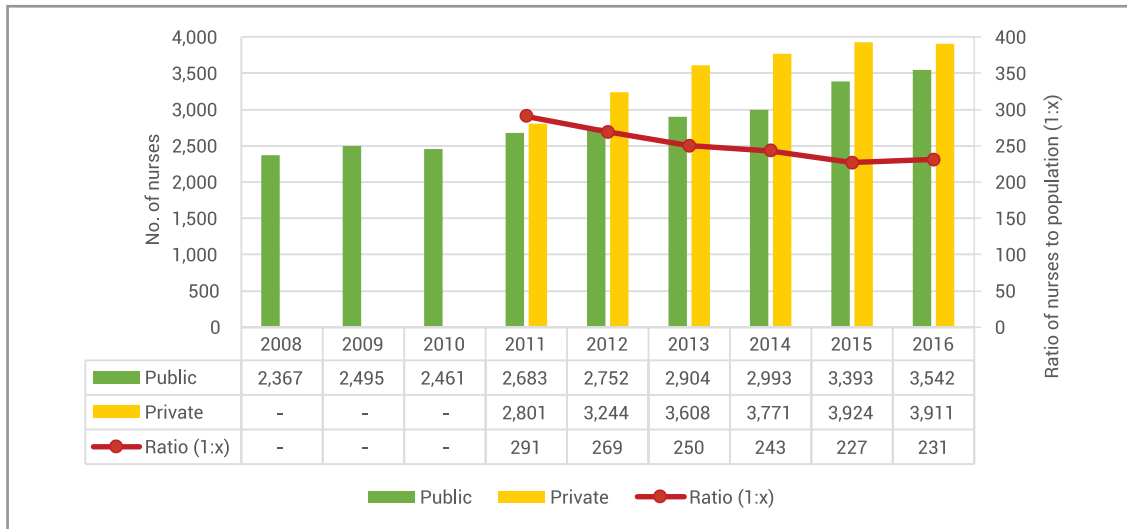
*Source: Health Indicators, Ministry of Health Malaysia.*

## c) Number and ratio of pharmacists to population in Penang

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|
| Public | 219 | 271 | 324 | 378 | 406 | 459 | 482 | 473 | 479 |
| Private | 343 | 327 | 334 | 350 | 394 | 331 | 525 | 383 | 375 |
| Ratio (1:x) | 2,752 | 2,638 | 2,373 | 2,189 | 2,014 | 2,061 | 1,634 | 1,943 | 2,013 |
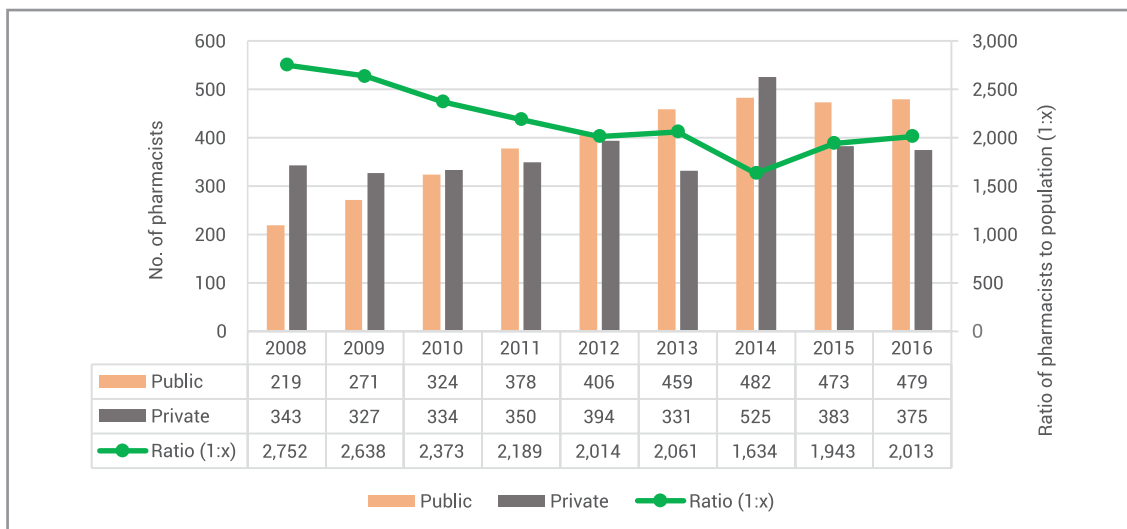
*Source: Health Indicators, Ministry of Health Malaysia.*

## 3.3 Construction sector

### *Residential and non-residential construction propel growth*

As the third-smallest sector in Penang, the value-add of the construction sector grew at 10.4% in 2016, contributing about 3% to the state's GDP according to the Department of Statistics. The total value of completed construction work increased by 5.8% y-o-y to RM1.7 billion in the first quarter of 2018,

up from RM1.6 billion in the same period in 2017. While the civil engineering sub-sector is the key driver of Malaysia's construction sector, Penang's construction sector is predominantly driven by residential and non-residential buildings, as well as leading civil engineering and special trade activity sub-sectors. More than 42% of the total value of construction work done have been attributed to non-residential construction, with a growth rate of about 33% y-o-y for Q1 2018, followed by 41% or RM703.6 million in residential construction (Q1 2018: 2.6%).

Figure 3.42 Total value of construction work done in Penang, Q1 2015–Q1 2018
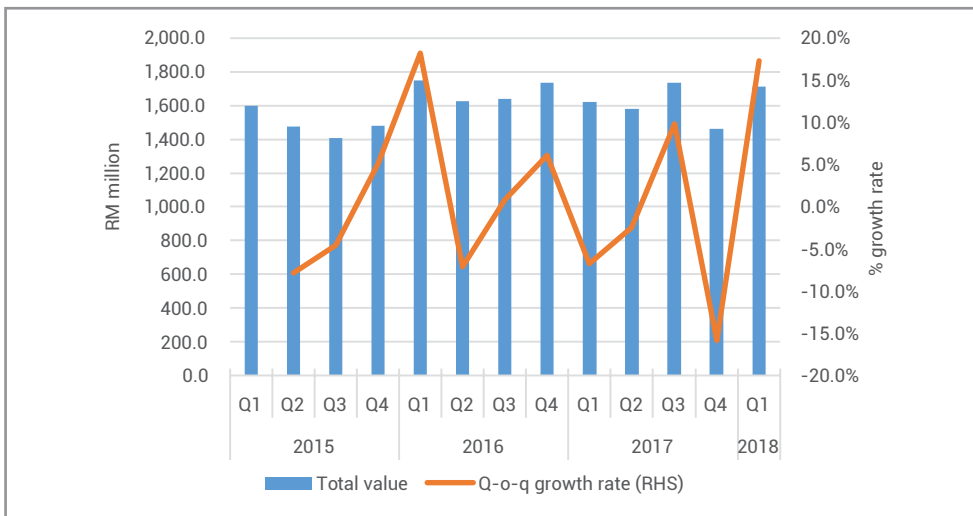
For the first quarter of 2018, Malaysia's HPI expanded at its slowest pace since 2010 after peaking in 2012. In the first quarter of 2018, the HPI increased 4.1% y-o-y compared to 6.7% in Q1 2017. Some cooling measures undertaken by Bank Negara Malaysia (BNM) from increasing property prices include strict financing requirements and rising lending rates. These measures are aimed at curbing speculative activity and preventing excessive borrowing. For instance, the maximum loan-to-value (LTV) ratio of 70% is imposed by BNM on borrowers with more than two outstanding housing loans.

With the exception of Sabah, Sarawak, Kelantan, and Pahang, all states had declines in the growth rate of house prices. Among the most developed cities in Malaysia, Penang's HPI showed the lowest growth rate of 2.5% in the first quarter of 2018, followed by Kuala Lumpur (3.3%) and Selangor (4.1%) (Figure 3.43). Specifically, Penang's HPI stood at 191.8 at base year 2010 during the first quarter of 2018 (Q1 2017: 187.2). In addition, its average house price increased by 2.4% to RM430,041 in Q1 2018, an increase from RM419,802 in Q1 2017.

Figure 3.43 Percentage change of house price index in selected states in Malaysia, Q1 2014–Q1 2018
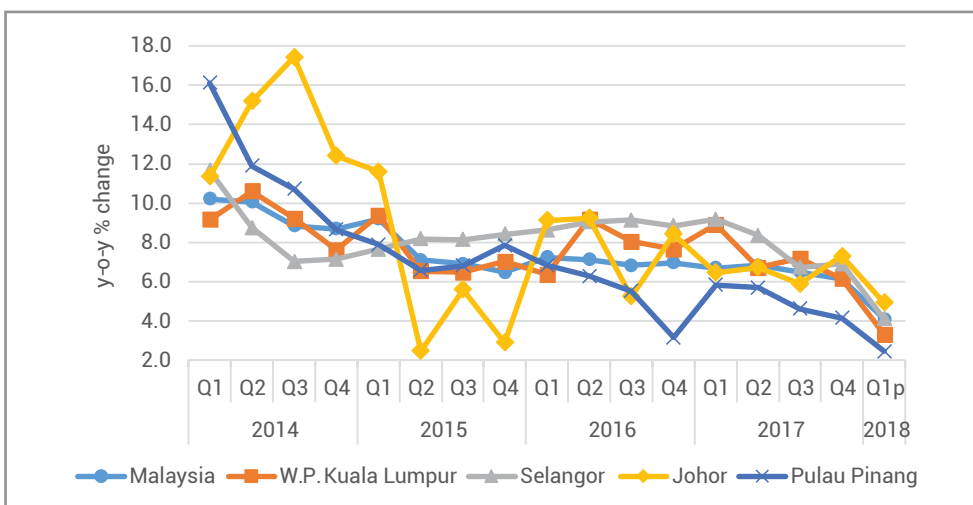
In terms of the type of residential houses, the HPI of all houses except semi-detached units grew at a sluggish pace, with high-rise units recording a negative growth of -1.9% (Figure 3.44). The average price of a terraced house increased marginally at 3% to RM476,760 in Q1 2018, with Seberang Perai experiencing a higher growth rate of 6.1% compared to 0.5% for terraced units on Penang Island. The average price of a terraced unit on Penang Island is three times higher than the average price in Seberang Perai, where a terraced unit on Penang Island is priced at about RM943,000 while a unit in Seberang Perai sells at about RM307,000. Anecdotal evidence shows that houses on Penang Island are relatively more expensive than the houses in Seberang Perai, likely due to the limited land available on the island.

