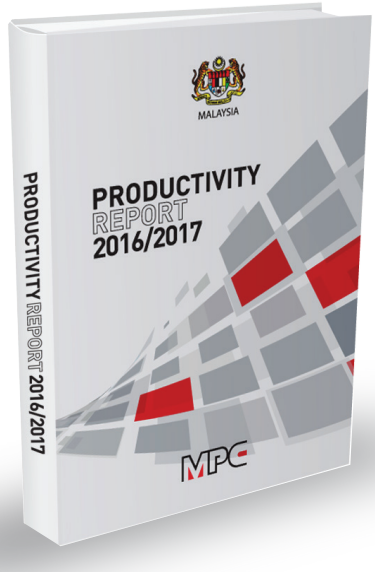

MALAYSIA

# PRODUCTIVITY REPORT 2016/2017

MPC




**CHALLENGING THE FRONTIER, EMPOWERING PEOPLE**

Transforming the mindset of people is essential towards greater collaboration to achieve better productivity. This will eventually mobilise higher economic growth and better well-being of society. An enhanced network of collaboration will nurture a more powerful and innovative drive for a more productive mindset and culture, and narrow the gap with the technological frontier.

# 24th Productivity Report 2016/2017

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# STATUTORY STATEMENT

This report is published for the Minister of International Trade and Industry
in accordance with Section 7 of the Malaysia Productivity Corporation (Incorporation) (Amendment) Act 1991.

# CONTENTS

# FOREWORD FROM THE MINISTER

As Malaysia is almost at the mid-point of the 11th Malaysia Plan (11MP) and tail-end of Vision 2020, it is important to take stock of our achievements of various development targets and evaluate the need to further invigorate our productivity strategies for better outcomes.

We have recognised that there is ample room in the productivity sphere to allow us to produce better performances that will give us the comfort that we are on the right track in relying on higher productivity to achieve our goals. Hence, the Government is giving stronger emphasis to the importance of productivity as the main driver to sustain economic growth over the long term. Malaysia's labour productivity expanded by a commendable 3.5% in 2016 to RM78,218 from RM75,548 in 2015. This achievement rate was about 85% of the 11MP's targeted level of RM92,300 to be achieved by 2020.

I am pleased to report that although there were challenges as a result of the uncertainties surrounding the global economy, Malaysia managed to sustain its labour productivity growth in 2016. The improved performances of our main economic sectors are testament of our pursuit of higher productivity and the sustainability of the Malaysian economy. It goes without saying that more rigorous efforts are needed to propel productivity growth towards the 3.7% annual productivity growth target under the 11MP. This will be through initiatives focusing on innovative ways to improve the competitiveness of Malaysia's exports, adaptation of new technology, capacity building towards a high-quality workforce and reinforcing a strong productivity mindset among Malaysians.

The Government believes that dynamic and purposeful strategies must be employed to monitor and evaluate the progress of various productivity-linked initiatives across ministries, agencies and industry. Productivity initiatives have to evolve into a day-to-day consciousness and culture to achieve the desired results. This calls for the importance of greater collaboration among various stakeholders to achieve the common objective of higher productivity for the improved well-being of the Rakyat. The Government, in implementing the recommendations of the Malaysia Productivity Blueprint (MPB) launched by the Prime Minister, will address productivity in a holistic way at the national, sectoral and enterprise levels. This comprehensive approach aims to transform the economy through five strategic thrusts to ensure systemic change.

The MPB, which accentuates greater collaboration by the Government, academia, industry players and the community, strives to build a productive workforce for the future. This will be facilitated by driving greater digitalisation and technology, fostering enhanced industry independence, ensuring a robust and accountable productivity-driven ecosystem, and inculcating a culture for higher productivity at all times. As part of the MPB's guidelines to ultimately benefit the Rakyat, the Government will establish a dynamic and all-encompassing Productivity Nexus initiative to promote higher collaboration between government agencies and industry players across various sectors. The Productivity Nexus initiative will focus on heightening reskilling and upskilling programmes, nurturing and developing innovative thinking among students at schools, colleges and universities to produce the right skill sets demanded by industry.

The journey towards the improved well-being of Malaysians through higher productivity has begun in earnest as outlined under the MPB. The Government will continue to provide the necessary impetus towards greater productivity gains to help Malaysia attain its aspiration of a high-income nation. There is no looking back as productivity is the way forward to reap the benefits of our full economic potential.

**DATO' SRI MUSTAPA MOHAMED**
Minister of International Trade and Industry
Malaysia

# CHAIRMAN'S STATEMENT

This is the 24th edition of the Malaysia Productivity Report, which is published annually to review the country's economic performance in terms of productivity. This report examines the performance of the key sectors in Malaysia's economy and highlights new opportunities to improve the country's productivity and competitiveness.

The recently launched Malaysia Productivity Blueprint (MPB) spearheads the country's effort to boost productivity and competitiveness in which MPC will continue its role in facilitating the Government's productivity agenda. The Blueprint is a holistic approach on productivity improvements across the economy with emphasis on strong coordination and governance for implementation certainty and instilling productivity as a daily work culture to raise productivity of the Nation that would have spillover effects on the Rakyat.

To achieve higher productivity, we must remove barriers to productivity growth at both the macroeconomic and microeconomic levels. The way forward does not have any complicated formula: it is about nurturing a competitive and productive mindset. Productivity is a long-term performance-oriented journey. It may take some time to adapt to new ideas and reforms to push the productivity frontier but we must pursue productivity and change for the better.

All productivity initiatives start with people -- be they in government, academia or organisations -- to power the processes and systems to improve things in our lives. We need to foster greater thought leadership for improved collaboration amongst all stakeholders and a productive mindset to be embedded in our day-to-day culture. Such collaboration can only result in win-win conclusions.

We have to be mindful that working in silos not only serves to jeopardise the benefits of multiplier effects in our business environment but also wastes time and resources. It is opportune for us to join hands to accelerate our mission to inculcate a greater productivity mindset and culture in our everyday lives. Only then will the Nation's aspirations to attain high income status and greater well-being among Malaysians from 2020 and beyond achieve sustainable success.

**TAN SRI AZMAN HASHIM**
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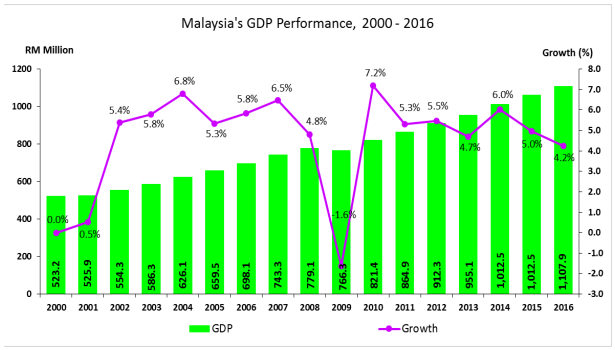
- Penang Skills Development Centre
- UYM Garden
- Wilron Products Sdn. Bhd.
- WT Plastic Sdn. Bhd.
- Zalora Malaysia

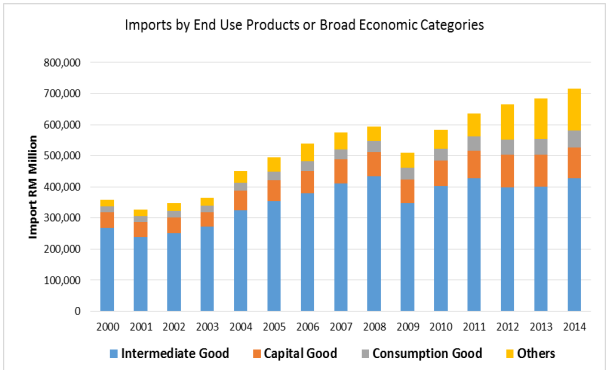
# MALAYSIA IN FIGURES

## GDP level is consistently on increasing trend since 2010



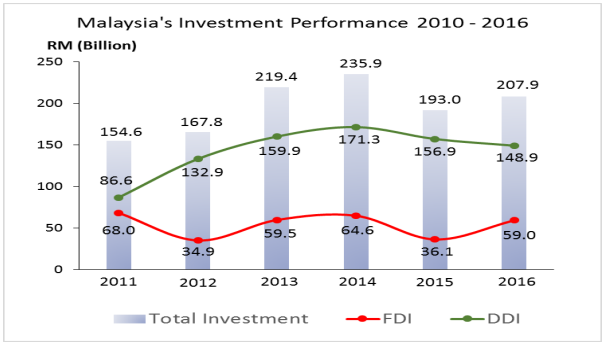

Source: Department of Statistics, Malaysia

## Intermediate goods dominates more than half of Malaysia's total Import



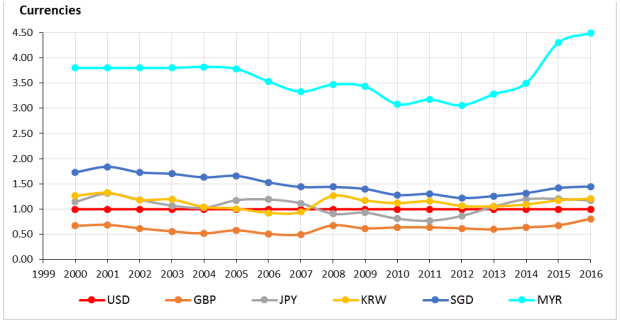

Source: Economic Planning Unit, Prime Minister's Department, Malaysia

## Malaysia continues to attract more investment



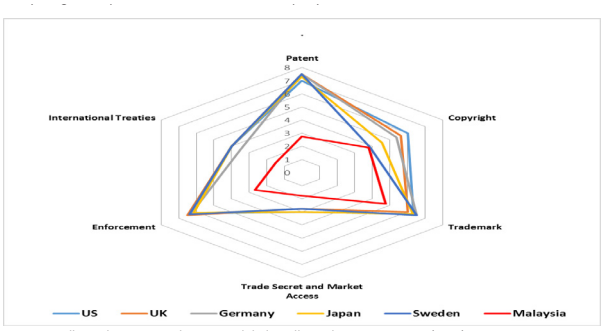

Source: Malaysia Investment Development Authority (MIDA)

## Performance of Selected Currencies against US Dollar



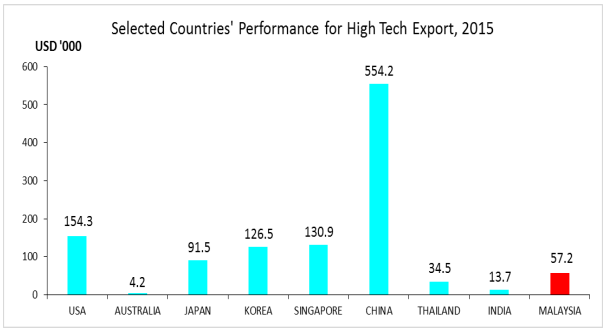

Source: Bank Negara Malaysia

## Malaysia against top 5 economies in Intellectual Property Index




Source: Intellectual Property Index 2017, Global Intellectual Property Centre (GIPC)

## Malaysia's position in high technology export

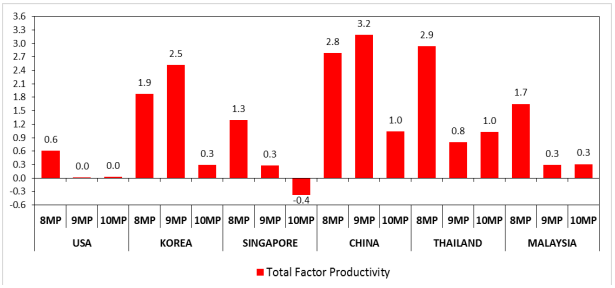



Source: World Bank Database

# IN PURSUIT OF A PRODUCTIVE NATION

## Malaysia needs to accelerate its TFP growth

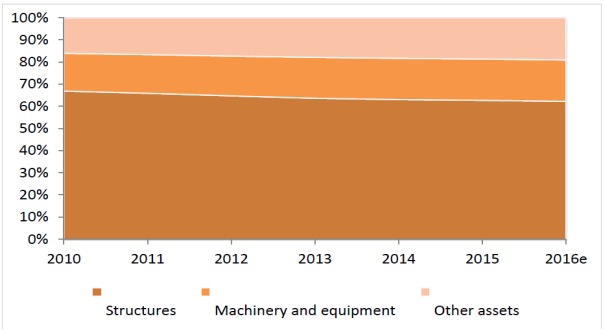
TFP Growth of Malaysia against other economies, 2001 - 2015




Source: The Conference Board Database

## Malaysia's capital concentrated on capital structure

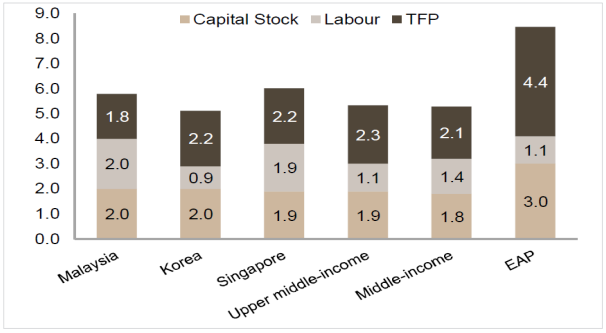
Malaysia's Capital Composition, 2010-2016




Source: Capital Stock Report, Department of Statistics, Malaysia

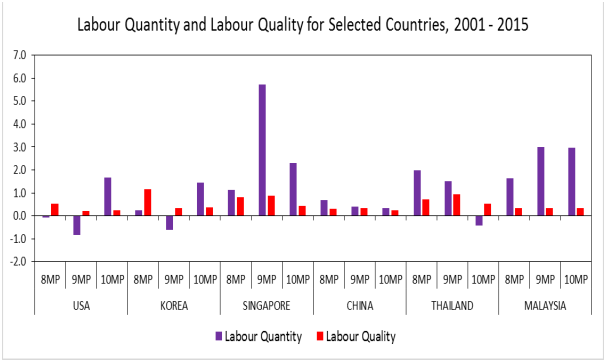
## Malaysia's TFP is at par with Korea and Singapore

Malaysia's Labour Productivity Components Against Selected Countries, 1990-2014



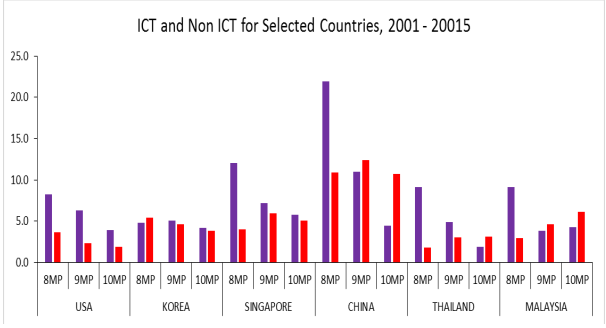

Source: Malaysia Economic Monitor, World Bank

## More efforts needed to improve Malaysia's labour quality



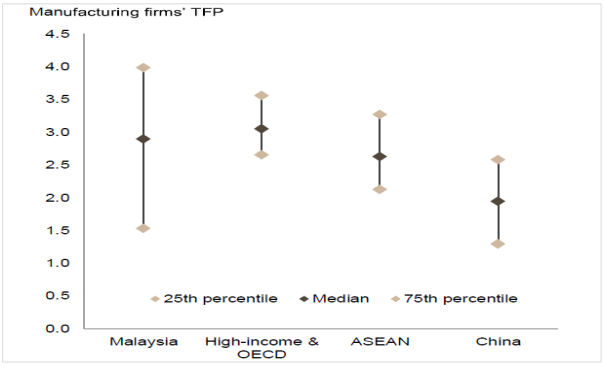

Source: The Conference Board Database

## Investment on ICT continues to strengthen during 10MP




Source: The Conference Board Database

## Malaysian manufacturing firms must reduce the TFP gap




Source: World Bank Enterprise Surveys

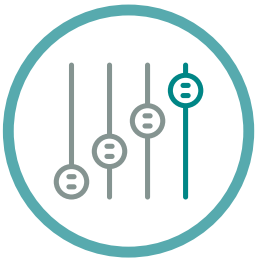

XMEDIA

01

# National Productivity Performance

# National Productivity
# **At a Glance**

## 2016



Productivity Level

**RM78,218**

Productivity Growth

**3.5%**

## 11MP Target

Productivity Level

**RM92,300**

Productivity Growth

**3.7%**

## Sources of Labour Productivity

TFP Growth

**1.9%**

Capital Intensity Growth

**1.6%**

TFP Growth

**2.3%**

Productivity remains the main driver of Malaysia's economic development as reflected in various strategies of the Eleventh Malaysia Plan (11MP: 2016-2020). Malaysia is poised to achieve its target of a high-income economy and a 3.7% growth in productivity level to RM92,300 by 2020 vis-a-vis a softer global economic environment. As productivity is the game changer for long-term economic stability and living standards, the 11MP was designed by using the Blue Ocean Strategy tools and framework to formulate high-impact, low-cost national strategies that can be rapidly implemented.

Malaysia's approach to productivity will shift from the primarily Government-driven initiatives at the national level to targeted actions across the public sector, industry players and individual enterprises, with champions identified to become role models of change and ensure buy-in across various stakeholders. Broad-based initiatives are being developed and tailored for each sector with targets set and monitored. At the national level, productivity-linked incentives are also being introduced and regulatory reforms accelerated as spelt out in the recently launched Malaysia Productivity Blueprint (MPB).

## MALAYSIA'S PRODUCTIVITY PERFORMANCE

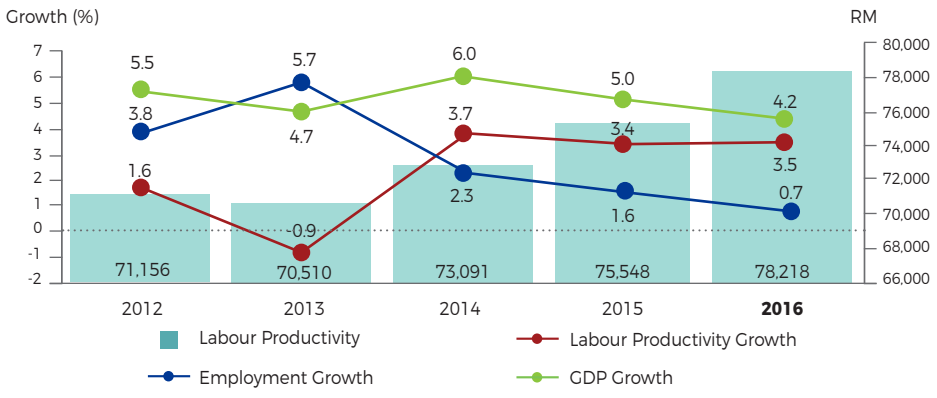
Malaysia's labour productivity expanded by 3.5% in 2016 to RM78,218 from RM75,548 in 2015 (Figure 1.1). This achievement rate was 84.7% of the 11MP's targeted level of RM92,300 to be achieved by 2020.

Although there were challenges from external factors such as the weaker ringgit, lower business confidence, financial market volatility and uncertainty resulting from the likelihood of protectionist tendencies by certain developed countries, Malaysia managed to sustain its labour productivity growth in 2016. Nevertheless, more rigorous efforts are needed to propel productivity growth towards the 3.7% annual growth target under the 11MP. Initiatives focusing on the competitiveness of Malaysia's exports, adaptation of new technology and capacity building towards a high-quality workforce are essential prerequisites in preparing for the future.

Growth in Malaysia's Gross Domestic Product (GDP) of 4.2% at RM1.1 trillion was driven by the growth of labour productivity rather than employment. This trend has been observed since 2014, indicating that economic growth is gradually moving away from labour intensity and shifting towards digital and technology-driven factors. This is the intended pattern for a productivity-driven economy, where productivity is the key factor to breach the frontiers towards Industry 4.0. Robust productivity initiatives will equip the Rakyat to face a new era of industrialisation.

In 2016, the manufacturing sector remained as the highest contributor of productivity at RM106,647 and with a growth of 1.4%. Next was the services sector with a level of RM68,166 and growth of 2.8%. The agriculture sector regained its labour productivity growth with 3.4% at a level of RM55,485, recovering

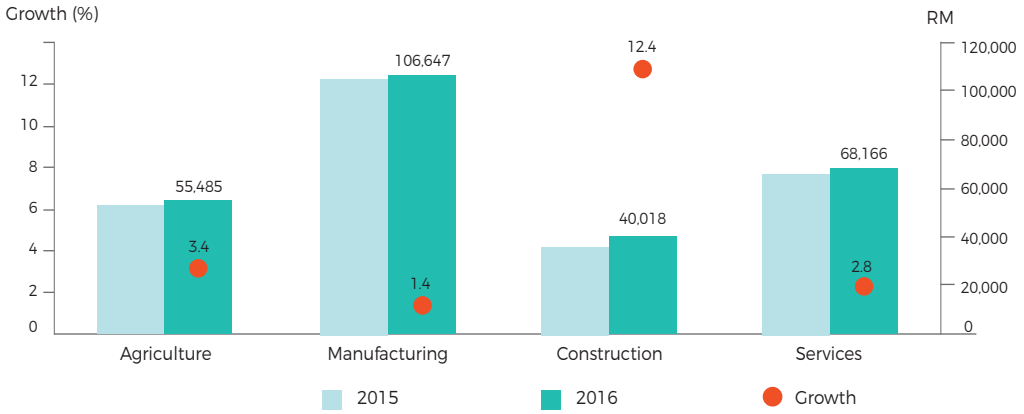
**Figure 1.1: Malaysia's Labour Productivity Performance, 2012-2016**




Source: Malaysia Industrial Productivity Database (MIPD), MPC

from -2.3% in the previous year. The construction sector had a double-digit productivity growth of 12.4% despite the relatively lower productivity level of RM40,018 (Figure 1.2).

**Figure 1.2: Main Economic Sectors Labour Productivity, 2015 and 2016**




Source: Malaysia Industrial Productivity Database (MIPD), MPC

## Labour Market Trends

Labour market conditions remained steady in 2016 although Malaysia experienced a slower growth in total workforce compared to the previous year. Total employment increased by 0.7% to 14.2 million (2015: 14.1 million). The number of job vacancies recorded in 2016 was 854,044 jobs and the highest vacancies were in the manufacturing sector with 376,349 jobs. This performance slightly lifted the unemployment rate to 3.4% as compared to 3.1% in the previous year with a labour force participation rate at 67.7%. The increase in the unemployment rate was due to mismatches between job vacancies and job seekers. On top of this, the business sector was also cautious in expanding the workforce due to uncertainties in the global market.

In terms of sectors' labour market, the manufacturing sector grew by 2.9% and was followed by the services sector at 2.8%. Meanwhile, construction recorded a contraction of 4.4%, similar to the agriculture decline by 8.2%. In facing the increase demand from industries for various high-end skills, Malaysia must play a robust and proactive role to improve the quality of its human capital. Although Malaysia experienced increases in the working-age population, labour shortages in certain segments seemed to have distorted the country's labour market. It is not a matter of demand and supply, gaps in the number of workers but rather a shortage of the right skills to work in a global, modern, and corporate environment. With that, there is a need for greater participation from industries to ensure a viable internal talent pipeline through upskilling programmes and on-the-job training, especially in basic technology training rather than depending on external talents.

The Government, on its part, has recognised the shortcomings of the country's talent pool. It has stepped up efforts to tackle the heart of the matter by focusing on moulding the country's human capital from young. Since 2011, the Government has introduced a series of programmes aimed at producing better talents with high order thinking skills, language and communication skills, and excellence in science, technical and vocational capabilities. These actions are seriously meant to narrow the gap in skills mismatches by laying a strong foundation for developing Malaysia's future human capital.

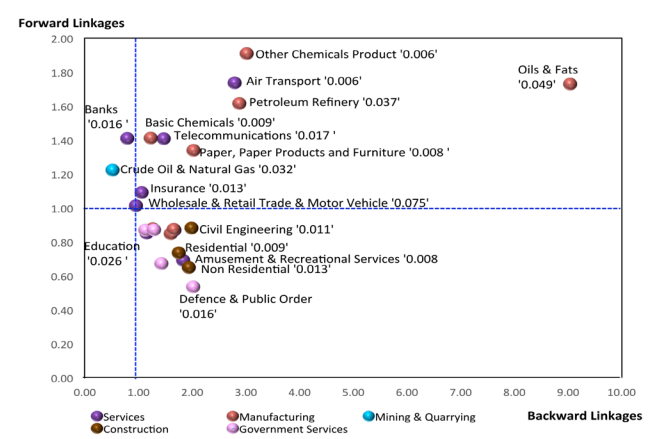
## KEY DRIVERS OF ECONOMIC INDUSTRIES

In the fields of development and planning economics, Input-Output analysis has been used extensively to determine the key industries of economic drivers. The key economic industries refer to industries that have high potential in creating demand for other segments of the economy and thus acting as leaders of economic growth. It has been previously identified based on two commonly used measures of linkages (forward and backward) and value added multipliers.

Backward and forward linkages measure the level of dependencies of intermediate input purchases and intermediate input sales for a given industry. Industries that have linkages indices greater than one are considered to have strong linkages intensity. Meanwhile, the value added multiplier measures the direct and indirect impacts on value added returns that are potentially generated by each additional unit of the final demand for a particular industry by taking into consideration the impact of the industrial size. Thus, the larger value added multiplier with considerable size impact will have higher returns to the economy.

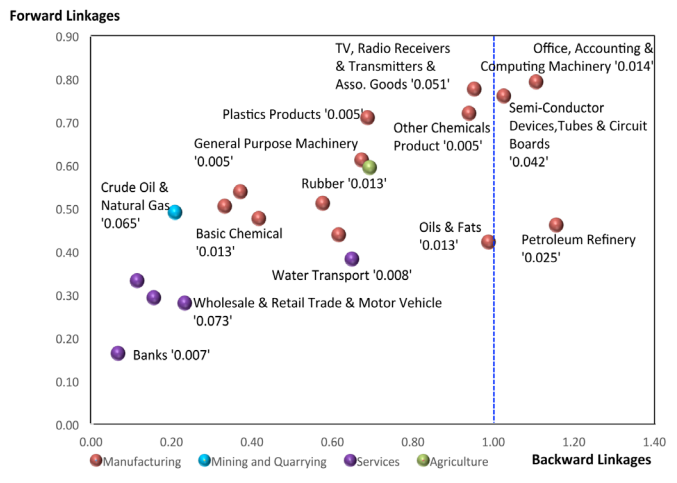
### Key Economic Industries for Overall Economy

Five top economic industries have been identified based on high value added multiplier indicating value added generation and high linkages effects to the rest of the economy and exports. They are wholesale and retail trade and motor vehicles; oils and fats; petroleum refineries; crude oil and natural gas; and telecommunications.




### Key Economic Industries For Export

The five top export industries are wholesale and retail trade and motor vehicles; crude oil and natural gas; tv, radio receivers and transmitters and associated goods; semi-conductor devices, tubes and circuit boards; and petroleum refinery.These industries have high value added returns and strong linkages to the domestic economy.




Note:

1. Numbers in ' ' refer to value added multiplier
2. Value added multiplier measures the value added return generated from a RM1 increase in the final demand of a particular industry adjusted according to the final demand size of that industry. For instance, a RM1 increase in final demand of Petroleum Refineries will generate RM0.025 value added returns to the overall economy considering the size impact of that particular industry.
3. Industries that have forward and backward linkages greater than one are considered to have strong linkages intensity with the rest of economy.

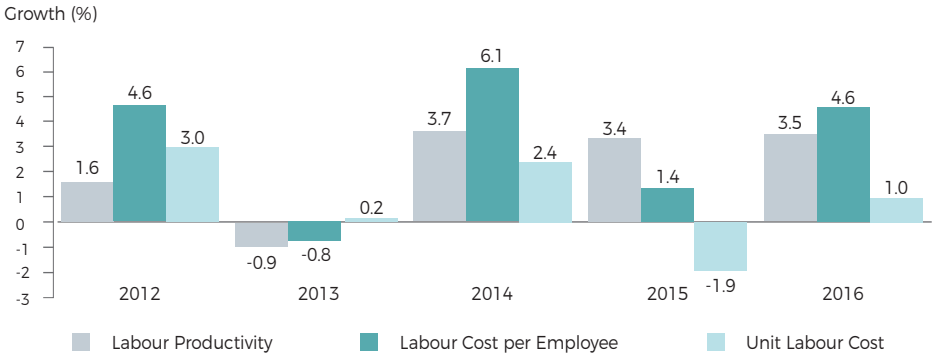
Source: "Identifying Drivers of the Malaysian Economy using Policy-relevant Measures", Khazanah Research Institute (KRI) and Institute of Agricultural and Food Policy Studies (IKDPM).

## Labour Cost Competitiveness

Malaysia needs to uplift its productivity further in order to enhance its labour cost competitiveness and better utilisation of labour resources. In 2016, growth of labour productivity at 3.5% was lower than its labor cost per employees at 4.6%, while the unit labour cost was at 1% (Figure 1.3). However, the gap between productivity and labour cost per employee was getting closer compared to 2012 indicating that wages received gradually translated to productivity gain.

According to the Bank Negara Report 2016, the local labour market from 2014 has been moving towards high-skilled jobs, especially in professional and managerial positions, and this trend continued to increase in 2016. Although the increase in these types of jobs will mean higher labour cost per employee, it must be offset by a rise in value-added creation to result in higher labour productivity in the medium and long term.

**Figure 1.3: Growth of Labour Productivity, Labour Cost per Employee and Unit Labour Cost, 2012-2016**




Source: Malaysia Industrial Productivity Database (MIPD), MPC

## Labour Productivity of Selected Countries

Global labour productivity growth, as measured by the average change in output (GDP) per person employed, remained at 1.5% in 2016, the same rate as in 2015 but was lower than 2014 (2.1%). Malaysia's labour productivity grew steadily by 3.4% in 2015 while other selected ASEAN countries such as Indonesia and the Philippines reported a growth of 4.6% and 4.4% respectively despite a slowdown in global exports (Figure 1.4). Indonesia and the Philippines showed that the strengthening of their domestic sectors have had a positive effect on their labour productivity.

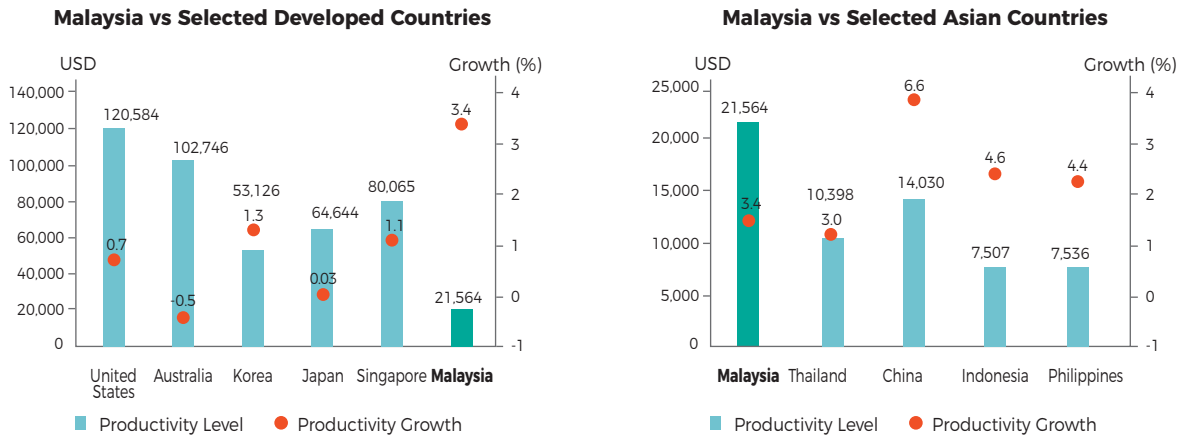
Advanced economies such as the United States registered a small productivity growth of 0.7% and Japan experienced a marginal growth of 0.03%. Emerging economies like China is showing an increase in productivity growth in 2015.

Malaysia's productivity level is still lagging behind several advanced economies such as Japan, South Korea, Singapore, Australia and the United States. The country's labour productivity per person employed was at USD21,564 while that of the United States was at USD120,584. In the case of China, despite registering higher productivity growth than Malaysia, its productivity value was still lower than that of Malaysia's. Notably, Malaysia also remained ahead of selected ASEAN countries such as Thailand, the Philippines and Indonesia.

## DETERMINANTS OF LABOUR PRODUCTIVITY

Measures of productivity constitute the core economic indicator representing the key determinant of long run economic growth. It is determined by changes in employment and labour productivity growth. Labour productivity growth is affected by a composite of factors such as Total Factor Productivity (TFP) and capital intensity. Productivity growth means that more value is added to products and services which

**Figure 1.4: Labour Productivity Level and Growth of Selected Countries, 2015**

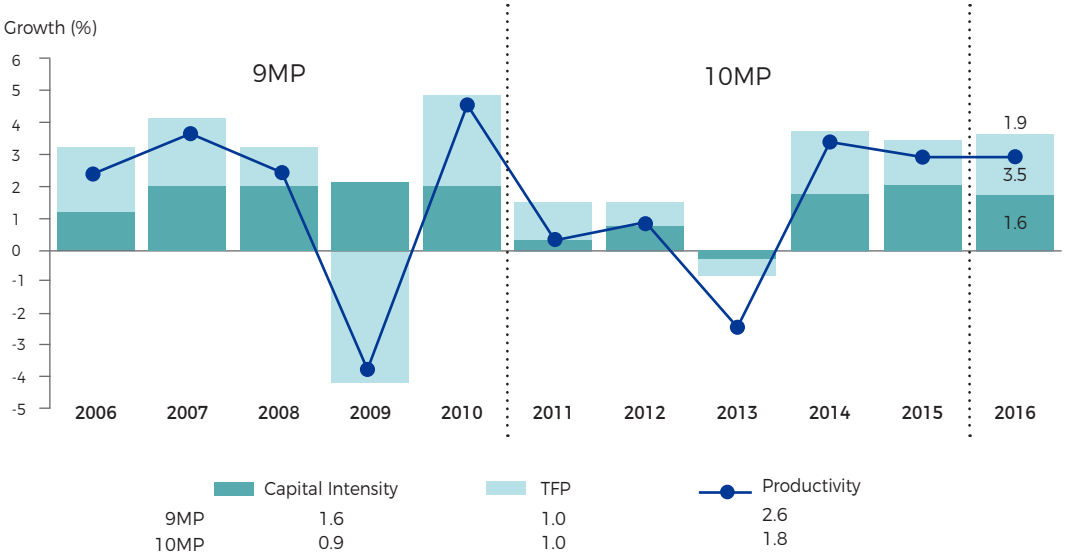



Source: IMD World Competitiveness Yearbook , 2016

then create more incomes for distribution. Over the periods of the 9MP and 10MP, TFP growth has been sustained at the average of 1%. It continued to improve to 1.9% in 2016 due to the efficient utilisation of resources in yielding products and services (Figure 1.5).

The contribution on capital intensity towards labour productivity was slightly lower than TFP. Uncertainties in the global market had forced some of the industries to reduce investment in capital expenditure, which led the industries to fully optimise their existing resources and shift towards higher value-added activities. TFP is designed to be the main contributor to productivity as it has been targeted in the 11MP to grow by an average of 2.3%. This requires concerted efforts in the form of a holistic approach through greater collaboration and integration to implement productivity enhancement initiatives at national, sectoral and enterprise levels.

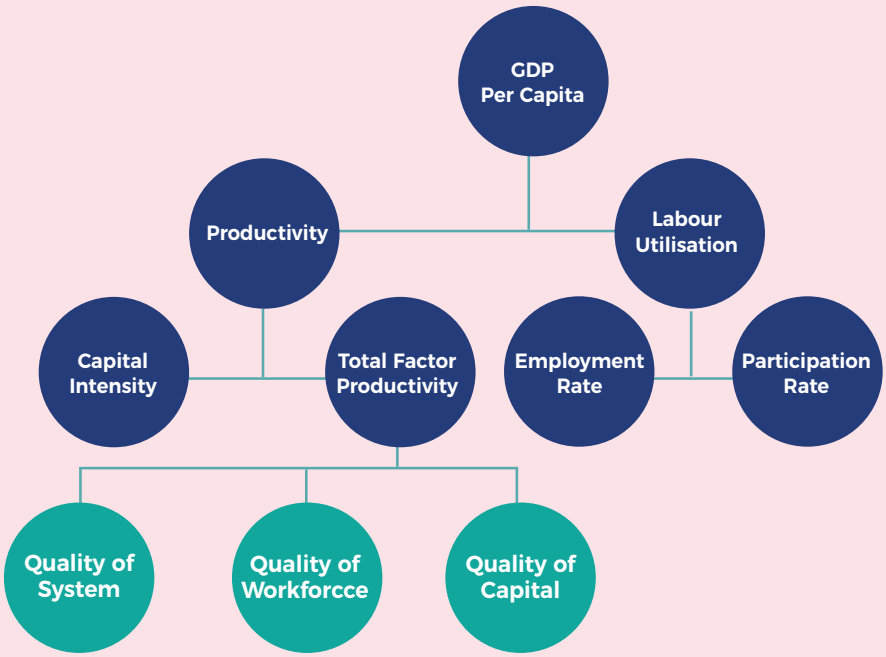
**Figure 1.5: Labour Productivity, Capital Intensity and TFP Growth, 2006-2016**




Source: Malaysia Industrial Productivity Database (MIPD), MPC

**PRODUCTIVITY: DRIVER OF GROWTH**

Quality of life, measured through GDP per capita growth, can be decomposed into changes in productivity and employment. The changes in employment, which is labour utilisation of labour force participation in the country, depends on the activity rate of the working-age population either by reducing unemployment or by bringing more people into the labour market.




Changes in productivity depends on several factors such as the quantitative expansion of physical capital per worker or capital intensity and changes in productivity within sectors or TFP. The growth in TFP is resulted from the utilisation of new machineries and innovative technology, quality of workforce and quality of system that allow more output with the same amount of input used.

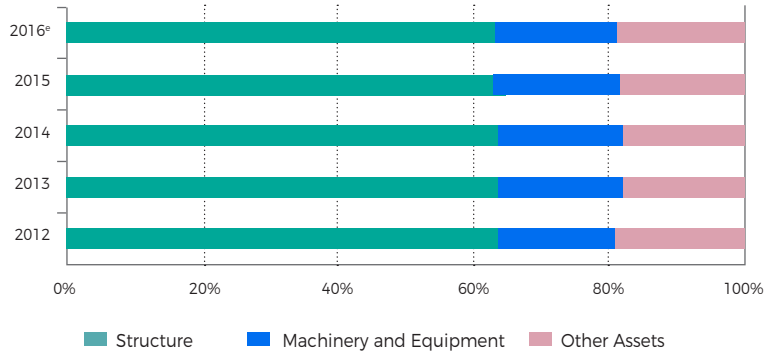
The growth in productivity can also be attributed to structural change due to reallocation of jobs across sectors. This can be seen when workers move from low- to high-productivity sectors such as in the case of employment shift from agriculture to either manufacturing or services sector.

## Capital Intensity

A continuous investment in productive capital that is turned into capital stock would usually drive higher productivity. Therefore, capital intensity,which is measured by capital stock over employees, is highly desirable for producing better productivity. Capital intensity depends highly on capital investment, where the capital invested is used to improve workers' efficiency and to assist in the creation of higher value-added products and services. Capital investment provides workers with more capital to work with and supported with new technology to enable workers to raise their level of productivity. Capital intensity contributed 51% to labour productivity growth in the period from 2012 to 2016. It grew by 1.6% in 2016 with capital to labour ratio of RM202.69 million from RM197.74 million in 2015, attributed by 63% to the capital structure (Figure 1.5 and 1.6). As a higher proportion of labour productivity was derived from capital intensity, a shift from capital structure to machinery and equipment as well as ICT will further improve the nation's productivity.

The increase in capital stock from investment was mainly driven by the private sector, which recorded a growth of 4.4% to RM187.1 billion in 2016, and this was largely concentrated in the manufacturing, services and construction sectors

**Figure 1.6: Productive Capital Stock by Type of Assets, 2012-2016**




Note:
1. Data is based on constant price 2010
2. 2016 data is estimated by MPC

Source: National Accounts Capital Stock Statistics 2015, Department of Statistics, Malaysia

(Table 1.1). The manufacturing sector's principal investment was in petrochemical products, electrical and electronics (E&E) and medical devices industries.

The services sector's investment was mostly in distributive trades and tourism while that of construction was in infrastructure projects.