Meanwhile, semi-detached units have been steadily growing since Q4 2016, from 179.9 points to 206.2 points in Q1 2018 – an increase of 12.5% y-o-y. On average, a semi-detached unit in Penang was priced at RM648,726 in Q1 2018. The average price of high-rise units, on the other hand, declined by 1.9%. However, this decline is only seen in other major cities like Kuala Lumpur, Selangor, and Johor from Q2 2018.

### Weaker demand and supply of residential units

The available residential houses had generally been moderated in the past year. During the first quarter of 2018, Penang's existing housing stock softened to 3.7% compared to 21.2% in Q1 2017. This comprised an increase of 1,236 newly completed units, where a majority of these housing units were located in Seberang Perai Utara, with two-to-three-storey terraced houses having the most number of completed units. Among residential properties, town houses had the highest rate of growth of 12.2% compared to condominiums and apartments (11.3%), low-cost houses (3.5%), and low-cost flats (3.5%). Out of 502,176 available residential units, Timur Laut accounted for slightly more than one-third of total available units in Q1 2018, with flats, condominiums, and apartments occupying the largest share.

The growth in available residential units is offset by the slowdown in new residential units. As can be seen in Figure 3.45, while the supply of incoming residential units peaked in 2016, it has declined persistently since 2017 due to the shrinking supply of town houses, flats, low-cost flats, and single-storey terraced houses. During the first quarter of 2018, incoming supply, which were under construction, reduced by 16.2% y-o-y basis. With the exception of Seberang Perai Selatan, all districts recorded a decrease in incoming supply, with Barat Daya registering the biggest drop (31.8%), followed by Seberang Perai Utara (29.9%) and Seberang Perai Tengah (19.9%).

Figure 3.44 Percentage change of house price index by type of houses in Penang, Q1 2015–Q1 2018
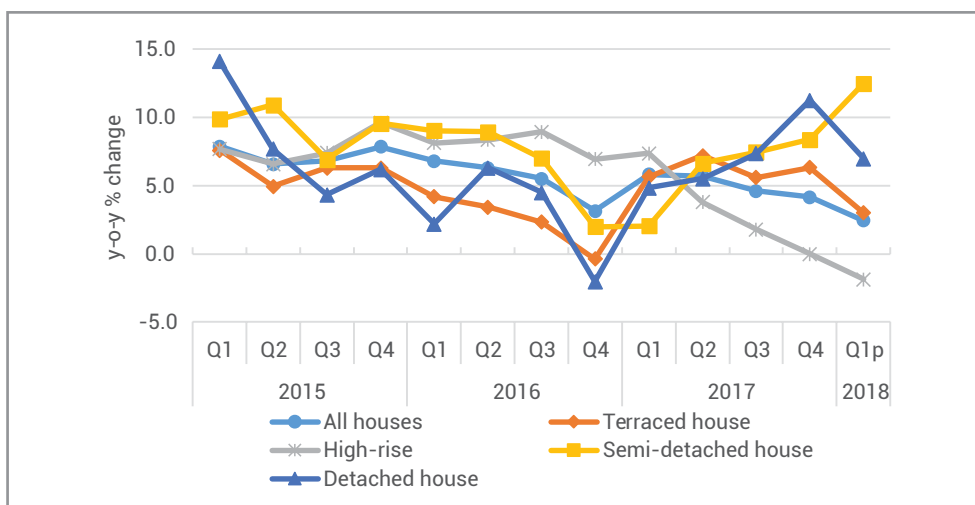


*Note: P=preliminary*
*Source: National Property Information Centre (NAPIC, 2018c).*

Figure 3.45 Supply indicators of residential property in Penang
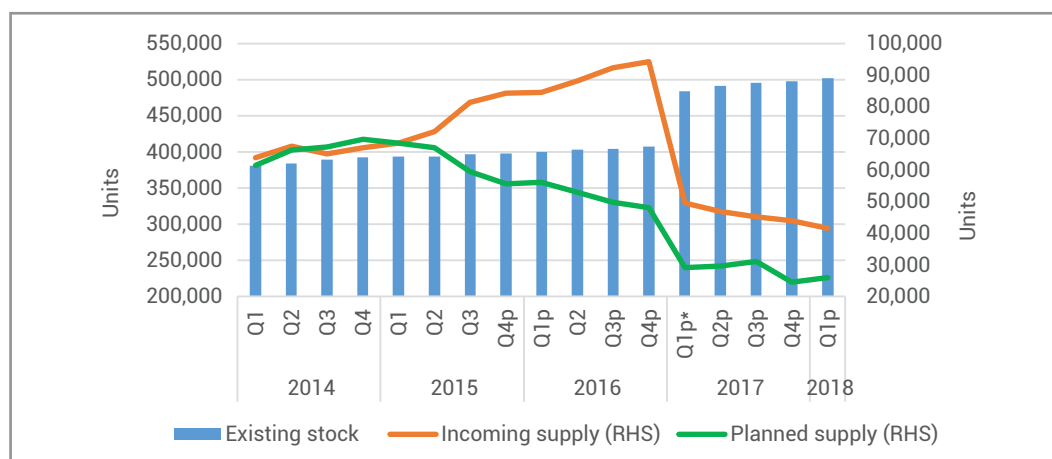


Notes: * For existing stock, the data were revised in Q1 2017 to include projects that have been completed and issued with Certificate of Completion and Compliance (CCC) in prior years but have only been captured in the current study period. For incoming supply, the data were revised in Q1 2017 to exclude projects that have since been completed and issued with CCC. Adjustments were also made to reflect the actual number of units built on-site (differing from total units in the initial plan). For planned supply, the data were revised in Q1 2017 to exclude projects with lapsed building plan approvals. Adjustments were also made to reflect projects that have since revised their building plans.
P=preliminary
Source: National Property Information Centre (NAPIC, 2018g).

Condominiums and apartments are the most popular residential type to be built by property developers as recorded in the first quarter of 2018, and Seberang Perai Selatan emerged as the only district with a significant increase in the supply of condominiums and apartments, including affordable housing units. The increase is in line with the development of Batu Kawan, which will potentially support Penang's engine of growth. For new approvals, the planned supply also revealed a sluggish trend with a deceleration rate of 11% in Q1 2018. The new approvals were primarily seen in Seberang Perai Utara and Seberang Perai Selatan, where a majority of the construction consisted of flats and two-to-three-storey terrace houses, respectively.

The demand for houses languished as the number of unsold residential units continue to rise. Based on the number of residential units launched, the number of unsold units increased by 41.4% to 2,478 units as of Q1 2018 (Q1 2017: 1,753 units), with a total value of unsold units amounting to RM2.1 billion in Q1 2018 – an increase of about 24% from RM1.7 billion in Q1 2017. Seberang Perai Tengah had the largest number of unsold units in Penang (43.8%), followed by Timur Laut (20.6%) and Barat Daya (16.4%). More than half of the unsold units were condominiums and apartments, the majority of which are located in Timur Laut and Barat Daya. Meanwhile, unsold two-to-three-storey semi-detached units were more substantial in Seberang Perai Selatan than other districts.

In contrast, the number of transacted residential units improved marginally at 2.3% in the first quarter of 2018 compared to a 7.2% contraction in Q1 2017. A total of 2,951 residential properties valued at RM1.2 billion were transacted, accounting for nearly 58% of total property transaction value in Penang. The expansion was predominantly attributed to the increase in residential properties valued between RM200,000 and RM250,000, with an increase of over 30% y-o-y during Q1 2018. This is also likely due to the upswing of affordable housing development priced between RM150,000 and RM300,000, where 11,152 affordable housing units were reportedly under construction in 2017 (See Box 3.6). Of these, 84% are being built in Penang Island while the remaining units are located in Seberang Perai, with a greater concentration in Seberang Perai Utara. The growth of residential properties valued above RM1,000,000 transacted, on the other hand, increased by 1% during the period compared to 16.2% in Q1 2017.

Looking at the supply of the residential market, the existing residential stock is expected to grow marginally due to the slowdown in incoming and new supply of residential units. Property developers are more cautious in investing new residential projects in response to the bearish trend of accumulative unsold residential units. Developers will have to strategically review future development plans to match the demand of homebuyers along with better resource and investment allocation.