**Table 1.1: Investment by Private and Public Sector, 2012-2016**

| Gross Fixed Capital Formation (GFCF) (RM Million) | 2012 | 2013 | 2014 | 2015 | 2016e |
|---|---|---|---|---|---|
| Private Investment | 134,543 | 151,698 | 168,512 | 179,282 | 187,111 |
| Public Investment | 98,659 | 100,464 | 95,724 | 94,725 | 94,222 |
| **Total** | **233,202** | **252,162** | **264,236** | **274,007** | **281,333** |

Note:
1. Data is based on constant price 2010
2. 2016e is estimated by MPC

Source: Gross Fixed Capital Formation, 2010-2015, Department of Statistics, Malaysia

## Total Factor Productivity

The period from 2012-2016 demonstrated an increase in TFP contribution to GDP by 22.1% compared to the last five-year period of 2007-2011 at 19.8% (Table 1.2). TFP growth was shown to improve to 1.1% from 0.9% in 2007-2011. Supported by the slight increase in terms of quality of labour and information and communication technology (ICT) capital investment, the growth indicated that the country had started to give more priority to productivity. During this period (2012-2016), it also witnessed less contribution by capital with 59.3% compared to the previous five-year period of 65.5% because of the increased contribution from labour and TFP.

With this performance, improving TFP to further drive productivity in Malaysia will need an increase in the use of machinery by workers, especially in the utilisation of technology for productivity gains. Elements that facilitate the adoption of technology need to focus on issues such as better organisational management, training and engaging human capital, organisational efficiency, as well as macroeconomic and business-friendly regulations.

**Table 1.2: Contribution and Growth of TFP, Labour and Capital to GDP, 2007-2016**

| | Growth (%) | | Contribution (%) | |
|---|---|---|---|---|
| | 2007-2011 | 2012-2016 | 2007-2011 | 2012-2016 |
| TFP | 0.87 | 1.12 | 19.8 | 22.1 |
| Labour | 0.64 | 0.94 | 14.6 | 18.6 |
| Quantity Labour | 0.55 | 0.85 | 85.7 | 89.8 |
| Quality Labour | 0.09 | 0.10 | 14.3 | 10.2 |
| Capital | 2.89 | 3.01 | 65.5 | 59.3 |
| ICT | 0.42 | 0.54 | 14.4 | 18.1 |
| Non-ICT | 2.47 | 2.47 | 85.6 | 81.9 |
| **GDP** | **4.41** | **5.08** | **100** | **100** |

Source: Malaysia Industrial Productivity Database (MIPD), MPC

### POTENTIAL DRIVERS OF TOTAL FACTOR PRODUCTIVITY

The present standard of living enjoyed by Malaysians has been the result of higher TFP growth which had enabled the national economy to have a sustained positive growth momentum. The factors that support TFP growth are innovation, education, efficiency and infrastructure.

In economic theory, productivity is defined as a ratio of output over input. In practice, it represents how efficiently input resources such as capital and labour are allocated to produce economic output. Productivity is mainly driven by four inter-related components: innovation, education, efficiency, and infrastructure (physical or institutional).

Innovation includes creating and adopting new technologies, products and processes, which can lead to higher value-added economic activities. This requires investment in research and development (R&D) and having competent scientists and engineers to create state-of-art technologies. More than that, innovation also requires strengthening human capacity to be able to learn from existing technologies, products and processes, and apply and/or develop them into new products and processes for the market. An OECD study showed that the elasticity of TFP is around 0.15 and 0.45 with respect to domestic and foreign R&D expenditure, respectively, during the 1980-1998 period in 16 OECD countries. This result suggests that domestic R&D investment is important, but the preparedness to adopt foreign technologies is also important and could result in a higher impact in terms of productivity growth.

Education is also another important factor as it develops human capacity by teaching knowledge and skills, promoting generation of new ideas, and providing an environment for R&D in schools and industries. For this to happen, it is crucial to have an effective education system that provides primary and secondary education to everyone and promotes higher education in universities and continuous training in industries. Studies have shown that the elasticity of TFP in respect to years of schooling is significantly positive, especially for middle-income countries.

Source: Malaysia Economic Monitor: The Quest for Productivity Growth (December 2016), World Bank

## SOURCES OF OUTPUT GROWTH FOR MAIN ECONOMIC SECTORS: KLEMS METHOD

KLEMS growth accounting methodology measure the source of output growth based on factors contributed from labour, capital, intermediate inputs and TFP. For the period of 2012-2016, TFP has contributed the highest growth for agriculture, construction and services sectors which indicates the improvement in the sectors' productivity levels. However, the mining and quarrying sector is driven by capital investment, while that of manufacturing sector is driven by intermediate inputs.

Looking at the capital investment, it has outweighed the contribution of labour in the mining and quarrying, construction, and services sectors throughout the period of 2012-2016. This is due to the operational design of these sectors that require high investment on capital inputs to uplift the production of output. For instance, mining and quarrying spent 78% of the total capital investment in mineral exploration to sustain their output growth.

The Government's strong emphasis on the high-skilled labour has shown favourable result as reflected in the agriculture, construction and manufacturing sectors. High-skilled labour has emerged to be an important source of output growth for these sectors during the period of 2012-2016. The significant contribution of high-skilled labour growth is in line with the 11MP initiatives to further increase the numbers of high-skilled labour as part of the effort to move up the production value chain and attract large capital investment in the country.

In the same period, the intermediate inputs were largely concentrated in the manufacturing sector. This was due to several factors, such as outsourcing, processing and trade fragmentation activities.These activities reflected that majority of the industries were still operating within lower production segment.

It is interesting to note that there is a significant increase in the investment on computer and ICT capital for all sectors which is one of the good strategies in preparing the industries for the evolution of Industry 4.0. Having said that, all five main economic sectors showed that TFP and capital investment were the key drivers for Malaysia's total output growth.

**Sources of Output Growth for Five Malaysia's Main Economic Sectors**

| | Agriculture | | Mining | | Construction | | Manufacturing | | Services | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Period 1 | Period 2 | Period 1 | Period 2 | Period 1 | Period 2 | Period 1 | Period 2 | Period 1 | Period 2 |
| **Capital:** | **0.64** | **0.87** | **5.60** | **8.16** | **0.43** | **0.68** | **0.09** | **0.50** | **1.12** | **1.50** |
| Structure | 0.04 | 0.14 | -0.02 | 0.00 | 0.02 | 0.09 | 0.05 | 0.13 | 0.50 | 0.96 |
| Transport | 0.03 | 0.02 | 0.66 | 0.45 | 0.10 | 0.12 | -0.01 | 0.00 | 0.19 | 0.14 |
| Computer & ICT | 0.13 | 0.26 | 0.46 | 0.98 | 0.20 | 0.34 | 0.14 | 0.35 | 0.28 | 0.31 |
| Machinery & Equip. | 0.02 | 0.08 | 0.24 | 0.30 | 0.12 | 0.12 | -0.09 | 0.02 | 0.14 | 0.09 |
| Biological Assets | 0.41 | 0.37 | n.a | n.a | n.a | n.a | n.a | n.a | n.a | n.a |
| Mineral Exploration | n.a | n.a | 4.25 | 6.44 | n.a | n.a | n.a | n.a | n.a | n.a |
| **Labour:** | **-0.80** | **2.13** | **1.18** | **1.08** | **0.40** | **0.52** | **0.11** | **0.13** | **0.90** | **0.82** |
| Low-skilled | -0.89 | 0.30 | 0.02 | 0.02 | 0.02 | 0.01 | -0.02 | -0.01 | 0.00 | 0.02 |
| Medium-skilled | 0.03 | 1.52 | 0.13 | 0.27 | 0.19 | 0.26 | 0.01 | 0.00 | 0.22 | 0.18 |
| High-skilled | 0.06 | 0.31 | 1.03 | 0.79 | 0.19 | 0.26 | 0.12 | 0.15 | 0.68 | 0.62 |
| **Intermediate Inputs** | **-0.39** | **-0.69** | **-4.07** | **-0.35** | **1.83** | **-2.24** | **-1.85** | **2.79** | **-0.42** | **0.46** |
| **TFP** | **0.55** | **2.64** | **0.76** | **1.01** | **0.22** | **3.00** | **0.63** | **0.86** | **1.03** | **1.68** |
| **Output** | **-0.01** | **4.95** | **3.47** | **9.91** | **2.89** | **1.96** | **-1.01** | **4.29** | **2.63** | **4.47** |

Note :
1. Period 1: 2007-2011; Period 2: 2012-2016
2. This approach uses KLEMS method which measures the source of output growth, where output is computed from the summation of intermediate inputs, imported commodities, taxes and gross value added.

## SOURCES OF OUTPUT GROWTH FOR PRIORITY INDUSTRIES: KLEMS METHOD

In manufacturing sector, capital investment led the growth of chemicals and chemical products as well as electrical and optical equipment, while TFP is the main key driver for machinery industry for the period of 2012-2016. The contribution of capital investments towards computer and ICT capital were more prominent than labour inputs for these three industries.

As for the services sector, TFP has been the major source of output growth for both the wholesale and retail trade industries. Intermediate inputs was the second contributor after TFP since the design of these industries depend largely on the intermediate inputs for their operations. In the same period, capital inputs which largely focused on structured capital such as building and land were more dominant than labour inputs.

### Sources of Output Growth for Selected Industries

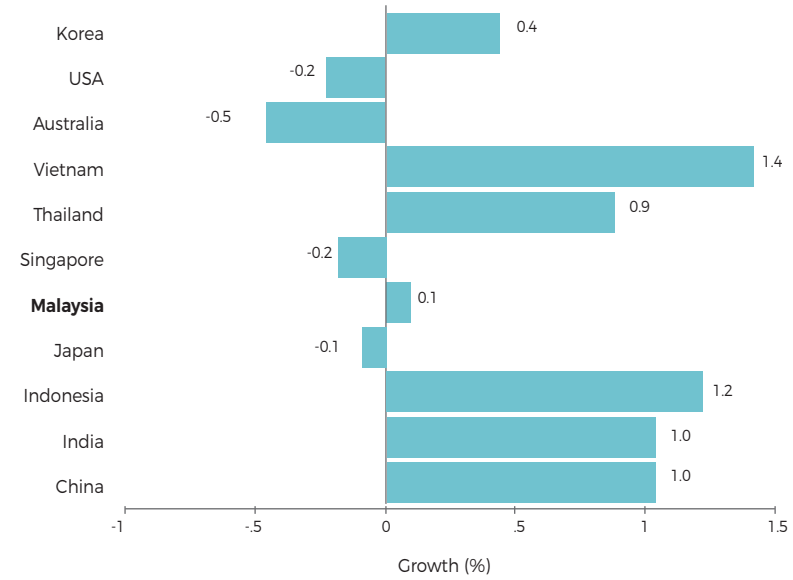
| | Chemicals & Chemical Products | | Machinery | | Electrical & Optical Equipment | | Wholesale Trade | | Retail Trade | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Period 1 | Period 2 | Period 1 | Period 2 | Period 1 | Period 2 | Period 1 | Period 2 | Period 1 | Period 2 |
| **Capital:** | **1.20** | **1.83** | **0.57** | **0.24** | **-0.40** | **0.40** | **0.80** | **0.88** | **1.72** | **1.25** |
| Structure | 0.23 | 0.47 | 0.16 | 0.08 | -0.05 | 0.17 | 0.38 | 0.63 | 1.11 | 0.87 |
| Transport | -0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.21 | 0.11 | 0.25 | 0.13 |
| Computer | 0.73 | 1.20 | 0.28 | 0.15 | -0.02 | 0.31 | 0.12 | 0.13 | 0.25 | 0.23 |
| Machinery & Equipment | 0.24 | 0.16 | 0.13 | 0.00 | -0.32 | -0.09 | 0.09 | 0.02 | 0.10 | 0.03 |
| **Labour:** | **0.33** | **0.23** | **0.05** | **-0.49** | **0.07** | **0.00** | **0.96** | **0.33** | **1.54** | **0.82** |
| Low-skilled | 0.00 | 0.00 | -0.02 | -0.04 | 0.00 | 0.00 | -0.03 | -0.08 | -0.05 | -0.10 |
| Medium-skilled | 0.09 | 0.09 | 0.05 | -0.21 | 0.01 | -0.01 | 0.34 | 0.04 | 0.86 | 0.47 |
| High-skilled | 0.24 | 0.14 | 0.03 | -0.24 | 0.07 | 0.00 | 0.65 | 0.36 | 0.72 | 0.45 |
| **Intermediate Inputs** | **-3.87** | **-0.47** | **-3.97** | **1.89** | **-7.10** | **-1.68** | **6.30** | **2.09** | **6.61** | **3.24** |
| **TFP** | **-0.16** | **0.57** | **2.29** | **3.10** | **-1.34** | **0.21** | **-0.30** | **2.81** | **-0.25** | **3.38** |
| **Output** | **-2.49** | **2.16** | **-1.06** | **4.74** | **-8.76** | **-1.07** | **7.76** | **6.11** | **9.61** | **8.69** |

Note ;
1. Period 1: 2007-2011; Period 2: 2012-2016
2. This approach uses KLEMS method which measures the source of output growth, where output is computed from the summation of intermediate inputs, imported commodities, taxes and gross value added.

## Total Factor Productivity of Selected Countries

In the period of 2011-2015, Malaysia's TFP growth of 0.1% was ahead of a few developed countries such as Australia (-0.5%), USA (-0.2%), Singapore (-0.2%) and Japan (-0.1%). Nevertheless, Malaysia needs to further boost its TFP growth as compared to neighbouring countries such as Vietnam (1.4%), Indonesia (1.2%) and Thailand (0.9%). It is imperative for developing countries, including Malaysia, to improve TFP to raise productivity levels as well as to further increase their GDP levels. (Figure 1.7).

**Figure 1.7: TFP Growth of Selected Countries, 2011-2015**




Source: Total Economy Database, The Conference Board

Vietnam is one of the fastest countries in terms of GDP per capita growth. The country has included itself in global value chains (GVCs), which is part of 2011–2020 Socio-Economic Development Strategy (SEDS) initiatives. The strategy focuses on structural reforms, environmental sustainability, social equity and emerging issues of macroeconomic stability that hinged on three main areas -- promoting human resources or skills development for modern industry and innovation; improving market institutions; and infrastructure development. With its purposeful development initiatives, Vietnam has managed to enhance its TFP growth during the period.

## MALAYSIA'S OUTLOOK IN 2017

The national economy is anticipated to sustain its growth momentum in 2017 in line with the recovering global economy. This should have a positive impact on productivity, which is expected to grow by 3% to 4% (2016: 3.5%). Productivity growth is expected to benefit from the positive GDP growth in Malaysia, estimated at 4% to 5% in 2017. This is supported by improvements in global growth that will enhance the country's trade, investment and income inflows as well as strong increases in domestic demand. Strong domestic private consumption is expected to feature significantly in the anticipated positive performance.

The expected global economic recovery is forecast to bolster the local construction sector for the latter's continued productivity growth among the main economic sectors, although at a slower rate. A similar pattern is also expected in the services and manufacturing sectors.

To attain the 11MP's productivity level target of RM92,300 by 2020, the country needs to have a quantum leap of 4% to 4.5% in annual productivity growth. This requires greater emphasis on qualitative factors such as spurring innovation, significantly adopting information technology, reducing the skills gap, fostering regional integration and strengthening institutions in the entire productivity ecosystem. Apart from regularly reviewing government strategies and implementation, it is essential to further narrow the gap between planning and implementation for impactful outcomes. Identifying and adopting best practices among institutions are crucial to achieving the targeted productivity growth.
As for innovation-driven productivity gains, taking the innovation path remains an imperative proposition for Malaysia to be competitive in the global market and its ability to participate in high-end segment of GVCs. This productivity transformation needs to be expedited by strengthening the implementation of innovation policies across various sectors.

The establishment of many productivity nexus around the country will encourage and drive industries to venture into higher level technological innovations and inculcate the productivity mindsets for greater innovation and creativity among industries as outlined in the MPB.

A key push for higher productivity gains will be to encourage enterprises to produce import-substitution products and services as local enterprises with a high proportion of imported inputs tend to have lower levels of productivity, especially among large enterprises. As such, initiatives should be given to enterprises that produce quality products and services that can substitute imported inputs. In addition, focusing on industries that have the biggest impact throughout their value chains will help contribute to effecting higher multiplier effects on the national economy.

In terms of infrastructure, especially with regard to having a business-friendly environment to further drive economic growth and productivity, institutions such as the Government, trade associations and universities or research institutions will need to expand their collaboration. There is a need for robust collaboration to unify the differences or mismatches in terms of the vision, objective, philosophy and implementation of the strategies to produce high value, innovative and competitive products and services for the global market.

As guided by the MPB, issues and challenges on productivity must be seriously addressed in a comprehensive and cohesive manner through the development of a national productivity framework. The blueprint has been designed and developed to accelerate productivity improvement strategies, initiatives and programmes at the national, sectoral and enterprise levels. It provides guided implementation to expedite productivity improvements as envisaged in the 11MP through five strategic thrusts. These thrusts are to ensure holistic and systematic change rather than fragmented efforts.

In striving for higher productivity growth, Malaysia must prepare for uncertain external factors as shifts in economic policies could affect a diverse range of outcomes for the Malaysian economy and local labour market conditions. Such externalities can be mitigated by stronger collaboration among the stakeholders through the establishment of various productivity nexus.

## 5 Strategic Thrusts

MALAYSIA PRODUCTIVITY BLUEPRINT
Driving Productivity of the Nation

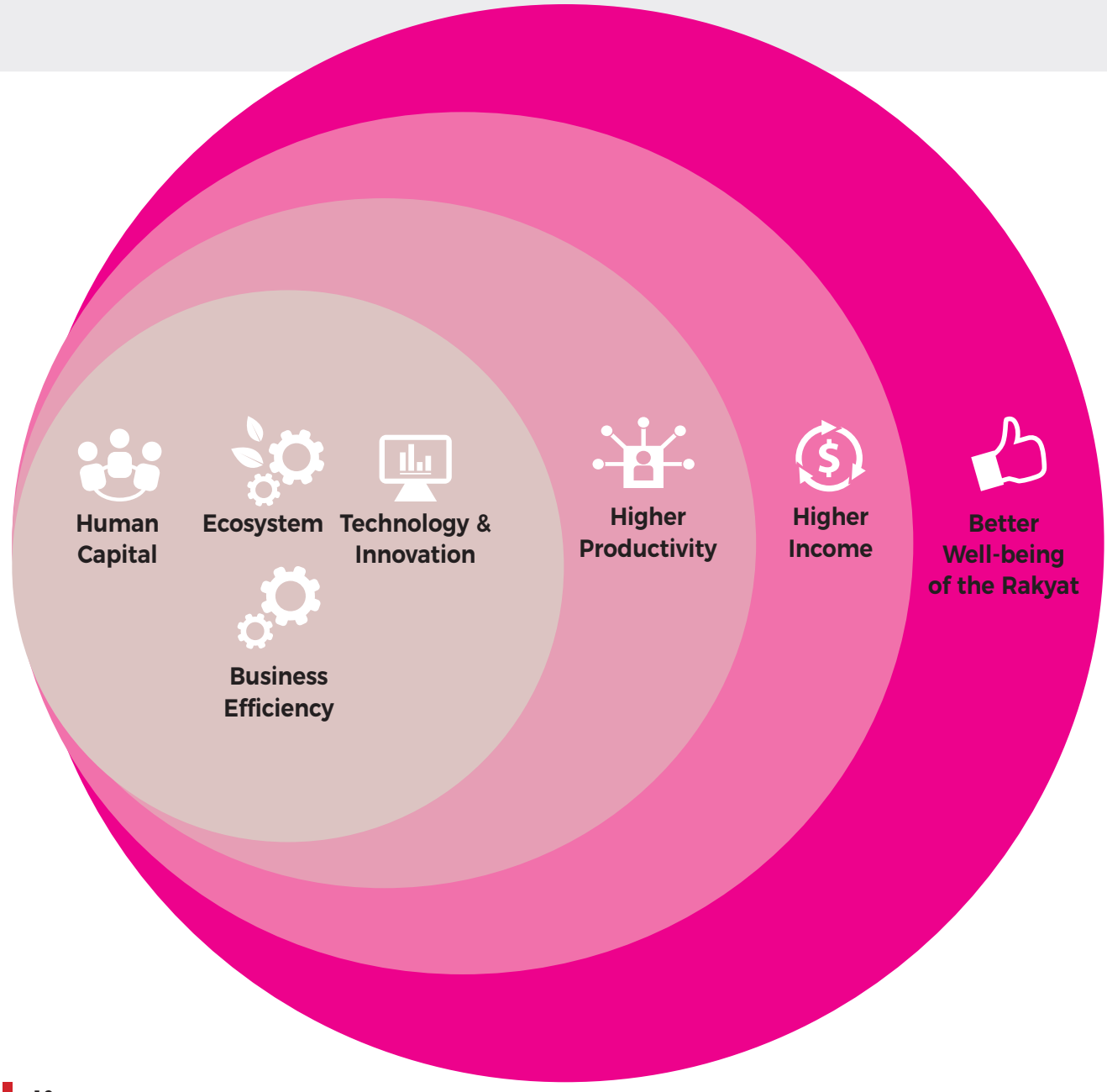
| BUILDING WORKFORCE OF THE FUTURE | DRIVING DIGITALISATION AND INNOVATION | MAKING INDUSTRY ACCOUNTABLE FOR PRODUCTIVITY | FORGING A ROBUST ECOSYSTEM | SECURING A STRONG IMPLEMENTATION MECHANISM |
|---|---|---|---|---|
| Restructuring workforce to shift balance towards higher-skilled workers, tightening entry of low-skilled workers, and meeting demands of the future economy | Strengthening the readiness of enterprises to effectively adopt and exploit technology and digital advantage (e.g. Industry 4.0) | Intensifying liberalisation efforts, reducing reliance on non-critical subsidies, and linking financial assistance to productivity outcomes | Addressing regulatory constraints and developing a robust accountability system to ensure effective implementation of regulatory reviews | Embedding culture of productivity through nationwide movement, and driving accountability in productivity performance through effective governance mechanism |

02

# Enchancing Productivity for the Well-Being of the Rakyat

# Enchancing Productivity for the Well-Being of the Rakyat

*"Well-being is defined as the physical, social and economic benefits that contribute to the enhancement in the quality of life and satisfaction of an individual, family and the community."*
~ Malaysian Well-Being Report



The well-being of the Rakyat is an indisputable aspiration and outcome of all the initiatives being undertaken by the Government. The Rakyat's state of being happy, safe and comfortable remains a priority thrust in the country's journey towards becoming an advanced and harmonious nation under Vision 2020. In the 11MP, the Malaysian Well-being Index (MWI) is targeted to increase by 1.7% per annum compared with 1.2% as recorded during the 10MP. Overall well-being is expected to improve as a result of rising household incomes and other initiatives to bring about greater inclusivity and a better way of life among Malaysians.

In this regard, several policies and initiatives are continuously being reviewed to keep pace with changing internal and external environments to boost economic opportunities and encourage the Rakyat's participation in various economic activities. A key factor will be that pro-Rakyat policies and initiatives must continue to underscore that productivity is the game changer for enabling high living standards in Malaysia.

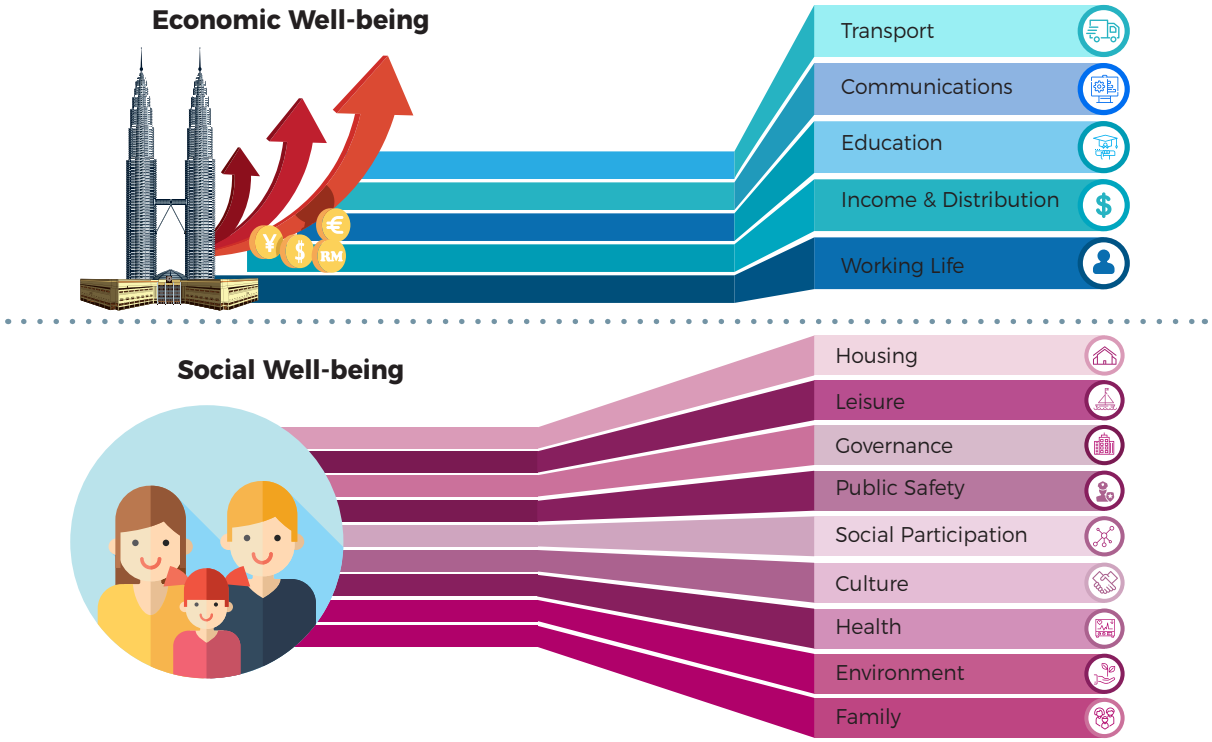
A continuous rise in productivity growth will lead to increasingly better standards of living and improved social well-being. This can be reflected from better living conditions, higher purchasing power, and greater access to education, transportation, and quality housing, amongst others. Other measures reflecting good living standards include the level of quality healthcare, life expectancy, income growth and educational standards. In addition, a higher level of well-being also manifests in a greater degree of creativity, innovation and employer-employee engagement, all which can lead to the improved value of organisations and for them to produce better productivity gains for the nation as a whole. As productivity increases, organisations can further transform their resources into higher value added products and services to generate more revenue, paying stakeholders and retaining cash flows for future growth and expansion. Improved productivity can then lead to greater competitiveness and potentially competitive advantages for the well-being of the Rakyat.

## STRONG CONNECTION BETWEEN HIGH PRODUCTIVITY AND WELL-BEING

The state of the Rakyat's well-being has often been described as a positive outcome that is meaningful for them and for many levels of society. This is because the state of well-being reveals that people perceive their lives are going well. These include good living conditions like housing and career, which are fundamental to one's well-being. It also relates to a host of amenities provided by the Government such as healthcare, education, infrastructure and security besides providing a conducive environment for the private sector to thrive. Well-being can be described as a combination of the physical, personal, social, cultural and economic effects of the workplace and place of residence on a person. Some even describe it as a positive state of mind.

According to the Malaysian Well-being Report 2013, well-being is defined as the physical, social and economic benefits that contribute to the enhancement of the quality of life and satisfaction of an individual, family and the community. In the report, economic well-being is more elastic to the GDP growth compared to social well-being, where even a 1% increase in GDP can contribute to a 0.21% improvement in the MWI.

**Components in the Malaysian Well-Being Index**




There are several authoritative international reports that measure well-being, namely, the Legatum Prosperity Index, World Happiness Report and Gallup-Healthways Global Well-Being Report. With the Government's ultimate goal of enhancing the people's prosperity in a fair and inclusive manner, giving due consideration to the these reports will facilitate individuals, organisations, industries and the nation to set benchmarks and guidelines to boost productivity and further enhance the Rakyat's well-being.

Therefore, monitoring conditions related to whether people are satisfied with their lives is extremely important for the Government in order to tweak existing policies or roll out more effective ones. These reports have also established an important link between psychological well-being and job performance ratings. Such findings suggest that organisations and companies can improve their overall effectiveness by increasing workers well-being.

**Key Areas of Social Well-being in the Three Main Reports**

### LEGATUM PROSPERITY INDEX

As an international think tank and educational charity focused on understanding, measuring, and explaining the journey from poverty to prosperity for individuals, communities and nations.

Published by: Legatum Institute

**Measured by:**

- Economic Quality
- Business Environment
- Governance
- Education
- Health
- Safety and Security
- Personal Freedom
- Social Capital
- Natural Environment

### WORLD HAPPINESS REPORT

It reflects growing global interest in using happiness and subjective well-being as a primary indicators of the quality of human development.

Published by: Sustainable Development Solutions Network

**Explained by:**

- GDP per Capita
- Social Support
- Health Life Expectancy
- Freedom to Make Life Choices
- Generosity
- Perceptions of Corruptions


### GALLUP-HEALTHWAYS GLOBAL WELL-BEING INDEX

Provides an overview of global citizens' well-being includes more than 146,000 surveys in 145 countries and areas, and captures how people feel about and experience their daily lives.

Published by: Gallup-Healthways Well-Being Index

**Measured by :**

- Purpose
- Social
- Financial
- Community
- Physical

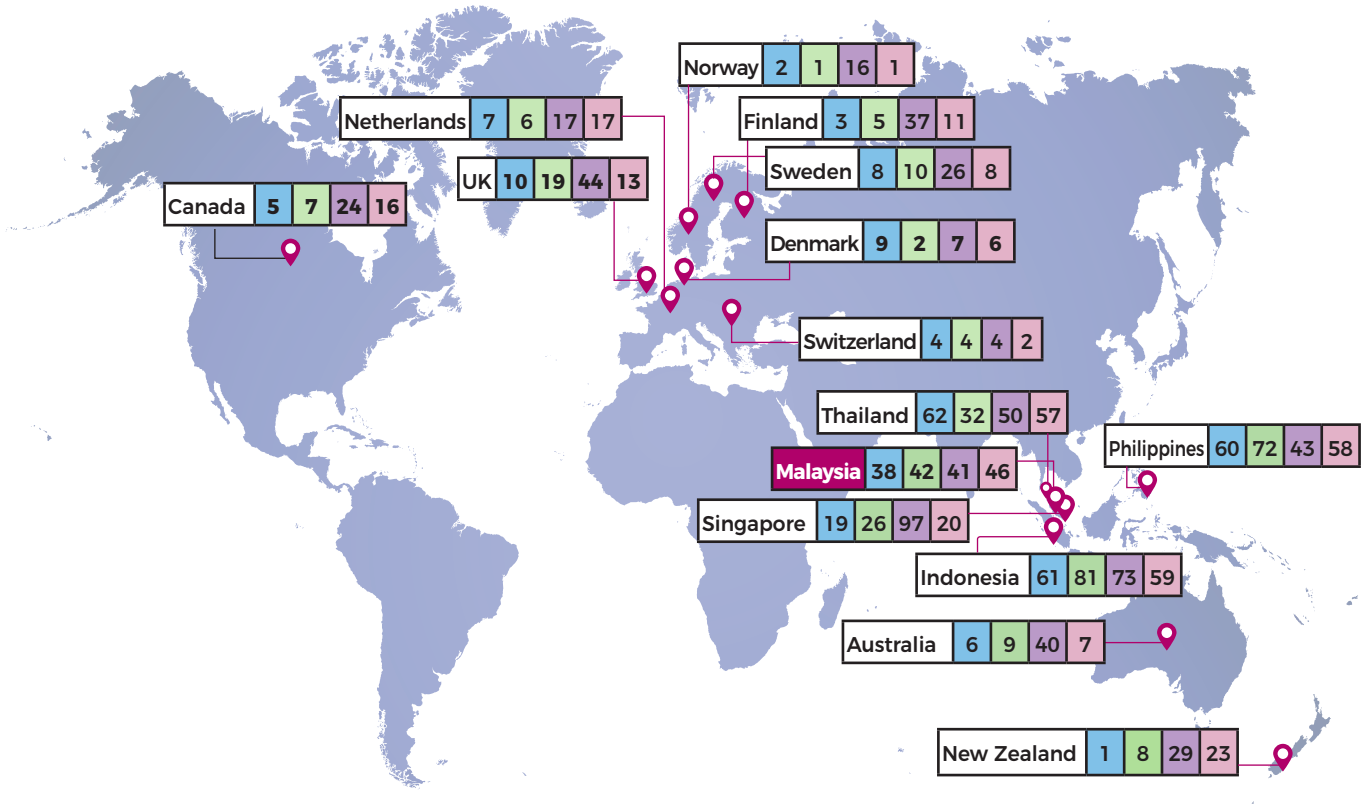
Malaysia ranked 38th out of 149 countries in the Legatum Prosperity Index 2016 while in the World Happiness Report 2017, the country emerged at the 42nd spot out of 155 countries. For the Gallup-Healthways Global Well-Being Index 2014, Malaysia was placed at the 41st position out of 145 countries surveyed. It is noteworthy that Malaysia fared well in these reports, being placed between the top 25%-28% globally.

Compared with other ASEAN countries, such as the Philippines, Indonesia and Vietnam, Malaysia is ahead in the rankings for prosperity, happiness, well-being and productivity.

Top countries listed in both the Legatum Prosperity Index as well as World Happiness Report are New Zealand, Norway, Finland, Switzerland, Canada, Australia, the Netherlands, Sweden and Denmark.

These are also the countries that performed well in terms of productivity, ranging from USD101,847 to USD147,478. Norway (1st), Switzerland (2nd), Denmark (6th), Australia (7th) and Sweden (8th) showed impressive levels of productivity and were among the top 10 countries in the IMD World Competitiveness Yearbook (WCY) 2016. Meanwhile, Malaysia recorded a level of USD21,564 and stood at 46th position out of 61 economies (Figure 2.1).

**Figure 2.1: Selected Reports Related to Well-being and Productivity Level**

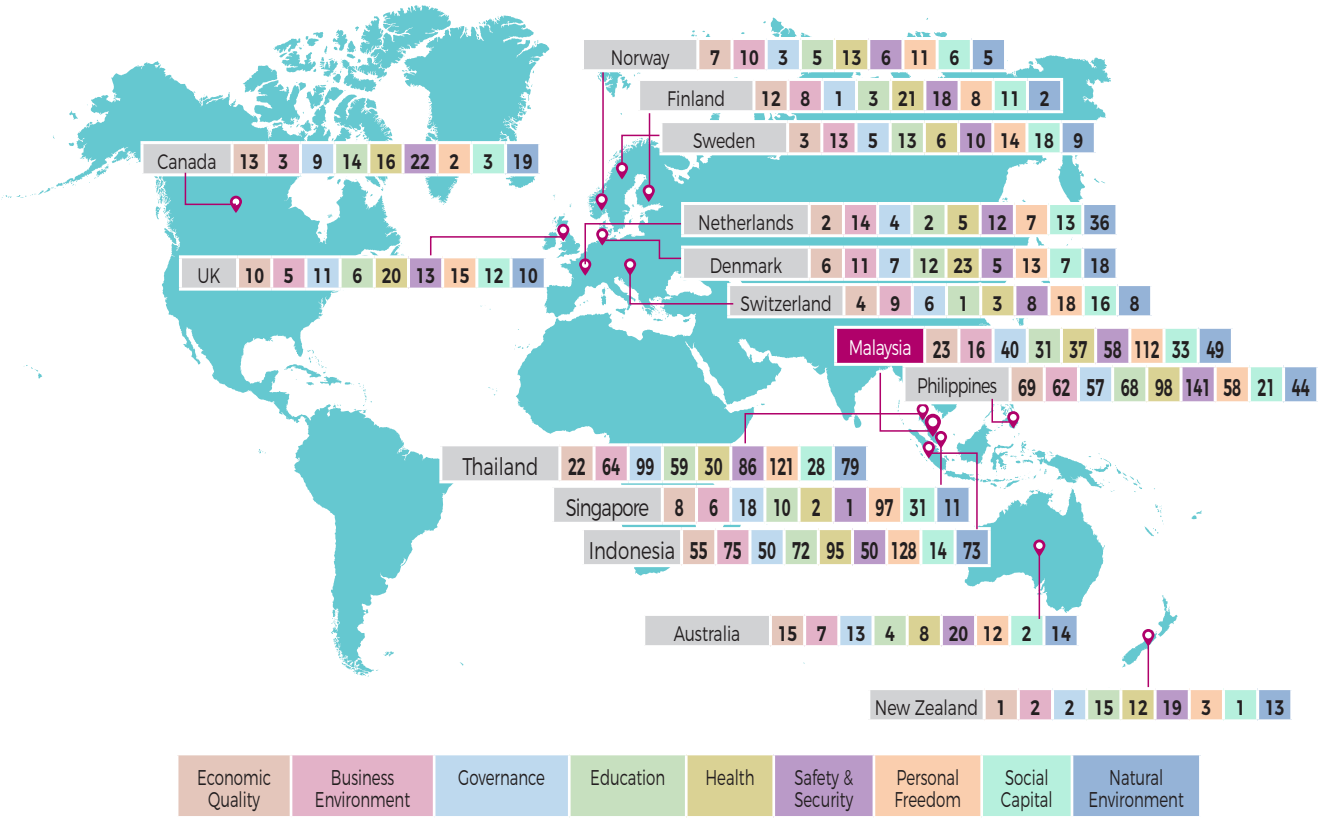



| Legatum Prosperity Index 2016 (n=149) | World Happiness Report 2017 (n=155) | Gallup-Healthways Global Well-Being Index 2014 (n=145) | Productivity Level (IMD World Competitiveness Yearbook 2016) (n=61) |
|---|---|---|---|

As a rapidly developing economy with thriving business environment, Malaysia is regarded as being in a continued transition phase towards prosperity. Malaysia is described as a regional success story by the Legatum Prosperity Index. As a newly-industrialised market economy with a relatively steady GDP growth over the long term, Malaysia has almost succeeded in eradicating extreme poverty in the last 50 years.

The Legatum Prosperity Index enables Malaysia to map its performance against benchmark countries, measured in nine areas. They are economic quality, business environment, governance, education, health, safety and security, personal freedom, social capital and natural environment. Malaysia performed well in the business environment index (16th), moderate achievement in economic quality (23rd), education (31st), social capital (33rd) and health (37th) (Figure 2.2).

**Figure 2.2: Legatum Prosperity Index of Selected Economies, 2016**




Source: Legatum Prosperity Index 2016

Countries with high happiness and well-being such as Switzerland and Denmark are also productive. Between Switzerland and Denmark, they have distinctive characteristics that contributed to their strong performances. Regarded as countries with the highest well-being levels, they performed well in areas such as education, basic and technological infrastructure, strong societal framework, excellence in health and environment, good management practices as well as outstanding attitudes and values.

## CHARACTERISTICS OF MOST WEALTHIEST AND PROSPEROUS COUNTRIES

### SWITZERLAND

Switzerland, one of the world's wealthiest and most prosperous nations, has consistently ranked in the top 10 global index for prosperity over the past decade. In the Legatum Prosperity Index 2016, Switzerland was ranked 4th. Its strong economic quality has moved the country into the global top five for prosperity for the past five years.

The Swiss have long been global leaders in the delivery of prosperity. The country has a stable, high-tech economy, strong democratic institutions with low corruption, and provides its people with quality education and healthcare. It has one of the highest GDP per capita in the world highest 'prosperity' surplus (it delivers more prosperity than expected) of the world's 10 wealthiest countries. Swiss public institutions are among the most effective and transparent in the world. Switzerland considerably outperforms OECD averages across the sub-indices, particularly in governance. Notably, it also ranks 1st in education, 3rd in health, and 4th in economic quality.

Switzerland also possesses one of the world's most fertile innovation ecosystems, combining a very conducive policy environment and infrastructure, academic excellence, an unmatched capacity to attract the best talents. Its large multinationals are often leaders in their sectors. It also has a strong network of small and medium-sized enterprises across sectors that are often reputed for quality and constantly strive for innovation.

Switzerland is a pioneer of the dual education system with excellence at all levels. The dual education system is a combination of apprenticeship in a company and vocational education at the vocational school in one course. Switzerland's pre-eminence in productivity and well-being has been due to the continuous and intense collaboration between academia and the business world, which has produced a host of innovative products with commercial applications.

### DENMARK

Denmark can be described as having the most sustainable system, with the skills of the current and future workforce both ranked in the top five countries. Denmark is one of the first countries to include computer science in its primary-school curriculum, together with the United Kingdom, New Zealand, and Australia.

Denmark's strong performances in governance, safety and security, and social capital have kept the country in the top 10 prosperity rankings over the last decade. Like its Nordic peers, Denmark is an extremely prosperous country, having consistently ranked in the global top 10 for overall prosperity in the past decade. This is based largely on its top social capital (7th), safety and security (5th), economic quality (6th), and governance (7th) performances. Denmark's main improvement has come in the natural environment sub-index, having gained 26 ranks from 44th in 2007 to 18th in 2016.

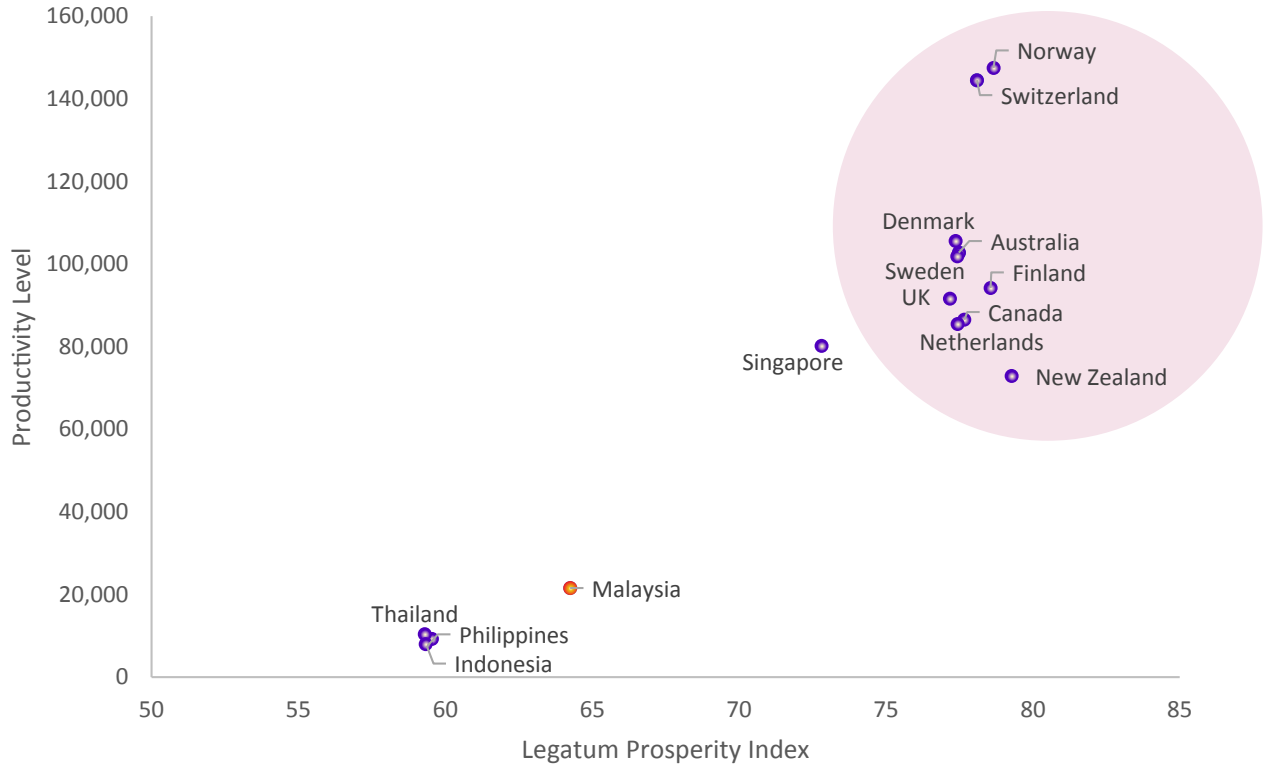
Denmark was ranked 7th best in the world for governance. This is unsurprising considering that the nation has the lowest level of corruption globally, and that its rule of law and judicial independence ranked 2nd and 3rd respectively. Denmark is also one of the world's most prosperous and wealthy countries whose society is supported by robust social welfare programmes. Consequently, Danish citizens are among those with the highest satisfaction with living standards in the world, after the Swiss and Norwegians.

Source: Legatum Prosperity Index 2016 and various international reports

## ROLE MODELS AND PRODUCTIVITY ENABLERS TO BOOST WELL-BEING

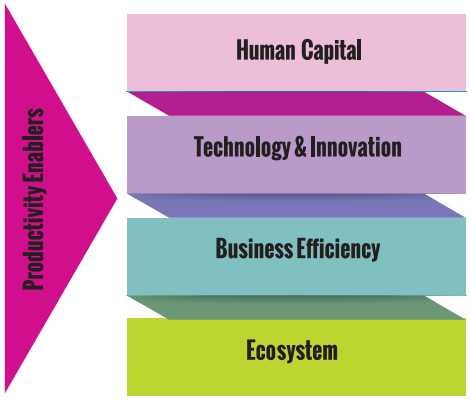
Rising productivity ultimately increases the income of the Rakyat that leads to improved well-being where the Rakyat can enjoy the fruits of growth and development, regardless of gender, ethnicity, socio-economic status and geographic location. This is evident in countries that posted high productivity levels and strong rankings in both social and economic well-being (Figure 2.3).

**Figure 2.3: Relationship between Productivity and Well-being in Selected Countries**




Source: IMD World Competitiveness Yearbook 2016 and Legatum Prosperity Index 2016

To catch up and keep pace with these top productive and prosperous countries, it is imperative that their best practices are emulated and adopted within the context of the local culture and environment in Malaysia. Switzerland and Denmark have been selected as benchmark countries as they are among the top 10 most productive and prosperous countries across the four reports. These two countries are regarded as national role models because of their holistic approach in combining productivity and prosperity as interdependent elements to raise the level of well-being of their citizens.




Learning from the two benchmarked countries, four enablers, namely human capital, technology and innovation, business efficiency, and ecosystem are key towards enhancing productivity and better well-being. These enablers ensure that higher productivity can be translated into more efficient wealth creation by offering high value job opportunities, adopting advanced technology, enhancing business efficiency through productivity initiatives and tools, and facilitating conducive ecosystem. These require continuous improvement in labour efficiency, innovation and the diffusion of new and better production methods, supported by good governance.

## Human Capital

In formulating policy for greater productivity, good quality education must be emplaced with supportive human capital development programme for people to have the right skills and so that they can find the right jobs and ultimately be compensated accordingly. Skills are important determinants of well-being as higher levels of skills lead to better jobs, improved health and greater trust.

People with multiple skill sets are highly demanded, flexible and responsive towards the dynamics of global economic and business condition. Malaysia has made good progress over the years in developing its capacity to upgrading the skills and knowledge of its workforce but more initiative needed to be among the top in the world.

Based on the WCY 2016, Malaysia is on the right path in terms of preparing the availability of skilled and knowledgeable workforce. When it comes to the availability of skilled labour, Malaysia was ranked a respectable 10th compared to Switzerland (8th) and Denmark (6th). Based on the flexibility and adaptability of people in facing new challenges, Malaysia was ranked at a commendable 18th, above Denmark (19th) and close to Switzerland (15th) (Table 2.1).

**Table 2.1: Malaysia Against Selected Benchmark Countries in Human Capital Indicators, 2016**

| | Best Performer | Switzerland | Denmark | Malaysia |
|---|---|---|---|---|
| Skilled labour is readily available | Norway (7.88) | 8 (6.91) | 6 (7.03) | 10 (6.80) |
| Flexibility and adaptability of people are high when faced with new challenges | Ireland (8.60) | 15 (7.31) | 19 (7.15) | 18 (7.19) |
| Higher education achievement (%) | Singapore (76.30) | 16 (46.0) | 23 (42.1) | 35 (33.5) |
| University education meets the needs of a competitive economy | Switzerland (8.80) | 1 (8.80) | 5 (7.98) | 24 (6.22) |

Source: IMD World Competitiveness Yearbook (WCY) 2016

In order to meet the target of the 11MP, efforts need to be intensified to build greater competencies towards mobile and flexible skill sets in the workforce across all sectors. A skilled workforce is needed to spearhead innovation and encourage the adoption of technology, has the ability to perform complex tasks and can easily adapt to the changing environment and production system. The competency gaps that are critical for highly skilled jobs requiring knowledge in specialised engineering and technical fields, problem-solving, people-to-people skills and English proficiency need to be seriously addressed.

In addressing the education paradigm, enhancing accessibility to higher education and skills training is essential for the nation to have a more competitive workforce. Malaysia was ranked 35th in terms of high education achievement compared to Denmark (23rd) and Switzerland (16th). Additionally, Malaysia was ranked 24th in terms of the university education which has yet to meet the needs of a competitive economy in comparison to Denmark (5th) and Switzerland (1st).

The importance of education is a critical component in developing a country's human capital because it can help increase the efficiency of the workforce and economy to move into Industry 4.0 and beyond manual tasks or simple production processes. It is therefore compelling for Malaysia to carefully plan and execute effective life-long learning programmes required for supporting the ongoing up-skilling of the workforce as outlined in the Malaysia Education Blueprint.

This can be further accelerated through strong collaboration between academic institutions and industries to reduce fragmentation and skill mismatches. The imperatives are that the education system has to be strengthened to produce the right workforce that can execute tasks efficiently. To be able to do this, they have to be equipped with innovative and creative skills to create new services and products for wealth creation to collectively benefit the nation as a whole and individually.

### TRANSFORMING TALENT AND TECHNOLOGY: EXCELLENCE IN LEADERSHIP AND PEOPLE MANAGEMENT AT PRESTARIANG BERHAD

Prestariang Berhad (Prestariang) plays a central role in Malaysia's march towards achieving a knowledge-based society and digital economy as it is involved in developing local talent for the global market. Its strength lies in its ability to develop innovative products relevant to customers' needs. Prestariang's niche is providing talent and technology solutions and enhancing human potential through life-long learning.

The key to Prestariang's growth and excellence performance has been its ability to evolve alongside market and technological forces that shape the local and global business landscape. It has invested sufficient resources to ensure that employees have the knowledge, skills, and competencies they need to work effectively in a rapidly changing and complex environment.

For corporate social responsibility initiatives, Prestariang practices building skills of employees and contributes 1% of total salaries into its Human Resource Development Fund for claimable training. To enhance its workforce learning, Prestariang allocates yearly allocation per employee for external training and development, and has a yearly training plan for in-house training programmes.

Acknowledging the importance of acquiring the right employees with the right and relevant skills to complement the organisational excellence, Prestariang values its workforce and considers it as its greatest asset. As a knowledge-based organisation, Prestariang continuously invests in people and ideas. The majority of the employees are professionals, and the human capital development and management is crucial to the entire organisation. The Prestariang culture emphasises that everyone is independent; employees do not have to wait for instructions as they are encouraged to innovate.

## Technology and Innovation

Technology and innovation drive long-term economic growth, productivity and improvement for inclusive well-being. Technology, especially in digital, also serves as an enabler for networking and connecting people from diverse backgrounds and geographical locations. Technology has had a huge impact to businesses that allows automation across their business operations. Despite new technologies, displacing low-skilled jobs in some industries, they also create jobs which are often in different industries and require different skill sets simultaneously. It is not just upskilling, but different sorts of skills are needed as well.

In terms of funding availability for technological development, Malaysia was ranked at 15$^{th}$, not far behind from benchmark countries. However, in terms of Internet bandwidth speed, Malaysia was ranked 49$^{th}$, far behind Denmark (10$^{th}$) and Switzerland (7$^{th}$). The same trend was observed in number of broadband subscribers, where Malaysia was ranked 43$^{rd}$ (Table 2.2).

**Table 2.2: Malaysia against Selected Benchmark Countries for Technology and Innovation Indicators, 2016**

| | Best Performer | Switzerland | Denmark | Malaysia |
|---|---|---|---|---|
| Internet users (number of internet users per 1000 people) | Iceland (891) | 21 (842) | 3 (887) | 39 (745) |
| Broadband subscribers (number of subscribers per 1000 inhabitants) | Japan (687) | 6 (557) | 4 (600) | 43 (214) |
| Internet bandwidth speed (average speed, Mbps) | Korea (26.7) | 7 (16.7) | 10 (16.1) | 49 (5.20) |
| Funding for technological development is readily available | Singapore (7.91) | 8 (7.20) | 11 (6.96) | 15 (6.80) |

Source: IMD World Competitiveness Yearbook (WCY), 2016

Progress made by cloud computing and Big Data facilitates businesses further in accessing and sharing information conveniently, leading to faster decision-making. The utilisation of digital technologies help to increase competition, reduce prices for goods and services, enable efficiencies within businesses, and drive innovation to produce better quality goods and services.

## Business Efficiency

Business efficiency in a market enables the measurement of the extent in which the local environment encourages businesses to perform in an innovative, profitable, and responsible manner. Profitability should be linked to productivity as it can be raised through efficiency in managing resources at the optimum level to maximise output, minimise cost or design strategies to explore greater opportunities for growth. With productivity growth, even the existing amount of resources can generate more output and income.

At the national level, productivity growth raises living standards because more real incomes help to improve the people's ability to purchase goods and services, enjoy leisure, improve housing and education, and contribute to social and environmental programmes. Hence, productivity gains of businesses will further contribute to national economic growth, which in turn helps to improve the quality of life and benefit the Rakyat.

Employee training is one of the key factors that leads to enhanced business efficiency. In this regards, Malaysia was ranked favourably at 7th, not far from that of Denmark (3rd) and Switzerland (1st). Despite strong efforts by the Government in making available training services and facilities, Malaysian companies have yet to be responsive and agile to market changes as their adaptability was not as high as their peers in Denmark or Switzerland.

There are more efforts to be done to bridge the gap between Malaysia and the benchmark countries when taking into account the standard of efficiency of local large corporations and small and medium enterprises (SMEs). Malaysia was ranked 17th and 23rd respectively behind Switzerland and Denmark (Table 2.3).

**Table 2.3: Malaysia against Selected Benchmark Countries for Business Efficiency Indicators, 2016**

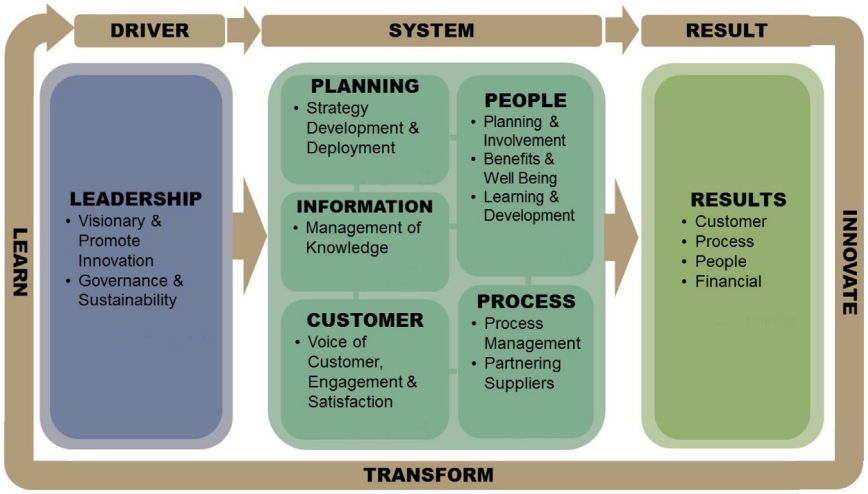
| | Best Performer | Switzerland | Denmark | Malaysia |
|---|---|---|---|---|
| Employee training is a high priority in companies | Switzerland (7.73) | 1 (7.73) | 3 (7.60) | 7 (7.08) |
| Adaptability of companies to market change is high | Hong Kong (7.92) | 2 (7.92) | 3 (7.54) | 16 (6.67) |
| Large corporations are efficient by international standards | Thailand (8.56) | 2 (8.46) | 4 (8.21) | 17 (7.27) |
| Small and medium enterprises are efficient by international standards | Germany (8.80) | 2 (8.49) | 8 (7.52) | 23 (6.43) |

Source: IMD World Competitiveness Yearbook, 2016

Malaysian companies can address today's global economic demands by strengthening their core capabilities and investing into productivity enhancing tools and technologies. The Malaysia Business Excellence Framework (MBEF), a tool for companies to strengthen their management systems and capabilities in achieving organisational sustainability and competitiveness, can help provide that road map to excellence (Figure 2.4).

By using this framework, businesses will be able to improve their productivity by adopting approaches to excellence in their entirety in identifying strengths and opportunities and align management systems and processes to create a sustainable and continuous improvement. The business excellence initiative facilitates companies to strengthen their management systems and processes for higher productivity and revenue growth. There was a rise of 20.2% to 7,763 companies in 2016 in terms of the number of companies having adopted MBEF since 2011, reflecting the increasing acceptance of companies to reap the benefits of implementing this programme.

**Figure 2.4: Malaysia Business Excellence Framework (MBEF)**




From the said framework, companies can choose to implement LEAN as a capacity building tool to improve productivity and cultivate a creative culture in their companies. Being a LEAN enterprise means disposing off non-value added activities along the supply chain to have more efficient systems of production that eliminate waste, reduce delays and cost, and improve quality simultaneously.

The Government, in continuing to work towards increasing the acceptance of MBEF among local businesses to boost productivity growth, has collaborated with a few anchor organisations in Malaysia. The deliverables of these productivity improvement undertakings had been translated into various programmes with the philosophy of "whatever is best gets shared". These concerted efforts are expected to create spill-over effects to facilitate more organisations in their journey towards greater productivity excellence.

The benefits from MBEF relate to the establishment of the Business Excellence Community (BEC). This is where individuals and organisations with a common interest are involved in helping, adopting, adapting, practising and propagating the positive elements embodied in MBEF. Between 2013 and 2016, MPC had trained 976 BEC participants in specific programmes aimed at producing more MBEF practitioners, assessors, and consultants. These individuals help others to better understand the operations of their business environment and develop strategies to adapt to changes.

## ABX EXPRESS DELIVERS PERFORMANCE

ABX Express (M) Sdn. Bhd. (ABX), a local courier company, improvises its Productivity-Linked Wage System (PLWS) once every two years to ensure that the company continues its business excellence as well as generate employee satisfaction. The company regards the PLWS as a crucial motivating factor for employees because its overall business performance and efficiency are determined by its workforce.

To motivate employees towards greater productivity, the PLWS provides nine types of incentives involving non-contractual bonuses, wage increments based on productivity performance, yearly profit sharings, Monthly Performance Tracking (MPT) for individual and group allowances. It also includes attendance incentives, transport allowances, incentive for deliveries and pick up parcels and other allowances that cover food, outstation and laundry. These benefits are received by all employees achieving monthly performance targets, to ascertain the incentives which will be distributed to motivate the workers further.

The take-home pay of employees is effected through two staggered payments, with the basic salary and overtime allowances being paid at the end of each month, and payment of incentives in the middle of the following month. Employees also receive payments from the annual profit sharing pool at the end of the year, giving them a sense of belonging to the company as a result of their performance.

They also assist others in understanding the strengths and setbacks of different functions, units or processes, and find out what can be integrally done to create greater synergy. The trained individuals also facilitate enterprises to achieve a common understanding of management and employee issues related to the health status of an organisation as well as aligning various organisational improvement initiatives.

## Ecosystem

Ecosystem refers to a complex network or interconnected system. One of the pre-conditions of an advanced economy is that the Government has a key role to ensure that the regulatory ecosystem has a positive impact on productivity. It can either have indirect impact (incentives that influence operating and investment decisions) or direct impact (effects on compliance cost).

As for the private sector, its innovation and participation in the economy requires a regulatory environment that provides the necessary protection and guidelines while promoting healthy competition. Poor quality regulations lead to increased compliance costs and these costs are passed through to consumers in the form of higher prices and this in turn will reduce economic activities and impede wealth creation.

Doing business in Malaysia is highly supported by facilitative regulations as indicated in the WCY report where Malaysia was ranked at a commendable 6$^{th}$ position behind Denmark (5$^{th}$) but ahead of Switzerland (8$^{th}$). This reflects that the concerted effort put by PEMUDAH has been successful in addressing issues faced by the business community.

Malaysia also fared well in terms of labour regulations that promote business activities (9$^{th}$) with adequate legislation to support the creation of firms (18$^{th}$) among the 61 countries surveyed. Malaysia's fairly commendable ranking was aided by the establishment and provision of regulations that are supportive of business operations. The clarity of the regulations also help to remove barriers and reduce the cost of doing business in the country (Table 2.4).

**Table 2.4: Malaysia against Selected Benchmark Countries for Ecosystem Indicators, 2016**

| | Best Performer | Switzerland | Denmark | Malaysia |
|---|---|---|---|---|
| Ease of doing business is supported by regulations | Hong Kong (8.88) | 8 (6.95) | 5 (7.19) | 6 (7.14) |
| Labour regulations (hiring/firing practices, minimum wages, etc.) do not hinder business activities | Switzerland (8.38) | 1 (8.38) | 2 (7.98) | 9 (6.59) |
| Competition legislation is efficient in preventing unfair competition | New Zealand (8.15) | 13 (6.88) | 3 (7.83) | 19 (6.53) |
| Creation of firms is supported by legislation | Hong Kong (9.17) | 12 (7.61) | 5 (8.23) | 18 (7.45) |

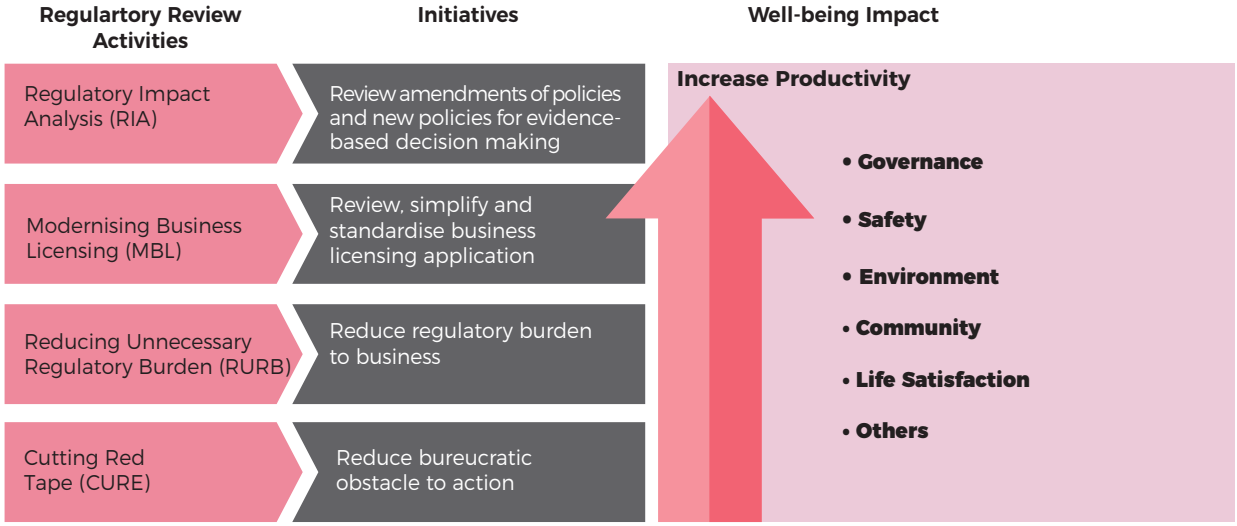
Source: IMD World Competitiveness Yearbook, 2016

The Government's initiatives to promote a competitive business environment through regulations have certainly shown positive outcomes. A comprehensive regulatory reform programme has been built for a seamless national economy to unleash productivity through a continuous programme. Such regulatory reforms will ensure policy consistency, maintains regulatory clarity, targets lower transaction costs and fosters business competition and innovation. The economic, social and environmental costs to society from poor quality regulations are substantial.

Regulatory review activities such as the Regulatory Impact Analysis (RIA), Modernising Business Licensing (MBL), Reducing Unnecessary Regulatory Burden (RURB), and Cutting Red Tape (CURE) can contribute significantly to promoting economic and social development through various initiatives in the country. These relate to having a sound design and implementation of policies, safeguarding public interest; maximising the use of public resources and minimising wastage and unnecessary expenditure by relocating them to social development and promoting well-being.

They also cover enabling the effective delivery of public services and basic infrastructure for inclusive economic growth, enhancing the security of the Rakyat, and safety of the environment for improved economic investment and social climate.

**Impact of Regulatory Review to Well-being**




## IMPACT OF MODERNISING BUSINESS LICENSING IN PAHANG LOCAL GOVERNMENT AUTHORITY

Providing greater convenience to the business community to operate has always been the Government's objective since it embraced the drive for higher productivity in the country. The Government sees this as a win-win approach as a prosperous business community means new jobs, new skills and enhances wealth creation.

- Number of application forms was reduced and use standard forms
- Duration of approval for 96 business activities were immediate and other are within 30 days
- Validity of licenses was extended to 1 – 3 years which reduce the burden of business community and authorities
- Delegation of authority up to Administrative Assistant level to expedite the approval process and promote the application for licenses
- Revenue from licenses increased to empower enforcement and inspection activity
- Total savings on compliance cost of RM24,600

Following the mandate to modernise business regulations in the 11MP, MPC has been pursuing a comprehensive review of business regulations, including improving licensing processes and procedures at the state level. One of the successful MBL projects is in the state of Pahang. Through this initiative, local government authorities in Pahang have simplified and improved their business licensing systems. This has been done by adopting more streamlined procedures and licensing approval skewed on the risk-based approach, redesigning application forms and strengthening rules and compliance.

## JOURNEY TOWARDS GREATER PRODUCTIVITY AND HAPPINESS

The strategic thrust on improving the well-being of the Rakyat under the 11MP stresses on ensuring that every Malaysian will have equal access to quality healthcare and affordable housing. Neighbourhoods and public spaces will have to be made safer, allowing the people to have peace of mind, and for communities to live harmoniously.

To achieve the goals of the well-being strategic thrust, the Government has vowed to adopt a balanced development approach to give equal emphasis to both economic growth and the well-being of the Rakyat. This is because without economic growth, the scope for improving well-being may be limited.

Hence, emphasis will be on developing highly-productive human capital that can fulfill demanding tasks needed in a modern, dynamic and growing economy. A key segment will be boosting Technical and Vocational Education and Training (TVET), an area which will address the shortage of skills competencies to meet specific industry needs.

Overall, the quality of education will be raised to develop talent to thrive in a globally competitive and dynamic environment. This is related to another strategic thrust of the 11MP in terms of re-engineering economic growth for greater prosperity in which all economic sectors will migrate into more knowledge-intensive and high-value added activities. The inclusion of Higher Order Thinking (HOT) skills in schools will help create better quality pools of talent to address the needs of the increasingly demanding job market. Through HOT, students will think on a level that is higher than just memorising facts or telling something back exactly the way they were told. HOT takes thinking to a higher levels by making students understand the facts, infer from them and connect it to other facts and concepts. It involves managing and putting the information together in new or novel ways, then apply them as they seek new solutions to new problems.

Against the backdrop of MPB, its initiatives will help enhance greater productivity for improved social well-being among the Rakyat. The initiatives will be done through inculcating a stronger mindset and culture of productivity across various segments of society nationwide. This is by institutionalising stronger coordination and governance to ensure implementation certainty. MPB will also place great emphasis on driving digitalisation and technology to strengthen the Rakyat's readiness, knowledge and adoption of technology across all sectors. It will also be through intensifying efforts towards strengthening digitalisation of SMEs, including local ICT players.

These initiatives are being driven by achieving greater productivity in mind through optimising resources for maximum results or outcomes, which will eventually lead to a better state of well-being or a better quality of life among Malaysians. A better quality of life may in one way or the other encompass greater happiness and satisfaction as a result of better skills, higher-paying jobs, improved access to quality healthcare and education. It will also mean having a more conducive living environment of less congested cities, superior transportation systems and better accommodation, and more fulfilling lives. That change towards greater well-being starts now with a mindset change on attaining greater productivity. It is about pursuing a better way of life equipped with a host of quality and fulfilling services and amenities. All this can be attained by adhering to good practices based on the principle that improved productivity can only be achieved with the right ambition and willpower.

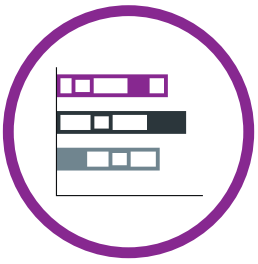

customer service

03

# Productivity Performance of the Services Sector

# Services Sector Productivity
# **At a Glance**

## 2016



Labour Productivity Level

**RM68,166**

Labour Productivity Growth

**2.8%**

## 11MP Target

Labour Productivity Level

**RM83,400**

Labour Productivity Growth

**4.1%**

## Sources of Labour Productivity, 2016

TFP Growth

**3.1%**

Capital Intensity Growth

**-0.3%**

## Productivity Growth of Selected Sub-sectors, 2016

| Wholesale & Retail Trade | Finance & Insurance | ICT | Government Services | Education | Real Estate & Business Services | Transportation & Storage | Food, Beverage & Accomodation | Utilities | Health | Other Services |
|---|---|---|---|---|---|---|---|---|---|---|
| **3.2%** | **4.7%** | **11.0%** | **5.3%** | **1.5%** | **3.4%** | **3.0%** | **-2.3%** | **-8.6%** | **5.4%** | **9.8%** |

Malaysia's services sector can be divided into three broad categories: intermediate services, final services and government services. As a matter of definition, intermediate services comprise finance and insurance, transport and storage, real estate and business services and communication while sub-sectors such as wholesale and retail, accommodation and restaurants, utilities and other services are defined as final services.

In the 11MP, the services sector will continue to be the primary pillar for Malaysia's economic growth. A significant growth of 6.9% per annum in the sector is expected, thus increasing its share to GDP from 53.8% in 2015 to 56.5% by the end of the 11MP in 2020. Broad-based growth across all sub-sectors is anticipated to provide jobs and business opportunities besides enhancing the social well-being of Malaysians. The wholesale and retail sub-sector will continue to be the main contributor, expanding by 5.8% per annum, supported by modernisation in the sub-sector and the improved efficiency and effectiveness of the supply chain. The real estate and business services sub-sector is also expected to expand by 7.9%, followed by the finance and insurance sub-sector at 6.1%.

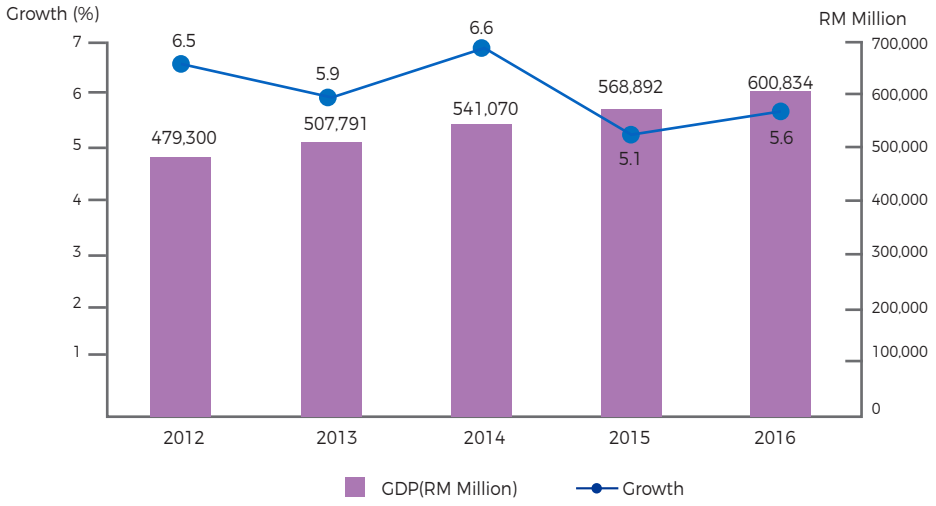
In the quest for a high-income economy by 2020, the Economic Planning Unit (EPU) has developed a detailed Services Sector Blueprint with various policy recommendations in which the services sector remains as the major growth engine and main contributor to the GDP. Under this national aspiration, EPU has proposed greater internationalisation by local businesses to penetrate global markets. Increased market knowledge and market access, better-skilled human capabilities, improved technologies and infrastructure as well as expanded financial resources will be crucial in supporting this endeavour.

Harnessing human capital to develop and create more knowledge workers is also one of the main pillars to boost the services sector. This calls for the Government to facilitate access to hard and soft technologies, including instituting partnerships between firms and universities, and access to management technologies and managerial know-how by successful SMEs.

## PERFORMANCE AND CONTRIBUTION TO NATIONAL ECONOMY

The services sector, as the main economic growth driver and contributing 54.2% to GDP in 2016, will continue to experience increases in its contribution to GDP (Figure 3.1). By 2020, the services sector is targeted to reach 58%, surpassing the targeted growth as outlined in the 11MP. The services sector's GDP performance improved significantly in 2016 by 5.6% compared to 5.1% in 2015, and employed 62.2% of the country's total workforce. This strong performance was largely due to the wholesale and retail trade sub-sector with the retail segment, in particular, contributed

**Figure 3.1: GDP Performance of the Services Sector, 2012-2016**

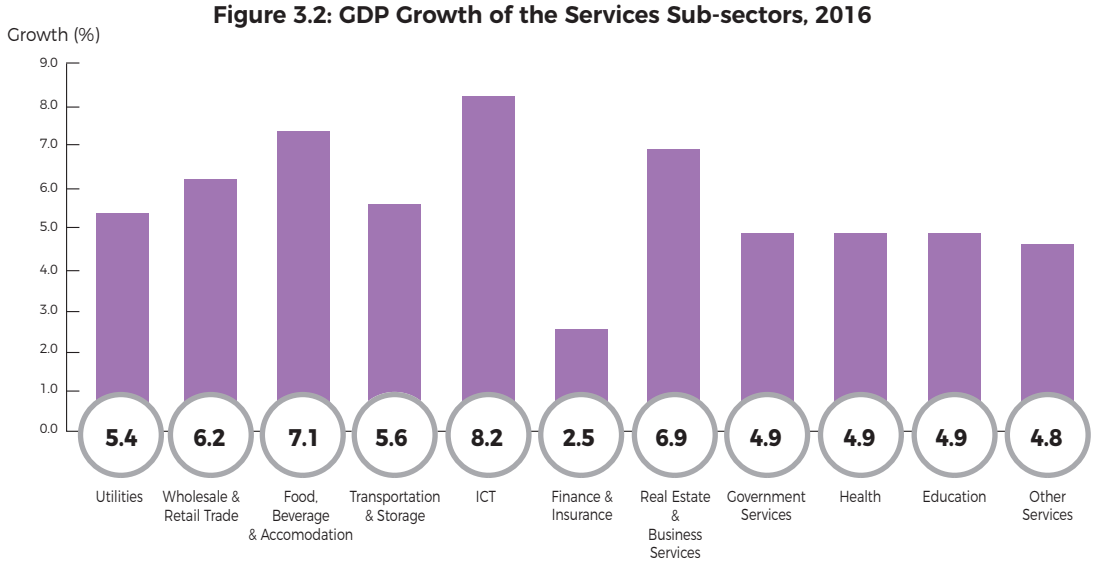



Source: Department of Statistics, Malaysia

to a sturdy 6.3% growth by both specialised stores (8.4%: RM129.6 billion) and non-specialised stores (8.3%: RM66.1 billion). This was attributed to various government-backed sales promotion campaigns, namely, the Buy Malaysian Product Campaign and Price Reduction Campaign. With over 60% of Malaysia's GDP contributed by domestic consumption, the emphasis on the wholesale and retail National Key Economic Areas (NKEA) will also lay the foundation for the sub-sector to boost the country's total gross national income (GNI) by RM156 billion and create 454,190 new jobs by 2020.

The food and beverage (F&B) and accommodation sub-sector also saw high growth at 7.1%, supported by continued wage and employment growth and an upswing in tourist arrivals. The finance and insurance sub-sector (2.5%) turned around to register positive growth, driven by higher net interest income and better performance in the life insurance segment (Figure 3.2). The stronger demand for Internet and digital services enabled the ICT sub-sector to grow by 8.2% as it was impacted by the increase in the purchase of ICT devices against a backdrop of continuous initiatives to enhance network coverage and affordable communication access. The real estate and business services sub-sector's growth of 6.9% was mainly driven by business services activities and a higher demand for professional services.

**Figure 3.2: GDP Growth of the Services Sub-sectors, 2016**

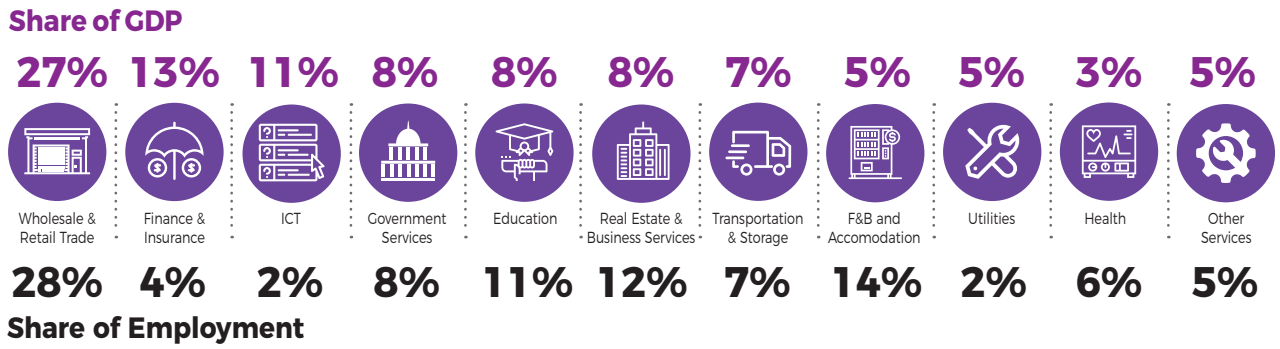



Source: Department of Statistics, Malaysia

In terms of output contribution, the wholesale and retail sub-sector accounted for the largest share of the sector's output to GDP at 27%. The finance and insurance remained the second largest contributor (13%) followed by ICT (11%).

Various strategies are being formulated to intensify productivity and competitiveness of the services sector. For example, in terms of the number of SMEs in the services sector, they comprise 98% of total SMEs in the sector and contributed 21% to the overall GDP. Under the SME Masterplan (2012-2020), the emphasis is for local SMEs to be globally competitive across all sectors, thus helping them to enhance wealth creation and contributing to the social well-being of the Rakyat.

**Contribution of Services Sector to GDP and Employment, 2016**

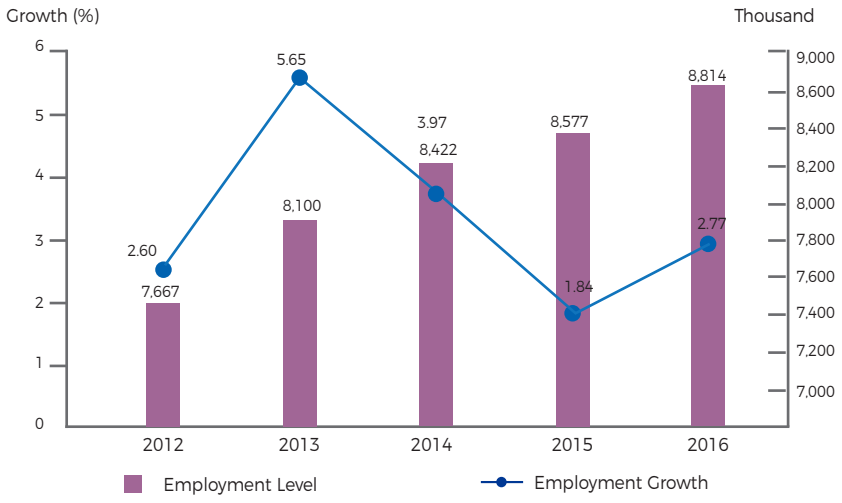



Source: Department of Statistics, Malaysia

The services sector employed 8.8 million workers (62.2% of the country's total workforce) across various sub-sectors in 2016, making it Malaysia's largest employer (Figure 3.3). This is in consonance with the target set in 11MP where the sector is expected to contribute 62.5% of total employment. Among the sub-sectors, wholesale and retail trade remained having the largest share of jobs at 28% (2.4 million workers) followed by F&B and accommodation at 14% (1.3 million workers) and real estate and business services at 12% (1.1 million workers).

Employment gains in the services sector were driven largely by the wholesale and retail trade, F&B and accommodation, and education sub-sectors. In terms of skill-sets required during the year under review, net job gains were mostly concentrated in the high-skilled segments such as professional and managerial jobs.