## Box 3.6 Bridging the housing gap: Penang's affordable housing scheme
*by Ong Wooi Leng, Socioeconomics & Statistics Programme*

**Introduction**

Given that the increase in house prices is outpacing income growth, many Malaysians experience various challenges to purchasing a home. As reported by BNM, using the median multiple approach applied by Demographia International (2018), houses in Malaysia were severely unaffordable with a price-to-income ratio of 6.1 in 2016[25]. With a median household income of RM62,736 per year, this means that the median price for a house was more six times higher than the median household income, where a typical affordable house price should not be more than fourfold compared to one's median annual household income.

Interestingly, the mismatch of supply-demand houses is found to be more critical in Sabah and Sarawak compared to Kuala Lumpur and Penang. Sabah and Sarawak respectively recorded price-to-income ratios of 8.2 and 8.1 (Figure 3.46), with median monthly household incomes of RM4,110 and RM4,163 – slightly lower than the income in Terengganu (RM4,694) and Perlis (RM4,204). Meanwhile, the price-to-income ratios for Kuala Lumpur and Penang respectively were 6.8 and 6.3, marginally above the national average.

### Figure 3.46 House price-to-income ratio by states in Malaysia, 2016
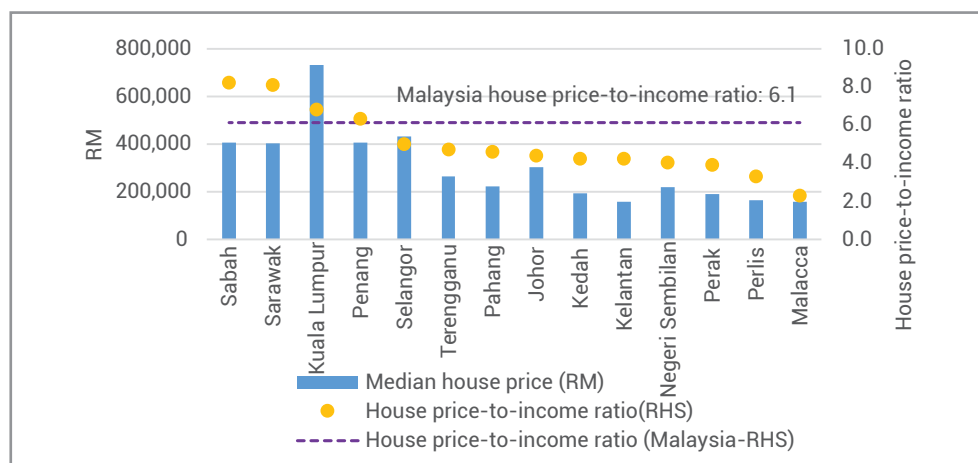


*Source: Author's own calculation based on data from the National Property Information Centre (NAPIC) and Department of Statistics, Malaysia.*

In Penang, high-rise units appear to be more affordable compared to other types of housing properties such as terraced, semi-detached, and detached houses, even though the price-to-income ratio for high-rise properties were slightly beyond the severely unaffordable threshold of 5.1. Condominiums and apartments, in particular, are severely unaffordable on Penang Island, with Timur Laut and Barat Daya respectively recording house price-to-income ratios as high as 8.6 and 8.0, compared to Seberang Perai Tengah (2.4) and Seberang Perai Utara (3.1). This has resulted in government intervention by ensuring an adequate supply of houses in meeting the housing needs of households on Penang Island.

**Supply of affordable homes in Penang**

Although the average house price has moderated in recent years, many households are still facing financial difficulties in owning a house in Penang. Due to the continued demand for houses, particularly from middle-income households, the Penang state government has intervened in the development of

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[25] "Median multiple is a method used by Demographia International (2018) and Ng (2017) to measure housing affordability in the country. It is calculated by dividing median house price with median annual household income, and it is also known as house price-to-income ratio. A ratio falling below 3.0 signifies that the houses are affordable, 3.1–4.0 means that the houses are moderately affordable, 4.1–5.0 shows that the houses are seriously unaffordable, and 5.1 and above indicates that the houses are severely unaffordable.

residential property through a collaboration with private property developers to strategically bridge the affordable housing gap in Penang.

Penang's affordable housing scheme is divided into three major categories: Type A (houses priced RM42,500 and below), Type B (houses priced not more than RM75,000), and Type C (houses priced up to RM300,000). In general, a household with an income of not more than RM10,000 per month is eligible to apply for an affordable home corresponding to the level of household income.[26]

Based on the latest data provided by the Penang State Housing Department from 2010–17, all completed affordable homes involved Types A and B, where the number of Type A housing units were proportionately higher than Type B (Table 3.44). Meanwhile, 11,152 Type C homes are still under construction as of April 2018; these are largely being built by private property developers, with the majority being built on the island. Among the projects that are expected to be completed by 2018 include Taman Gema Intan at Jelutong, Taman Ria at Teluk Kumbar, Dua Residensi and One Foresta at Bayan Lepas, and Jiran Residensi at Butterworth.

### Table 3.44 Supply indictors of affordable housing in Penang, 2010–17

|  |  | Existing stock | | | Incoming supply | | | Planned supply | | |
|---|---|---|---|---|---|---|---|---|---|---|
|  |  | Public | Private | Total | Public | Private | Total | Public | Private | Total |
| Penang Island | Type A | 204 | 4,264 | 4,468 | 0 | 1,880 | 1,880 | 0 | 1,610 | 1,610 |
|  | Type B | 510 | 5,124 | 5,634 | 667 | 2,145 | 2,812 | 1,753 | 1,473 | 3,226 |
|  | Type C | 0 | 0 | 0 | 348 | 9,018 | 9,366 | 2,569 | 4,051 | 6,620 |
| Seberang Perai | Type A | 195 | 4,696 | 4,891 | 0 | 1,091 | 1,091 | 1,098 | 2,384 | 3,482 |
|  | Type B | 0 | 738 | 738 | 502 | 249 | 751 | 5,591 | 0 | 5,591 |
|  | Type C | 0 | 0 | 0 | 725 | 1,061 | 1,786 | 11,533 | 186 | 11,719 |
| **Grand total** | **Type A** | **399** | **8,960** | **9,359** | **0** | **2,971** | **2,971** | **1,098** | **3,994** | **5,092** |
|  | **Type B** | **510** | **5,862** | **6,372** | **1,169** | **2,394** | **3,563** | **7,344** | **1,473** | **8,817** |
|  | **Type C** | **0** | **0** | **0** | **1,073** | **10,079** | **11,152** | **14,102** | **4,237** | **18,339** |

*Source: Ministry of Higher Education, Malaysia.*

Looking at the median household income of Penang residents, the supply of affordable homes is important to reflect the level of household income in each district. According to the Household Income Survey 2016, households on Penang Island earned more than those living in Seberang Perai. As such, more Type C affordable homes would be needed for households with greater monthly household income, such as in Timur Laut.

While the supply of new low-cost affordable homes will continue to consistently increase in both Penang Island and Seberang Perai, approvals for new affordable home projects are estimated to increase substantially in Seberang Perai. In 2017, more than 20,000 low- and medium-cost affordable housing units were planned for Seberang Perai, with about 88% to be developed by public developer Penang Development Corporation (PDC) Properties. Of this, more than 8,000 medium-cost affordable homes are planned for Bandar Cassia in Seberang Perai Selatan. This may be because of the state's next phase of development focus, where commercial and industrial clusters in the region are expected to attract more workers in the near future.

**Demand for affordable houses**

Demand for affordable homes continue to be robust, underpinned by the slow growth in household income and rising house prices. The number of applications for affordable homes on Penang Island is

[26]  Households earning not more than RM2,500 are entitled to Type A home application, households earning not more than RM3,500 are eligible for Type B application, households earning not more than RM6,000 are eligible to purchase Type C1 houses at a maximum price of RM150,000, households earning not more than RM8,000 are allowed to purchase Type C2 houses priced not more than RM200,000, and households earning not more than RM10,000 are eligible to apply for Type C3 (not more than RM300,000) affordable houses.

far greater compared to applications for affordable homes in Seberang Perai. From 2008–17, more than 70% of total applications were for affordable units in Timur Laut and Barat Daya. Likewise, a majority of applications for higher-cost affordable homes (Type C) trended towards affordable units in Timur Laut.

One key reason is that the majority of households living on Penang Island are eligible for Type C affordable homes rather than Types A and B low-cost affordable homes. According to the 2016 Household Income Survey, Timur Laut and Barat Daya had the most households with monthly incomes falling in the RM5,000–10,000 bracket, comprising over half of total households in the respective district. In comparison to Seberang Perai, about a quarter of total households on Penang Island earned not more than RM4,000 a month. However, more than 35% of households in Seberang Perai fall into this income bracket, with Seberang Perai Selatan registering the highest proportion of low-income households.

Therefore, more applications for Type C affordable homes are likely to be seen in Penang Island while more applications for low-cost affordable homes in Seberang Perai are forecast, with the assumption that there exists a low level of residential mobility intention among households.

**Conclusion**

It is a challenge for the state government to provide sufficient affordable houses that cater to the needs of all household segments. The socio-economic background of homebuyers is necessary to take into consideration before planning for an affordable home project. Age, occupation, housing types, location, connectivity, and environment may be included in homebuyers' decision. To strengthen the state's affordable housing scheme, it is important for policymakers to look into the socio-economic status of homebuyers by introducing strategies that match the preferences of homebuyers and avoid any unsold affordable units.

*Slowdown in non-residential property*

As of the first quarter of 2018, the total incoming supply of non-residential properties declined sharply at 44.3% to 4,217 units, down from 7,568 units in Q1 2017. This was mainly due to the drastic drop in construction activity in commercial[27] (44.3%) and industrial properties (39.9%). Non-residential properties priced below RM100,000 reported the highest growth rate at about 49%, compared to properties at other price ranges, totaling at RM22.3 million in Q1 2018. This was followed by properties priced between RM50,000 and RM100,000 (35.1%), and RM300,000 and RM400,000 (20.3%). Commercial property and development land had particularly high numbers of units being transacted compared to industrial and agricultural projects. About 340 units commercial and development properties were transacted in Q1 2018.

Among the commercial properties, Penang had only four purpose-built office (PBO) units under construction, with three being supplied by private property developers, while the shop segment, which were under construction, dipped at about 64%, or slightly more than 1,900 units. Small office/home office (SOHO) and serviced apartments continued to increase at 2.2% and 31.2%, respectively, amounting to more than 4,000 units as of the first quarter of 2018; the majority of these commercial units are located in Timur Laut. In particular, shop units and office lots in Timur Laut accounted for the majority of transacted units in Penang, comprising 45 units and 34 units, respectively, valued at RM43 million.

For industrial properties, incoming supply plunged to 181 units, primarily situated in Seberang Perai Tengah, with semi-detached having the most units, followed by detached. In the first quarter of 2018, semi-detached projects continued to gain popularity compared to terraced units. Many new approvals were issued to projects with plans to build semi-detached industrial units, even though the demand for terraced industrial units are higher. Although Barat Daya had the fewest industrial properties sold, it made up the highest value of transactions in

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[27]  Including purpose-built offices (PBO), shopping complexes, small office-home offices (SOHO), serviced apartments, and shops.

Penang, with detached factories accounting for 88% of total sales in the district (RM80.5million) during Q1 2018.

In comparison to the proportion of PBO units among major cities, George Town's rental prices for a PBO unit, on average, grew higher than the rest of the country, seeing a 4.4% y-o-y increase in the last quarter of 2017 compared to Johor Bahru (3.5%) and Klang Valley (3.1%) (Figure 3.47). The PBO rental index had been consistently growing at a higher rate than in Klang Valley and Johor Bahru. However, the average rental prices of a PBO unit in George Town remained the lowest among the three cities, charging only RM30.28 per square meter (psm) as compared to RM46.84 psm in Klang Valley and RM33.48 psm in Johor Bahru.

In terms of the take-up rate for PBO, Penang has a stable rate of occupancy in privately owned office space, hovering at 76% from Q3 2016 to Q1 2018, compared to Selangor and Kuala Lumpur (Figure 3.48). This is partly due to the fact that the existing office spaces remained constant for the past year, with a total of 822,040,000 square meters as of Q1 2018 (Selangor: 3,403,520 square meters; Kuala Lumpur: 8,394,700 square meters). The occupancy rate for retail spaces in shopping complexes, on the other hand, remained weak in Penang, compared to Kuala Lumpur and Selangor (Figure 3.49). The rate lingered below 75% in Penang while Kuala Lumpur and Selangor recorded rates of as high as 85%. Penang's occupancy rate has been improving since Q1 2017.

Figure 3.47 Average rental price and annual growth of PBO units in major cities, Malaysia
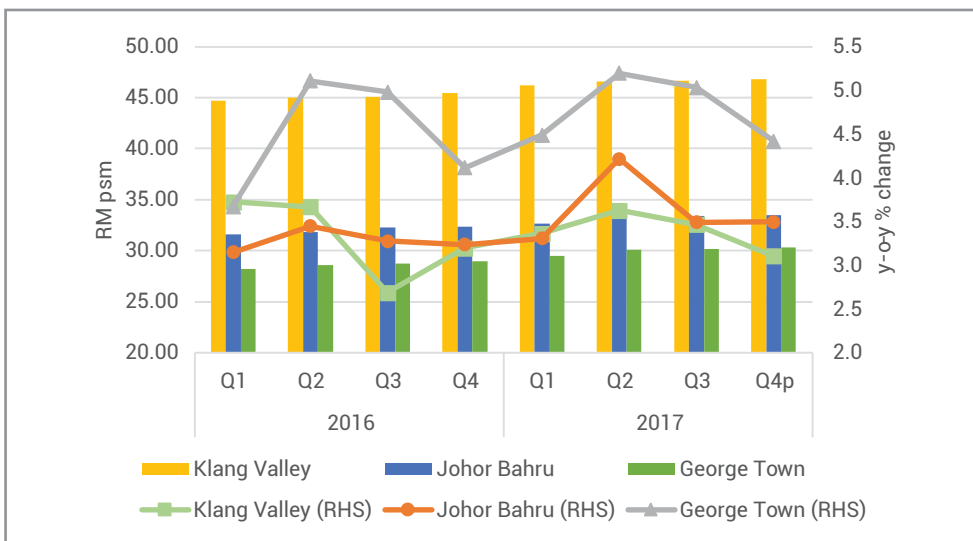


*Note: P=preliminary*
*Source: National Property Information Centre (NAPIC, 2018f).*

Figure 3.48 Occupancy rate for office space by major cities in Malaysia (%)
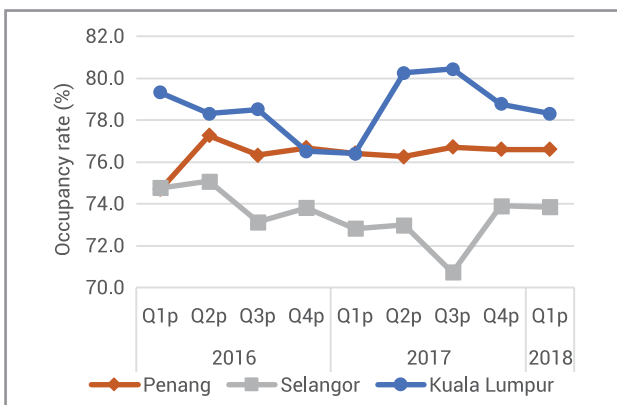


*Note: P=preliminary*
*Source: National Property Information Centre (NAPIC, 2018a).*

Figure 3.49 Occupancy rate for retail space by major cities in Malaysia (%)
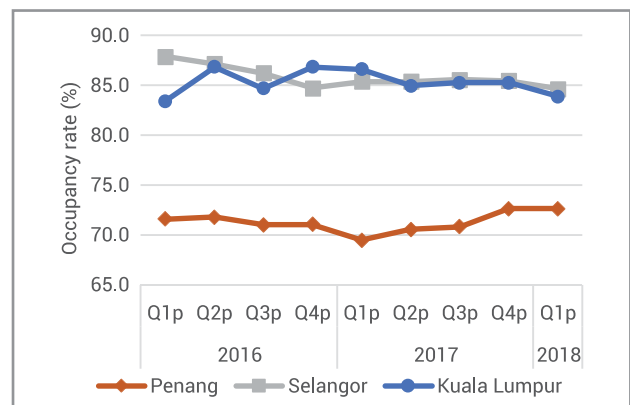


*Note: P=preliminary*
*Source: National Property Information Centre (NAPIC, 2018a).*

Demand for commercial properties continued to be unsatisfactory during the first quarter of 2018. With 125 launched units, 60% units, worth about RM 40 million, were unsold during this period. All unsold units were located in Seberang Perai Utara. In the same period last year, only 40% of units were not taken up despite about a much bigger launch of about 665 shop units. Furthermore, the demand for serviced apartments was weaker than the shop category. Out of 206 units of serviced apartments launched, only five were unsold in Q1 2017; but in Q1 2018, only 37% or 132 units, valuing at nearly RM 48million, (total units launched: 360 units) were sold. All unsold units were in Seberang Perai Tengah.

Although the value of completed non-residential construction activity increased sharply by 32.7% to RM732.5 million in Q1 2018 (Q1 2017: RM552,016), the non-residential property market is expected to experience a moderate hike in 2018 due to the completion of shopping areas at Batu Kawan in Seberang Perai Selatan. This is likely to boost the rental rate for shops and the occupancy of retail spaces in 2019 within this area. But this is also dependent on market demand, and it is expected that the speed of building non-residential property will slow down as a result of available unsold commercial units.

## 3.4 Agriculture Sector

As the country continues to grow, the agriculture sector has diminished to make way for Malaysia's transformation into an industrialised economy. Although the agriculture sector contributes very little to Penang's GDP (2%), it plays an important role in the state economic development, functioning as a food supplier, employment provider, export earner, and provider of raw materials for agro-based industries. It is also one of the main economic pillars of the Northern Economic Corridor Region (agriculture, manufacturing, and tourism). In spite of the opportunities, Penang's agriculture industry faces an array of challenges resulting from resource constraints (land and labour), heavy dependence on imported raw materials, and vulnerability to climate change and disease.