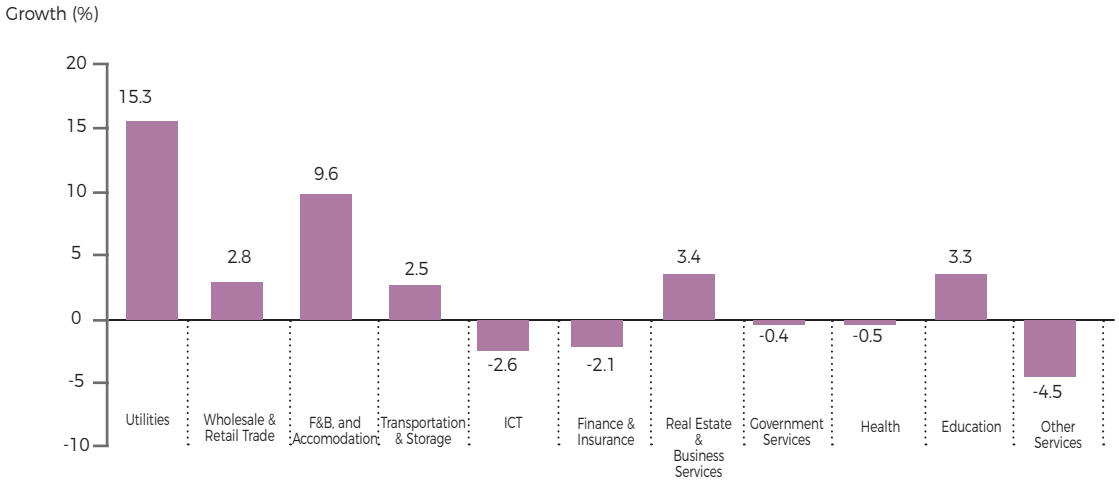
**Figure 3.3: Employment of the Services Sector, 2012-2016**




Source: Department of Statistics, Malaysia

The utilities, F&B and accommodation, wholesale and retail, and transport and storage sub-sectors had contributed to employment growth accordingly (Figure 3.4). Wholesale and retail trade grew by 2.8% while F&B and accommodation expanded by 9.6%. These increases were supported by a larger travel account surplus amidst the rise in tourist arrivals of 25.7 million and tourist spending of RM69.1 billion in 2016. Additionally, improved access to e-Visa applications for Chinese and Indian nationals saw an influx of Chinese tourists from March 2016 onwards, with 2.1 million arrivals from China and 638,000 Indian tourists. The existing popular local attractions in scenic spots, food and culture coupled with heightened promotions in medical and sports tourism, improved tourism infrastructure such as better shopping facilities and greater access to direct flights, and the lower ringgit were the major factors in drawing more tourists to Malaysia.

**Figure 3.4: Employment Growth for Services Sub-sectors, 2016**

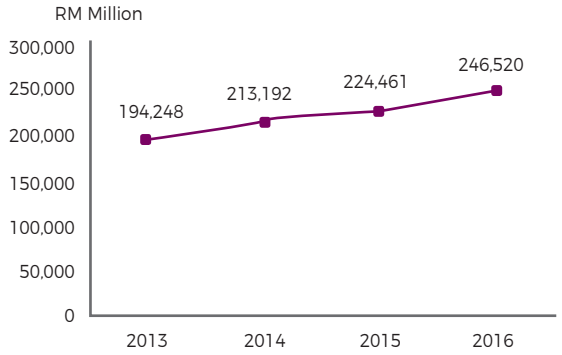



Source: Department of Statistics, Malaysia

As the services sector accounted for more than half of the Malaysian economy, a further liberalisation of the economic landscape will help maintain high levels of FDI, which had played an important role in terms of the country's growth and development. A steady and continued inflow of FDI could also provide additional expertise and networking to support the transformation of Malaysian businesses to expand globally. It will also improve information and leads on potential investment opportunities in emerging industries where local expertise may be insufficient at present. Liberalisation is often a catalyst for change as evidenced by the huge strides in the services sector since 2009 and will further boost competition and productivity in industries within the sector.

Despite a weaker global environment, Malaysia remains an attractive investment location for foreign investors. A significant development was the sturdy increase of 9.8% in FDI to RM247 billion in 2016 from RM224 billion in 2015 amidst a shift from a production-based to a knowledge-based economy, which leveraged on mechanisation and digitalisation towards Industry 4.0 (Figure 3.5). This demonstrates that Malaysia's services sector is on the right path towards liberalisation and globalisation.

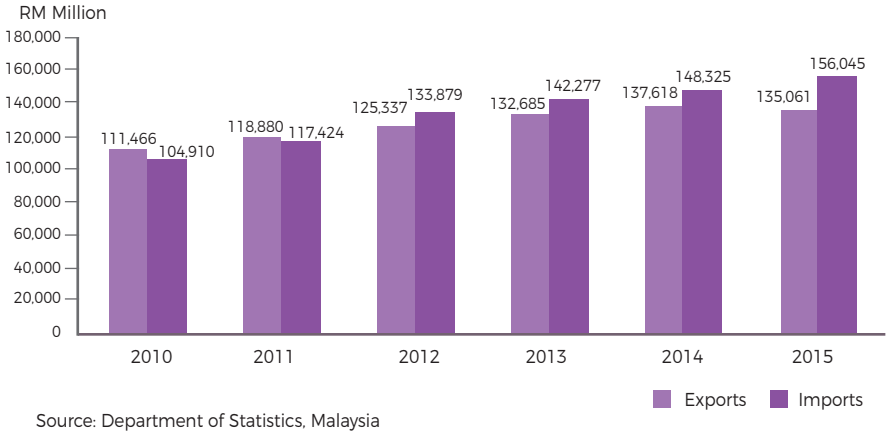
**Figure 3.5: Foreign Direct Investment of the Services Sector, 2013-2016**




Source: Department of Statistics, Malaysia

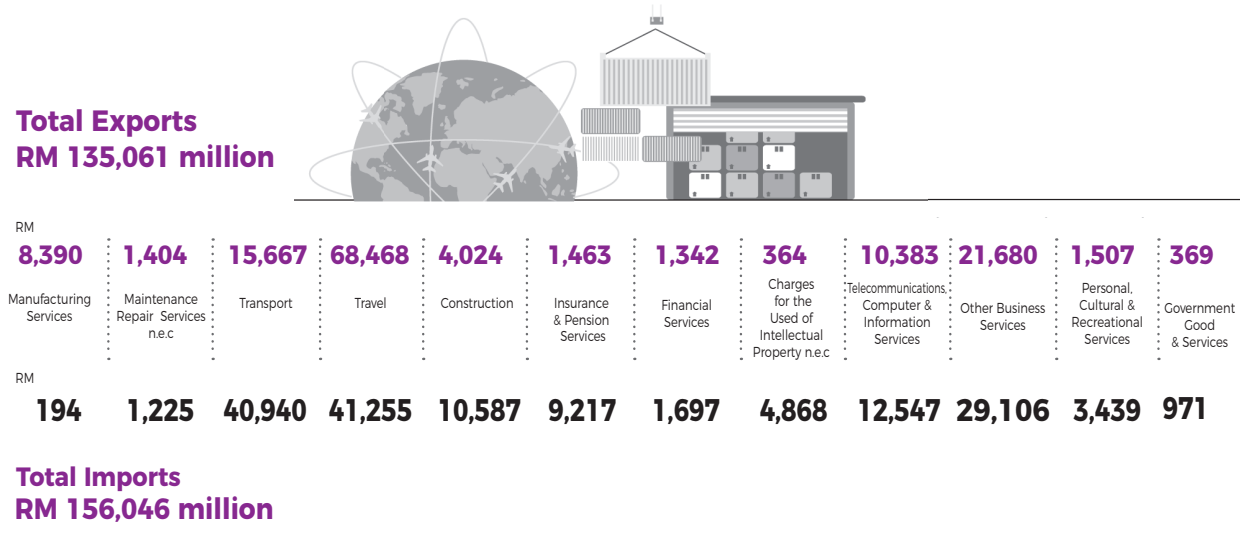
Among ASEAN countries, Malaysia ranked second in terms of ratio of trade in services to GDP as well as the world's top 30 largest services exporters. Malaysia's growth in services exports saw a consistent increasing trend between 2010 and 2015. It is worth noting that in 2015, Malaysia's services exports declined slightly to RM135.1 billion from RM137.6 billion in 2014. A similar growth pattern was also observed for services imports during the same period. In fact, import growth overtook export growth in 2012, and since then import growth has been higher than that of export growth. Additionally, imports of services increased to RM156 billion in 2015 from RM148.3 billion in 2014 (Figure 3.6). The largest contributor of Malaysia's exports in services in 2015 was travel services with a 50.7% contribution followed by other business services (16.1%) and transport services (11.6%).

**Figure 3.6: Imports and Exports of the Services Sector, 2010-2015**




Source: Department of Statistics, Malaysia

**Total Exports and Imports of Services Sub-sectors, 2015**

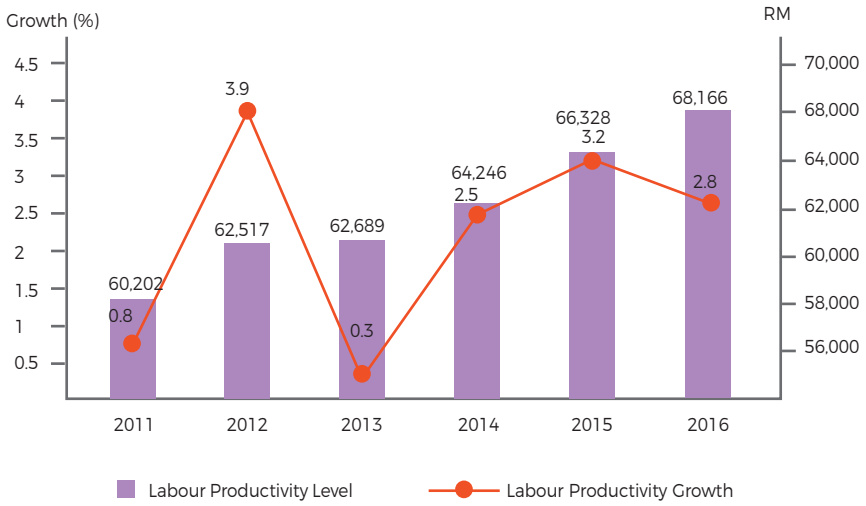



Source: Department of Statistics, Malaysia

## PRODUCTIVITY PERFORMANCE

In 2016, labour productivity growth in the services sector increased by 2.8% to RM68,166 compared to 3.2% in 2015 (Figure 3.7). Despite recording higher productivity, the sector needs to step up its efforts to move away from sub-sectors that depend mostly on low-skilled labour. Among the factors that can negate productivity in services include low technology adoption, over-reliance on foreign workers, complex regulatory framework and weak institutions.

**Figure 3.7: Labour Productivity of the Services Sector, 2011-2016**




Source: Malaysia Industrial Productivity Database (MIPD), MPC

The ICT, finance and insurance, and real estate and business services were the main drivers for the productivity growth in 2016 as they contributed to about 30% of the services output (Figure 3.8). ICT recorded a double-digit productivity growth of 11% to RM313,383 in 2016 compared to RM282,311 in 2015, mainly spurred on by the expansion of new internet-based applications and enhanced data plans. The infrastructure expansion was initiated to cater for the rising demand of reliable and high-speed Internet, including 4G Long Term Evolution (LTE) network and fibre optics.

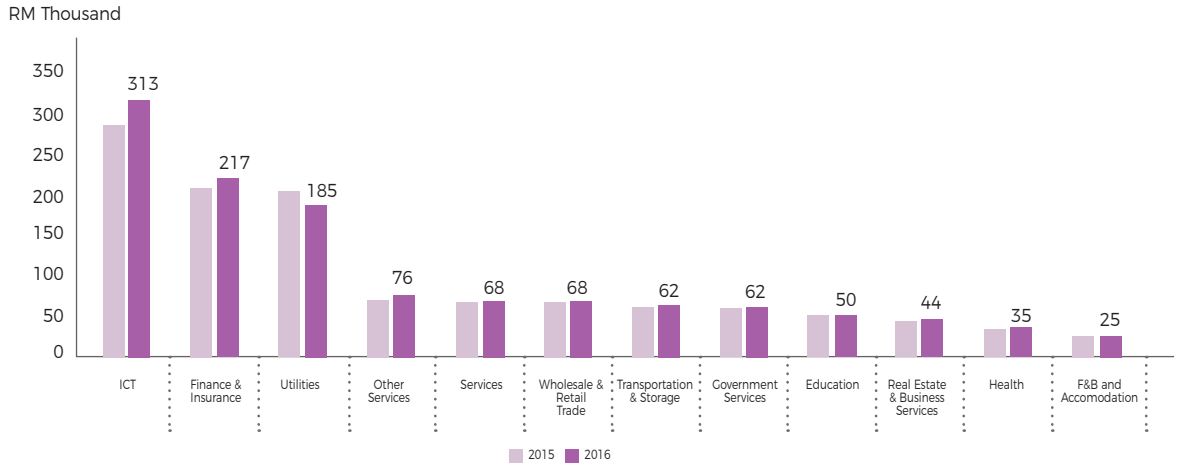
Labour productivity in the finance and insurance sub-sector regained its growth momentum and grew by 8.9% in 2016 compared to -7.8% in 2015. This sub-sector's improved productivity was driven by higher net interest income and the better performance in the life insurance segment. Growth of the insurance segment was spurred on by the steady increase in premium income amidst lower claims in the motor segment.

The wholesale and retail sub-sector recorded a 3.2% labour productivity growth to RM68,089 in 2016 from RM65,955 in 2015. The retail segment's growth stemmed from various sales campaigns such as the Buy Malaysia Products Campaign, Kempen Jom Beli Barang Raya Putrajaya, Malaysia Year-End Sales (YES) and Price Reduction Campaign. The segment also benefited from the opening of several new malls such as IOI City Mall Putrajaya, IKEA Cheras and Sunway Velocity and the re-opening of Sunway Putra, all in the Klang Valley. Existing malls in Kuala Lumpur such as Pavilion, Suria KLCC, and Mid Valley Megamall continued to attract large numbers of shoppers, both foreign and domestic. Additionally, the emergence of major factory outlets like Johor Premium Outlet; Melaka's Freeport A'Famosa; KLIA's Mitsui Outlet Park; and Penang's Design Village Outlet also provided competition to existing urban shopping malls and contributed towards a vibrant retail shopping scene in Malaysia.

Productivity in the health and education sub-sectors grew by 5.4% and 1.5% respectively, as a result of the strong development of private health and private education in the country. For the health sub-sector, the continuous global demand for Malaysia's renowned healthcare services was the main contributor for the improved performance, a development that is expected to expand in the future. This is especially in line with Malaysia being recognised as a preferred medical tourism destination for the second consecutive year by an international medical tourism magazine. Malaysia's private healthcare services have also gained reputation as being of quality and safe besides having effective treatments at affordable prices from the lower ringgit.

As for education, the number of private higher institutions increased by 2.8% to 496 institutions nationwide in 2016, including foreign university branch campuses, private universities, private university colleges and private colleges. The increased demand for private higher education also brought a 31.1% increase in the number of foreign students into Malaysia in 2016 as a result of the availability of different kinds of courses, a conducive environment for studying and the competitive value of the ringgit.

**Figure 3.8: Labour Productivity Level of the Services Sub-sectors, 2016**




Source: Malaysia Industrial Productivity Database (MIPD), MPC

## Labour Cost Competitiveness

In 2016, the services sector was competitive in terms of labour cost. Its labour cost per employee was recorded at 2.3% while the unit of labour slipped into negative territory by 0.5%. Overall, productivity in the services sector increased by 2.8% in 2016 (Table 3.1). Meanwhile, the ICT sub-sector managed to sustain its labour cost competitiveness, with productivity rising by 11%, slightly higher than its labour cost per employee growth of 10.8% while its unit labour cost declined by 0.2%. Other sub-sectors such as finance and insurance, real estate and business services, health, and education struggled to manage their respective labour cost competitiveness as their labour cost per employee rose in double digit terms when compared to their productivity growth despite their unit labour cost declining significantly.

**Table 3.1: Labour Cost Competitiveness for the Services Sector, 2016**

| Growth (%) | Labour Productivity | Labour Cost per Employee | Unit Labour Cost |
|---|---|---|---|
| **Services** | **2.8** | **2.3** | **-0.5** |
| Utilities | -8.6 | -20.6 | -13.1 |
| Wholesale & Retail Trade | 3.2 | 5.6 | 2.3 |
| F&B and Accommodation | -2.3 | 3.1 | 5.5 |
| Transportation & Storage | 3.0 | 3.2 | 0.2 |
| ICT | 11.0 | 10.8 | -0.2 |
| Finance & Insurance | 4.7 | 1.0 | -3.5 |
| Real estate & Business Services | 3.4 | 3.8 | 0.4 |
| Government Services | 5.3 | -2.4 | -7.3 |
| Health | 5.4 | 3.2 | -2.1 |
| Education | 1.5 | -0.9 | -2.4 |
| Other Services | 9.8 | -1.2 | -10.0 |

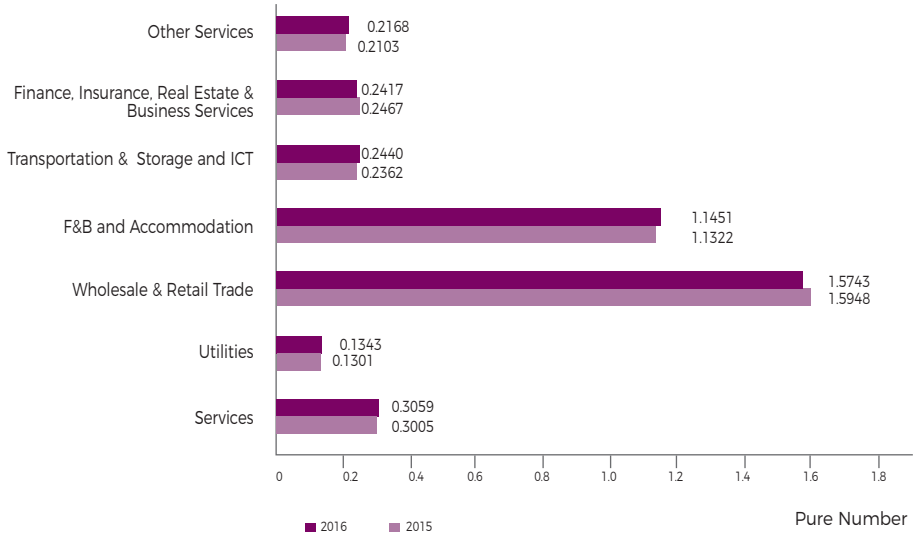
Source: Malaysia Industrial Productivity Database (MIPD), MPC

## Capital Productivity

The efficiency of fixed assets utilisation in generating value added in the services sector grew by 1.8% in 2016 with a value of 0.31. Most of the sub-sectors were able to contribute higher value-added in their products and services, with wholesale and retail registering the highest value-added level. In terms of capital productivity, wholesale and retail sub-sector, however, saw efficiency declining to1.6% (Figure 3.9).

In contrast, the transportation, storage and information sub-sector recorded the highest growth at 3.3% with a value of 0.24. This was due to infrastructure expansion to cater for the rising demand of high-speed Internet, and the expansion of the land transport segment, which attributed its growth to a higher volume of inter-city train services. As for the utilities sub-sector, the growth was at 3.2% with the value level of 0.13 in 2016 as a result of higher usage of electricity during the El-Nino weather phenomenon in Malaysia.

**Figure 3.9: Capital Productivity for the Services Sub-Sectors, 2015-2016**




Source: Malaysia Industrial Productivity Database (MIPD), MPC

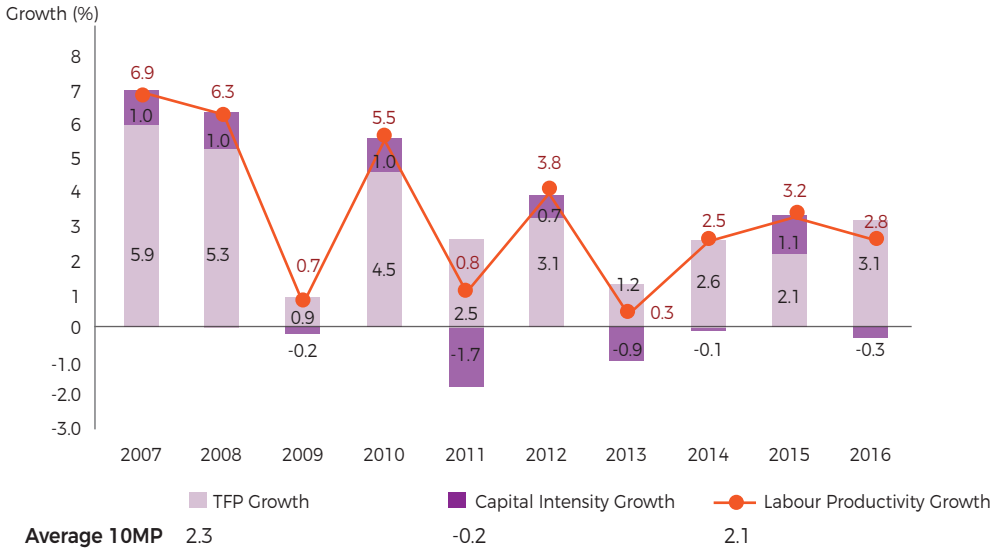
## Sources of Labour Productivity

In 2016, the services sector recorded a TFP growth contribution of 3.1% to the sector's labour productivity growth (Figure 3.10). Growth of TFP in 2016 was attributed to ICT-based operations in modern services such as professional services and finance that were information-intensive as well as efforts by companies to provide innovative, personalised and excellent services standards. Technological and innovations contributed to higher TFP as a result of the significant usage of electronic payment transactions. The initiatives undertaken by the Government such as reduction in interest rates and liberalisation of the financial sector had been the key factors towards increased TFP growth. It was also observed that there was a sharp drop in TFP growth in 2009 due to externalities of unconducive demand and currency volatility. In 2010, TFP growth improved to 4.5% when the global economy recovered.

The 10MP period witnessed TFP-driven labour productivity growing by 2.1%, reflecting the Government's initiatives to modernise the services sector through greater liberalisation to spearhead economic and TFP growth over the long term. This clearly showed the positive impact of TFP initiatives in the sector such as the greater use of technology and ICT in transactions and adoption of the latest operational systems based on quality, reliability, speed and customer satisfaction. All these efforts had a strong positive impact on the sector's enhanced productivity.

Over a 10-year period from 2007 to 2016, the services sector was very much TFP-driven as witnessed by an increase in knowledge workers, skills and experience, advancements in information technology, adoption of new technologies, and upgrading of technology in tandem with modernisation. The liberalisation of the services sector in Malaysia was jump-started in 2009 to attract more foreign investments and enhance its competitiveness to further fuel TFP growth in services. From an initial 27 services sub-sectors in 2011, this was increased to another 18 services sub-sectors in 2012. These 18 services sub-sectors were further liberalised to allow for up to 100% foreign equity in wholesale and retail trade services, healthcare, professional services, environmental services, telecommunications, courier and education. A series of regulatory reforms and business process improvement, which included the Government enforcing the Competition Act in 2012, further augmented the liberalisation initiatives. TFP in the services sector also benefited from better management skills and gains from the greater skills specialisation from training that workers received under the Human Resource Development Fund (HRDF) for capacity building.

**Figure 3.10: Sources of Labour Productivity Growth of the Services Sector, 2007-2016**




Source: Malaysia Industrial Productivity Database (MIPD), MPC

### PROCESS EFFICIENCY IN EZHAJJ SYSTEM

Tabung Haji (TH). the primary organisation that facilitates Hajj, is the country's largest Islamic fund institution that has more than 8 million depositors. On an annual basis, TH facilitates about 22,000 pilgrims who are selected to perform Hajj.

Based on the Critical versus Capability matrix and Pareto diagram, the team decided to resolve the most critical issue of high number of unreturned feedbacks for hajj offers amounted to 103. The team used the Fishbone diagrams, 5W+2H method, Frequency table and Pareto diagram. Subsequently, 17 causes were identified which was then reduced to five causes: lengthy time in reviewing the submitted forms, an ample of forms to fill-in, ineffective method of data updates, repetitive information and inefficiency in time management at the counters.

The implementation of this ICC project has reduced the number of unreturned feedback to 0, indicating a 100 percent improvement. Additionally, the time taken in dealing with unreturned feedback has also reduced to 1 day as compared to 16 days previously. This resulted in cost savings of RM10,208 to RM350 from RM10,558 previously for managing the process of getting unreturned feedback for hajj offers.

| Root Cause | Proposed Solution | Action Taken |
|---|---|---|
| Lengthy time in form reviews | Develop an automated system for form management | 1. The group developed a new application known as ezHaJJ<br>2. ezHaJJ is designed to cater all the proposed solutions<br>3. ezHaJJ is able to extract data from existing database<br>4. ezHaJJ Unique Features:-<br>¨ On-line application that can be easily accessed by all users at any time and anyway<br>¨ Review hajj offers<br>¨ Accept or reject the offers process<br>¨ Updating pilgrim personal data<br>¨ Updating pilgrim family inheritance data and cording<br>¨ Flight details and package selection<br>¨ Fare choices<br>¨ Pilgrim data storage and processing<br>¨ Print replies from pilgrim on hajj offers |
| An ample of forms to fill-in | Inclusion of the forms and to amend all related forms | |
| Ineffective method in data updates | Develop an automate system for managing depositors information | |
| Repetitive information | To utilise IC number as an ID for each depositor | |
| Inefficient time management at the counters | To prepare statistic report of feedback received for hajj offers to monitor staff performance | |

## FOCUS SECTOR: RETAIL INDUSTRY

The MPB has identified the retail industry as one of the focused industries because recent trends demanded that retail players quickly adapt to the shift in demand for new skill sets and capabilities or face the threats to the survival of their current business models. The selection of retail was also due to the industry having the highest portion of contribution within the services sector backed by strong household spending, rising income levels and higher tourist arrivals. The emergence of e-commerce has necessitated a new breed of skilled workers to manage multi-channel strategies and understand customer preferences in terms of online and in-store shopping experiences. Retailers would also need to incorporate greater productivity and efficiency elements into their business models, which also translate into training new skills to existing workers who may face redundancy in view of shifting trends.

**Retail Industry Profiling**

## FOCUS SECTOR: RETAIL INDUSTRY

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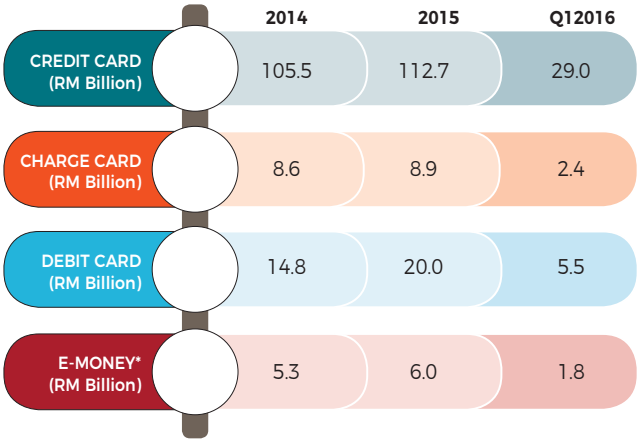
**Payments by e-money in Malaysia**



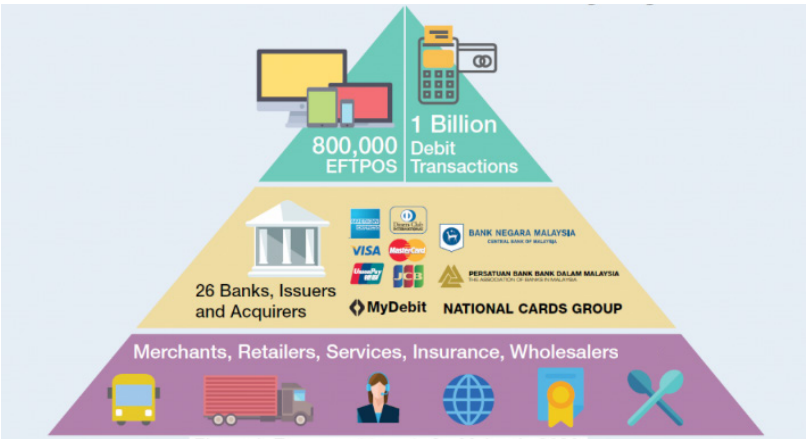

Note:
e-money include e-purse initiatives, e.g. TouchnGo and MEPS cash.

Source: Bank Negara Malaysia

### Strengthening E-Commerce as the Business of the Future

Far-sighted retailers from the traditional brick-and-mortar business have already begun to incorporate e-commerce in their businesses. They cover almost all retail products from international luxury brands in fashion apparel and accessories, gifts, toys, books, electrical and electronics, furniture, hardware, building products, groceries, and F&B. As consumers begin to migrate to the ease of online shopping, retailers would stand to lose out if they did not take advantage of shifting preferences in shopping. To further strengthen the improving ecosystem in e-commerce in the country, a National e-Commerce Strategic Roadmap has been developed to double the e-commerce growth rate from the current 10.8% to 20.8% by 2020.

**The Revolution Starts Towards a Cashless Society by 2020**

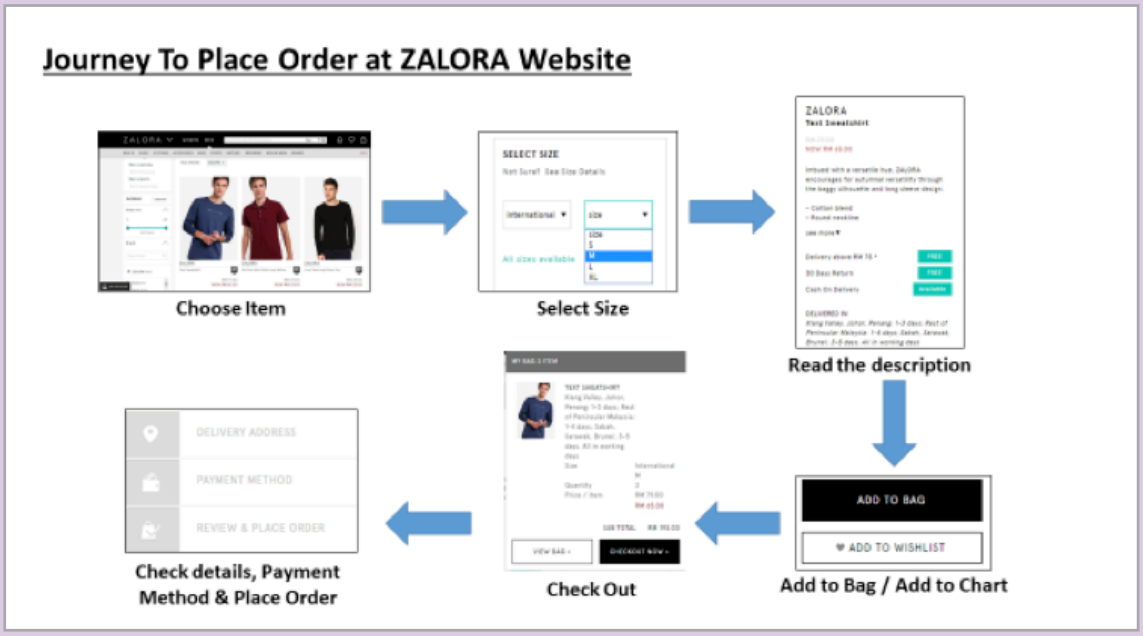


Z

## CUSTOMER EXPERIENCE AT ZALORA

Zalora Malaysia is the distribution hub for the ASEAN region as it hosts the largest warehouse, measuring 500,000 sq ft in all. With a workforce of about 500, Zalora's focus is on unique and exceptional customer experience of online shopping. This is manifested by dedicating a third of its manpower to manage the customer service process. Zalora is also distinctive in its product offerings as its focus is on apparel and fashion accessories. Zalora has about 4,000 to 5,000 brands in its list and new brands are being added every year. It also has its own house brand, Zalora, to offer its customers the latest design in fashion at affordable prices.

The customer journey with Zalora starts from two channels -- Zalora mobile apps or the Zalora website. Customers have various payment methods to choose from, including credit and debit cards, cash on delivery and online banking, along with a free delivery charge if the purchase is above RM75. If a customer is dissatisfied with the product, he or she can return it to Zalora by using an exchange slip provided by Zalora through POSLaju or the Zalora courier team. About 90% of customers' orders are in the Klang Valley. They are usually delivered the next day upon receipt of the orders. One of the ways to ensure a high rate of delivery is having Zalora's courier team getting incentives for every successful parcel delivered to the customer. It has also set up a system where customers need to sign in the system and the delivery team needs to take a picture of the house where the parcel is delivered as verification. The courier team has also installed a GPS system to improve the tracking of couriers.




Source: Engagement with Zalora on 22nd March, 2017

## IKEA'S 3D FURNITURE APPLICATION

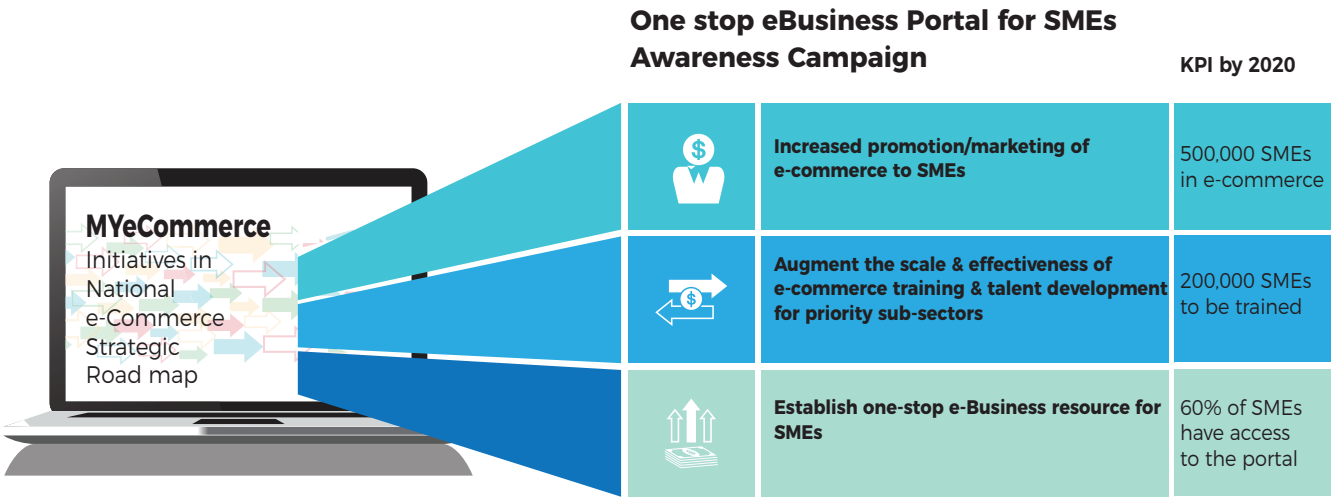
As a major homeware and furniture retailer, IKEA has come out with new catalogue application that allows customers to place 3-D versions of its furniture in their homes. The idea for this technology arose when people found it hard to buy furniture from IKEA without having a proper idea how it would really fit into their houses. This is because most purchasers are not equipped with the trained eye of an interior designer, which may lead to some disappointing purchases.

By using augmented reality, the IKEA catalogue app allows customers to visualise 3-D versions of IKEA's furniture in their homes. Items like sofas, tables, desks and chairs can now be virtually placed into a room, ultimately making the planning process much more accurate. It works by customers flipping through the print catalogue, and when they come across a plus symbol on a page, they can hover their phone or tablet over it until a screen pops up and it asks them to scan the images on the page. At that point, users will see the bonus features, which can be a 360-degree view of a room, videos, additional product information, or an option to place a piece of furniture in their room.

Currently only about 100 products are available for the 3-D augmented reality option. The app's other features include time-lapse images that allow one to watch a room being decorated piece-by-piece and get some inspiration from the arrangements.

Source: https://www.wired.com/2013/08/a-new-ikea-app-lets-you-place-3d-furniture-in-your-home/

In the early stages of e-commerce, retail was the only industry taking advantage of it to reach out to more customers. However, e-commerce is no longer restricted to retailers and has expanded to other industries like banking, insurance, utilities, healthcare, publishing, telecommunications and education. The cost of transitioning to e-commerce has also dropped drastically, thus making it an affordable option for modernising the business.




## ISSUES AND CHALLENGES

The National E-Commerce Strategic Roadmap has called for the establishment of a critical mass of relevant SMEs and large retailers to create a strong supply base. This calls for Malaysian retailers to collaborate with each other to create a stronger supply chain of products, especially within medium-sized retailers. Fashion Valet, a portal where local fashion retailers can promote or sell their products to potential customers across the globe with many brands under one platform, is a good example of collaboration among different businesses. Local retailers also have to be more creative and innovative to enable their products to have strong value proposition by understanding their target markets, value and pricing of their product range, and their competitive advantage in order to have greater success.

The relatively limited payment mechanisms were also found to be a hindrance in the expansion of e-commerce but retailers have to be mindful that consumers have always been changing their payment methods by adopting new technologies that provide better convenience. Under the Malaysia Financial Sector Blueprint 2011-2020, the number of electronics payment systems will be increased as the country's retail industry moves closer towards operating in a cashless society by 2020. Malaysian Electronic Clearing Corporation Sdn. Bhd. (MyClear), a wholly-owned subsidiary of Bank Negara Malaysia, has created Electronic Payment Exchange (EPX) to allow for a direct-to-bank Internet payment gateway, thus facilitating Internet payments and e-commerce purchases using savings and current accounts.

Lack of consumer trust has been cited as one of the obstacles towards greater adoption of e-commerce against a backdrop of online fraud. However, the bright spot is that consumers have higher awareness as they take greater cognisance of online fraud and that businesses are taking greater steps to safeguard their payment systems.

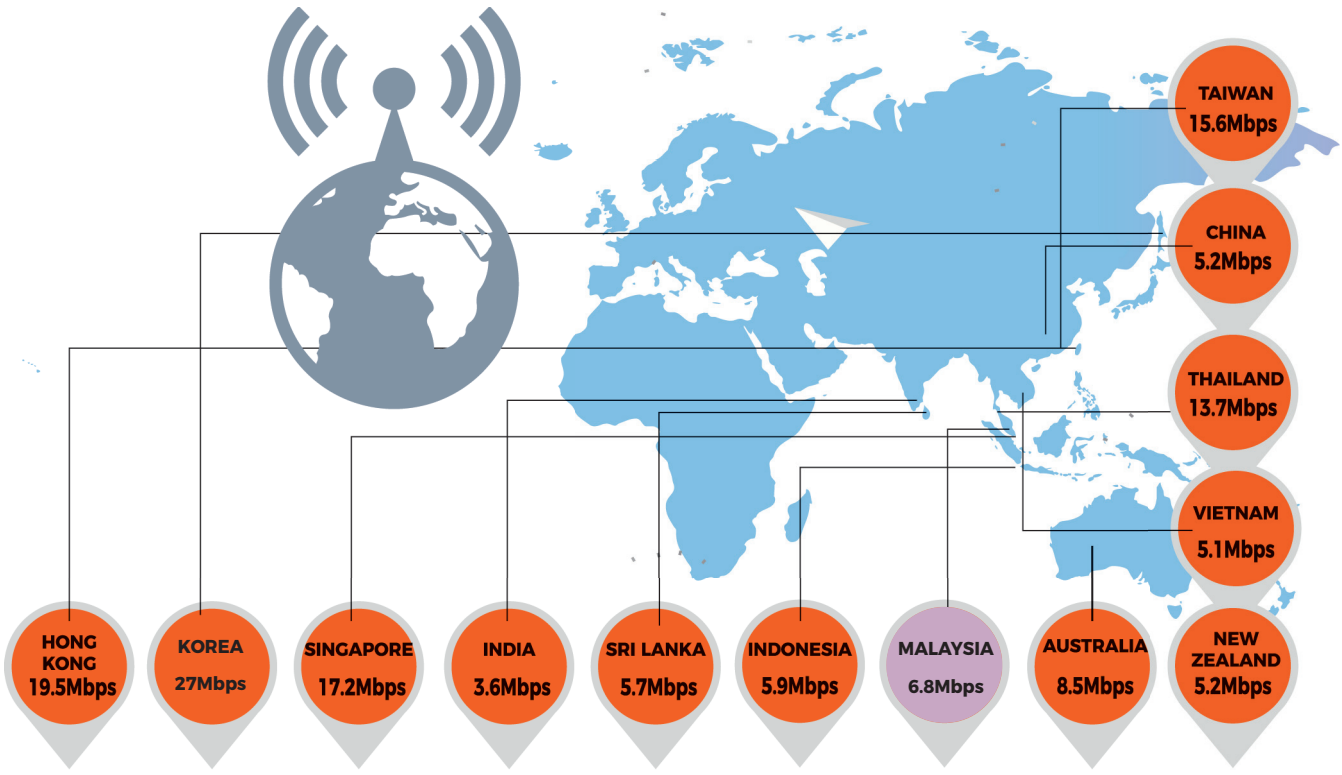
With advancements in the Internet of Things (IoT), various types of portable devices will be introduced and connected to Internet for various transactional purposes. This is an area where the Government and business community have to step in to build greater confidence and promote increased acceptance of e-commerce which will eventually lead to greater wealth creation.

Weak logistics infrastructure has also been cited as one of the impediments in expanding online transactions. This calls for retailers to invest more on their value chain to deliver products straight to their customers without much hassle. Thus, their warehousing facilities would have to be equipped with high-end technologies to enhance order fulfilments and shipping logistics to leverage on inter-operability between multiple shipping platforms and integrate with efficient real-time tracking and traceability.