### 3.4.1. Crops sub-sector

Overall crop land use decreased from 2001 to 2016, especially for coconut, vegetables, spice crops, and fruits (Table 3.45). After industrial crops (rubber, oil palm, coconut, and cocoa), paddy fields have the highest percentage of total agricultural land in Penang. The paddy and rice industry in Malaysia has always been given special treatment owing to the strategic importance of rice as a staple of the country. It is also the third-most-important crop after rubber and palm oil. Seberang Perai, as one of the eight major granary areas and the hub of paddy production in Peninsular Malaysia, is a significant contributor with its relatively high productivity to the domestic production of the country.

### Table 3.45 Crop land use in Penang (hectares), 2001−16

| Crops | 2001 | 2006 | 2011 | 2016 |
|---|---|---|---|---|
| Paddy | 13,448.0 | 12,782.0 | 12,782.0 | 12,782.0 |
| Fruits | 6,830.0 | 6,812.0 | 6,921.1 | 4,715.7 |
| Rubber | 12,758.0 | 11,177.0 | 10,837.6 | NA |
| Oil palm | 12,988.0 | 13,962.0 | 13,864.6 | 14,135.0 |
| Coconut | 2,339.1 | 2,195.0 | 1,991.8 | 329.1 |
| Cocoa | 103.5 | 10 | 8.2 | NA |
| Vegetables | 1,718.0 | 481 | 477.2 | 715.4 |
| Cash crops | NA | 269 | 236.9 | 216.5 |
| Spice crops | 318.0 | 167.9 | 251.0 | 138.3 |
| Sugar cane | NA | NA | 37.3 | 42.9 |
| Others | 74.2 | 50.4 | 32.2 | NA |
| **Total** | **50,576.8** | **47,906.2** | **47,439.8** | **33,074.9** |

*Note: NA=Not available.*
*Source: Derived from the data provided by Department of Agriculture, Penang; Penang in Numbers 2014/2015 and 2015/2016; Malaysian Palm Oil Berhad (MPOB); and Rubber Industry Smallholders Development Authority (RISDA).*

In 2016, Penang produced approximately 148,290 metric tons of paddy, up from 133,050 metric tons in 2009 (Figure 3.50). In 2016, paddy production decreased by about 1% compared to 2015, possibly due to weather conditions (high temperatures and low rainfall). Penang's rice yield is the second-highest in the country after Selangor (Figure 3.51), yet its rice production has not met domestic demand. Based on the national per capita rice consumption of about 82.3 kg per year[28] and a total population of 1.7 million, Penang's rice needs in 2016 were estimated to be around 141,366.7 metric tons. With a total rice production of 88,974 metric tons in 2016, Penang's rice self-sufficiency level (SSL) was roughly 63%, with imports filling in the remainder of market demand. Nevertheless, with the increase in per capita income and changes in consumption patterns and lifestyle, rice consumption is expected to drop in the future.

Figure 3.50 Paddy production in Penang, 2009–16
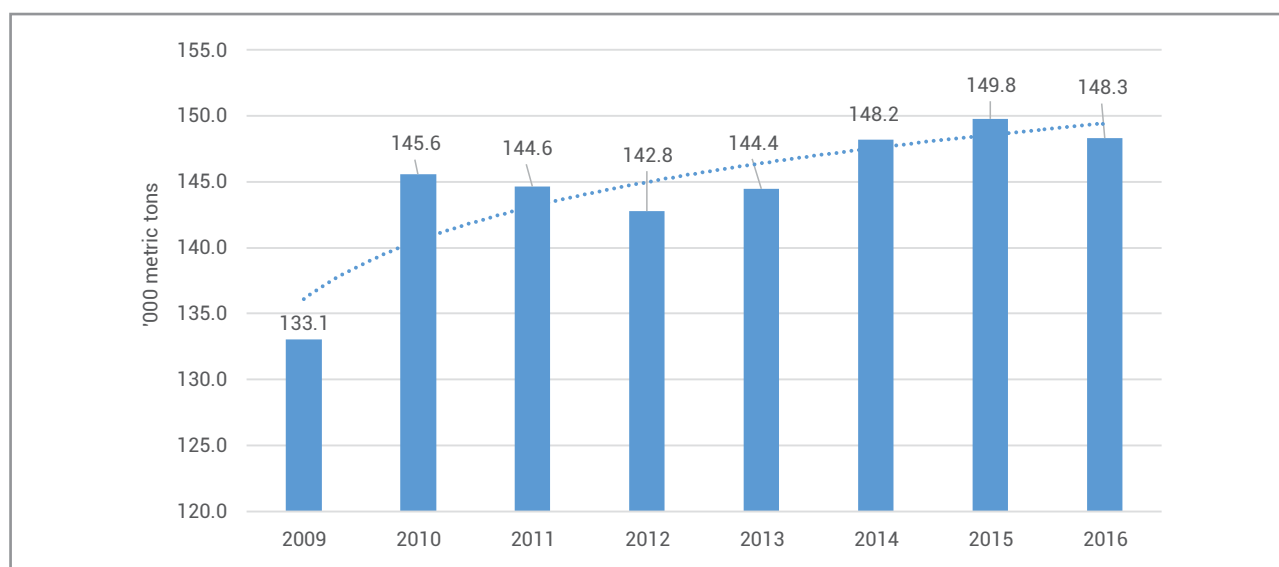


*Source: Department of Agriculture, Penang.*

Figure 3.51 Average yield of paddy by state, 2016



*Source: Department of Agriculture, Penang.*

28  Gain Report: Grain and Feed Annual (2017). Retrieved from: https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Grain%20and%20Feed%20Annual_Kuala%20Lumpur_Malaysia_3-27-2017.pdf

Although the rice industry in Penang shown a positive growth, it still faces many challenges including economic, social, technology, and infrastructure. For instance, urbanisation, industrialization, and expansion of residential areas have resulted in limited available farm land. Promising and attractive employment in the industrial sector led to an acute labour shortage. Furthermore, the lack of modern farming machines, rice processing equipment, and rice by-product reprocessing facilities to maximise their full economic potential resulted in slower production growth.

The agriculture sector in Malaysia has always been geared towards the production of export commodities such as palm oil, rubber, and cocoa. However, the food industry, other than paddy, has not received adequate support, as the government is more interested in developing export crops. Hence, the potential downstream sectors for the agro-food industry such as fruits, vegetable, and livestock did not develop, which explains Malaysia's heavy dependency on imported fruits, vegetable, feed stuff, dairy products, and processing food items.

As there is high demand for land in other sectors, the fruit industry faces intense competition. Although the planted area of fruits in Penang decreased by about 34% in 2016 compared to 2009, its production increased by nearly 29% (Table 3.46), meaning that there has been an increase in average yield per hectare (productivity) in Penang. The fruits industry is suffering from high cost of production, inconsistency in supply, market access, and poor food safety and quality standards. The increasing cost of production is mostly due to labour shortage, dependency on imported raw materials, and limited land area for fruit cultivation.

Despite the growing vegetable sector, Malaysia is still a net importer of vegetables as domestic production is unable to meet growing domestic demand. Growing health concerns as well as the rise of vegan/vegetarian culture are expected to contribute more to the growth of demand for vegetables.

In Penang, the cultivated area of vegetables is about 2% of total agricultural land use. Despite the limited land allocated to the agricultural sub-sectors, the vegetable industry has managed to grow in size. The planted area of vegetables has seen an average annual growth rate of about 6% between 2009 and 2016. Along with the growing planted area, Penang's vegetable production has also increased by about 8% within the same period (Table 3.47).

## Table 3.46 Fruits production and planted area in Penang, 2009−16

| Year | Production ('000 metric tons) | Growth rate (%) | Planted area (hectares) | Growth rate (%) |
|------|-------------------------------|-----------------|-------------------------|-----------------|
| 2009 | 76.5 | - | 7,149.8 | - |
| 2010 | 77.4 | 1.2 | 6,926.2 | -3.1 |
| 2011 | 80.5 | 4.0 | 6,921.1 | -0.1 |
| 2012 | 92.6 | 15.0 | 6,085.1 | -12.1 |
| 2013 | 67.6 | -27.0 | 6,706.4 | 10.2 |
| 2014 | 85.9 | 27.1 | 5,602.3 | -16.5 |
| 2015 | 91.0 | 5.9 | 4,816.1 | -14.0 |
| 2016 | 98.6 | 8.4 | 4,715.7 | -2.1 |

*Source: Department of Agriculture, Penang.*

Table 3.47 Vegetable production and planted area in Penang, 2009–16

| Year | Production ('000 metric tons) | Growth rate (%) | Planted area (hectares) | Growth rate (%) |
|------|------|------|------|------|
| 2009 | 28.0 | - | 489.4 | - |
| 2010 | 29.0 | 3.4 | 477.2 | -2.5 |
| 2011 | 31.6 | 9.1 | 477.2 | 0.0 |
| 2012 | 33.8 | 7.3 | 600.6 | 25.9 |
| 2013 | 50.7 | 49.9 | 601.1 | 0.1 |
| 2014 | 42.4 | -16.4 | 690.6 | 14.9 |
| 2015 | 43.9 | 3.5 | 712.3 | 3.1 |
| 2016 | 44.0 | 0.2 | 715.4 | 0.4 |

*Source: Department of Agriculture, Penang.*

Overall, the agriculture sector in Malaysia and Penang is hindered by fragmented small-scale farmers, rising demand, and cost of production. Malaysia also has to compete with other countries such as China and Thailand in the international market. China benefits from lower production and shipping costs compared to producers in Malaysia. China's agricultural industry has also influenced the major global export markets, such as Japan, South Korea, Taiwan, Hong Kong and Singapore. Furthermore, climate change, lack of freshwater, and spread of diseases should be dealt with in order to have a sustainable growth.

### 3.4.2 Livestock sub-sector

The livestock industry is Malaysia's largest source of protein. In 2016, this industry contributed around 11.6% to the GDP of the agriculture sector in Malaysia, 0.9% more than 2015. The contribution of the livestock sector to the economy is relatively small, yet the sector has grown gradually over the years.

According to the Department of Veterinary Services (DVS) Penang, there were 1,456 livestock breeders in Penang in 2017, a decrease of 2.5% over the previous year. The livestock population also dropped by 15% from 13.3 million in 2016 to 11.3 million in 2017.

The livestock sector is divided into two main categories: ruminants including cattle, sheep, goat, and buffalo, and non-ruminants encompassing chicken, duck, pig, and egg. Beef is produced from beef cattle, buffaloes, and cull dairy cattle. The beef production in Penang has seen a significant rise during 2012–17. Within this period, beef production grew from 1,662.2 metric tons in 2012 to 2,891.6 metric tons in 2017, an increase of 3.6%. Its value also increased by 7.5% (Figure 3.52). The incremental increase in demand for beef is still well above production. As projected by the 11th Malaysian Plan, by 2020 the demand for beef/buffalo meat is expected to increase to 12,400 metric tons, while the production may only increase to 3,020 metric tons. This enormous gap between supply and demand might explain the 36.3% SSL of the beef and buffalo sector in 2015.

Figure 3.52 Production and value of beef/buffalo in Penang, 2012–17
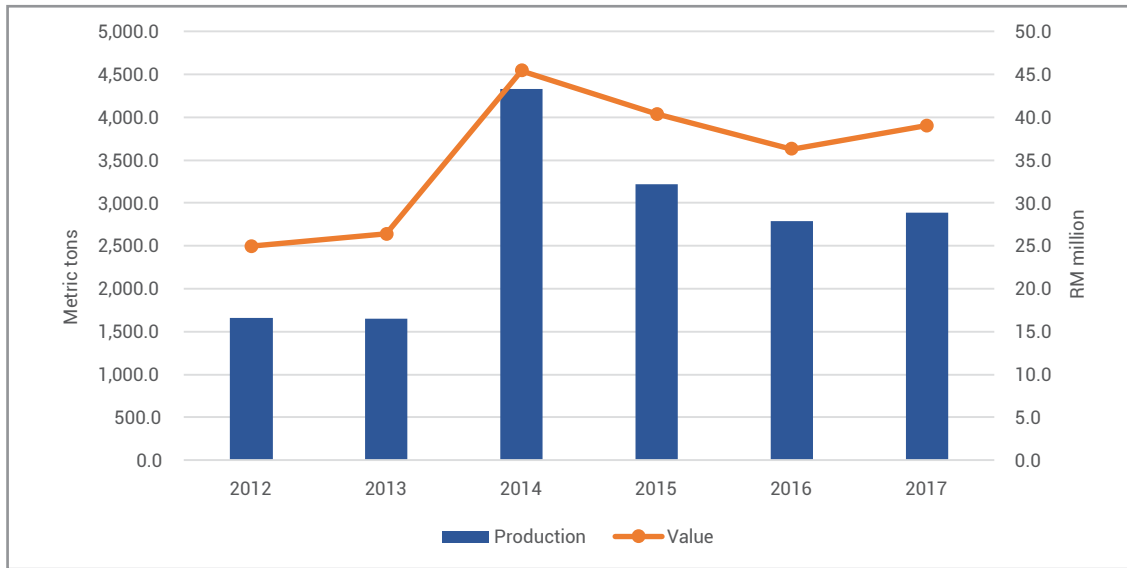


*Source: Department of Veterinary Services, Penang.*

The goat/sheep industry in Penang and Malaysia is still in its infancy. Despite an extensive growth in goat/sheep meat production from 108.5 metric tons in 2012 to 249.1 metric tons in 2017 (Figure 3.53), total production is still well below the 1,630 metric tons in projected demand. According to the latest available data released by the DVS in 2015, Penang's goat/sheep industry has the lowest SSL (14.9%) compared to other commodities such as beef (36.3%), chicken (118.9%), pork (265.8%), and eggs (76%). Malaysia has been filling the supply gap through imports from Australia, New Zealand, and South Africa. This is often due to the lack of entrepreneurship and government intervention in the sector.

The fresh milk industry in Penang is often sidelined. As illustrated in Figure 3.54, the production and value of fresh milk increased by about 29.5% and 354.9%, respectively, in 2017 compared to 2012. Although the quantity and value of fresh milk experienced a significant increase within the past five years, there is still a huge gap between supply and demand. In 2017, the production of fresh milk was nearly 0.6 million litres while demand was estimated to be 92.6 million litres. By 2020, fresh milk output (0.7 million litres) is expected to continue trailing demand (107.2 million litres). The increasing awareness among the population regarding the nutritional benefits of fresh milk, paired with the increasing consumer preference for dairy products, has been fueling the rise in demand for fresh milk.

Figure 3.53 Production and value of goat/sheep meat in Penang, 2012–17
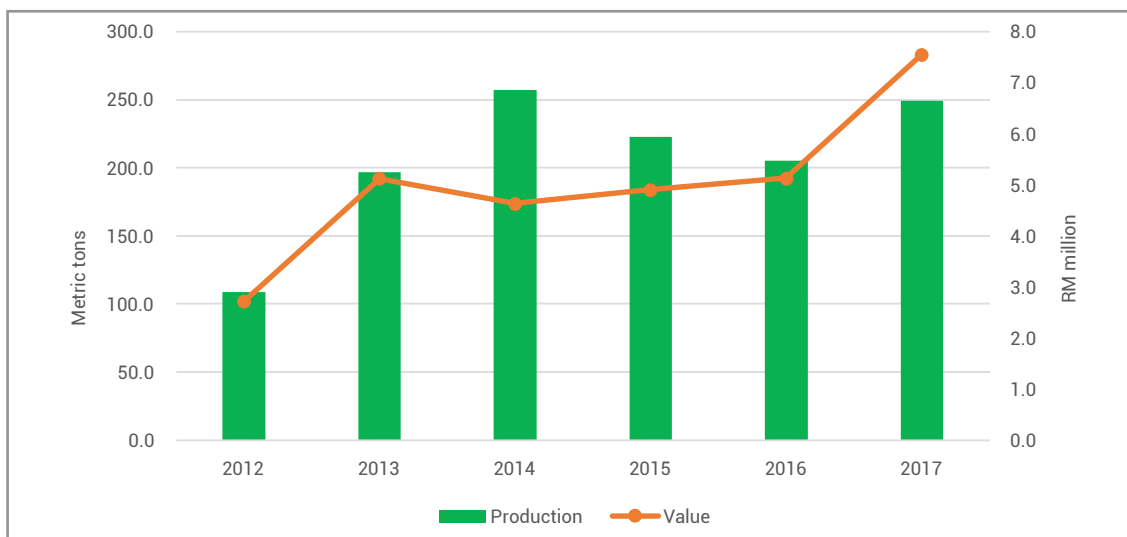


*Source: Department of Veterinary Services, Penang.*

Figure 3.54 Production and value of fresh milk in Penang, 2012−17
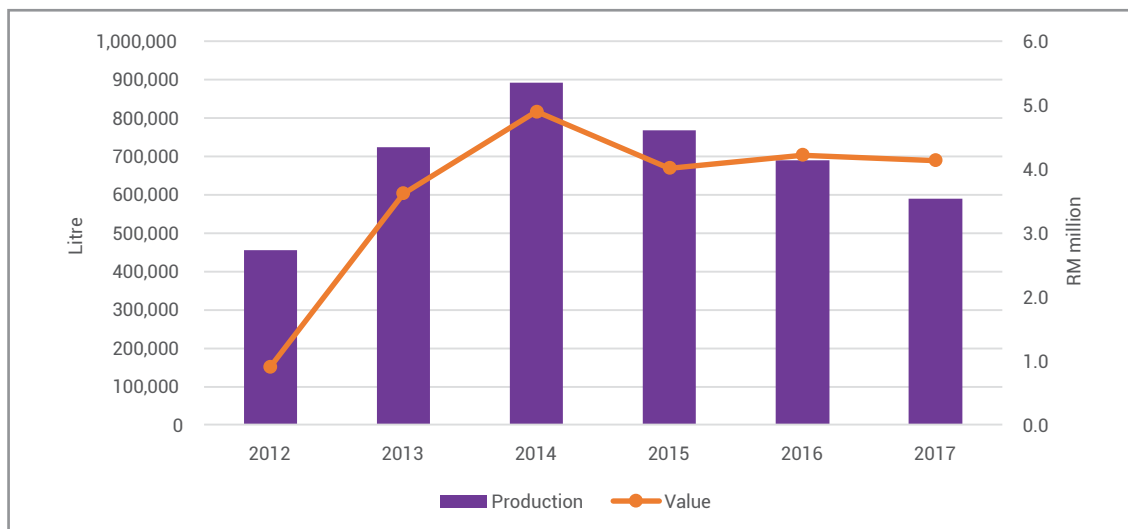


*Source: Department of Veterinary Services, Penang.*

In the non-ruminant sector, the production of pork and chicken in Malaysia and Penang has always been above domestic demand. Over the past five years, the production and value of pork increased by 29.3% and 27%, respectively (Figure 3.55). In 2015, the output of 31,577.5 metric tons of pork meat has enabled Penang to achieve an SSL of 265.8%. This figure solidifies the pork industry in Penang as the most self-sufficient when compared to other commodities, allowing Penang to be a net exporter of pork.  By 2020, the output of pork meat is forecast to reach 31,890 metric tons while the demand will grow to 13,620 metric tons.