Promoting online commerce requires a strong technological backbone but a weak Internet infrastructure with low Internet penetration and slow speeds can also hamper this aspiration. The 11MP highlighted that broadband infrastructure will continue to expand and that affordable broadband and high quality digital infrastructure will be rolled out to cater for the increasing number of Malaysians going online. To address the issue of the relatively slow Internet speed, the Government has allocated RM1 billion to improve high-speed broadband in the country under the 2017 Budget.

## AVERAGE INTERNET CONNECTION SPEED IN ASIA PACFIC:

Malaysia Average Internet Connection Speed was 6.8Mbps in Q2 2016, ranking improved to 68 Globally (Q12016 : 73rd)



**TALENT MANAGEMENT IN INDUSTRY 4.0**

Industry 4.0 has an impact on the world of how we work, which cannot be foreseen in its entirety at this stage. It is the new age in production, where intelligent systems are networked via the Internet to coordinate the value chain of the organisation. Based on the technological concepts of cyber-physical systems, the IoT and the Internet of Services, Industry 4.0 facilitates the vision of a Smart Factory.

This development will certainly impact on talent management processes. It means that these processes have to be tighter, yet more flexible to reflect these new market dynamics and to ensure that employees are constantly aware of the latest developments. They include cloud-based talent management solutions to help companies respond quicker due to emerging trends. The high technological demands in Industry 4.0 have immediate consequences in issues such as succession planning and strategic workforce development. Standardised processes create room for human resource to respond to the individual needs of the target groups.

In addition, software solutions also provide businesses with the necessary cross-sectoral and holistic overview of talent while employees in the Industry 4.0 are in a permanent onboarding process in terms of new situations and content. This means that training must be adapted with the focus on learning formats such as e-learning or social media platforms that make learning available anytime and anywhere.

Source: https://www.cornerstoneondemand.co.uk/blog/talent-management-age-industry-40

RM

**LEVERAGING ON RINGGIT DEPRECIATION**

The ringgit may have depreciated against major currencies, and particularly by more than 20% against the US dollar in the last three years. Although this means that there is not much room for businesses to manoeuvre, this also calls for looking at ways to turn challenges into opportunities. There is still a silver lining for local businesses to take advantage of the country's cost competitiveness as a result of the lower ringgit. A whole range of services can be ramped up to the country's advantage. Tourism (including the food and beverage, accommodation and retail segments), healthcare and education are sub-sectors that are well-poised to take advantage of this situation for the financial returns are almost immediate.

Having a vibrant online ecosystem also requires the right skill sets to operate the multiple channels involved in the digital business. This necessitates the retail industry to hire professional workforce capable of delivering highest level of services quality as well as high competency in new technologies. The Government, industry and relevant institutions have to work towards creating a positive outlook within the digital business, including attracting skilled graduates. These graduates will then drive innovation and enhance technological capabilities in the industry. In addressing the importance of digital literacy among graduates, educational institutions and the Government will have to emphasise key competencies like digital literacy, entrepreneurial mindsets and knowledge on the digital business as well as giving weightage to Science, Technologies, Engineering and Mathematics (STEM) to ensure a better future for young Malaysians.

## ELEVATING SERVICE EXECELLENCE

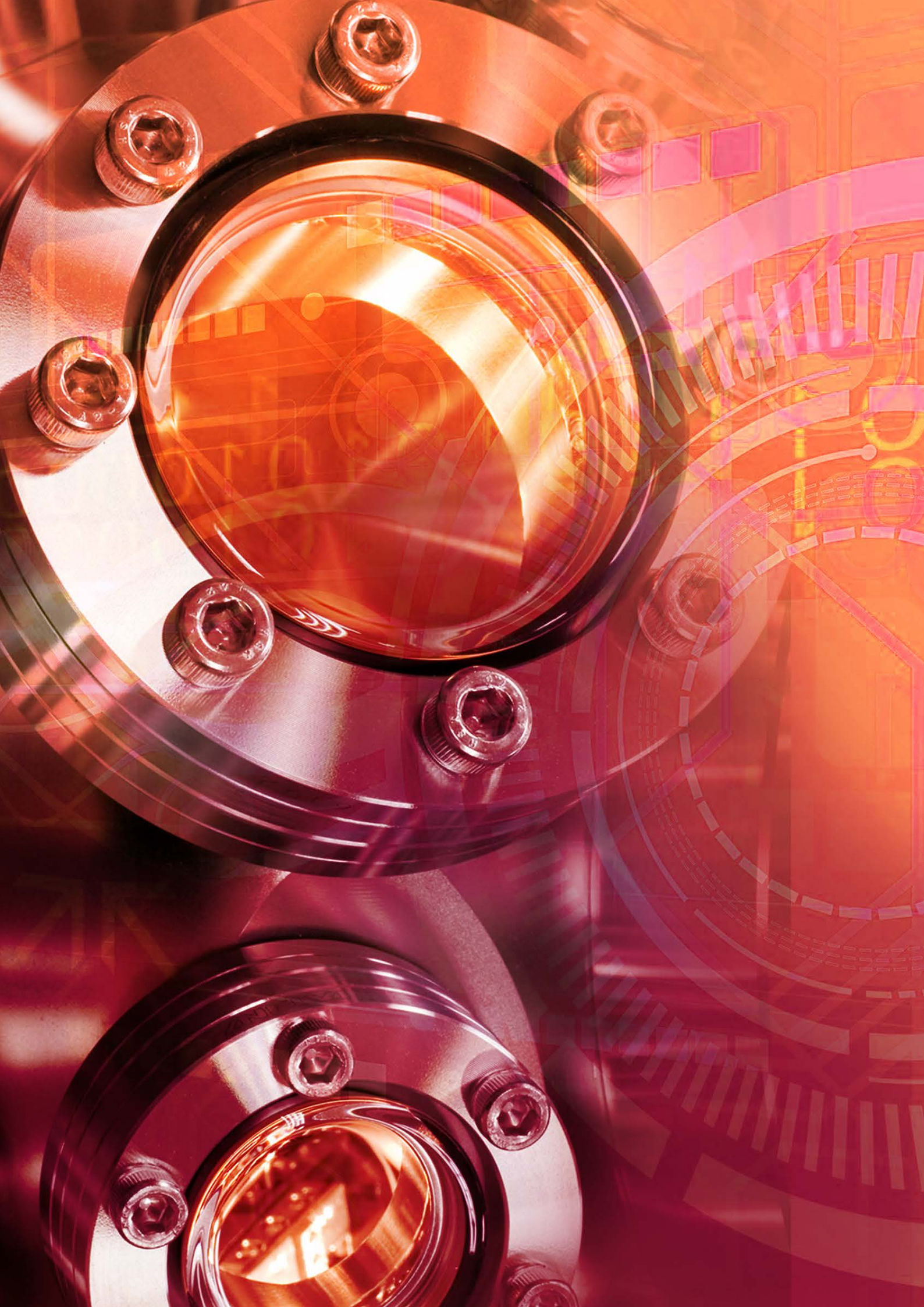
The services sector is at the crossroads of change with an uncertain external environment and emerging technologies and marketing channels pushing for better alternatives in the e-commerce ecosystem. The challenging economic environment has also prompted the Malaysian Institute of Economic Research (MIER)

to forecast that the GDP growth for services may be a shade lower at 5.3% in 2017 from 5.6% in 2016. The services sector needs to inject higher momentum for productivity growth to at least 5.2% to realise the targeted productivity level of RM83,400 by 2020.

Faced with this challenge, players in the services sector will have to look for alternatives and opportunities including integrating e-commerce initiatives. This requires providing adequate and ideal cross-channel customer experiences as these business mechanisms become more imperative to meet customers' needs. A change in mindset is needed so that productivity gains can be sustained by realigning their engagement strategies with customers. Although technology plays a key role in e-commerce, it should not be at the expense of customer experience, but rather that it helps to enhance the service delivery.

Against this promising scenario, the Government too will have to augment the sector by putting in place regulations and safeguards to boost e-commerce and retailing in order to protect against Internet fraud. The Government's pivotal role over the medium and long term will be to address the importance of digital literacy among young Malaysians. This will require educational institutions to place greater emphasis on key competencies like digital literacy, entrepreneurial mindsets and knowledge on the digital business as well as giving greater weightage to STEM subjects in the educational curriculum. A case in point is the proposed launch of Malaysia's Digital Free Trade Zone (DFTZ), a joint initiative with foreign parties with the necessary skills and experience. The move is expected to boost the nation's ICT segment and eventually develop a digital economy as a new source of growth for the country's GDP that is expected to generate trade of around RM286 billion by 2025. However, competent and skilled Malaysians must also be part of this growth.

As e-commerce consolidates its presence in all industries in the services sector and not just retail, an all-round effort is needed to reap the benefits of productivity gains and wealth creation. It is a productivity path that must be pursued earnestly by all as the services sector remains the key contributors to boost economic growth. This pursuit aligns with the focus of economic development on moving up the GVCs on the services sector.



# 04

# Productivity Performance of the Manufacturing Sector

# Manufacturing Sector Productivity **At a Glance**

## 2016

Manufacturing Productivity Level
**RM106,647**

Manufacturing Productivity Growth
**1.4%**

## 11MP Target

Manufacturing Productivity Level
**RM112,100**

Manufacturing Productivity Growth
**2.6%**

## Sources of Labour Productivity Growth, 2016

TFP Growth
**1.1%**

Capital Intensity Growth
**0.3%**

## Labour Productivity Growth of the Manufacturing Sub-sectors, 2016

### Export-oriented Sub-sectors

| Chemicals & chemical Products | Refined Petroleum | Electrical & Electronics | Textiles |
|---|---|---|---|
| **2.8%** | **1.5%** | **9.6%** | **5.1%** |

| Wearing Appearel | Wood & wood Products | Paper & paper Products | Rubber & Plastic Products |
|---|---|---|---|
| **3.4%** | **5.3%** | **1.5%** | **0.6%** |

### Domestic-oriented Sub-sectors

| Basic Metals | Pharmaceutical Products | Machinery Equipment | Transport Equipment |
|---|---|---|---|
| **-1.1%** | **1.7%** | **3.0%** | **3.2%** |

| Food Products | Other Non-metallic Mineral Products | Fabricated Metal Products | Beverages |
|---|---|---|---|
| **-3.5%** | **1.7%** | **0.5%** | **0.7%** |

The manufacturing sector comprises both export and domestic-oriented sub-sectors. E&E products; chemicals and chemical products; refined petroleum products; wood and wood products; and textiles, apparel and footwear form the majority of export products. The domestic-oriented sub-sectors include fabricated metal, basic metal, non-metallic mineral products; transport equipment; food products; and beverages.

For Malaysia to achieve high-income nation status by 2020, manufacturing remains a core sector for sustainable growth under the 11MP. Three primary sectors, namely, the E&E products; machinery and equipment; and chemicals and chemical products sub-sectors have more complex and high value-added products that provide strong catalytic support for the development of other products and production activities. Potential growth areas such as aerospace and medical devices, meanwhile, continued to evolve into higher value-added activities after having established a strong base in the country.

Among the many sound reasons that Malaysia has continued to attract huge investments in the manufacturing sector despite a challenging economic environment have been its highly-diversified economy, strong manufacturing foundation, developed infrastructure and connectivity, proactive government policies and hardworking workforce. All these contributed to the decisions of investors, both foreign and local, to continue expanding and diversifying their projects in the country.

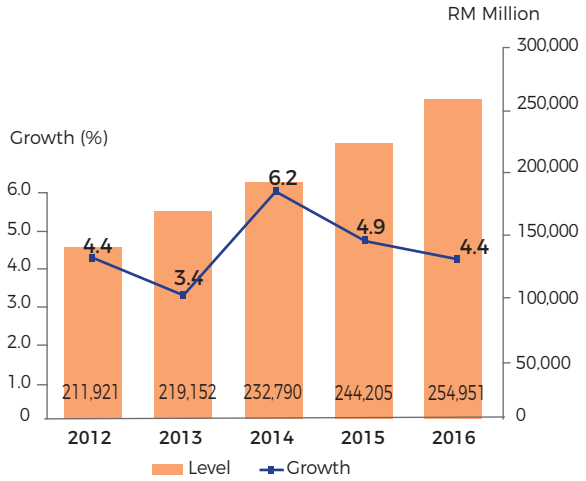
Under the 11MP, Malaysia aims to increase productivity in manufacturing by increasing automation and enhancing workforce skills. These initiatives have also been extended under the MPB, where E&E, chemicals and chemical products, and machinery and equipment have been identified as the prominent sub-sectors. These sub-sectors are prioritised based on their contribution to GDP, share of workforce, opportunity for productivity improvement, high multiplier effect and their readiness to implement productivity improvement.

To nurture such an efficient ecosystem, the Government will be actively involved in the continued promotion of export-related activities with emphasis on productivity and innovation across the manufacturing sector. Focus will continue on higher value added manufacturing activities and the downstream production of commodity-related products, such as palm oil, rubber, petroleum and gas. This will further expand the usage of the country's natural resources to create more value-added products.

## PERFORMANCE AND CONTRIBUTION TO NATIONAL ECONOMY

The importance of manufacturing was evidenced by its contribution to the country's GDP, external trade and job creation. Despite a slight slowdown in the economy, the manufacturing sector contributed 23% to GDP in 2016 or RM254.95 billion, making it the second largest sector of the economy by value. While that was an improvement, the sector's GDP growth moderately eased to 4.4% in 2016 compared to 4.9% in 2015 (Figure 4.1).

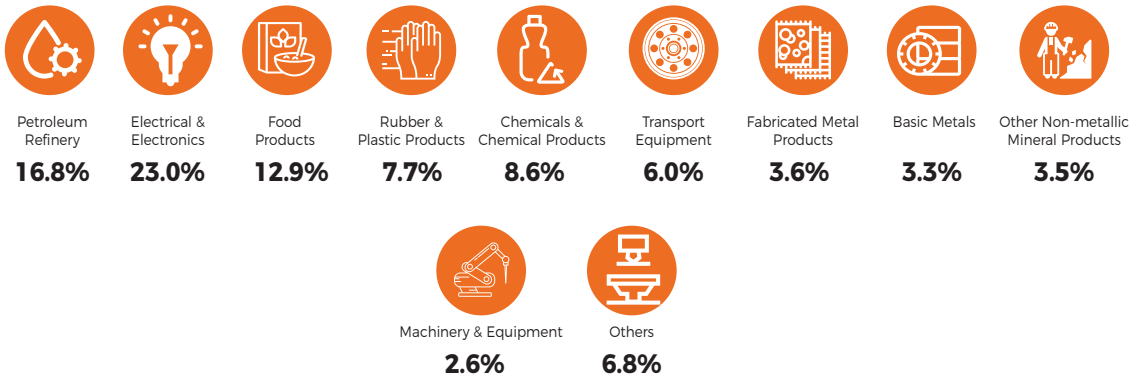
**Figure 4.1: GDP Performance of the Manufacturing Sector, 2012-2016**




Source: Department of Statistics, Malaysia

In the manufacturing sector, E&E registered the highest contribution of added value (23%) followed by refined petroleum (16.8%), food products (12.9%), chemicals and chemical products (8.6%), rubber and plastic (7.7%) and transport equipment (6%) (Figure 4.2).

**Figure 4.2: Added Value Contribution of Selected Manufacturing Sub-sectors, 2016**

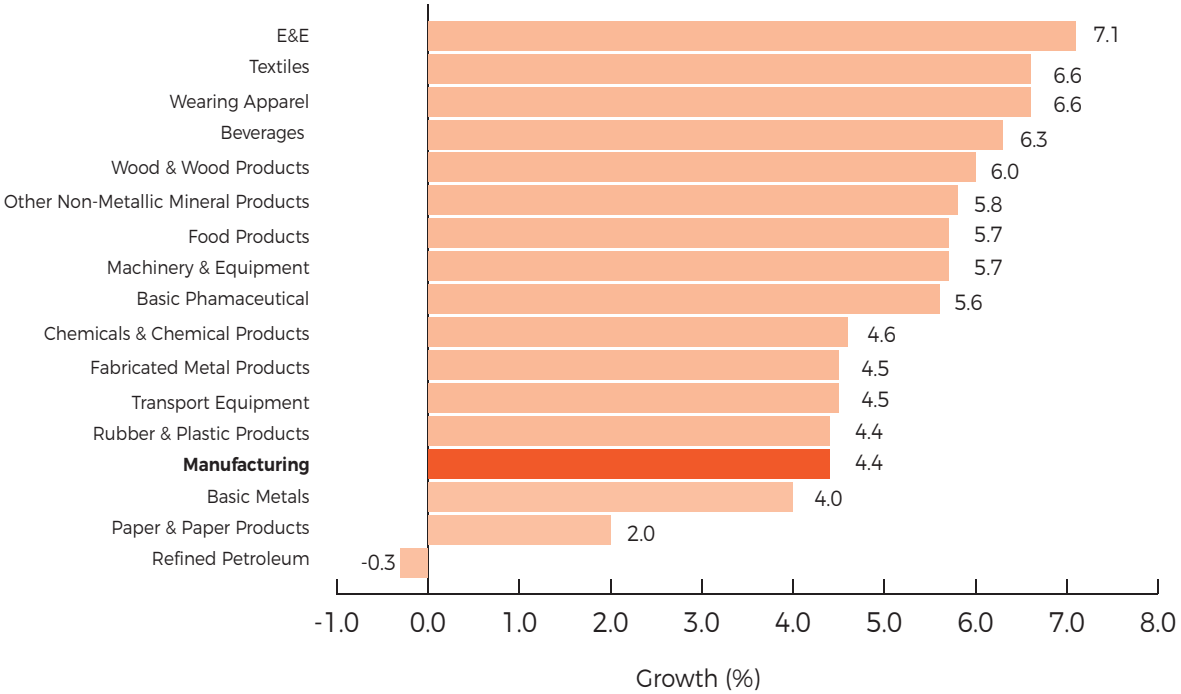



Computed from: Department of Statistics, Malaysia

The majority of export-oriented sub-sectors showed better growth than the domestic-oriented sub-sectors. E&E registered added value growth of 7.1% while textiles and wearing apparel both registered growth of 6.6%, respectively.

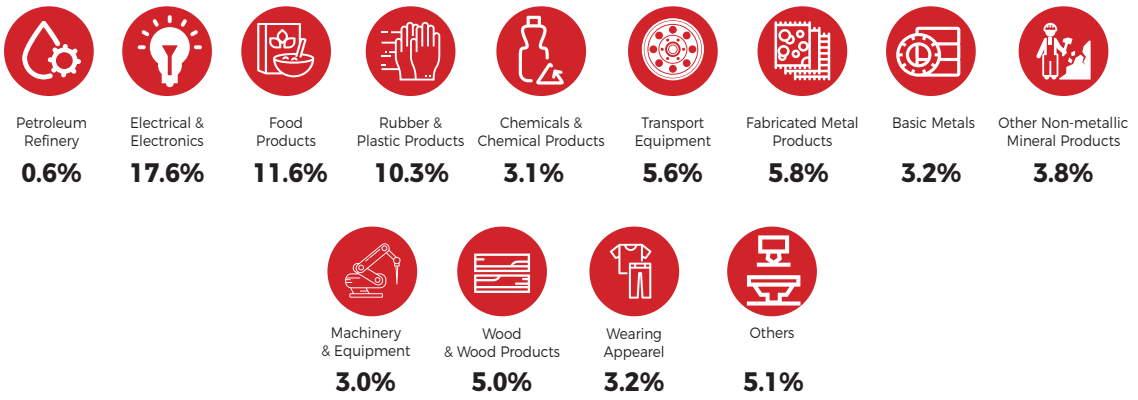
As for the added value in the domestic-oriented sub-sectors like beverages and other non-metallic mineral products, they grew by 6.3% and 5.8%, respectively (Figure 4.3).

**Figure 4.3: Added Value Growth of Selected Manufacturing Sub-sectors, 2016**



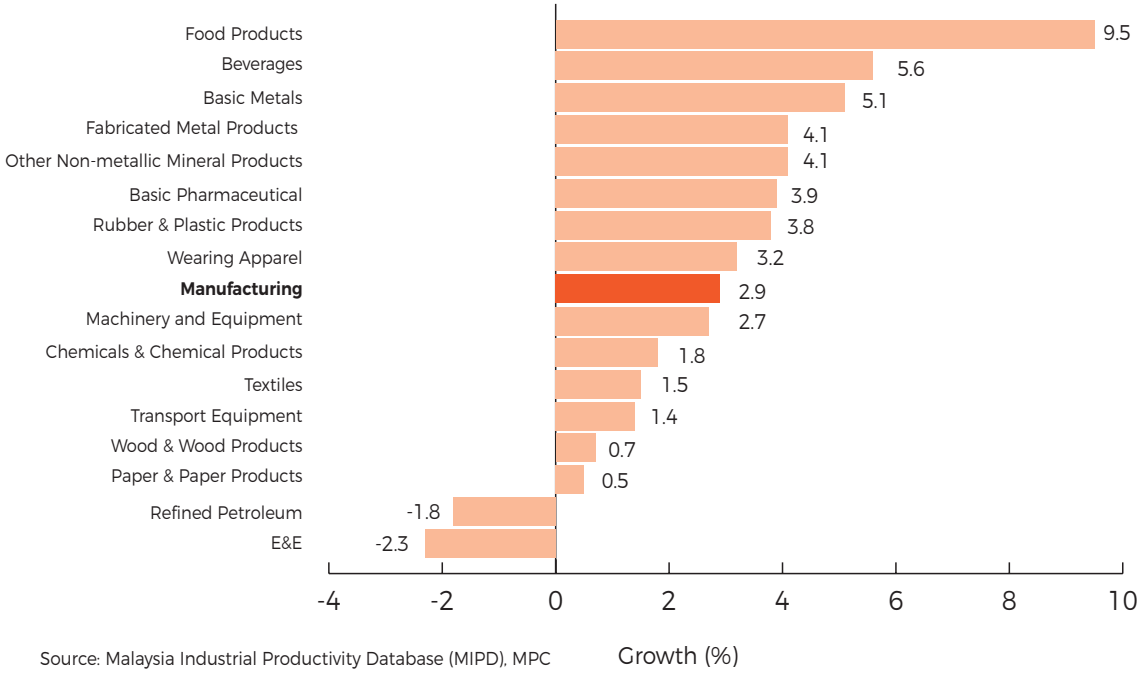

Employment in the manufacturing sector grew by 2.9% to 2.39 million in 2016, making up 16.9% of the total Malaysian workforce. E&E was the biggest employer with 421,018 workers, however in 2016 employment in E&E sub-sectors dropped by 2.3% largely due to automation to replace unskilled workers. The refined petroleum sub-sector, which just employed 0.6% of the manufacturing workforce with 13,915 workers, had it workforce trimmed by 1.8% as a result of job rationalisation following lower crude oil prices (Figure 4.4 and Figure 4.5).

**Figure 4.4: Employment Distribution of Selected Manufacturing Sub-sectors, 2016**




Source: Malaysia Industrial Productivity Database (MIPD),MPC

**Figure 4.5: Employment Growth in Selected Manufacturing Sub-sectors, 2016**

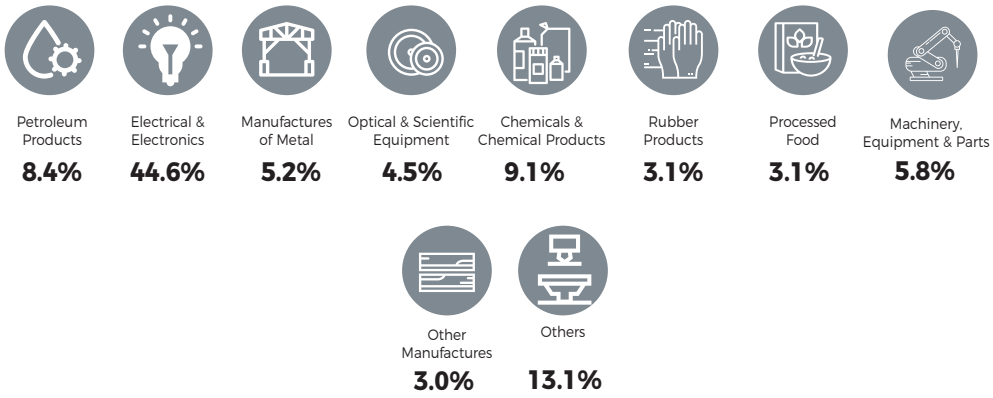



Source: Malaysia Industrial Productivity Database (MIPD), MPC

The manufacturing sector attracted investments worth RM58.5 billion or 28.1% of total investments in 2016. Approximately RM27.4 billion (46.8%) came from foreign sources while the balance of RM31.1 billion (53.2%) were drawn from domestic sources. Projects approved for investment will create more employment opportunities, especially for the E&E, transport equipment and rubber product sub-sectors, with an estimated 30,505 jobs.

Manufacturing exports totalled RM645.67 billion in 2016, an increase of 3.2% from 2015. Manufactured exports also accounted for a larger share of total exports in 2016, comprising 82.2% compared to 80.5% in 2015. This was due to the significant increase in demand for E&E products from Singapore, USA and Germany, especially for electronic integrated circuits and parts and accessories for office machines. Exports of E&E products rose by 3.5% to RM287.7 billion in 2016 and accounted for the largest share of the manufacturing sector's total exports of 44.6%. Chemicals and chemical products, and petroleum products also registered significant exports of 9.1% and 8.4% of the total respectively (Figure 4.6).

**Figure 4.6: Total Exports Contribution of Selected Manufactured Goods, 2016**

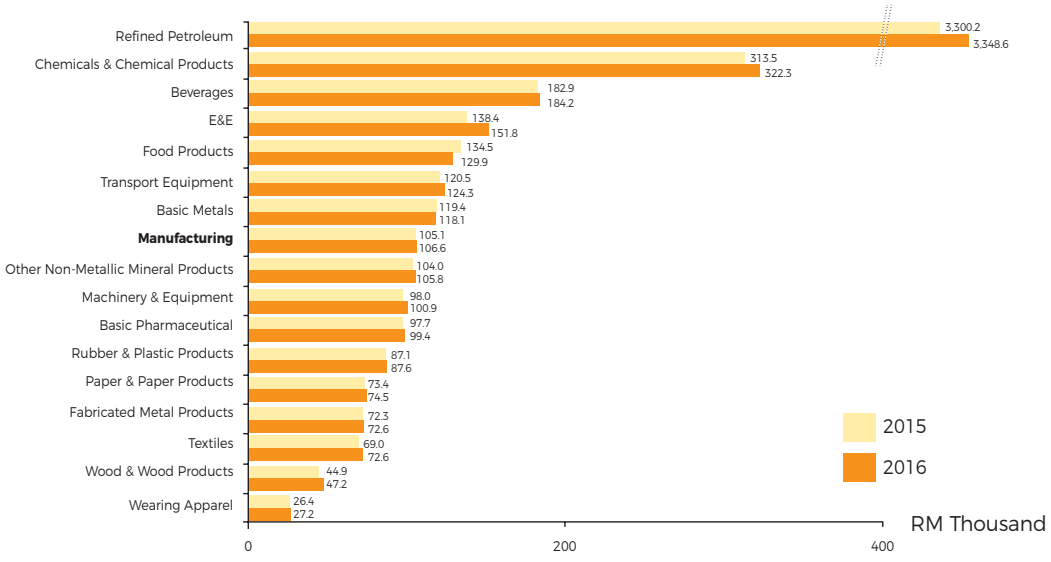



Source: Department of Statistics, Malaysia

## PRODUCTIVITY PERFORMANCE

In 2016, productivity in the manufacturing sector grew by 1.4% to RM106,647, up from RM105,138 in 2015. Productivity growth was driven by both export and domestic-oriented sub-sectors. The better performance of export-oriented sub-sectors was driven mainly by the stronger growth in chemicals and E&E products. Productivity in the refined petroleum sub-sector was highest at RM3.3 million followed by chemicals and chemical products at RM322,345 despite the decline in oil and gas prices. Other sub-sectors with above average productivity levels were food products, beverages, and E&E. In contrast, wearing apparel experienced the lowest productivity at RM27,246 (Figure 4.7).

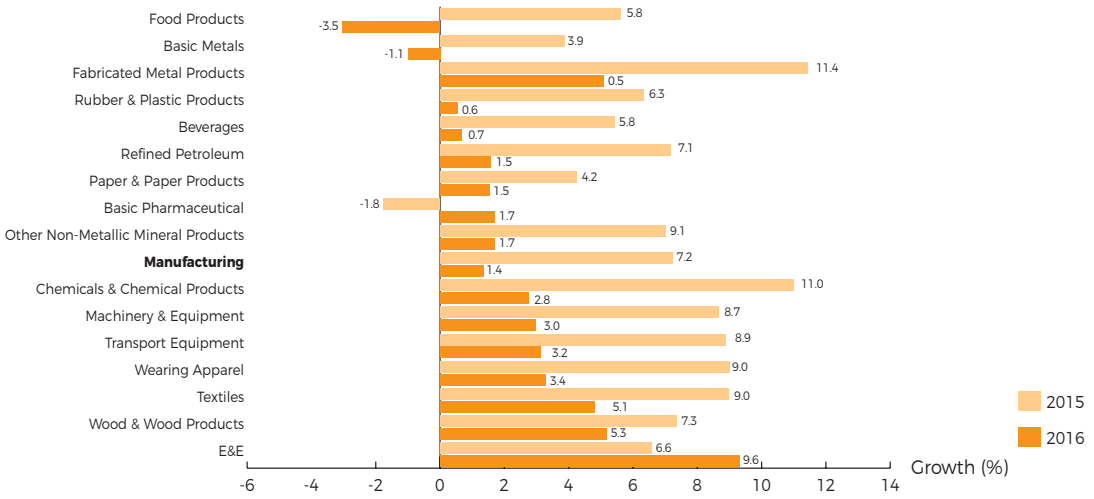
**Figure 4.7: Labour Productivity Level of Selected Manufacturing Sub-sectors, 2015-2016**




Source: Malaysia Industrial Productivity Database (MIPD), MPC

The E&E sub-sector continued to be a key driver in the manufacturing sector, with a significant contribution to added value, employment, investments and exports. In 2016, the added value of the E&E sub-sector totalled RM63.90 billion as a result of new applications for semiconductors in digitisation, mobility, connectivity, energy efficiency and miniaturisation. In addition, strong global demand for E&E products contributed to the added value growth and led to a significant productivity growth of 9.6% compared to 6.6% in the previous year (Figure 4.8).

**Figure 4.8: Labour Productivity Growth of Selected Manufacturing Sub-sectors, 2015 – 2016**




Source: Malaysia Industrial Productivity Database (MIPD), MPC

Raising productivity continues to be a key challenge for the manufacturing sector, an area where the Government has continued to place strong emphasis in its policies and guidelines. Under the 11MP, the Government aims to increase productivity in manufacturing by encouraging industries to move up the value chain to generate high value-added products. These will require more knowledge and skills-intensive activities in line with global standards, improved quality and high-technology.

## Labour Cost Competitiveness

Labour cost competitiveness in the manufacturing sector declined in 2016 as both unit labour costs and labour cost per employee rose by 3.1% and 5% respectively (Table 4.1). The growth of these indicators was due to a lack of skilled workers, poor labour mix and high labour turnover. The E&E, wood and wood products, textiles, transport equipment, machinery and equipment, and chemicals and chemical products were among the labour cost competitive sub-sectors. These sub-sectors employees have been rewarded with increased wages as productivity improved. In contrast, the refined petroleum sub-sector was unable to sustain its labour cost competitiveness, with labour cost per employee rising by 16.8% and its unit labour cost was 10.9% higher than the increase in its productivity of 1.5%. The increase in labour cost per employee was due to higher demand for high skilled workers among various industries but yet to be translated into productivity growth.

**Table 4.1: Labour Cost Competitiveness of Selected Manufacturing Sub-sectors, 2016**

| Growth (%) | Productivity | Labour Cost per Employee | Unit Labour Cost |
|---|---|---|---|
| E&E | 9.6 | 4.7 | -2.4 |
| Wood & Wood Products | 5.3 | 3.2 | -1.9 |
| Textiles | 5.1 | 2.3 | -2.6 |
| Wearing Apparel | 3.4 | 7.8 | 4.3 |
| Transport Equipment | 3.2 | -5.4 | -8.3 |
| Machinery and Equipment | 3.0 | 2.6 | -0.2 |
| Chemicals & Chemical Products | 2.8 | 2.5 | -0.2 |
| Other Non-metallic Mineral Products | 1.7 | 6.4 | 4.8 |
| Basic Pharmaceutical | 1.7 | -0.7 | -2.3 |
| Paper & Paper Products | 1.5 | -1.0 | -2.6 |
| Refined Petroleum | 1.5 | 16.8 | 10.9 |
| **Manufacturing** | **1.4** | **5.0** | **3.1** |
| Beverages | 0.7 | 7.5 | 6.8 |
| Rubber & Plastic Products | 0.6 | 6.4 | 5.8 |
| Fabricated Metal Products | 0.5 | 6.9 | 6.4 |
| Basic Metals | -1.1 | 4.7 | 5.8 |
| Food Products | -3.5 | 9.1 | 14.3 |

Source: Malaysia Industrial Productivity Database (MIPD), MPC

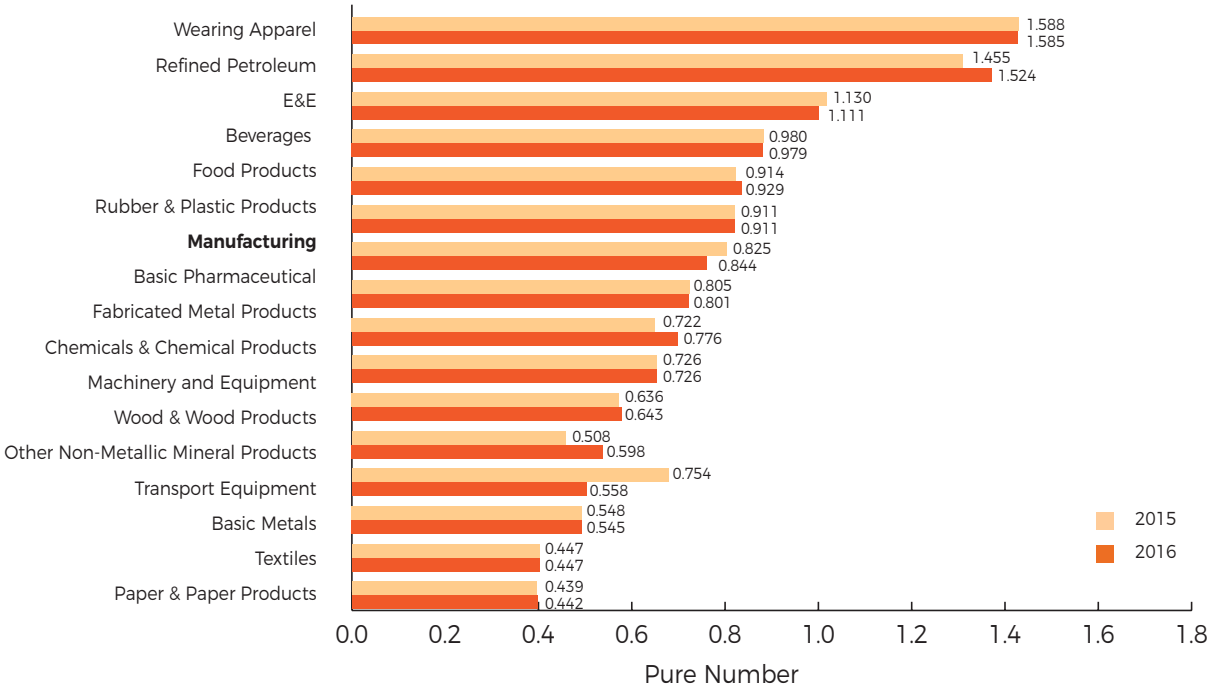
## Capital Productivity

The efficiency of fixed assets utilisation in generating added value in the manufacturing sector continued to decline by 0.9% in 2016 with a value of 0.884 from -3.9% in 2015. Fixed assets invested have kept increasing since 2015 with an average of 5.7% per year, higher than the average increase in value-added of 4.7%.

This reflected that the capacity of fixed assets such as machinery, office equipment and transport were under optimum utilisation and this could be due to the gestation period before the new investments could reap the potential at the fullest.

The marginal decline in capital productivity in the manufacturing sector was contributed by sharp drop of 25.9% in the transport and equipment sub-sector. However, it was offset by an impressive growth in other non-metallic mineral products at 17.8%. There were also bright spots in that the wearing apparel, refined petroleum and E&E were among sub-sectors that registered higher than the manufacturing average capital productivity level with ratios of 1.6, 1.5 and 1.1 respectively (Figure 4.9).

**Figure 4.9: Capital Productivity for Selected Manufacturing Sub-sectors, 2015-2016**




Source: Malaysia Industrial Productivity Database (MIPD), MPC

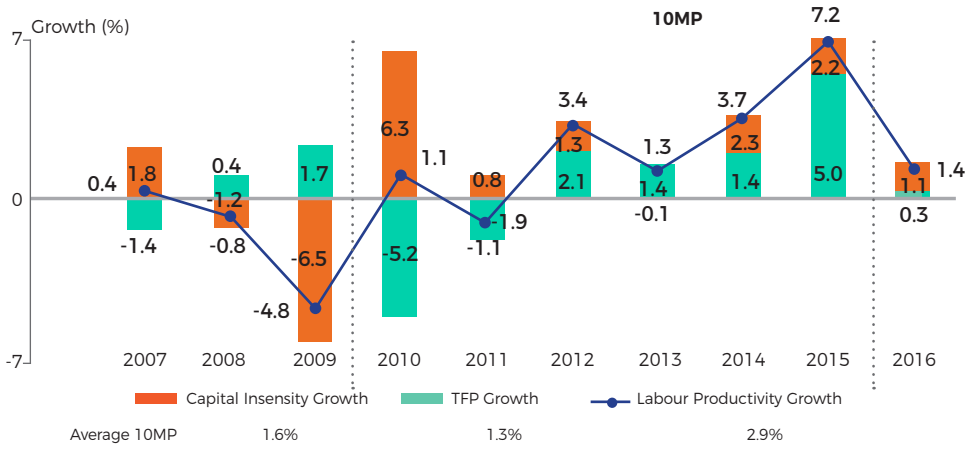
## Sources of Labour Productivity

TFP contributed 79% to the manufacturing sector's labour productivity growth in 2016 with a growth of 1.1% compared with capital intensity growth of 0.3%. However, TFP contribution towards labour productivity has been inconsistent over the last 10 years as it experienced a dramatic drop during the global financial crisis in 2008 and 2009. External factors such as unfavourable global demand and currency exchange contributed largely to the drop. The global recovery in 2010 had TFP improving substantially by 6.3% while capital intensity decreased by 5.2% (Figure 4.10).

During the 10MP period from 2011-2015, the manufacturing sector's productivity growth was led by capital intensity rather than TFP, with an average growth of 1.6% due to strong investments and capital accumulation in the sector. Gains from strong external demand and higher capital intensity contribution during the 10MP had translated into higher TFP growth of 1.3%. TFP growth is expected to continue its contribution towards productivity growth during the 11MP.

The shift towards higher value added manufacturing activities from increased investments in advanced machinery and automation as outlined in the 11MP can help industries boost TFP and further increase productivity of the sector. TFP growth could be further accelerated through greater collaboration among industries, research institutions and relevant government agencies in ensuring sustained supply of industry-ready workers who have been re-skilled or up-skilled.

**Figure 4.10: Sources of Labour Productivity, 2007-2016**




Source: Malaysia Industrial Productivity Database

## FOCUS INDUSTRY: CHEMICALS SUB-SECTOR

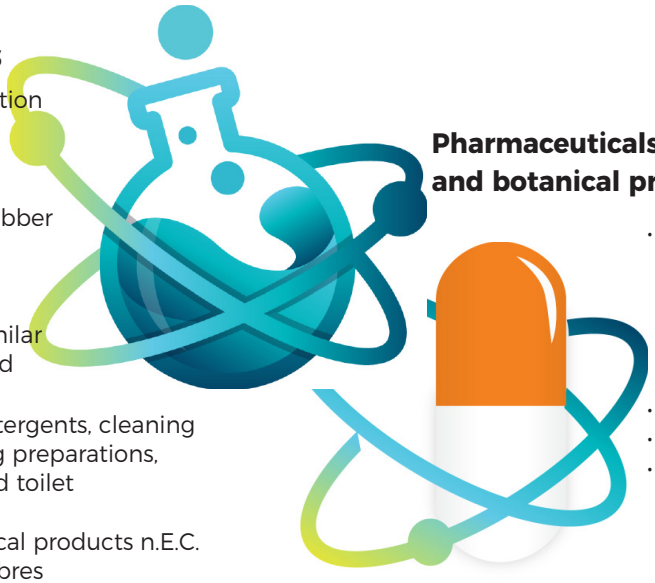
The chemicals sub-sector, regarded as one of Malaysia's largest and leading industries, has been given strong focus under the MPB. It contributed to a share of 9.2% amounting to RM25.60 billion to manufacturing sector added value in 2016. As an export-oriented industry and the second highest contributor to exports of RM59 billion, the sub-sector has the potential to move towards higher value-added levels and contribute further to the overall manufacturing sector's performance.

The chemicals sub-sector comprises two main industry groups, namely the manufacture of chemicals and chemical products as well as pharmaceuticals, medicinal chemical and botanical products. The industry specifications are illustrated below:

**Classification of Chemicals Industries**

### Chemicals and chemical products

- Basic chemicals distribution and control apparatus
- Fertilizers and nitrogen compounds
- Plastics and synthetic rubber in primary forms
- Pesticides and other agrochemical products
- Paints, varnishes and similar coatings, printing ink and mastics
- Soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations
- Other chemical products n.E.C. Man-made fibres
- Processing of blood
- Medicaments
- Chemical contraceptive products



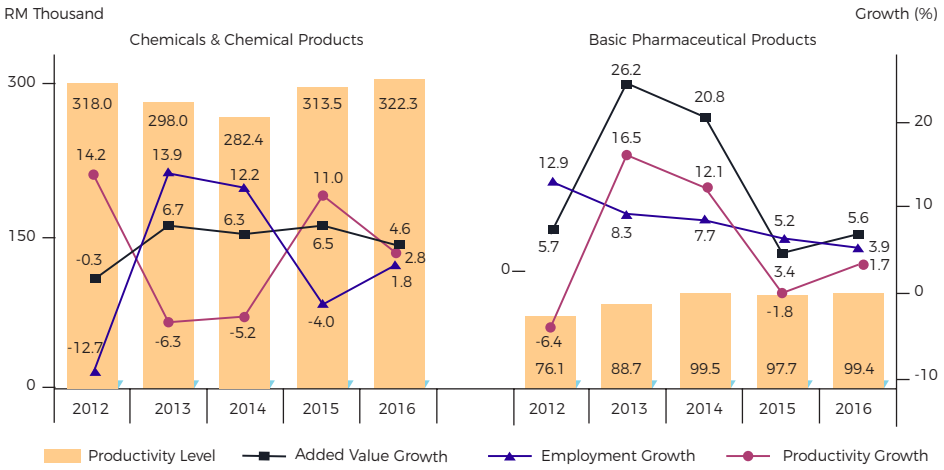
### Pharmaceuticals, medicinal chemical and botanical products

- Medicinal active substances to be used for their pharmacological properties in the manufacture of medicaments
- Processing of blood
- Medicaments
- Chemical contraceptive products

Source: Malaysia Standard Industrial Classification, 2008, Department of Statistics, Malaysia

Productivity by the chemicals and chemical sub-sector increased by 2.8% to RM322,344 in 2016 from RM313,473 in 2015 (Figure 4.11). This was due to the growing productivity of its industries in basic chemicals, fertilisers and nitrogen compounds, plastics and synthetic rubber in primary forms (3.3%); other chemical products (0.5%); and man-made fibres (0.5%). The productivity growth for basic pharmaceutical products in 2016 returned to positive territory when it appreciated by 1.7% to RM99,365 as compared to -1.8% (RM97,725) in 2015. This was mainly attributed by the higher added value growth of 5.6% compared to employment growth of 3.9%.

**Figure 4.11: Added Value, Employment and Labour Productivity Growth of the Chemicals Sub-sectors, 2012-2016**




Source: Malaysia Industrial Productivity Database (MIPD), MPC

Being high-technology and capital-intensive, these sub-sectors require a highly-trained and skilled workforce for R&D activities. The chemicals and chemical products sub-sector was able to sustain its labour cost competitiveness in 2016 as its productivity growth of 2.8% was higher than the 2.5% growth in labour cost per employee while unit labour cost decreased by 0.2%. Among other industries, only basic chemicals were observed as labour cost competitive.

The basic pharmaceutical products sub-sector sustained labour cost competitiveness as its productivity growth of 1.7% exceeded growth in labour cost per employee with the decline in unit labour cost. Its drop in labour cost per employee was due to the lower average wages resulting from new recruitment (Table 4.2).

**Table 4.2: Labour Cost Competitiveness of the Chemicals Sub-sectors, 2016**

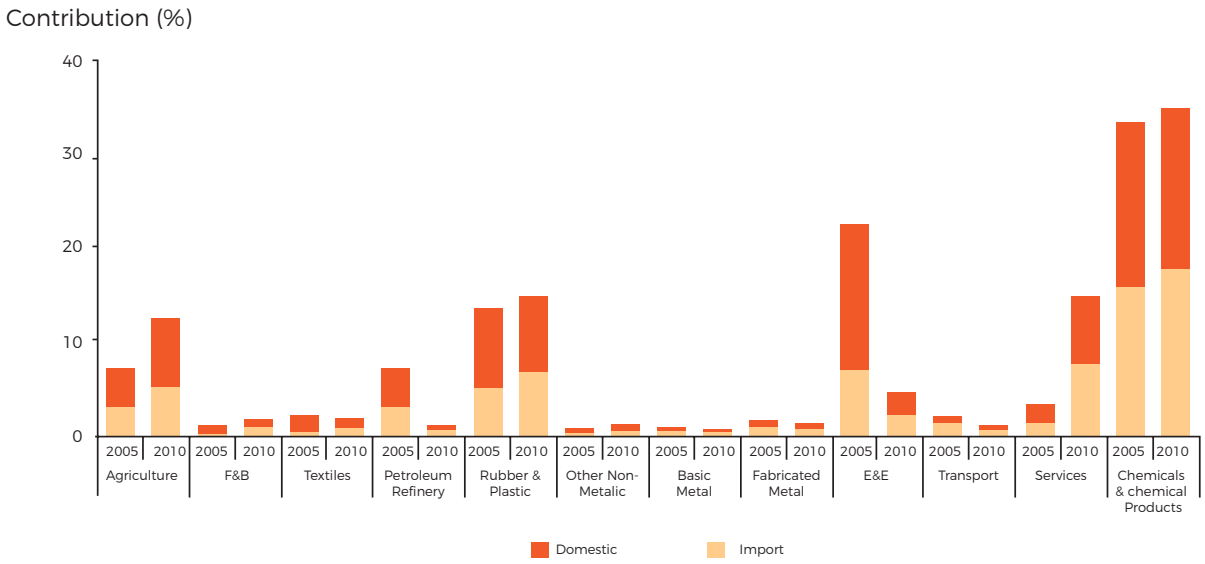
| Growth (%) | Productivity | Labour Cost per Employee | Unit Labour Cost |
|---|---|---|---|
| Chemicals & Chemical Products | 2.8 | 2.5 | -0.2 |
| Basic Chemicals, Fertiliser and Nitrogen Compounds, Plastics and Synthetic Rubber in Primary Forms | 3.3 | 2.8 | -0.4 |
| Other Chemical Products | 0.5 | 1.9 | 1.4 |
| Man-Made Fibres | 0.5 | 1.1 | 0.6 |
| Basic Pharmaceutical Products | 1.7 | -0.7 | -2.3 |

Source: Malaysia Industrial Productivity Database (MIPD), MPC

## Composition of Input Demand in Chemicals and Chemical Products Sub-sector

Local supplies accounted for 49.4% of the input of chemicals and chemical products in 2010 that were required by other sectors as compared to 42.1% in 2005. However, imported inputs were higher at 50.6% in 2010 (2005: 57.9%). The highest share of inputs was consumed within the chemicals and chemical products sub-sector (Figure 4.12). This was followed by the rubber and plastics sub-sector at 14.9% (2005: 13.6%) and agriculture at 12.5% (2005: 7.1%). However, E&E shrank to 4.7% from 22.5% in 2005 while the petroleum refinery sub-sector dropped to 1.2% in 2010 from 7.2% in 2005.

**Figure 4.12: Contribution of Chemicals and Chemical Products Input Demand by Other Selected Industries, 2005 and 2010**




Computed from: Input-Output Table 2005 and 2010, Department of Statistics, Malaysia

The main inputs of the chemicals and chemical products sub-sector indicated that between 2005 and 2010, the sources of the intermediate inputs remained unchanged. Demand for intermediate inputs from the mining and chemicals and chemical products sub-sectors demonstrated a shift towards more domestic sources at 3.7% (2005: 0.1%) and 24.5% (2005: 15.9%) respectively. This indicated that local suppliers were becoming more competitive and capable of meeting local demand for chemicals and chemical products.

The demand for intermediate inputs in 2010 from sub-sectors such as basic metals; computer, electronic and optical products; and services were more inclined towards imported sources at 0.6% (2005: 0.1%), 1.3% (2005: 0.1%) and 2.9% (2005: 2.1%) respectively (Table 4.3).

**Table 4.3: Sources of Intermediate Inputs for Chemicals & Chemical Products Sub-sector, 2005 and 2010**

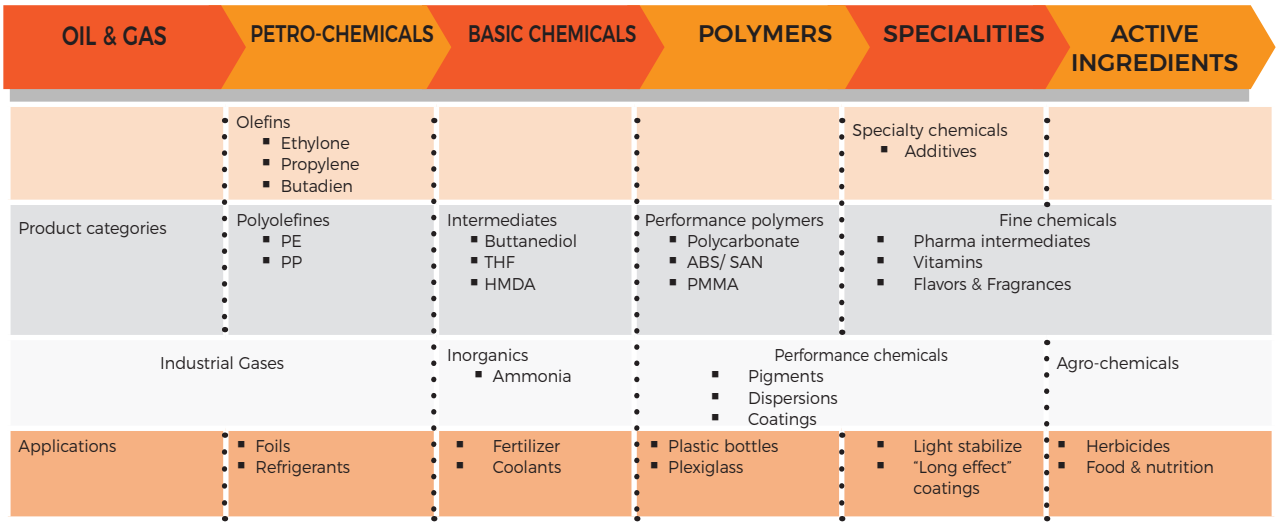
| Contribution (%) | 2005 | | 2010 | |
|---|---|---|---|---|
| | Domestic | Imported | Domestic | Imported |
| Agriculture | 2.2483 | 0.1632 | 0.0733 | 0.2763 |
| Mining | 0.0689 | 1.2134 | 3.6677 | 1.7251 |
| Food & Beverages | 6.1692 | 0.5162 | 6.2841 | 0.8003 |
| Textiles | 0.0100 | 0.0139 | 0.0230 | 0.0362 |
| Wood | 0.0039 | 0.0004 | 0.5071 | 0.0931 |
| Petroleum Refinery | 17.8657 | 8.4744 | 7.3519 | 3.2576 |
| Chemicals & Chemical Products | 15.9015 | 17.4873 | 24.5441 | 23.2509 |
| Rubber & Plastic Products | 0.8750 | 0.5193 | 0.79662 | 0.35512 |
| Other Non-metallic Mineral Products | 0.4905 | 0.5445 | 0.63394 | 0.10136 |
| Basic Metals | 0.2455 | 0.1155 | 0.06921 | 0.59913 |
| Fabricated Metal Products | 0.6608 | 0.6683 | 0.53859 | 0.44518 |
| Machinery & Equipment | 0.0956 | 0.1241 | 0.00023 | 0.00346 |
| Electrical Equipment | 0.0005 | 0.0129 | 0.00095 | 0.01248 |
| Computer , Electronic, Optical Products | 0.1222 | 0.1133 | 0.03295 | 1.31397 |
| Other Manufacturing | 1.1830 | 1.1810 | 0.5206 | 0.3396 |
| Construction | 0.0389 | 0.0000 | 0.3034 | 0.0112 |
| Services | 20.7964 | 2.0731 | 19.1439 | 2.8717 |
| **TOTAL** | **66.7789** | **33.2211** | **64.5069** | **35.4931** |

Computed from: Input-Output Table 2005 and 2010, Department of Statistics, Malaysia

## Global Value Chain

The chemicals and chemical products sub-sector involves activities that relate to the transformation of organic and inorganic raw materials by a chemical process and formation of products. With the production of basic chemicals, intermediates and end-products, the sub-sector probably recorded more activities than other industries due to the multitude of GVCs involved. The chemical industry structure and value chain start with oil and gas, which is transformed into petrochemicals, basic chemicals, polymers, specialties and active ingredients (Figure 4.13). As indicated by the index of the distance to final demand in the GVC, countries like Korea, China, Malaysia and Taiwan are more specialised in producing basic chemicals while Ireland and Switzerland are seen to be more active in specialty (intermediates and final) products, especially pharmaceuticals.

**Figure 4.13: The Chemicals Value Chain**



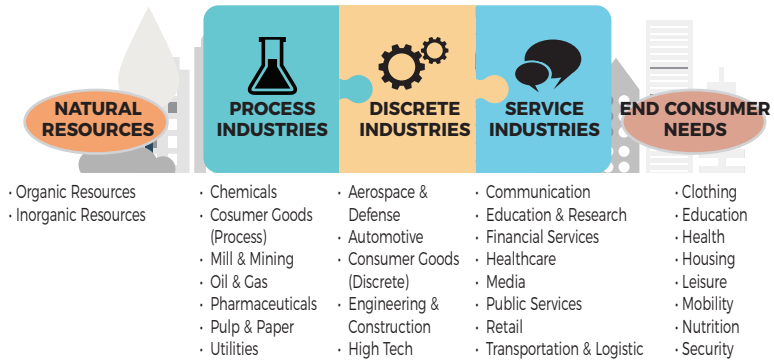

Note: PE: Polyethylene; PP: Polypropylene; THF: Tetrahydrofuran; HMDA: Hexamethylenediamine; ABS: Acrylonitrile Butadine Styrene; SAN: Styrene-acrylonitrile.

Source: Value Chain Management in the Chemical Industry: Global Value Chain Planning of Commodities, Kannegiesser and Matthias.

The sub-sector has strong links to almost every other sector of the economy as chemicals serve as key components to industries such as E&E, automotive, oil and gas, pharmaceuticals, construction and others. Hence, establishing a more efficient ecosystem will reduce dependency on imported raw chemicals while local industries will, in turn, benefit from the improved quality and shorten production time for their products. However, the chemical industry needs to keep abreast of the latest technologies, automation, R&D and efficiency in order to stay competitive globally.

The chemical industry provides raw materials and inputs which are used in multiple applications across industries. The strong linkages will create higher multiplier effect in terms of job creation, investment, value-added and trade along its supply chain. Further technological innovation in this industry can lead to positive spillover effects into other industries as well.

**The Chemicals Sub-sector as Part of the Process Industry**



## Trade Competitiveness

In 2016, exports of chemicals and chemical products grew by 6.6% to RM58.8 billion from RM55.1 billion in 2015. Although the sub-sector was the country's second largest exporter of manufactured goods, imports were higher at RM68.2 billion, thus creating a deficit of RM9.4 billion.

The export of all chemicals and related products has been increasing since 2010 except for organic chemicals. According to UN Comtrade statistics (Table 4.4), the export growth of inorganic chemicals was the highest at 11.7%, followed by dyeing, tanning and colouring materials (5.8%) and plastics in non-primary forms (4.2%). The manufacture of organic chemicals accounted for the biggest export contribution of 32.8% in the sub-sector, producing basic chemicals, which were low in value-added. The next biggest export component was plastics in primary form, which accounted for 24.2%. It also recorded the highest import at 24.7%, showing an annual increase of 5.7% since 2010.

As for medicinal and pharmaceutical products, they accounted for only 2.2% of the sub-sector's exports. The lower composition indicated that the industry was domestically-driven with focus on producing generic drugs and nutraceuticals. The generic pharmaceuticals industry has a small market value and low profit margin. It is also price-driven and faces vigorous competition. However, product differentiation such as nutra-pharmaceuticals, herbal drugs, halal alternatives, novel dosage forms and drugs for tropical diseases are expected to develop a potential niche for domestic players to venture into producing high value-added and innovative drugs. They also have export potential to cater for a growing global population.

**Table 4.4: Malaysia's Chemical Trade Statistics, 2010-2015**

| | CAGR (%) 2010-2015 | | Contribution to Chemical (%) 2015 | |
|---|---|---|---|---|
| | Export | Import | Export | Import |
| **Chemicals and Related Products** | **2.4** | **3.7** | **100** | **100** |
| Organic Chemicals | -0.5 | 0.1 | 32.8 | 18.6 |
| Inorganic Chemicals | 11.7 | 6.6 | 4.7 | 9.1 |
| Dyeing, Tanning and Colouring Materials | 5.8 | 0.0 | 4.2 | 4.0 |
| Medicinal and Pharmaceutical Products | 1.6 | 6.2 | 2.2 | 8.5 |
| Essential Oils and Resinoids and Perfume Materials; Toilet, Polishing and Cleansing Preparations | 3.3 | 3.0 | 7.3 | 7.2 |
| Fertilizers | 2.4 | -5.6 | 3.1 | 6.4 |
| Plastics in Primary Forms | 3.1 | 5.7 | 24.2 | 24.7 |
| Plastics in Non-Primary Forms | 4.2 | 7.0 | 9.1 | 7.0 |
| Chemical Materials and Products, n.e.c. | 3.8 | 8.4 | 12.5 | 14.4 |

Source: UN Comtrade Database, various years – SITC Rev. 4

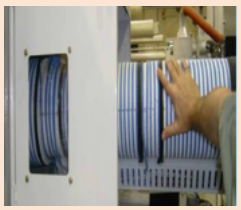
### SAVING ENERGY FOR HIGHER PRODUCTIVITY

WT Plastics has been manufacturing high quality shopping bags, garbage bags and carrier bags made from High Density Polyethylene (HDPE), Low Density Polyethylene (LDPE) and Polypropylene (PP). It also produces biodegradable plastic bags.

Its round-the-clock operations seven days a week and requiring electricity as in its production has meant high costs of electricity bills, and more so after the hike in electricity tariffs in 2015. The company decided to invest in technology to reduce energy consumption by installing energy saving induction heaters known as GMI-Heaters. The move reduced power consumption by 44% and even lowered the temperature in the factory, thus creating a more pleasant working environment. It also contributed to a reduction of carbon dioxide emission by 138,288kg $CO_2$ per year.

**Issues :**

- Existing band heater consumed a lot of energy and takes time in achieving a setting temperature.
- Most machines operate around the clock.
- Requires energy saving solution.



**Improvement :**

- Save electric energy by replacing existing band heater to induction heater.
- Possibility of 30-40% electricity saving.
- It is also covered by insulating material which can decrease the surface temperature of facility from 250-300°c to 50-60°C.
- It can prevent the accident and improve working environment.

**From.....**
**BAND HEATER ▶ INDUCTION HEATER**
Machine power consumption change from 8.5 kWh to 4.8 kWh.
**44% energy saving**

## FOCUS INDUSTRY: ELECTRICAL AND ELECTRONICS SUB-SECTOR

The E&E industry has been the prime mover of the manufacturing sector and has made a strong impact on the Malaysian economy, having attracted foreign investments and created much employment. The sub-sector is divided into two main industries, namely computer, electronic and optical products; and electrical equipment. Due to its importance, the sub-sector is one of the 12 NKEAs as well as a focus industry under 11MP and MPB.

The sub-sector's importance stemmed from its significant contributions of the total value-added in the manufacturing sector (23%) as well as employment (20%). In 2016, the E&E sub-sector accounted for 44.6% of the manufacturing sector's exports and 36.6% of Malaysia's overall exports. E&E products also accounted for 30% or RM209.9 billion of the country's imports in 2016. E&E was again the country's largest export earner in 2016 at RM287.7 billion, accounting for 36.6% of manufacturing goods total exports. Singapore, USA, Germany, Mexico, India and the United Arab Emirates were among the top export destinations.

Given its significance, the Government has prioritised its support and investment towards this sub-sector to ensure that it remains competitive internationally. A flourishing E&E sub-sector will be advantageous to other sub-sectors in the country, both on the supply and demand sides, due to the large impact of its forward and backward linkages.

**Classification of E&E Industries**

### Computer, Electronic and Optical Products

- Electronic components and boards
- Computers and peripherals
- Communication equipment
- Consumer electronics
- Measuring, testing, navigating and control equipment; watches and clocks
- Irradiation, electro-medical and electrotherapeutic equipment
- Optical instruments and photographic equipment
- Magnetic and optical media

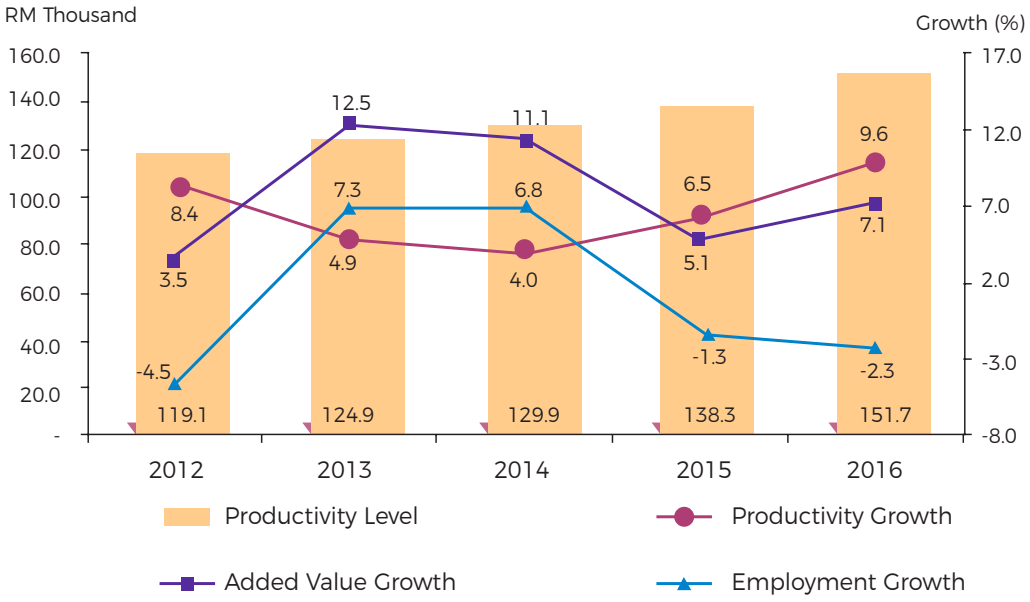
### Electrical Equipment

- Electric motors, generators, transformers and electricity distribution and control apparatus
- Batteries and accumulators
- Wiring and wiring devices
- Electric lighting equipment
- Domestic appliances
- Other electrical equipment

Source: Malaysia Standard Industrial Classification, 2008, Department of Statistics, Malaysia

In 2016, productivity in the E&E sub-sector surged by 9.6% to RM151,557 due to stronger growth in the computer, electronics and optical industry (10.5%) with a two-digit expansion in the electronic components and boards industry (12.7%), followed by computers and peripheral equipment (7.9%), consumer electronics (7.7%) and communications equipment (7%) (Figure 4.14 and Table 4.5).

**Figure 4.14: Added Value, Employment and Productivity of the E&E Sub-sectors, 2012-2016**




Source: Malaysia Industrial Productivity Database (MIPD), MPC

The E&E sub-sector was able to sustain its labour cost competitiveness as evidenced by the 9.6% growth in productivity had exceeded growth in labour cost of 4.7%, while unit labour cost decreased by 2.4%. In fact, all industries in this sub-sector sustained their labour cost competitiveness in 2016. A rise in unit labour labour cost per employee in most of E&E industries represented an increased reward as productivity improved.

**Table 4.5: Labour Cost Competitiveness of the E&E Sub-Sector, 2016**

| Growth (%) | Productivity | Labour Cost per Employee | Unit Labour Cost |
|---|---|---|---|
| **Electrical & Electronics Sub Sector** | 9.6 | 4.7 | -2.4 |
| **Computer, Electronic and Optical Products** | **10.5** | **5.2** | **-2.6** |
| Electronic Components & Board | 12.7 | 6.3 | -3.0 |
| Computers & Peripheral Equipment | 7.9 | 4.3 | -2.2 |
| Communication Equipment | 7.0 | 3.8 | -1.8 |
| Consumer Electronics | 7.7 | 4.1 | -2.2 |
| Measuring, Testing, Navigating & Control Equipment: Watches & Clocks | 6.7 | 3.8 | -1.7 |
| Irradiation, Electrometrical & Electrotherapeutic Equipment | 6.5 | 3.6 | -1.6 |
| Optical Instruments & Photographic Equipment | 6.5 | 3.6 | -1.7 |
| **Electrical Equipment** | **3.6** | **2.2** | **-0.6** |
| Electric Motors, Generators, Transformers & Electricity Distribution & Control Apparatus | 4.0 | 2.4 | -0.6 |
| Wiring & Wiring Devices | 3.4 | 2.1 | -0.8 |
| Domestic Appliances | 3.2 | 2.0 | -0.5 |
| Other Electrical Equipment | 3.3 | 2.2 | -0.3 |

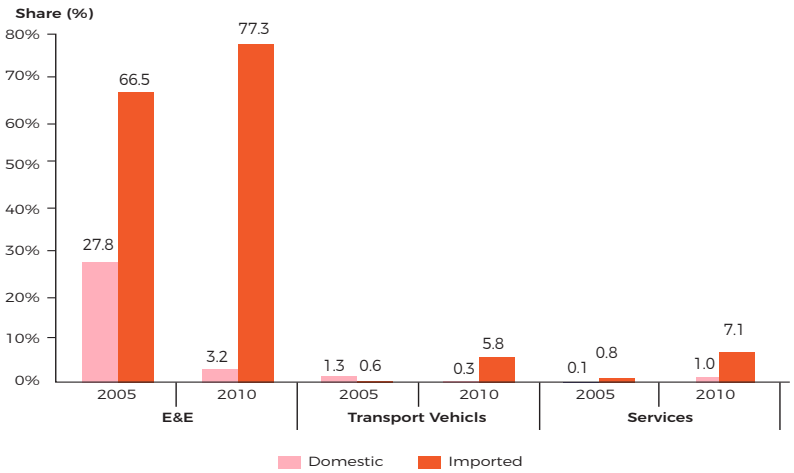
Source: Malaysia Industrial Productivity Database (MIPD), MPC

## Composition of Input Demand in Electrical and Electronics Sub-Sector

In 2010, imported supplies accounted for 77.3% of the inputs of E&E products required by other sectors as compared to 66.5% in 2005. Domestic inputs were smaller at 3.2% (2005: 27.8%). The share contribution of inputs of E&E products required by its own industry was at 80.5% in 2010 (2005: 94.3%), followed by services at 8.1% (2005: 0.9%) and transport vehicles at 6.1% (2005: 1.8%) (Figure 4.15).

Hence, the demand for the E&E products sub-sector was more on imported inputs at 77.3% as compared to local inputs of its own industry, which accounted for 3.2%.

**Figure 4.15: Contribution of E&E Input Demand by Other Selected Industries, 2005 & 2010**




Computed from: Input-Output Table 2005&2010. Department of Statistics, Malaysia

A further analysis on the main inputs of the E&E sub-sector indicated that between 2005 and 2010, sources of the intermediate inputs remained unchanged. Demand for intermediate inputs from other non-metallic mineral and rubber and plastic products demonstrated a shift towards more domestic sources at 1.4% in 2010 (2005:0.3%) and 1.6% (2005:1.1%) respectively. This indicated that local suppliers were becoming more competitive and capable of meeting local demand for this sub-sector. On the other hand, demand for intermediate inputs from sub-sectors such as basic metals, electrical equipment, and computer, electronic optical products, was more inclined on imported sources at 4.5%, 5.0% and 55.7% respectively (Table 4.6).

**Table 4.6: Sources of Intermediate Inputs for the E&E Sub-sector, 2005 and 2010**

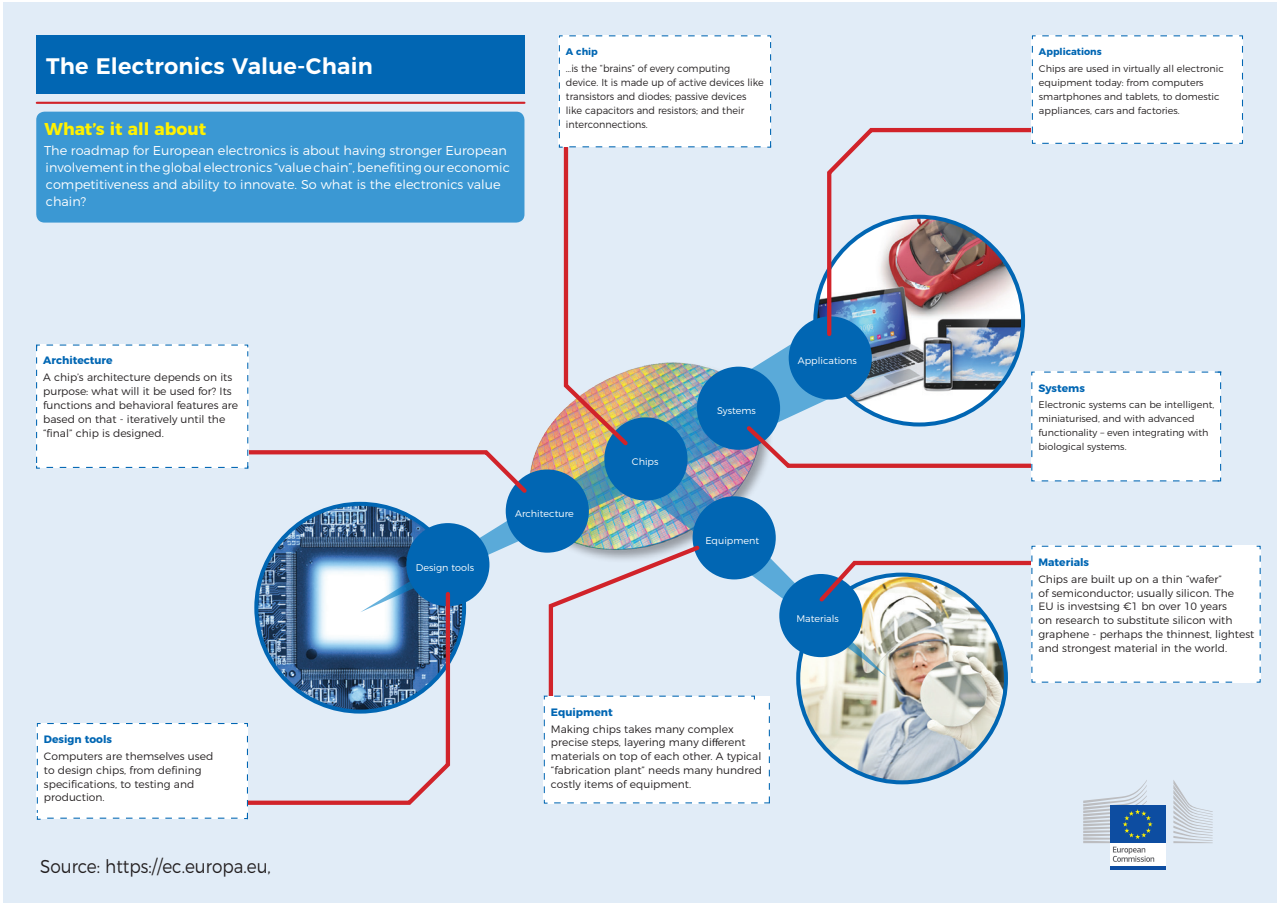
| Contribution (%) | 2005 | | 2010 | |
|---|---|---|---|---|
| | Domestic | Imported | Domestic | Imported |
| Agriculture | 0.0983 | 0.0909 | 0.0147 | 0.0435 |
| Mining | 0.0002 | 0.0028 | 0.0392 | 0.0391 |
| Food & Beverages | 0.0012 | 0.0002 | 0.0012 | 0.0006 |
| Textiles | 0.0040 | 0.0054 | 0.0268 | 0.0429 |
| Wearing Apparel | 0.0254 | 0.0205 | 0.0533 | 0.0001 |
| Wood | 0.0228 | 0.0081 | 0.4200 | 0.0605 |
| Petroleum Refinery | 0.2982 | 0.0875 | 0.1969 | 0.0872 |
| Chemicals & Chemical | 1.1521 | 2.4739 | 1.0314 | 1.1553 |
| Rubber & Plastic Products | 1.1464 | 0.2465 | 1.5572 | 0.7012 |
| Other Non-Metallic Mineral Products | 0.3085 | 0.1688 | 1.4187 | 0.5920 |
| Basic Metals | 0.5124 | 2.2059 | 1.4649 | 4.5413 |
| Fabricated Metal Products | 1.3723 | 0.4085 | 1.4103 | 0.9266 |
| Machinery & Equipment | 0.0989 | 0.4154 | 0.5806 | 1.3044 |
| Electrical Equipment | 2.8260 | 3.1921 | 0.5277 | 5.0218 |
| Computer , Electronic, Optical Products | 16.7055 | 43.4726 | 1.9635 | 55.7351 |
| Transport Vehicles | 0.0536 | 0.0462 | 0.0397 | 0.0303 |
| Other Manufacturing | 0.4193 | 0.0652 | 0.4969 | 0.2283 |
| Construction | 1.8540 | 0.0000 | 1.1558 | 0.0427 |
| Services | 19.6646 | 0.5256 | 14.9901 | 2.0476 |
| **TOTAL** | **46.5638** | **53.4362** | **27.40** | **72.60** |

Computed from: Input-Output Table, 2005 & 2010, Department of Statistics, Malaysia

## Global Value Chain for Electronics Industry

The E&E sub-sector, with its large range of products and services, often forms the backbone of the manufacturing sector. Computer, electronic and optical products account for about 87% to the total E&E share. However, there have been challenges for manufacturers of semiconductor chips in the new era of new digitisation and IoT. Pressure is constantly piled on chips makers to come up with something better and even cheaper to meet the expectations of customers. Traditionally, semiconductor companies controlled the entire production process, from designing to manufacturing. Many chips makers are, however, delegating more production to others. Chips producers are emerging to be leaner and more efficient amidst the growing demand for more sophisticated chips to meet today's demands from modern medical equipment to the most inexpensive radio transistor. Most of the popular modern equipment and devices of today usually contain chips rather than without them. The industry itself will contribute to the growth of other industries such as telecommunication, professional services, ICT, automotive, aerospace, machinery and equipment, and medical equipment

**The Value Chain of Electronics Industry**




Source: https://ec.europa.eu,

## SEMICONDUCTOR COMPONENTS

The semiconductor industry is made up of four main product categories – memory, microprocessors, commodity integrated circuits or chips, and complex system on a chip (SOC):

- **Memory:** Serves as temporary storehouses of data and pass information to and from computer devices' brains. The continued consolidation of the memory market has driven memory prices so low that only a few big companies like Samsung, Toshiba and NEC can afford to stay profitable.
- **Microprocessors:** These are central processing units that contain the basic logic to perform tasks. Intel's domination of the microprocessor segment has forced nearly every other competitor, with the exception of Advanced Micro Devices, out of the mainstream market and into smaller niches or different segments altogether.
- **Commodity Integrated Circuit:** Sometimes called "standard chips", these are produced in huge batches for routine processing purposes. Dominated by very large Asian chip manufacturers, this segment offers razor-thin profit margins that only the biggest semiconductor companies can compete for.
- **Complex SOC:** SOC is essentially all about the creation of an integrated circuit chip with an entire system's capability on it. The market revolves around growing demand for consumer products that combine new features and lower prices. With the doors to the memory, microprocessor and commodity integrated circuit markets tightly shut, the SOC segment is arguably the only one left with enough opportunity to attract a wide range of companies.

Semiconductor companies are faced with the classic conundrum of whether its technology that drives the market or the market that drives the technology. Investors should recognise that both have validity for the semiconductor industry. Following is a summary of the key drivers and risks that impact fundementals and stock prices.

| Drivers | Impact | Measured By |
|---|---|---|
| Market share gains | Drives revenue and earning increases | Units shipped vs competition |
| Higher margins or profits | Absorption of higher fixed costs contributes to lower unit costs | Manufacturing process efficiencies |
| Higher product performance vs competition | Stimulates greater enthusiasm for end-products and support | End performance based on industry benchmarks |

Source: The Industry Handbook: The Semiconductor Industry, Investopedia (http://www.investopedia.com/features/industryhandbook/semiconductor)

## Trade Competitiveness

Malaysia's E&E trade has been registering a surplus of approximately USD19 billion annually over the past five years. Electrical machinery, apparatus and appliances registered a 0.9% increase in export, contributing the highest trade share to the E&E sub-sector and help cushioned its overall performance. However, the value of both exports and imports deteriorated by 1.9% and 2.8% respectively (Table 4.7). The highest decline in both exports and imports was recorded by the office machine and automatic data-processing machine industries, followed by telecommunications, sound recording and reproducing apparatus equipment.

**Table 4.7: Malaysia E&E Trade Statistics**

| | CAGR 2010-2015 (%) | | Contribution to High-Tech Products (%) 2015 | |
|---|---|---|---|---|
| | **Export** | **Import** | **Export** | **Import** |
| **E&E** | **-1.9** | **-2.8** | **100.0** | **100.0** |
| Office Machines and Automatic Data Processing Machines | -7.0 | -8.0 | 18.8 | 12.1 |
| Telecommunication and Sound Equipment | -6.1 | -4.4 | 14.5 | 12.2 |
| Electrical Machinery, Apparatus and Appliances | 0.9 | -1.6 | 66.7 | 75.7 |

Source: UN COMTRADE Database, various years – SITC Rev. 3

The OECD describes high-technology products as containing technical products of which the manufacturing involves a high intensity of R&D. Malaysia exported 81.4% of high-technology products amounting USD58.21 billion worldwide. Meanwhile, total E&E imports of high-tech products were 82.6% or USD42.77 billion, mostly being intermediate products such as electronics integrated circuits and microcircuits, and Piezo-electric crystals for assembly purposes.

E&E high-technology products are categorised into four industry groups, namely computers-office machines, electronics-telecommunications, scientific instructions, and electrical machinery. Among these, the contribution of electronics-telecommunications to total high-technology products was the highest at 75.4% valued at USD43.92 billion. Within this industry group, the electronic integrated circuits and microcircuits; diodes, transistors, semiconductor devices etc; and telecommunications equipment excluding parts industries were among the top highest contributors of 56.7%, 13.8% and 12.4% respectively with total exports valued at USD36.38 billion (Table 4.8). These high amounts of high-technology product exports, however, only generated value-added content of merely 20%-30%.

In analysing the five-year compound average growth rate (CAGR) of the electronics-telecommunications industry group, optical fibre cables reached 32.1%, the highest among the export industries. The sharp rise for the products was due to higher demand of fibre optic cables worldwide. On the other hand, video equipment have shown remarkable decline in exports due to weak demand and low prices.