In 2017, Penang's chicken/duck production dropped by about 12.6% compared to 2012, yet its value increased by approximately 9% within the same period (Figure 3.56). The production of poultry meat has had a steady output with minor fluctuations over the last three years (2014−17). Despite the negative growth, Penang's poultry sector caters well to domestic demand, with an SSL of 120% in 2015.

Figure 3.55 Production and value of pork in Penang, 2012−17
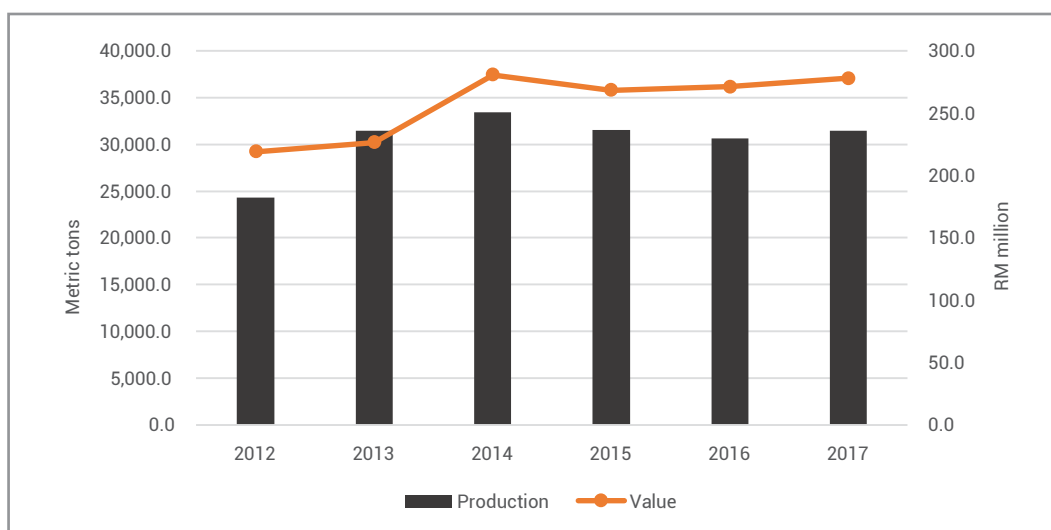


*Source: Department of Veterinary Services, Penang.*

Figure 3.56 Production and value of chicken/duck in Penang, 2012–17
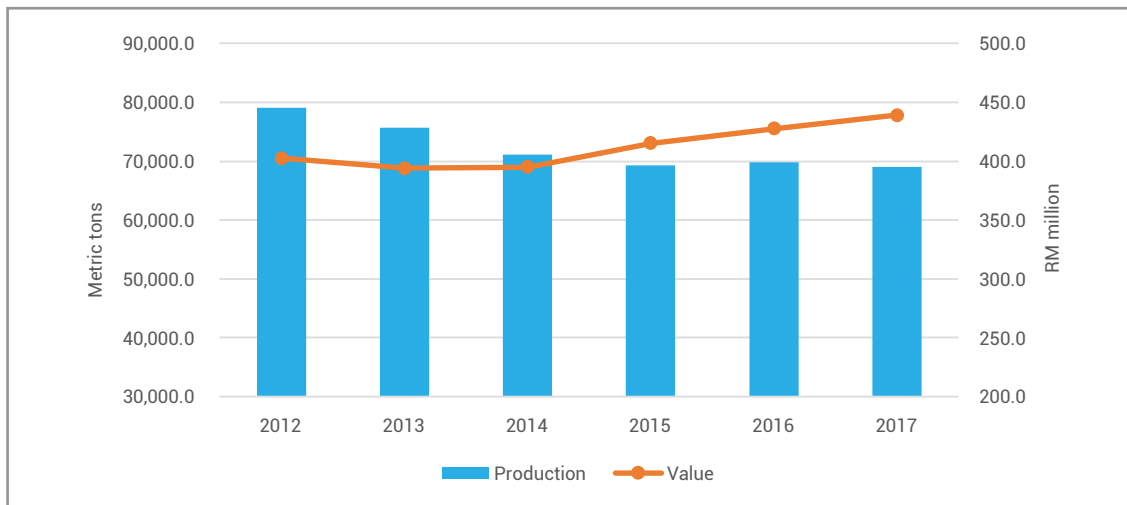
Furthermore, the production and value of egg (chicken/duck) dropped significantly by 32.9% and 34.3%, respectively, in 2017 compared to 2012 (Figure 3.57). By 2020, Penang is forecast to have a domestic demand of 514.2 million eggs, while output is expected to reach 335.2 million eggs.

Overall, rapid economic and population growth in Malaysia and Penang led to an increase in demand driven consumption of livestock products. While the non-ruminants industry responded by enhancing its domestic supply, the ruminants sector faced stresses on its production system. The non-ruminants sector is well developed and commercialised with modern technology and the involvement of the private sector, while the ruminants sector is lagging behind in terms of technology and production. Despite making some progress, the ruminants sector is unable to produce enough to meet domestic consumption.

Problems that runs through the ruminants are a lack of land resources, high feed prices, cheaper import substitutes, lack of private sector involvement, lack of modern technology, and low number of quality breeds, expertise, and workforce.

Figure 3.57 Production and value of egg (chicken/duck) in Penang, 2012–17
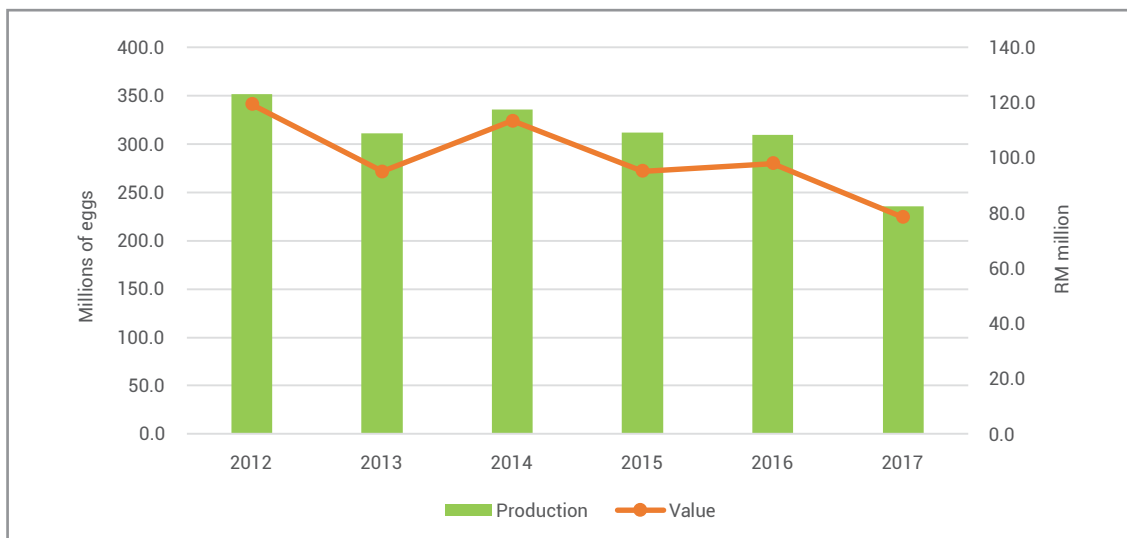
### 3.4.3 Fisheries sub-sector

For many years, the fisheries industry in Penang has played important role in poverty reduction, especially among coastal communities, as well as in achieving food security. In line with population growth and increases in consumption of animal protein associated with changes in lifestyle and rising incomes, demand for aquatic food products is expected to increase.

Fishing in Penang remains a means of livelihood for traditional fishermen. In 2016, the fisheries sector provided direct employment to 4,973 fishermen, 444 culturists, and 1,872 workers who were involved in the aquaculture industry. Out of 7,289 people working in the fisheries sector, 6,124 (84%) are local. In 2016, Penang's food fish sector, which consists of marine capture fisheries, aquaculture fisheries, and inland fisheries, produced about 87,283 metric tons, valued at RM1.26 billion. However, domestic demand for fish exceeds local supply. In 2016,

Penang's food fish production reached the highest wholesale value in the country. Marine capture, aquaculture, and inland fisheries contributed about 65.3%, 34.6%, and 0.05% to the state's total food fish production in 2016, respectively.

*Marine capture fisheries*

As illustrated in Figure 3.58, Penang's marine capture fisheries declined significantly by about 49% from 46,177 metric tons in 1995 to 23,450 metric tons in 2005, due mainly to overfishing. After years of steady decline in marine fisheries production, the quantity of marine fish landings began to increase to a high of 63,972 metric tons in 2011, and was reportedly around 57,013 metric tons in 2016. The wholesale value of captured fisheries increased dramatically from RM152.6 million in 1995 to RM605.4 million in 2016. It is projected that the marine captured fishery production would increase at a rate of 10% per year until 2020.

Figure 3.58 Marine landing fish production and value in Penang, 1995−2016
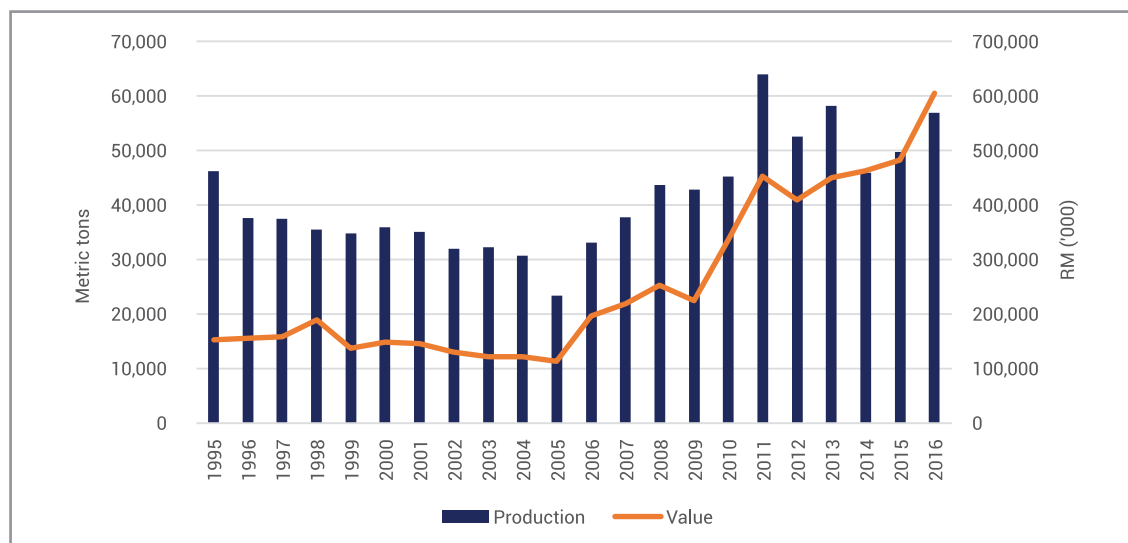


*Source: Department of Fisheries, Malaysia.*

In the west coast of Peninsular Malaysia, overfishing is mostly caused by trawl fishing. Trawling is destructive, as trawl gears drag their nets along the seabed, not only catching juvenile fish but also destroying their breeding or spawning grounds. In Penang, the greatest contributions to total landings were made by drift/gill nets (56%) followed by trawl nets (31%) (Figure 3.59).

*Aquaculture sector*

Production from marine capture fisheries in the west coast of Peninsular Malaysia may become unreliable since many fish stocks have been overexploited, and various means of increasing production through aquaculture are being explored. The aquaculture sector in Malaysia is diverse in terms of species and culture systems. In Penang, aquaculture products come through two culture systems: freshwater comprising ponds, cement tanks, and canvas tanks; and brackish water including ponds, cages, cockles, mussels, and oysters.

Over the last two decades (1995–2016), Penang's aquaculture sector has grown at an average annual growth rate of 5.5% and 20% in production and value, respectively (Figure 3.60). In fact, the percentage contribution of aquaculture to total fish production

shows an increasing trend and, as predicted by the Department of Fisheries (DOF) Malaysia, the overall aquaculture production in Penang will continue to increase at a rate of 10% per year until 2020. However, Penang's total aquaculture production dropped significantly by about 55.6% in 2016 compared to 2014, mostly due to the 2015/2016 El Niño event, and diseases. Penang is currently the third-largest producer of aquaculture products in the country, after Sabah and Perak. The aquaculture industry is the main income earner of Penang's fisheries sector, followed by marine-captured fish products. The industry can be the main driving force to enhance the economy of the state.

In 2016, Penang's aquaculture production gained the highest wholesale value in the country. Brackish water ponds and cages constitute the majority of Penang's aquaculture and have the highest number of culturists. Fisheries from brackish water have been contributing about 32.4% of the total fish production and about 51.1% of its value in Penang. Sea bass and snapper recorded the highest production, followed by shrimp, cockle, and other brackish water cages species, such as grouper and mackerel. Brackish water aquaculture is one of the most economically valuable fisheries in Penang.

Figure 3.59 Landing of marine fish by fishing gear group, Penang, 2016
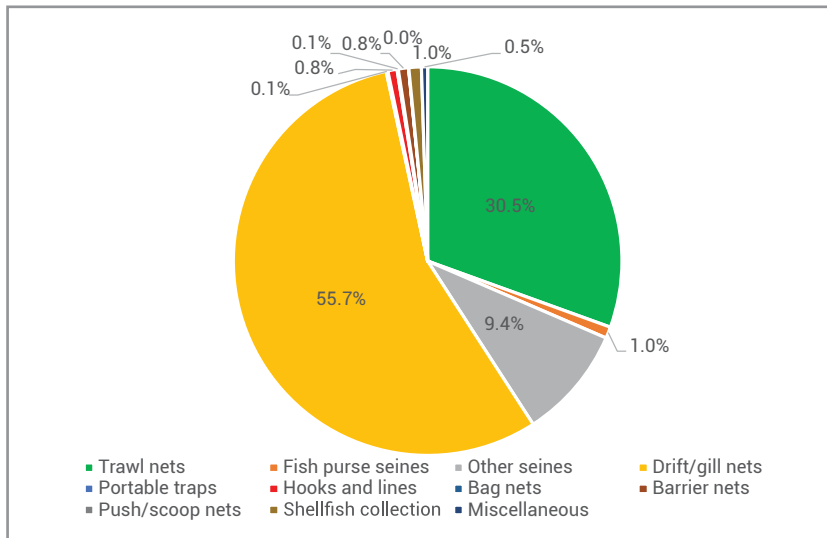


*Source: Department of Fisheries, Malaysia.*

Figure 3.60 Aquaculture production and value in Penang, 1995–2016
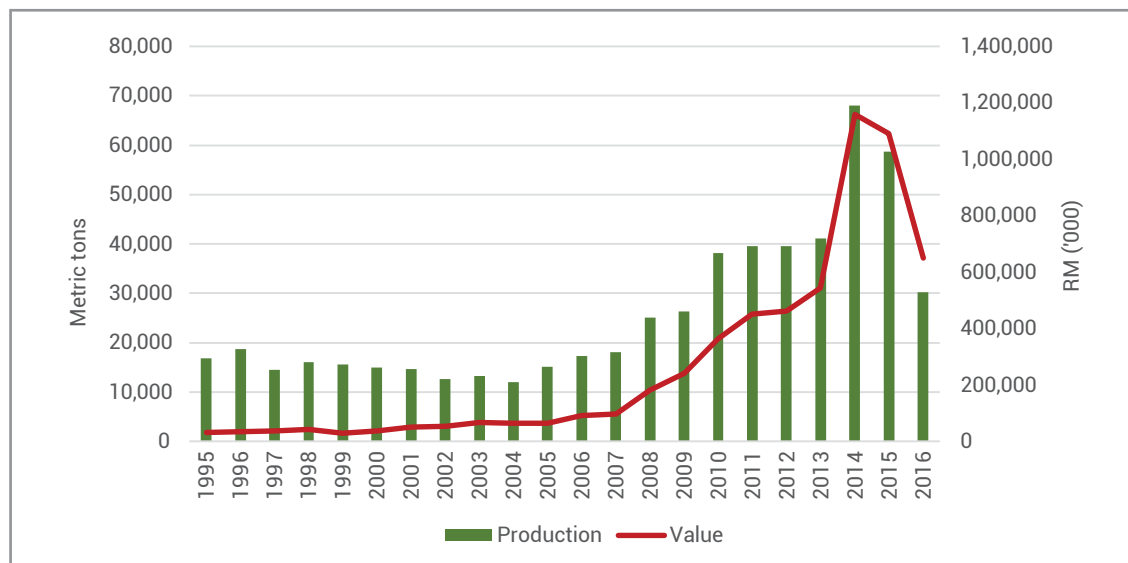


Source: Department of Fisheries, Malaysia.

Shrimp culture in brackish water pond contributes most in terms of value. Although Penang's shrimp production dropped dramatically by 58.7% in 2016 compared to 2015, its value was the second-highest in the country. In 2016, Penang produced 4,323.7 metric tons of Hawaiian white shrimp valued at RM116.4 million. In fact, shrimp aquaculture is a high-income venture for farmers and has a very high export value. Since returns from shrimp aquaculture can be forecasted, it provides farmers a higher and more stable income than fishing or other agricultural activities such as rice farming and oil palm plantation (Kharas et al., 2010). However, unplanned and unsustainable development of shrimp farms may have serious environmental costs such as habitat destruction and displacement of traditional livelihoods. Therefore, organic aquaculture practices and best management practices would enhance the sustainable development of shrimp aquaculture.

Being rich in natural mudflats has made Penang a suitable breeding area for the cockles. Penang is the fourth-largest cockle producer in the country after Perak, Selangor, and Johor. Cockle culture is the fifth-largest income earner for Penang's aquaculture industry.

In the non-food fish sector (ornamental fish and aquatic plants), ornamental fish is the main contributor with a value of approximately RM23.8 million in 2016. Penang is the third-largest producer of ornamental fish in the country, trailing Johor and Perak. Penang is one of the largest centres for breeding and export of different domesticated strains of Discus fish.