**Table 4.8: Electronics-telecommunications Growth and Contribution to High-tech Products, 2011-2015**

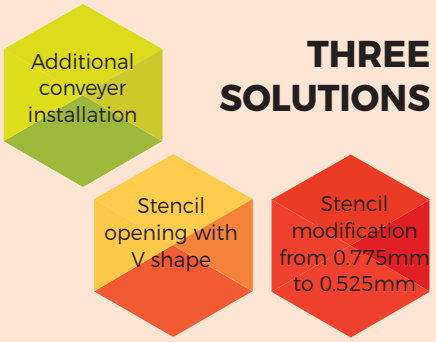
| | CAGR 2011-2015 (%) | | Contribution to High-Tech Products (%) 2015 | |
|---|---|---|---|---|
| | Export | Import | Export | Import |
| **Electronics-telecommunications** | **3.6** | **-1.1** | **100.00** | **100.00** |
| Video Apparatus | -26.5 | -13.7 | 0.9 | 0.6 |
| Telecommunications Equipment excluding Parts | 11.3 | 8.1 | 12.4 | 12.5 |
| Printed Circuits | 11.0 | -5.9 | 3.1 | 4.5 |
| Electrical Boards, Panels and Consoles | -7.0 | -6.3 | 2.9 | 1.5 |
| Optical Fibre Cables | 32.1 | -9.6 | 0.1 | 0.3 |
| Microwave Tubes | -28.3 | -17.5 | 0.002 | 0.007 |
| Other Valves and Tubes | 9.8 | 4.8 | 0.005 | 0.010 |
| Diodes, Transistors, Semi-Conductor Devices | -0.2 | 5.1 | 13.8 | 6.8 |
| Electronic Integrated Circuits and Microcircuits | -0.004 | 0.5 | 56.7 | 43.4 |
| Piezo-Electric Crystals | 4.1 | -4.7 | 10.1 | 30.5 |

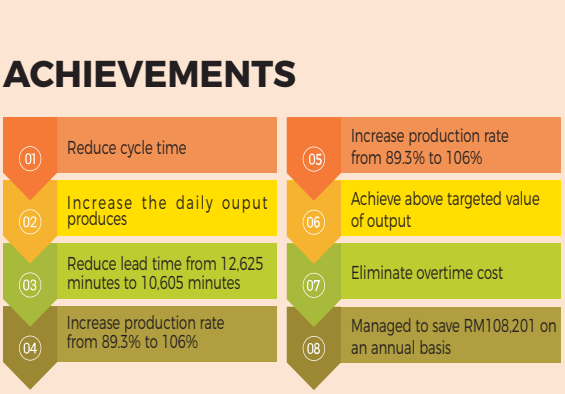
Source: UN Comtrade Database, various years - SITC rev.3

## SHARPENING THE COMPETITIVE POSITION

Sharp Manufacturing Corporation (M) Sdn Bhd (SMM) applies the Innovative and Creative Circle (ICC) approach to maintain optimal conditions throughout the production process for high yield rates and quality levels. At SMM, a complete LCD or LED television set undergoes eight processes in the production. All these processes are implemented in accordance to the company's targeted performance of Balanced Scorecard Key Performance Indicators (KPIs), including financial, customer, internal business process and learning and growth. This is to ensure that requirements for quality enhancement, material stock availability, reduction in production cost, safety and on-time delivery are adhered to.

The problem was identified at the loading process of the Auto Insert (AI) Checker Unit and part mounting process of the production line. To effect higher output, reduce time loss, wastage and costs after taking into consideration that local production was lower than similar plants in China and Indonesia.



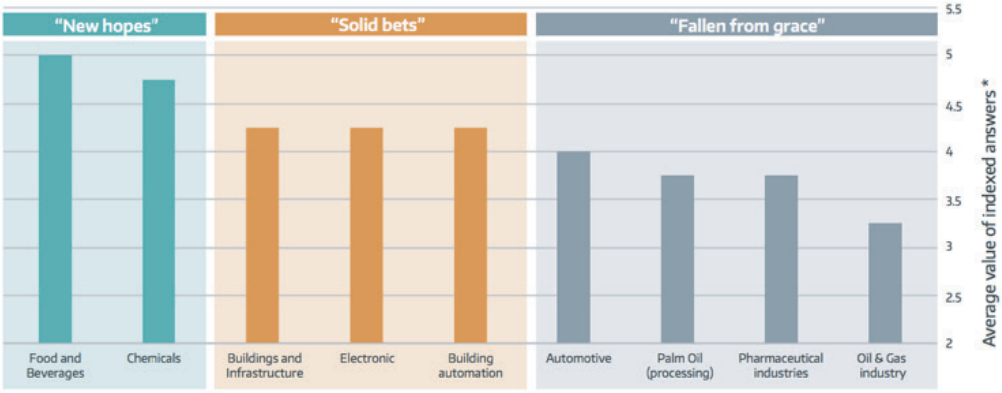
## ISSUES AND CHALLENGES

### Propelling Malaysia Towards Industry 4.0

Under the global manufacturing landscape, which has entered its fourth wave of revolution or industry 4.0, local manufacturers will have to ramp up their operations by adopting end-to-end digitisation of all physical assets and integration into a digital ecosystem with value chain partners. Industry 4.0 essentially focuses on "smart factories", which are associated with robotics, sophisticated sensors for data input, predictive analytics and IoT. According to a study on Malaysia's automation investment, only 30% of our manufacturers have started to invest and leverage on modern technology despite being receptive to the concept of industry 4.0.

Many factors have influenced their relative reticence to invest in more modern technology. They include lack of skilled manpower, high production costs and the weak economic climate. The same study also found that more than 190 automation vendors were looking at the food processing and chemical industries as their new target market (Figure 4.16). Their focus on these two industries strongly suggest that the present scenario of Malaysia's manufacturing sector actually calls for greater automation before players can fully embark on Industry 4.0.

**Figure 4.16: Automation Vendors' Priorities for Relevant Industry Sectors, 2015**




Notes:
1. "New hopes", as these sectors appear to have suddenly high expectations in them
2. "Solid bets", sectors that had performed well in the past and could be at least stable in coming years
3. "Fallen from grace", large sectors, once hailed motors of growth, seem to have lost their importance here.

Source: Solidiance's research and analysis

Industry 4.0 needs manufacturers to be flexible as it requires them to computerise their entire operations based on a common IoT communication mechanism. According to the National IoT Strategic Roadmap released in 2015, the initial IoT economic potential for Malaysia will be RM9.5 billion in GNI creation by 2020. The IoT will help the economy to experience exponential growth beyond 2020 and reach RM42.5 billion by 2025 as it also serves as a good platform to commercialise resource and development output.

To ramp up the implementation of IoT in the industry, the Government has to ensure data protection must be enhanced to create a trustworthy ecosystem for manufacturers, suppliers and clients to share confidential and propriety information. Hence, commitment and sizable investment from manufacturing companies, suppliers, government and other stakeholders should be in place to embrace this new revolution. Various institutions such as the Penang Skills Development Centre (PSDC) and Malaysian Industry-Government Group for High Technology (MIGHT) will facilitate the manufacturing sector to move towards Industry 4.0.

## ARE INDUSTRIES READY FOR INDUSTRY 4.0 CHALLENGE?

Many challenges lie ahead in the march towards the Industry 4.0 adoption. Although productivity improvements can be attained by earnest initiatives, the transformation will require commitment and investments from companies, suppliers, governments and other stakeholders in several areas to address issues like readiness, displaced workers, skills shortage and equipment upgrades.

In a survey conducted by McKinsey & Company in January 2015, only 48% from 300 manufacturing leaders were ready to meet the challenges of Industry 4.0 while 78% of the suppliers surveyed were comfortable in their readiness rate. This indicated that the supply chain partners may lead the way for Industry 4.0 readiness.

To adopt Industry 4.0 earnestly, different skills will be needed to operate the systems of the smart factory. In the short term, increased automation will put many low-skilled workers out of jobs. Revenue from increased production and efficient processes will be offset by increased training and displacement costs.

The transformation to fully integrated manufacturing is putting pressure on colleges, universities and government agencies to create more training programmes to equip workers with the knowledge and skills needed in engineering, software development and IT technologies. Mechatronics, which integrates several engineering disciplines, is emerging as holding the future for manufacturing.

Executives surveyed showed that between 40% and 50% of today's equipment will need to be upgraded or replaced to operate the new world of integrated manufacturing. It will take considerable investment over many years to adapt today's factories to future requirements. However, a start has to be made especially in the mindset change towards greater acceptance of Industry 4.0 and the Government's preparedness to lay the foundations for the future by transformation its education curriculum to factor in these changes.

Source: Industry 4.0 and the Factory of the Future, the PNC Financial Services, Inc.

## A SYSTEMATIC AUTOMATION TOWARDS PRODUCTIVITY AND EFFICIENCY ENHANCEMENT

Wilron Products Sdn. Bhd., an SME producing adhesive products such as Water-Based Adhesive (WBA), Solvent-Based Adhesives (SBA) and Hot-Melt Adhesives (HM). Previously, its workers shifted the adhesive containers manually from stirring machines to stores before they are delivered to customers. The maximum weight of a container is about a tonne and about 200 tonnes are produced daily. Moving these containers had become a concern among elderly employees, which also resulted in increases of medical costs and medical leave.

SIRIM, through its technological audit on Wilron has identified that the company needs to automate its packing process to enhance productivity. Consequently, through the process and assembly automation and redesign of plant layouts for productivity and efficiency enhancements, an automated conveyor was installed which ease the work of employees in transferring adhesive containers to the store.

Kaizen initiatives at Wilron have yielded tremendous achievements as the company's greater automation enabled it to reduce accident rates and medical leave, as well as increase productivity by 10% to 20 %. Wilron estimated that automation had led to cost savings of RM12,000 annually.

## Preparing Talent for the Future

Change is always inevitable and numerous drivers of change often impact the overall environment in many areas, including producing future skills. Greater globalisation these days, which take into account the movement of capital, people, goods and services, often contributes to change. As for advanced developing countries like Malaysia, such change also effects an influx of inward foreign direct investment. Such a change also requires their people to be equipped with scientific and technological advancement skill sets or else the benefits of such a move would not benefit the host countries.

The shifting demographics, especially for aging populations in many countries worldwide, will have a profound impact on how and where manufactured goods and associated materials and commodities are produced. Increased consumer preferences on the sustainability of products and issues like carbon footprints will mean more stringent environmental regulations and goals for energy efficiency. This requires manufacturing firms to develop teams to drive efficiencies from input, through production and delivery to customers on a sustainable basis.

The increasingly competitive manufacturing environment has put strong emphasis on research, development and innovation activities. This is not only in the context of R&D for new products, but also the ability to absorb technologies and external expertise developed to further drive innovation in manufacturing products and processes. In this regard, ICTs have evolved towards having a high impact on manufacturing with ICT-enabled processes such as increasing automation, computer integrated manufacturing (CIM), simulated manufacturing, virtual test beds and 'digital factories' placed at the cutting edge of manufacturing competitiveness. These drivers all have significant implications for skills requirements. Such changes have resulted in strong demand for people with specialised skills and created skills shortages within manufacturing worldwide -- a critical issue at the operational level due to the technical expertise that they can provide.

In mitigating the skills shortage in manufacturing industries, five skills categories must be given emphasis in terms of skills for manufacturing excellence; skills for trades and technicians; skills for engineering; skills for researchers; and generic skills.

Lean manufacturing techniques and increasing automation are driving upskilling requirements for both generic skills and technical skills across virtually all occupations. This requires professionals with a strong understanding of the specific manufacturing process, typically

**Figure 4.17: Manufacturing Sector's Skills Landscape**


Source: Future Skills Requirements of the Manufacturing Sector to 2020 Report, FORFÁS, 2013

engineers or scientists to acquire skills in data analytics. Training and consultancy on lean and automation are available from both public and private institutions, locally and internationally such as MPC, Kaizen Institute of Malaysia, Neville Clarke and MalaysiaTraining.net.

Toolmaking and machinist skills are important to support the development of products across industries locally. These skills have a strategic role in ensuring competitiveness and sustainability in many key industrial sectors such as aeronautics, electronics, packaging, house appliances, rubber and most importantly, the automotive sector. Shortage of highly skilled machinists and experienced tools design engineers, prerequisites for tool-making, are among the setbacks in the industry.

Most of high value manufacturing firms require core engineering skills such as mechatronics. Precision engineering which is a sub-discipline of those engineering skills, is also required when designing stable and repeatable machines, fixtures, and other structures that have exceptionally low tolerances. Other valuable skills to be developed are biomedical or aeronautical engineering skills to cater for the niche industry development in Malaysia. In addition, supporting engineering skills should be further developed and incorporated into the life-long learning programmes at the diploma and masters levels.

This calls for greater leveraging on existing training and education institutions such as the Advanced Technology Training Centre (ADTEC), Institut Kimia Malaysia (IKM), Tati University College, UniKL Malaysian Institute of Chemical and Bioengineering Technology (MICET) and Universiti Teknologi Malaysia (UTM), which offer various polymer technology programmes from the diploma to PhD levels.

Researcher skills are needed for R&D, especially for product development. This work requires high or even advanced levels of relevant research skills. These kinds of research need funding on industry-relevant topics. The move to develop industrial PhD programmes will contribute greatly to meeting the skills needed. Industries can leverage on the public-private research network (PPRN) platform provided by the Government. There has been general consensus that technical skills at all levels be complemented with strong generic skills, particularly in terms of people skills, communication skills, problem solving skills, planning skills and project management skills as they are vital enablers for manufacturing excellence. They are also essential in other contexts, such as engagement with customers or suppliers in product development or when working with regulatory bodies, or even seeking greater investor participation.

## Enhancing TVET to Mitigate Skills Shortage

Under the Malaysian Education Blueprint, efforts will be stepped up to produce more graduates skilled in Technical and Vocational Education and Training (TVET). This will result in a 2.5-fold increase in TVET enrolment by 2025. Presently, there is an undersupply of TVET workers in most NKEA sectors. The primary focus will be to ensure that academic and TVET pathways are equally valued. This will include harmonising the national TVET qualifications framework and seeking greater international accreditation.

## Gaining from Softening of the Ringgit

Manufactured goods have been the key source of resilience of Malaysia's total exports to USA. In 2016, there was an increase in Malaysian exports to USA and they accounted for 95.7% of total exports. Industries in the manufacturing sector are, however, affected by weakening ringgit against the US dollar, which had been triggered by lower crude oil prices. This is often in the context of rising costs of imported raw materials and cost cutting measures implemented by their traditional customers.

According to the RAM Business Confidence Index 2016, SMEs were less optimistic about business expansion and capital investment in the first half of 2016 compared with the corporate sector. SMEs scored 51.3 on their intent to expand their businesses and 48.5 on capital investment. The corporate sector recorded 60.0 for business expansion and 57.7 for capital investment.

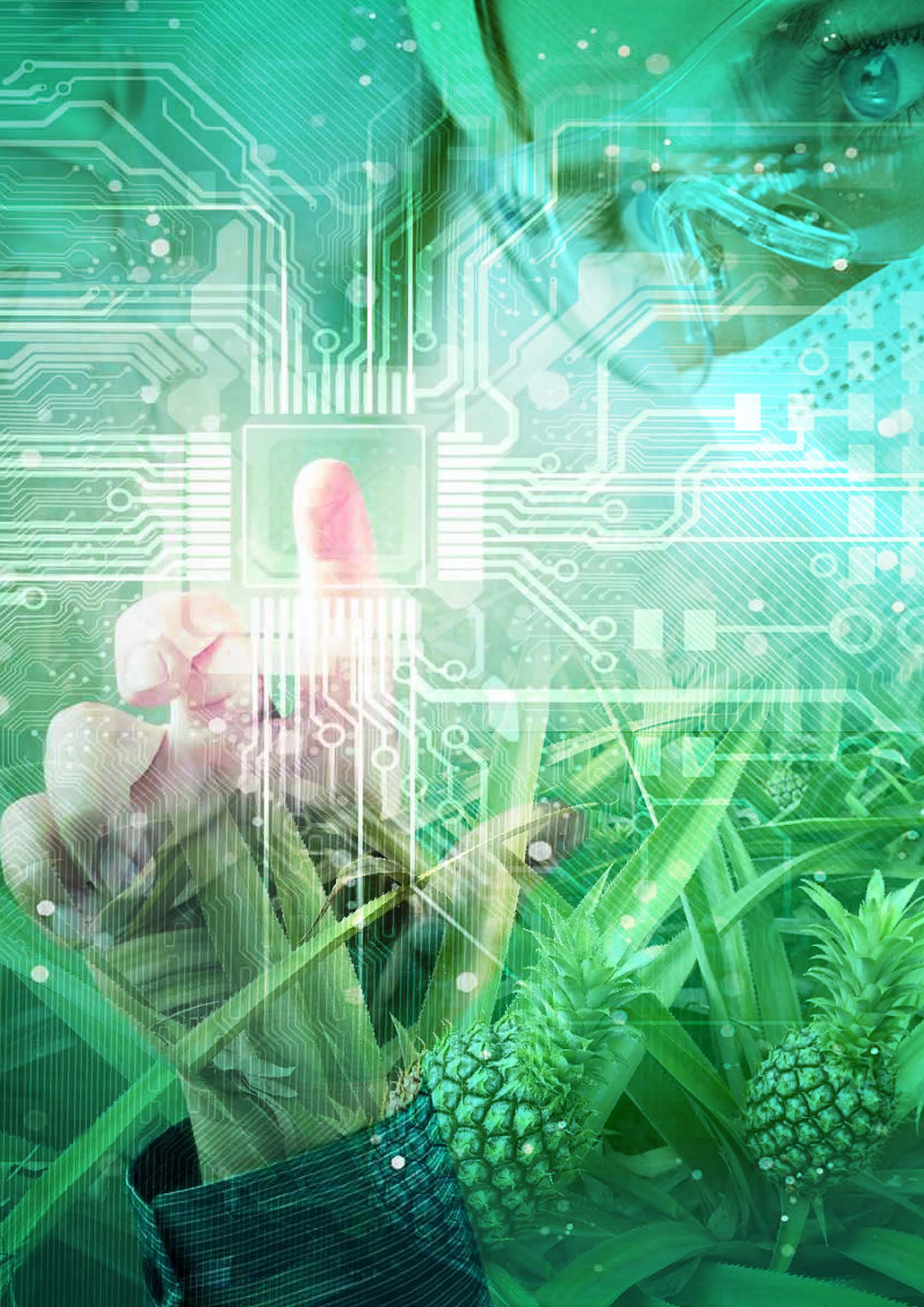
## ENGAGING ADVANCED TECHNOLOGY FOR HIGHER PRODUCTIVITY

The manufacturing sector is anticipated to achieve 1.1 times higher than its targeted productivity level of RM112,100 by 2020 if it were to sustain a 2.6% growth annually. This target will ensure that the sector remains to be the driver of the country's productivity.

MPB has outlined several initiatives to further uplift this sector productivity. Where, E&E, chemicals and machinery and equipment have been singled out as the catalyst of growth that would create higher multiplier effects and linkages to other industries along their value chain.

Amidst a more competitive external environment, the changing landscape in the manufacturing industry and the limited resources of essential talents, Malaysia needs to follow several pathways to extricate itself from these challenges. The way forward will be to find workable solutions that hinge on greater productivity to offset rising costs and obsolescence of Malaysian products and services. Besides pushing the main productivity agenda, the solutions lie in industry commitment, government transformation and promotion, greater collaboration between industry and academia, and deepening the skill-sets needed to tackle the new era of manufacturing.

The increasing usage of technology to drive efficiency will need skilled sets to drive integrated, automated and optimised production flow, Big Data analytics to improve forecasting predictability and applying cloud-based applications to reduce ICT costs. Industry 4.0 will provide the means to increase productivity where some countries are already at the frontier of applications. Malaysia will achieve a quantum leap into the new era of digitalisation once it invests in building upscaling and upskilling the manufacturing sector base. Such aspirations will need the Government to provide greater incentives and tax reforms for industries and for the relevant ministries to work with universities and industry to boost greater collaboration in various initiatives, including R&D. The Government will also have to provide support to high potential SMEs to expand internationally. The survival of Malaysia's manufacturing sector will depend on how well and fast it adapts to the changing environment backed by strong governmental support at the promotion, regulatory and provision of skilled manpower levels.



05

# Productivity Performance of the Agriculture Sector

# Agriculture Sector Productivity
# **At a Glance**

## 2016

Labour Productivity level

**RM55,485**

Labour Productivity Growth

**3.4%**

## 11MP Target

Labour Productivity level

**RM68,800**

Labour Productivity Growth

**3.6%**

## Sources of Labour Productivity Growth, 2016

TFP Growth

**-7.69%**

Capital Intensity Growth

**11%**

## Contribution to Added Value, 2016

Oil Palm

**43.1%**

Forestry & Logging

**7.1%**

Other Agriculture[e]

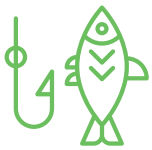
**1.8%**

Food Crops

**17.8%**

Livestock

**11.7%**



Fisheries

**11.5%**

Rubber

**7.1%**

The agriculture sector can be classified into industrial commodities and agro-food. Industrial commodities consist of rubber, oil palm, forestry and logging, cocoa and pepper products while agro-food comprise paddy, fruits, vegetables, fisheries, livestock and other agro-based produce.

The sector has witnessed strong focus on green and sustainable growth along with increasing mechanisation under the 11MP, thus boosting its human resources and technological and scientific inputs and outputs. The National Agro-food Policy (2011-2020) was formulated to further enhance the level of self-sufficiency level (SSL) and to reduce the vast sums spent on importing agro-food. This policy is also aimed at addressing food security and safety; guaranteeing the availability, affordability and accessibility of food; ensuring the competitiveness and sustainability of the agro-food industry; and increasing the income levels of agropreneurs.

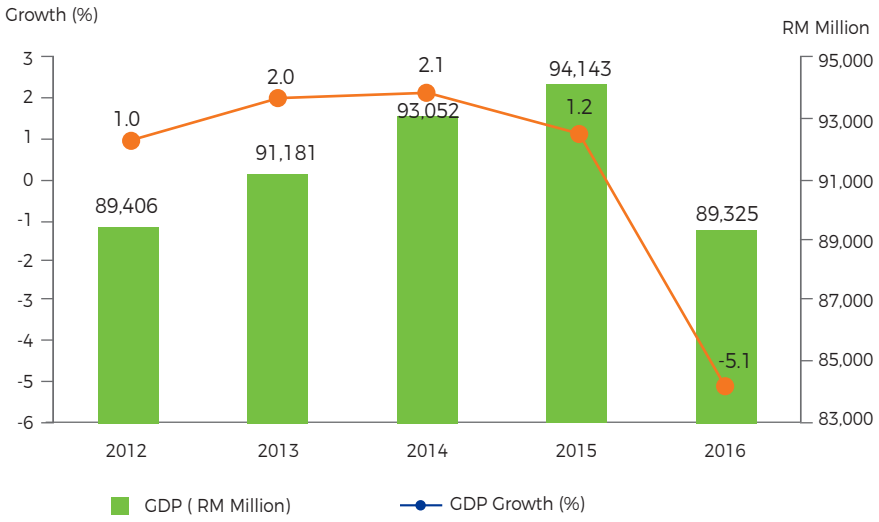
The National Commodity Policy (2011-2020), meanwhile, aims to increase the contribution of plantation industrial commodities to the nation's economy; modernise and transform the commodity industry towards more competitive and sustainable levels; encourage the development of the commodity industry along the value chain; increase the income of operators and smallholders; and promote Malaysia as the centre of excellence in R&D, technology development and the downstream processing of industrial commodities.

Under the Permanent Food Production Park (TKPM) programme, a strategy under the Third National Agriculture Policy (NAP3), it aims to promote the implementation of large-scale agricultural projects, commercial and high-tech entrepreneurs, including those in the private sector. This programme has benefited 472 farmers and 60% of them have achieved monthly net incomes of more than RM3,000 from 2015.

## PERFORMANCE AND CONTRIBUTION TO NATIONAL ECONOMY

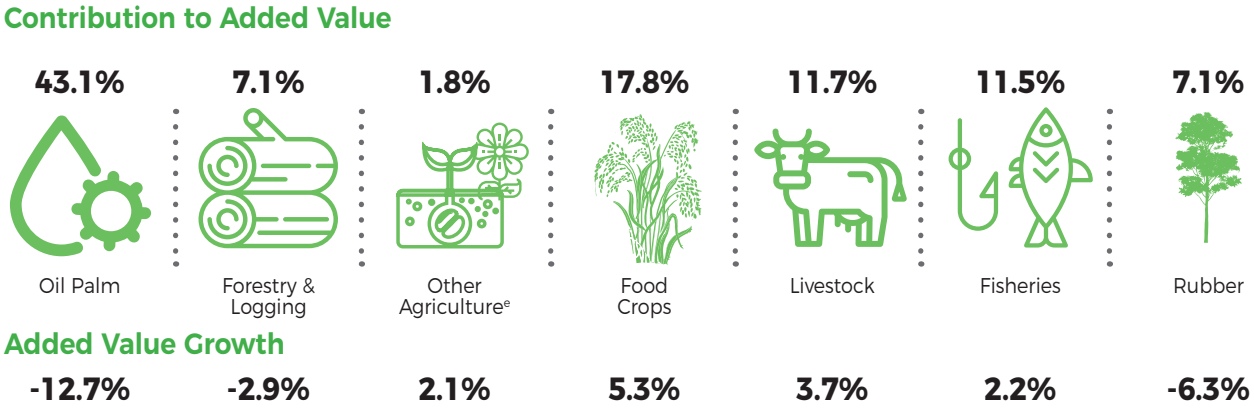
The agriculture sector contributed 8.1% of Malaysia's GDP worth of RM89.33 billion in 2016 (Figure 5.1). Of the total, the agro-food sub-sector accounted for 40.9% and the balance of 59.1% was from the industrial commodity sub-sector. These contributions were in line with the targeted contribution of value-added of 42.4% for agro-food and 57% for the industrial commodity sub-sector. In terms of growth, the agriculture sector declined by 5.1% due to the contraction of output by 10.5% in industrial commodities.

**Figure 5.1: GDP Performance of Agriculture Sector, 2012-2016**




Source: Department of Statistics, Malaysia

**Figure 5.2: Contribution and Growth to Added Value of the Agriculture Sector, 2016**




Source: Ministry of Agriculture and Agro-based Industry, Malaysia

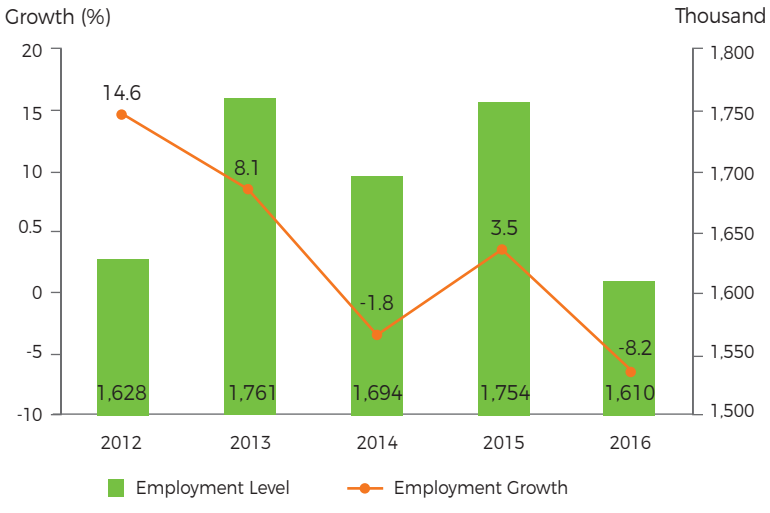
The palm oil industry was the largest contributor to the industrial commodity sub-sector with 43.1% of the sector's total added value in 2016 followed by food crops (17.8%), livestock (11.7%), and fisheries (11.5%). All industries except palm oil, natural rubber, and forestry and logging experienced growth in added value (Figure 5.2). The palm oil industry remains the pillar of the Malaysian agriculture economy and plays a pivotal role in feeding and fuelling a growing population. As the most versatile and productive oil crop, palm oil has responded well in terms of investments in research and technical promotion. Growth in the upstream sector has had a cascading impact along the entire value chain. The reduction of Fresh Fruit Bunches (FFB) owing to the El-Nino phenomenon beginning in the second half of 2015, with prolonged dry weather conditions and below average rainfall, had impacted on production of FFB in 2016. This affected the production of crude palm oil (CPO), which dropped by 13.2% to 17.3 million tonnes against 19.9 million tonnes in 2015 (Table 5.1).

**Table 5.1: FFB Yield, CPO and Extraction Rate, 2015 - 2016**

| | 2015 | 2016 |
|---|---|---|
| Fresh Fruit Bunch (FBB) Yield (tonnes/hectare) | 18.48 | 15.91 |
| Crude Palm Oil Production (tonnes) | 19,961,581 | 17,319,177 |
| Oil Extraction Rate (OER) (%) | 20.46 | 20.18 |

Employment in the agriculture sector accounted for 11.4% of national employment. There was a

**Figure 5.3: Employment in the Agriculture Sector, 2012-2016**




Source: Department of Statistics, Malaysia

sharp drop of 8.2% to 1.61 million employees in 2016 (Figure 5.3). This could be attributed to the Government's efforts in strengthening human capital by continuous training and encouraging the use of modern technology and mechanisation to reduce dependency on foreign labour.

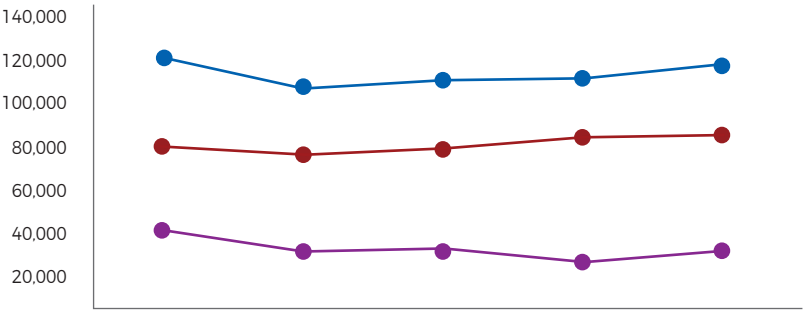
Exports of the agriculture sector comprised 14.7% of Malaysia's total exports while that of imports accounted for 12.1% of total imports.

The agriculture sector continued to record a surplus trade balance of RM31.17 billion in 2016. The sector's export were valued at RM115.84 billion, a rise of 5.4% compared to RM109.96 billion in 2015 due to high demand, particularly in major commodities. Meanwhile, the value of imports also increased by 0.9% to RM84.67 billion in 2016 (Figure 5.4).

The main agricultural exports comprise palm oil, rubber and forestry and logging contributed to 74% or RM85.69 billion of the total agricultural exports of RM115.84 billion in 2016. Of these, the export revenue of CPO contributed significantly at 75.4% to the agricultural exports valued at RM64.6 billion. CPO remained the main revenue generator in agricultural exports despite a decline in export volume by 2.1 million tonnes.

Cocoa beans were the second largest contributor to agricultural exports where their volume increased by 27.8% to 91,090 tonnes in 2016 compared to 71,291 tonnes in 2015. The export revenue for cocoa beans also increased to RM1.1 billion in 2016 from RM0.9 billion in 2015.

**Figure 5.4: External Trade for the Agriculture Sector, 2012-2016**




| RM Thousand | 2012 | 2013 | 2014 | 2015 | 2016p |
|---|---|---|---|---|---|
| Exports (RM'000) | 119,647,433 | 106,144,848 | 109,173,692 | 109,959,944 | 115,844,243 |
| Imports (RM'000) | 79,122,093 | 75,215,109 | 77,643,288 | 83,953,974 | 84,672,581 |
| Balance of Trade | 40,525,340 | 30,929,739 | 31,530,404 | 26,005,970 | 31,171,661 |

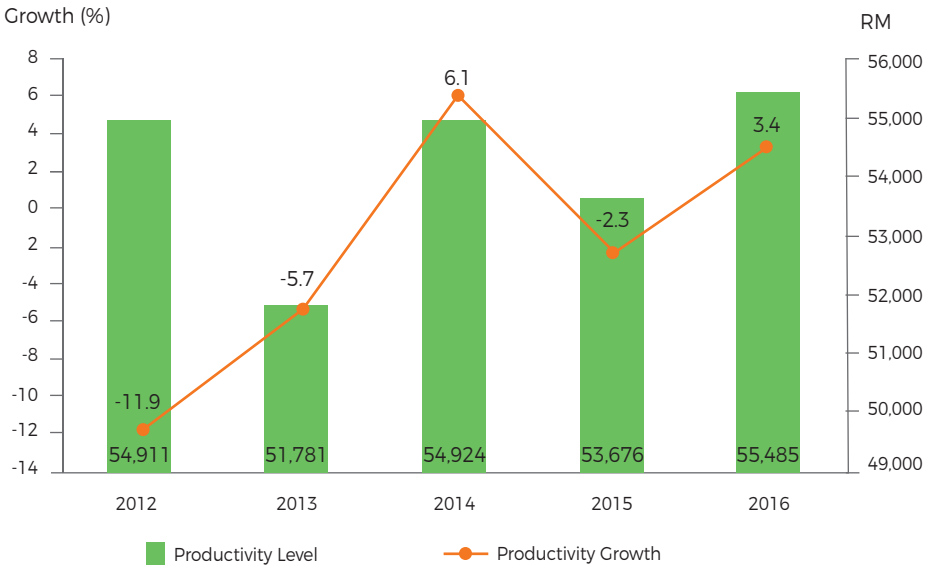
Source: Ministry of Agriculture and Agro-based Industry, Malaysia

## PRODUCTIVITY PERFORMANCE

The agriculture sector is often characterised by substantial volatility in productivity over time, with fluctuations in climatic conditions, such as droughts, severely impacting on output in some years. In 2016, agriculture sector recorded a labour productivity growth of 3.4% to RM55,485 from RM 53,676 in 2015 (Figure 5.5). Its growth was mainly driven by industrial commodities such as palm oil and rubber, which had benefited most from mechanised farming technologies and increased size of the cultivated areas.

The ability of farmers to respond positively on the use of input factors based on climatic conditions helped the sector to record productivity improvements. The reduction of 8.2% of the input factor in employment, which was faster than the decline of 0.1% in terms of output, contributed to the growth of the sector. This was also due to greater mechanisation and automation as reflected by the increase in capital stock by 0.1% to RM79.7 billion in 2016.

**Figure 5.5: Productivity Performance of the Agriculture Sector, 2012-2016**




Source: Malaysia Industrial Productivity Database (MIPD), MPC

Some key factors had also shaped productivity trends over the years such as changes in Government policies, technological advances and innovation, and emerging environmental concerns. The sector also had to respond to the continuing challenge of variations in weather conditions, which were beyond the control of the farmers themselves. The quality of the land, the meteorological environment surrounding the property and farming methods also had a significant impact on the productive capacity of farms within a particular geographical region. For example, integrated farming in industrial commodities would have enabled an increase in productivity and income through greater optimisation of land use.

The last few years had seen a shift towards more intensive farming, which also had greater impact on the productivity of the sector. This trend was reflected in the structural shift to enterprises using more intensive production systems (livestock, fisheries, and food crops) and the adoption of more intensive production techniques (increased use of feeds, chemicals and irrigation).

Agriculture has also become more closely integrated within the agro-food chain. An increasing proportion of the agricultural output, for example, is now supplied to processors or major retailers under comprehensive prearranged contracts. In part, this shift has been facilitated by unwinding the statutory marketing arrangements in many agriculture industries and allowing farmers to have greater control and choices in the management and marketing of their output.

## BETTER TECHNOLOGY, AUTOMATION AND INNOVATION

iSHARP Farm or "Integrated Shrimp Aquaculture Park" rears the 'Penaeus Vannamei' or Pacific White Shrimp in a fully integrated commercial shrimp farm in Terengganu. The farm was primarily developed to promote sustainability on three fronts – ecology, commercialisation and socio-economy within the aquaculture industry. To achieve these objectives, iSHARP Farm consciously and progressively embarked on various efforts to increase productivity with a minimal footprint via improved best-practices, innovation and greater automation.

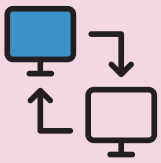
The key initiatives that helped iSHARP Farm improve its productivity while minimising the risk of human error in its operations are the Automation Paddle Wheel System (APS), Supervisory Control and Data Acquisition (SCADA) and Drone (Monitoring Device).

### APS

APS is used to monitor and control the operation of Paddle Wheels (PW) at the ponds with minimal intervention of human operator. The system consists of Smart Controller System that automatically starts the PW after a power failure or any breakdown in one of the PW in the pond. The system also monitor and detect if there is any problem or breakdown from PW and disable the defected PW individually while at the same time enables the good PWs to operate

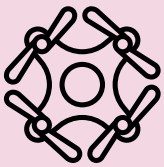
### SCADA

SCADA system is an integrated system that monitors and controls the main system and stations in the farm such as the Sea Water Pump House, Substation, Weather Station, Sea Water Main Supply Canal, and Main Discharge Canal from a control center. In the control center, we can monitor and even operate pumps and machines from as far as 3 km remotely.



### DRONE

Drone is being utilized in the farm to monitor the condition of the farm and ponds in our vast area (1000ha). Using the technology, we are able to monitor our farm literally from the office via real time monitoring. In addition, the Drone is also used to monitor areas which are difficult to access.



Source: Blue Archipelago Berhad

## Labour Cost Competitiveness

Being labour-intensive, the agriculture sector's unit labour cost has made significant improvements as reflected in unit labour cost growth of 3.1% in 2016 from 20.2% previously as a result of intense mechanisation and application of modern farming methods. The sector's labour cost per employee grew by 8.8% faster than the labour productivity growth of 3.4% in 2016 although there had been improvements in terms of unit labour cost. On average, employees in this sector received RM1,340 monthly as compared with RM1,005 in 2012. As the rise in wages did not commensurate with productivity growth in 2016, thus the agriculture sector not yet able to achieve labour cost competitiveness (Table 5.2).

**Table 5.2: Labour Cost Competitiveness for the Agriculture Sector, 2012-2016**

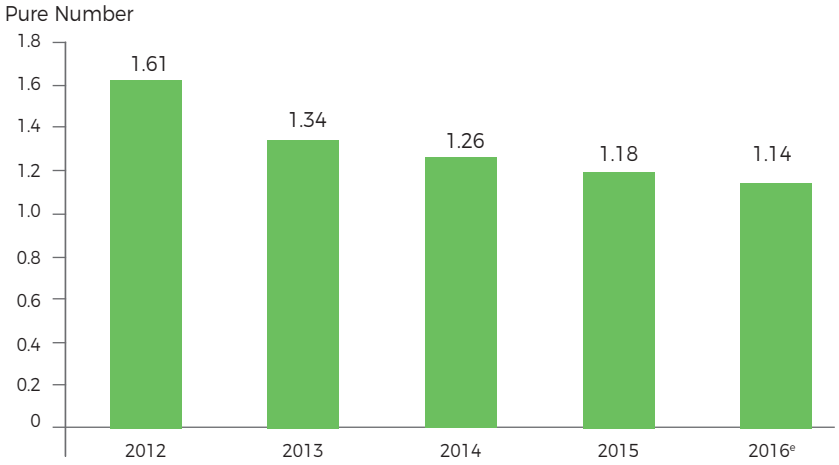
| Year | Labour Productivity Growth (%) | Labour Cost per Employee Growth (%) | Unit Labour Cost Growth (%) |
|---|---|---|---|
| 2012 | -11.9 | 9.5 | 20.2 |
| 2013 | -5.7 | 3.6 | 16.8 |
| 2014 | 6.1 | 6.5 | 2.8 |
| 2015 | -2.3 | 11.1 | 9.6 |
| 2016 | 3.4 | 8.8 | 3.1 |

Source: Malaysia Industrial Productivity Database (MIPD), MPC

## Capital Productivity

The current investment in capital is expected to benefit future productivity growth and it comes at a cost to the enterprise and economy. The returns, however, are not guaranteed and will depend on how successful investment decisions are and how efficiently capital is used in production. However, the contribution of capital to labour productivity growth has been substantial. This means that the efficient use of investment resources will have a significant impact on the future growth of output. Capital productivity in agriculture sector had shown a decreasing trend from 2012 to 2016 (Figure 5.6). It was due to the low utilisation of modern technology and machinery, particularly among smallholders. There were also a few issues related to the use of machinery by farmers in Malaysia. Chief among these was the suitability of imported machinery for the type of soil conditions in Malaysia as there was no standard regulation imposed on bringing in such machinery from abroad.

**Figure 5.6: Capital Productivity of the Agriculture Sector, 2012-2016**



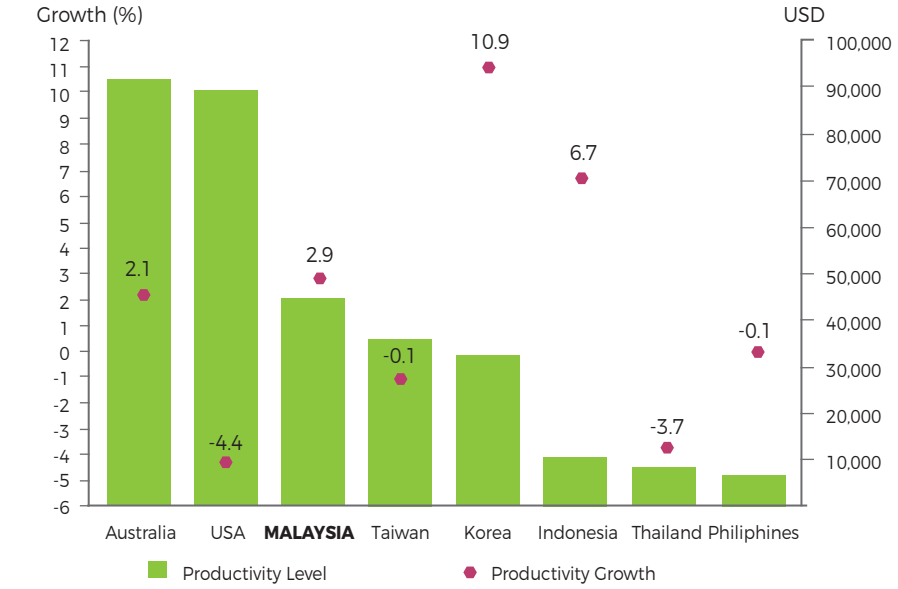

Source: Malaysia Industrial Productivity Database (MIPD), MPC

## International Agricultural Productivity Comparison

Malaysia's agriculture productivity level in 2015 amounted to USD43,868, ahead of Taiwan, Korea, Indonesia, Thailand and the Philippines (Figure 5.7). However, Malaysian agriculture productivity still lagged far behind other high performing countries. The nation's agriculture sector level is only 49.3% that of USA and 48% that of Australia, two countries where farming methods are more mechanised, technology-reliant and holistic in approach.

In terms of productivity growth, Korea recorded a double-digit performance of 10.9% as compared to Malaysia's 2.9%. Korea's rapid productivity growth was attributed to various factors such as its ability to maximise land utilisation through urban agriculture, improving soil productivity, and minimising environmental loading by adopting high-technology green farming.

**Figure 5.7: International Agricultural Productivity (PPP) Comparison, 2015**




Source: IMD World Competitiveness Yearbook 2016

## Sources of Labour Productivity

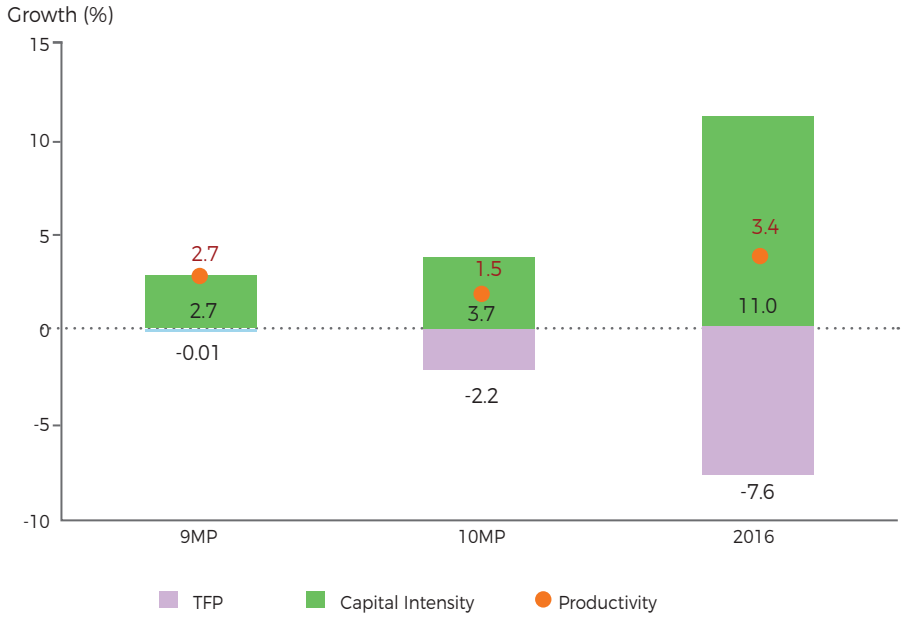
During the 10MP period, labour productivity was driven by capital intensity at 3.7% improved from 2.7% in 9MP. Over the 10-year period (2007-2016), capital intensity remains the main contributor to labour productivity with growth of 4.1%. Throughout 9MP and 10MP period, unfavourable TFP growth have pulled down labour productivity growth in this sector. Among the contributing factors were low knowledge content due to absence of institution involvement, lacking basic skills development, and low adoption in technology investment.

In 2016, the fall in TFP by 7.6% has been offset by capital intensity growth of 11%, turned the productivity growth to 3.4% from -2.3% in 2015. Capital intensity is anticipated to contribute to higher efficiency of the sector and will be translated into higher TFP growth in the long-run with efficient coordination and management on the productive capital.

The Government has continuously encouraged the involvement of youths in entrepreneurship in line with the national agenda. The main objective is to inculcate interest among the young generation towards agriculture sector and develop a group of high-income young agriculture entrepreneurs. This programme was designed specifically for young people under 40 years. The involvement of youths in the agricultural sector is complemented by those aged between 30 and 49 years. The agricultural sector has responded well to the national agenda by increasing the

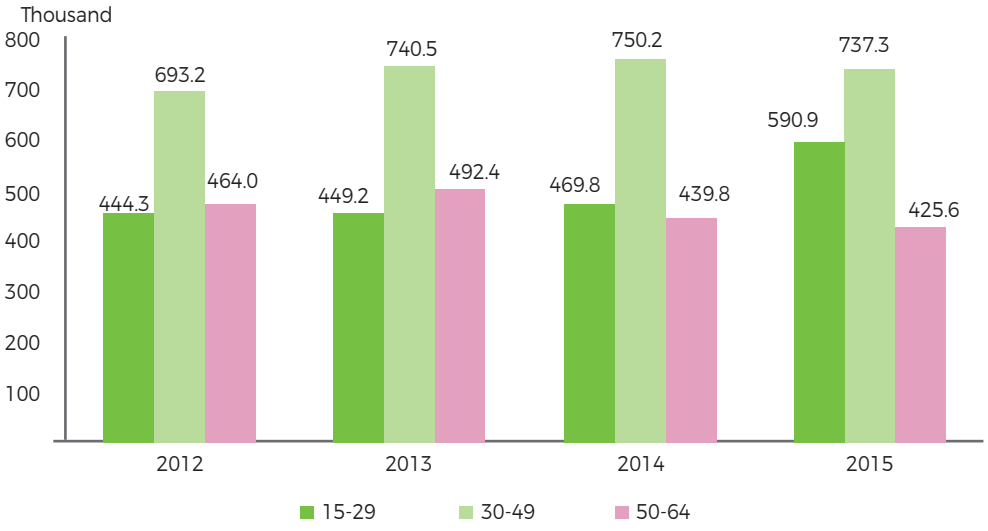
involvement of youths. From 2012 to 2015, the involvement of youths aged between 30 and 49 years had increased by 6.4% (Figure 5.9). The upward trend of youths' involvement as technology-savvy agropreneurs would accelerate the technology diffusion that will further enhance higher TFP contribution in the future.

**Figure 5.8: Sources of Labour Productivity Growth of the Agriculture; 9MP, 10MP and 2016**




Source: Malaysia Industrial Productivity Database (MIPD), MPC

**Figure 5.9: Employment by Age Group in the Agriculture Sector, 2012-2015**

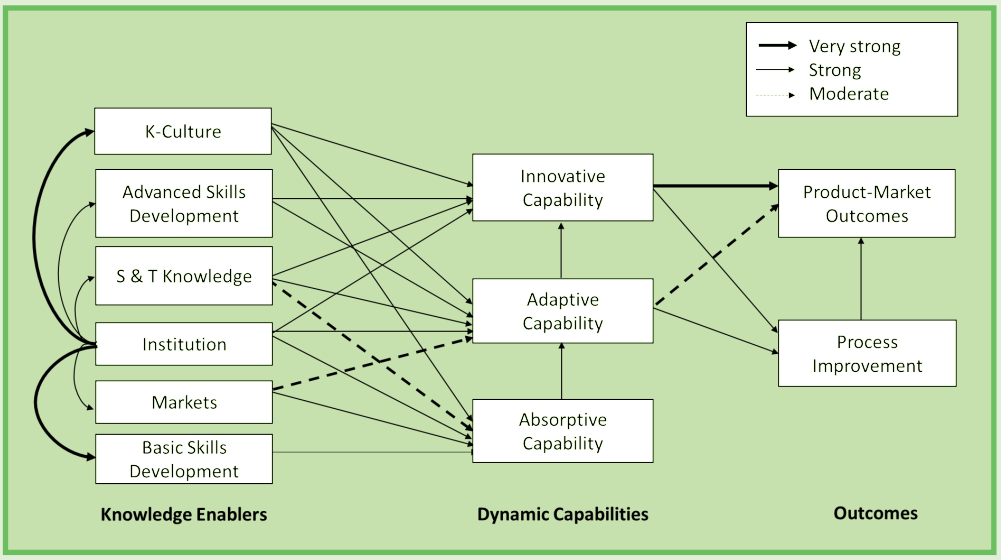



Source: Department of Statistics, Malaysia

## KNOWLEDGE ECOSYSTEM IN BOOSTING PRODUCTIVITY OF THE AGRICULTURE SECTOR

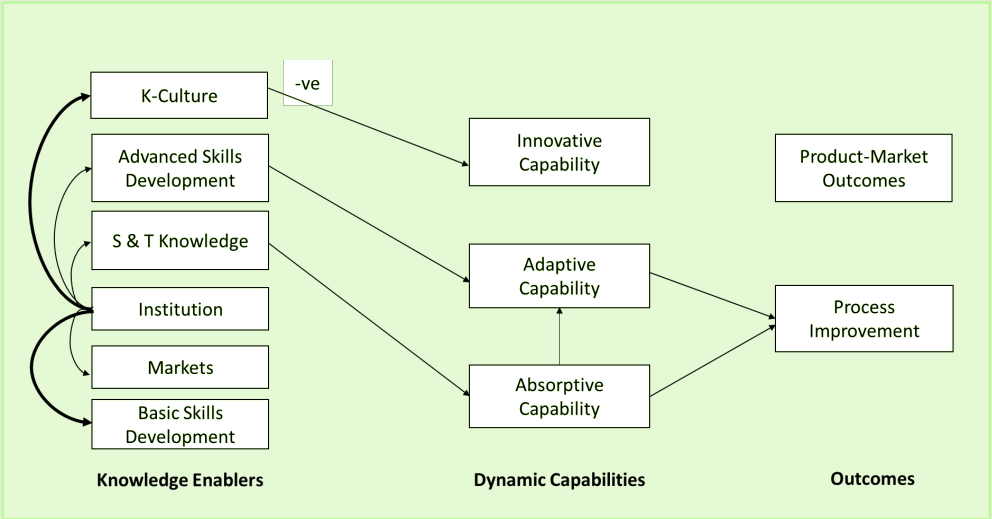
In advanced countries, the enablers for all three components of dynamic capabilities (innovative, adaptive and absorptive) are very strong. A very strong absorbability in this industry lays a good foundation for both adaptive and innovative capabilities for the industry. Sound absorptive, adaptive and innovative capabilities have enabled the industry to develop new process improvements and generate new product outcomes. They have resulted in many agriculture downstream industries becoming global players.

**Knowledge Ecosystem of the Agriculture Industry in an Advanced Countries**




The agriculture knowledge ecosystem for Malaysia is classified as a laggard industry with low knowledge content. The Malaysian agriculture knowledge system showed that enablers need to support three dynamic capability components in terms of innovative, adaptive and absorptive capabilities are relatively weak and primarily to enhance process improvement.

**Knowledge Ecosystem of the Agriculture Industry in Malaysia**

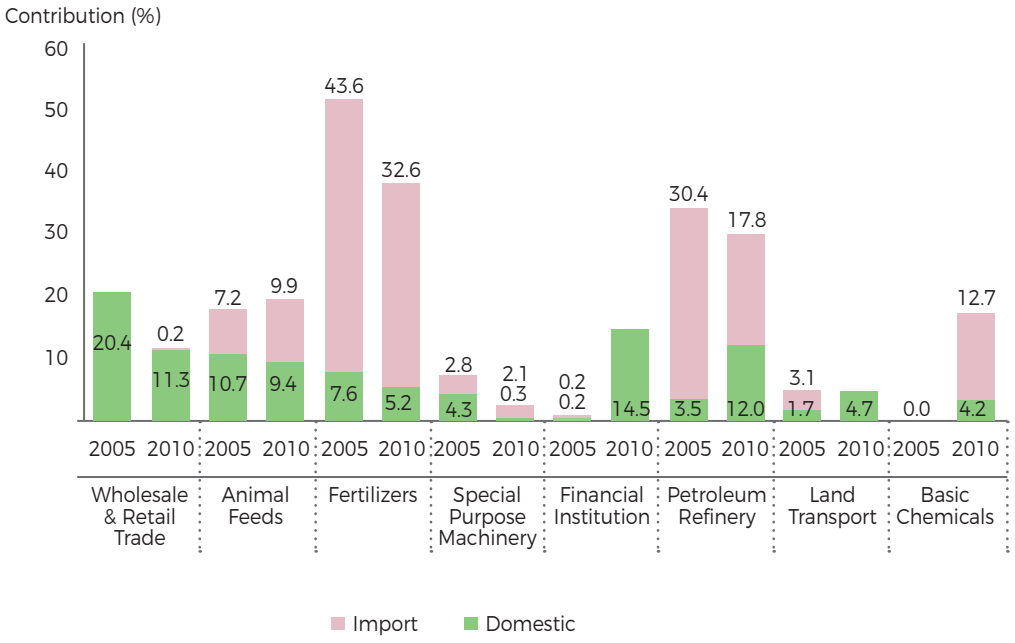



Source: A Study on Knowledge Content in the Key Economic Sectors in Malaysia Phase III, EPU, September 2016

## Composition of Intermediate Inputs in the Agriculture Sector

The agriculture sector consumed 37.8% of the intermediate inputs from fertilisers followed by petroleum at 29.8% and animal feed at 19.3%. Most of the consumption for intermediate inputs were imported with a share of 32.6% for fertilisers, followed by 17.8% for petroleum and 12.7% for basic chemicals (Figure 5.10). In terms of production costs, labour costs constituted the biggest amount as compared to seeds and other inputs. As most of the agricultural special purpose machinery are imported, the weakened ringgit has made it costlier to import mechanised technology but has opened up opportunities to develop such technology locally through greater R&D. However, the input price of fertilisers was not affected very much as it was compensated by the fall in oil prices.

**Figure 5.10: Sources of Intermediate Inputs of the Agriculture Sector, 2005 and 2010**




Computed from: Input-Output Table 2005 & 2010, Department of Statistics, Malaysia

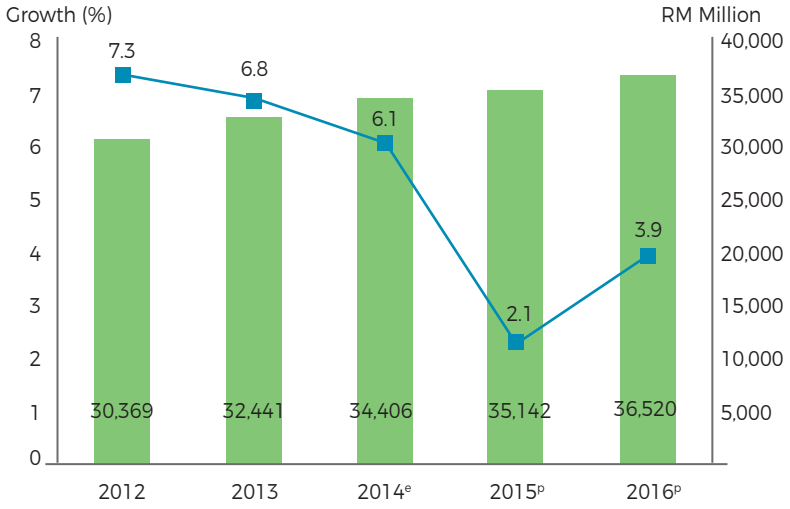
## FOCUS SECTOR: AGRO-FOOD SUB-SECTOR

The agro-food sub-sector is described as a competitive and sustainable industry which can increase the income of agriculture entrepreneurs. This sub-sector covers food crops comprising paddy, fruits, vegetables, fisheries, livestock and others. Food crops have contributed 43.4% to the agro-food value-added followed by livestock and fisheries at 28.5% and 28.1% respectively.

The agro-food sub-sector was estimated to have contributed 40.9% of the total agriculture added value in 2016 compared to 37.3% in 2015. It has been showing improvements from year to year.

This was in line with the two main objectives of the National Agro-food Policy (2011-2020) in boosting the income of the target groups and to increase the contribution of the agro-food sub-sector to the national income. To date, the agro-food sub-sector had achieved 77.7% amounted to more than RM36 billion of the targeted added value outlined in the 11MP (Figure 5.11).

**Figure 5.11: Added Value of Agro-food Sub-sector, 2012-2016**




Note:
11MP Targeted : RM46.98 billion (at 2010 price)
Growth: 5.4% per annum

Source: Ministry of Agriculture and Agro-based Industry, Malaysia

## Paddy

The total planted area of paddy increased 7.5% to 730,016 hectares in 2015 compared with 679,239 hectares in 2014. Even though the total planted area of paddy increased in 2015, paddy production in Malaysia decreased by 6.1% to 2.7 million tonnes. As a comparison, Indonesia had the highest paddy production in ASEAN (74.9 million tonnes), followed by Vietnam (45.2 million tonnes) and Thailand (31.6 million tonnes) (Table 5.3).

**Table 5.3: Production of Paddy of Selected ASEAN Countries (Thousand tonnes), 2012-2015**

| | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|
| **Malaysia** | **2,599.5** | **2,615.9** | **2,848.6** | **2,674.4** |
| Indonesia | 69,056.1 | 71,279.8 | 70,846.5 | 74,991.8 |
| Vietnam | 43,748.3 | 44,038.9 | 44,972.8 | 45,215.7 |
| Thailand | 38,102.7 | 38,000.2 | 36,762.3 | 31,616.9 |
| Myanmar | 29,009.9 | 27,703.7 | 28,322.2 | 28,127.2 |
| Philippines | 18,032.4 | 18,439.4 | 18,967.8 | 18,296.7 |
| Cambodia | 8,779.4 | 9,290.9 | 9,291.0 | 9,324.4 |

Source: Department of Statistics, Malaysia

The EPP 9 initiative was introduced to focus on planting fragrant rice in rain-fed areas to increase the average national paddy yield and reduce the country's dependence on imports of specialty rice. Initiatives under this EPP also sought to produce premium organic rice with anchor companies appointed to undertake the planting and commercialisation of fragrant rice varieties developed by the Malaysian Agricultural Research and Development Institute (MARDI). Malaysia's paddy yield improved by 8.5% to 4.6 tonnes per hectare in 2015. Barat Laut Selangor posted the highest yield per hectare followed by MADA and KADA. The EPP 10 and EPP 11 initiatives were introduced to raise the productivity of paddy farming in the MADA area and to scale up and strengthen paddy farming in other irrigated areas. MADA farmers have managed to increase their average paddy yield from 5,539 to 5,800 tonnes per hectare and the EPP programmes had benefited them to achieve better economies of scale and higher productivity (Table 5.4).

**Table 5.4: Average Yield of Paddy, 2012-2015**

| | Metric Tonnes per Hectare | | | | Growth (%) 2015 |
|---|---|---|---|---|---|
| | 2012 | 2013 | 2014 | 2015[e] | |
| Malaysia's Average Yield | 3,797 | 3,876 | 4,194 | 4,551 | 8.5 |
| MADA, Perlis | 4,843 | 5,026 | 5,539 | 5,800 | 4.7 |
| KADA, Kedah | 4,196 | 4,136 | 4,297 | 4,800 | 11.7 |
| Barat Laut, Selangor | 5,989 | 6,280 | 6,403 | 6,500 | 1.5 |

Source: Ministry of Agriculture and Agro-based Industry, Malaysia

## Fruits and Vegetables

Under EPP 7, Malaysia has targeted to increase its GNI of premium fruits and vegetables to RM1.57 million in 2020. A total of 3,000 farmers were expected to be placed under anchor companies which will manage the integrated supply chain model, gain market access and export the produce. Six high-value non-seasonal tropical fruits (rock melon, starfruit, papaya, banana, pineapples and jackfruit) and three high-value highland vegetables (lettuce, tomato and capsicum) have been identified as the targeted produce under this EPP.

All non-seasonal tropical fruits had shown an increasing trend in yields from 2014 to 2015. Among these, pineapples contributed the highest average yield amounting to 42.7 tonnes per hectare in 2015, reflecting its higher export potential. Despite having decreasing yield trends in 2014-2015, tomatoes recorded the highest average yield among other produce (Table 5.5). Modern and innovative farming methods such as hydroponics and fertigation have proven to be effective in raising the productivity of vegetable produce as they required less planted areas as compared to fruit produce (Table 5.6).

**Table 5.5: Average Yield for Non-seasonal Tropical Fruits and High-value Highland Vegetables, 2012-2015**

| Average yield (tonne per hectare) | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|
| Pineapple | 29.0 | 28.6 | 35.5 | 42.7 |
| Starfruit | 15.3 | 16.7 | 13.9 | 14.1 |
| Papaya | 19.8 | 18.3 | 22.3 | 24.1 |
| Banana | 12.6 | 12.7 | 12.2 | 12.7 |
| Jackfruit | 9.9 | 11.1 | 9.0 | 9.2 |
| Tomato | 65.7 | 67.6 | 84.5 | 83.2 |
| Lettuce | 19.3 | 21.8 | 21.6 | 20.7 |

Source: Ministry of Agriculture and Agro-based Industry, Malaysia

**Table 5.6: Production and Planted Area of Fruits and Vegetables, 2014-2015**

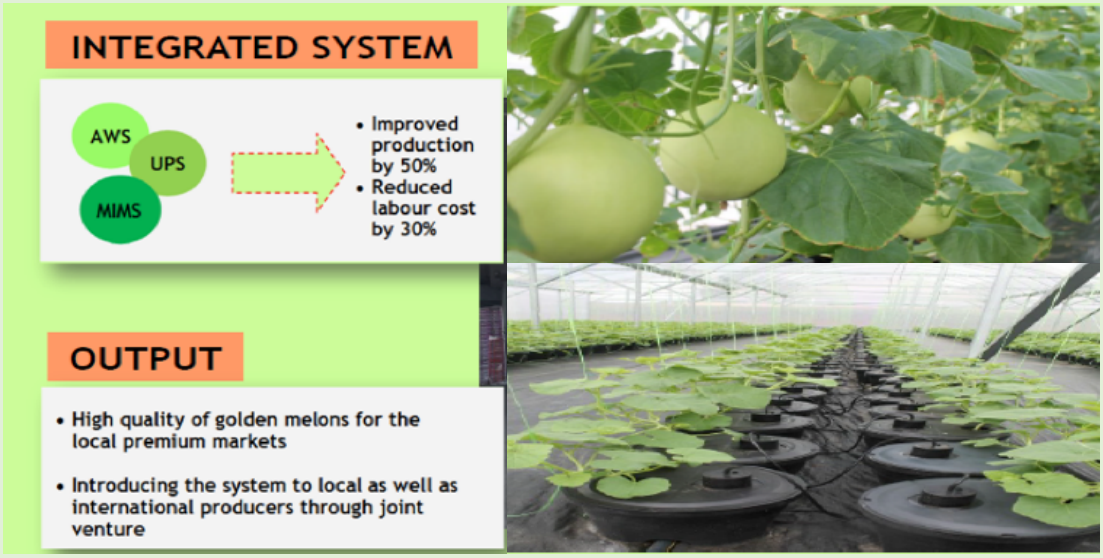
| | Fruits | | Vegetables | |
|---|---|---|---|---|
| | 2014 | 2015 | 2014 | 2015 |
| Production (tonne) | 1,621,975 | 1,589,271 | 1,452,846 | 1,373,086 |
| Planted Area | 199,570 | 199,709 | 71,460 | 68,927 |
| Productivity (tonne per hectare) | 8.13 | 7.95 | 20.3 | 19.9 |

Source: Ministry of Agriculture and Agro-based Industry, Malaysia

### APPLYING KAIZEN PHILOSOPHY IN A GOLDEN MELON FARM

UYM Garden uses the greenhouse hydroponic concept to plant high quality golden melons and supplies its produce to local fresh premium markets. UYM Garden converts good factory practices into farming and this has significantly improved its performance. The innovative factory practices are the Air Watering System (AWS), UYM Plant Supplement (UPS) and Melon Industrial Management Solution (MIMS). With such an integrated approach, UYM Garden managed to improve production by 50% and reduced labour cost by 30%.

The AirHydro Pot Technology is an example of innovation in the hydroponic system where potted plants manage to acquire similar amounts of nutrients as those planted in the soil. The company is also able to eliminate the root trimming process in routine maintenance. UYM Garden has proven its success by abandoning conventional planting methods and adopting good agricultural practices to attain increased productivity.

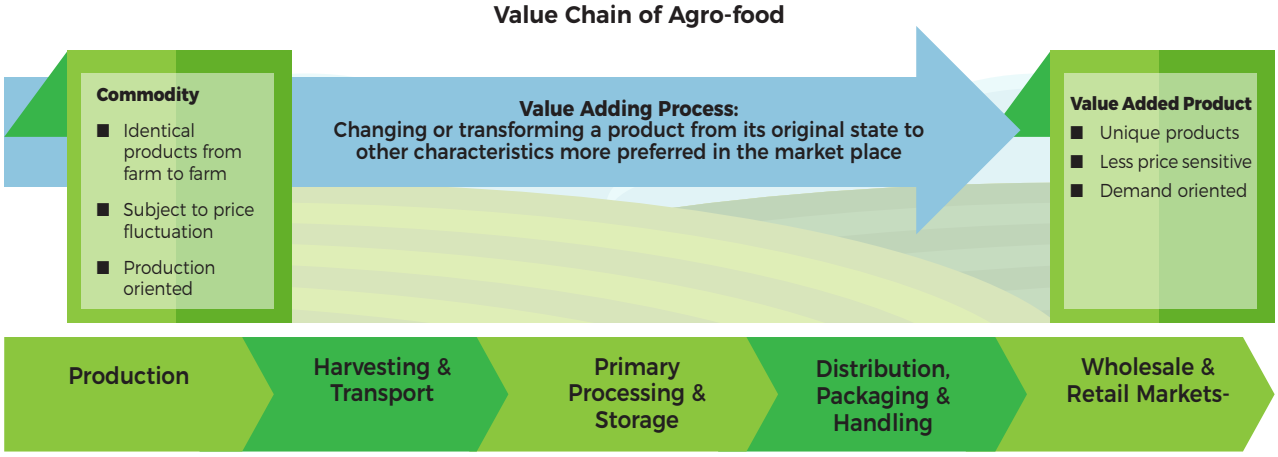



## MANAGING AGRO-FOOD CHALLENGES WITH HIGHER PRODUCTIVITY

The success of agro-food sub-sector very much depends on strong linkages along its value chain. A value chain is about linkages that generates value for the consumer. It involves processes in moving and transforming commodities from producers into products to consumers. Hence, determining the role of every entity in the supply chain starts from production to the wholesale and retail markets is very important to identify strengths and weaknesses related to ensuring

and improving supply sufficiency. The agro-food sub-sector faces several issues and challenges along its value chain that need to be addressed to meet the rising demand for affordable, healthy and safe food.

**Value Chain of Agro-food**




Source: Malaysia Productivity Blueprint (MPB)

## Upscaling Upstream and Downstream Agro-food Value Chain Through Better Linkages

In commercial agriculture, the supply chain's focus is on producers while competitive advantage is derived from processes that improve efficiency and reduce costs. Farmers are generally isolated from consumers and products are "pushed" into the market place and move in single transactions through the supply chain.

The agro-food industry value chain starts with inputs to the farm sub-sector and links the farm sub-sector to consumers. It covers the integrated and very interdependent functions of harvesting and transport, primary processing and storage, distribution, packaging and handling and lastly selling the product to wholesale and retail markets. What has been generally prevalent at the producer-end is the production-oriented stance and production of almost identical products from farm-to-farm. This often leads to a greater propensity for price fluctuations. Subsequent interventions through the integration of the value chain via the anchor company model had improved the cost of doing business, thus resulting in cheaper prices for the end user and higher incomes for smallholders.

## Pumping Up Agro-food Sector with Higher Added Value

The agro-food sector is dominated by SMEs (76%) with mostly low levels of productivity as they account for only 3% of the value-added in the agriculture sector. Their problems stem from fragmented land holdings and non-contiguous plots that restrict the scope for mechanisation, lack of access to high quality inputs and credit to invest in modern farming techniques. SMEs are also hampered by their inability to use yield-boosting techniques and the lack of good farm equipment. They are also saddled with issues like lack of well-trained operators or skilled labour, obsolete processing facilities leading to post-harvest losses, dependency on market intermediaries or middlemen, low availability of market information and the high cost of transportation and logistics.

## Employing More Technology and Modern Farming Techniques

As for the adoption of technology and modern farming techniques, several interesting revelations come to the fore and merits greater focus. Malaysia has been found to be lagging behind its ASEAN counterparts like Indonesia, Thailand and the Philippines in terms of technology-related spending at the national and enterprise levels. An estimated 52% of companies involved in the sub-sector were unsure or did not agree that they had sufficiently invested in farm technology and equipment. Compared to the other sectors, it was also found that the local agro-food sector used more manual productivity tracking methods.

### Raising Quality and Standards

The local agro-food sector, which is highly premised on the quality of human capital, R&D, and products, has to address issues of low quality and compliance to standards if it is to move up the value chain. In terms of human capital, it has to tackle gaps in the poor replenishment of talent as 60% of the workforce are already above retirement age. Besides the low inflow of youths into the sector, it also has to work with relevant stakeholders to ensure that graduates entering the sector are "field-ready" as a result of the mismatch in curriculum and industry needs. Tackling the issue of local talent will also help reduce the present heavy reliance on foreign labour besides harnessing the promising potential for higher levels of commercialisation when collaboration between industry and academia is intensified.

Malaysia is ranked amongst the highest in South East Asia in terms of agri-related R&D spending but research grants had mostly led to publications of research papers and a few commercial outcomes. This presents tremendous opportunities for greater commercialisation from good R&D. The current insufficient high-grade inputs had also resulted in poor product quality due to low compliance to good agricultural practices and the inability to penetrate new markets because of low adherence to standards.

## GROWING AGRICULTURE WITH HIGHER PRODUCTIVITY

The development of the agriculture sector is a continuing process towards contributing to the national economy. The NAP has set a direction that the production of agro-food commodities will grow around 4% a year in order to achieve a self-sufficiency level. The idea is to produce sufficient food for local consumption and generate incomes from exports. Production of many agro-food commodities has increased tremendously and helped reduce the importation of several types of agricultural produce. Increased production of agro-food products will also improve the trade deficit in agricultural products.

In recent years, changes in the global economy and trade liberalisation had strongly impacted on the sustainability of Malaysia's agricultural sector. The sector requires resolute strategies to redress the problematic challenges and imbalance, which had already been identified by MPB via six priority initiatives to boost productivity of the agro-food sub-sector. This will be through facilitating better matching along the value chain by linking downstream demand to upstream supply and application of the robust contract farming model across the sector.

MPB will also push for the enforcement and adoption of relevant standards and practices to strengthen end-to-end value chain and boost the awareness and adoption of technological upgrades and modern farming techniques. Industry will have to lead the collaboration with education institutions to strengthen the talent pipeline and knowledge creation for the sector and agro-food enterprises will be encouraged to move into high value products and markets. This calls for a strong will to transform the quality and productivity in the agriculture sector by the Government, including dedicated agencies, academia, and the industry, including enterprises.

Currently, the agriculture sector has achieved 81% of the targeted productivity level of RM68,800 to be achieved by end of 11MP. In order to realise this goal, the sector needs to grow by at least 5.5% annually.

06

# Productivity Performance of the Construction Sector

# Construction Sector Productivity
# At a Glance

## 2016

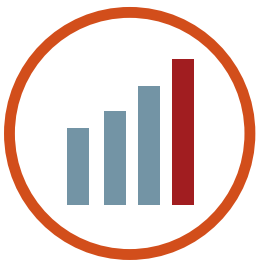
Labour Productivity Level

**RM40,018**

Labour Productivity Growth

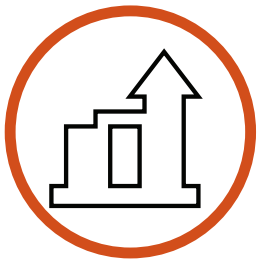
**12.4%**

## 11MP Target



Labour Productivity Level

**RM61,900**



Labour Productivity Growth

**9.6%**

### Sources of Labour Productivity Growth, 2016

TFP Growth

**9.9%**

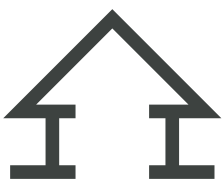
Capital Intensity Growth

**2.5%**

### Labour Productivity Growth of Sub-sectors, 2016

Residential

**12.9%**



Non - residential

**4.9%**

Civil Engineering

**13.9%**

Specialised Activities

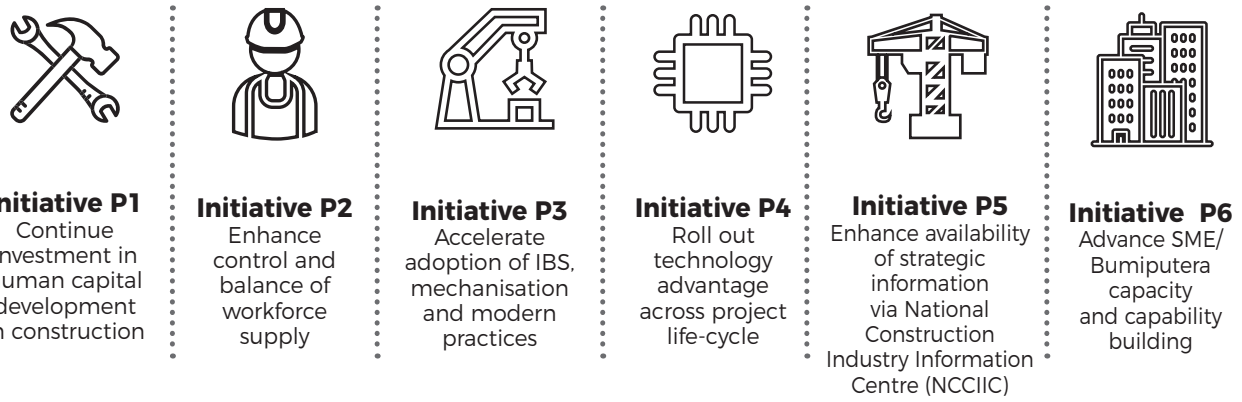
**15.4%**

The construction sector can be classified into four key sub-sectors, namely, residential, non-residential, civil engineering and specialised activities. Diversification activities in the construction sector include design, construction, installation and finishing services.

Both the 11MP and the Economic Transformation Programme (ETP) require significant physical infrastructure development to build on the country's future and realise its aspiration of becoming a high-income nation by 2020. In recognition of the importance of the construction sector in providing spillover effects to other economic sectors like manufacturing and services, the Construction Industry Transformation Programme (CITP) has been rolled out by the Construction Industry Development Board (CIDB) to transform the sector into a modern, highly productive and sustainable. The CITP is a comprehensive implementation plan which encompasses four strategic thrusts, namely quality, safety and professionalism (QSP); environment sustainability; productivity; and internationalisation. The plan has targeted to increase productivity in the sector by 2.5 times to value of USD16,500 by 2020.

Six specific productivity-related initiatives have been identified in order to double the construction sector's productivity growth.

**Productivity-related Initiatives**




Source: Construction Industry Transformation Programme (CITP)

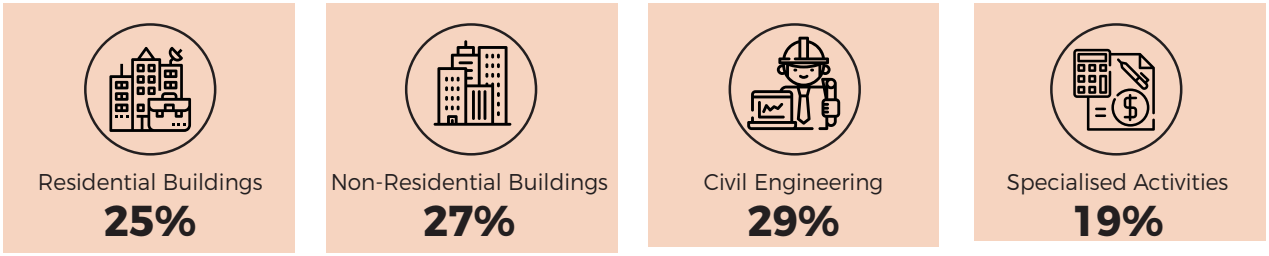
## PERFORMANCE AND CONTRIBUTION TO THE NATIONAL ECONOMY

The construction sector has proven to be one of the resilient industries in Malaysia due to the strong demand for residential and commercial buildings. In 2016, the construction sector's share of GDP was 4.5% valued at RM50.1 billion. The sector registered 7.4% output growth in 2016 (2015: 8.2%) but this growth was lower than the projected growth of 10.3% per annum targeted in the 11MP. This sector hired 1.25 million employees, which showed a drop of 4.4% from 1.31 million in the previous year. By 2020, the sector is expected to contribute 5.5% to GDP at RM327 billion and employing 1.2 million employees. Despite its smaller contribution, the construction sector continues to play a key role in the economy through its multiplier effect on many industries by accelerating domestic economic activities and providing all-round better quality infrastructure.

In 2016, civil engineering topped the contribution to the sector's output at 29% followed by non-residential building activities (27%), residential buildings (25%), and specialised activities (19%) (Figure 6.1). The performance of various sub-sectors was driven by major construction projects such as the Klang Valley's Mass Rapid Transit (MRT), Tun Razak Exchange (TRX) in Kuala Lumpur and Petronas Refinery and Petrochemical Integrated

Development (RAPID) project in Pengerang, Johor. From a quarterly comparison, construction projects recorded the highest number being registered in the fourth quarter of 2015 valued RM30.13 billion but the value of work done was much higher in fourth quarter of 2016 at RM32.55 billion (Table 6.1). Within Peninsula Malaysia, Selangor was the main driver of construction growth.

**Figure 6.1: Contribution of the Construction Sub-sector to GDP, 2016**




Source: Department of Statistics, Malaysia

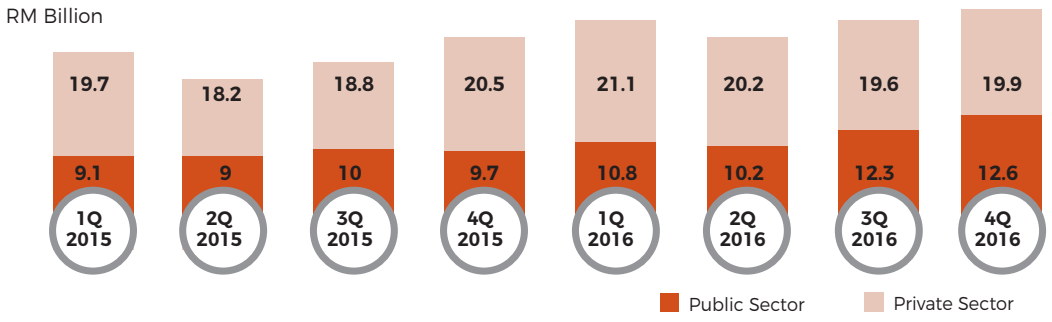
**Table 6.1: Number of Projects and Value of Work Done, 2015-2016**

| Period | Number of Projects | Value of Work Done (RM'000) | Percentage of Change on Value of Work Done (Quarter over Quarter) |
|---|---|---|---|
| Q1 / 2015 | 9,982 | 28,740,794 | 6.1 |
| Q2 / 2015 | 10,074 | 27,239,139 | -5.2 |
| Q3 / 2015 | 9,883 | 28,834,152 | 5.9 |
| Q4 / 2015 | 10,230 | 30,128,938 | 4.5 |
| Q1 / 2016 | 10,043 | 31,941,170 | 6.0 |
| Q2 / 2016 | 9,983 | 30,427,274 | -4.7 |
| Q3 / 2016 | 9,725 | 31,909,993 | 4.9 |
| Q4 / 2016 | 9,791 | 32,559,568 | 2.0 |

Source: Department of Statistics, Malaysia

Between January and March 2016, it was estimated that a quarter of the total value of Malaysian construction work was carried out in Selangor valued at about RM6.98 billion. The Federal Territory of Kuala Lumpur also attracted a significant volume of construction spending totaling RM5.87 billion during the same quarter. The value of construction work done in fourth quarter 2016 indicates that high percentage of construction projects belong to the private sector at RM19.9 billion as compared to RM12.6 billion is undertaken by the public sector. The highest value of construction work done by the private sector was registered in first quarter 2016 amounted to RM21.1billion (Figure 6.2).

**Figure 6.2: Value of Construction Work Done by Project Owners, 2016**



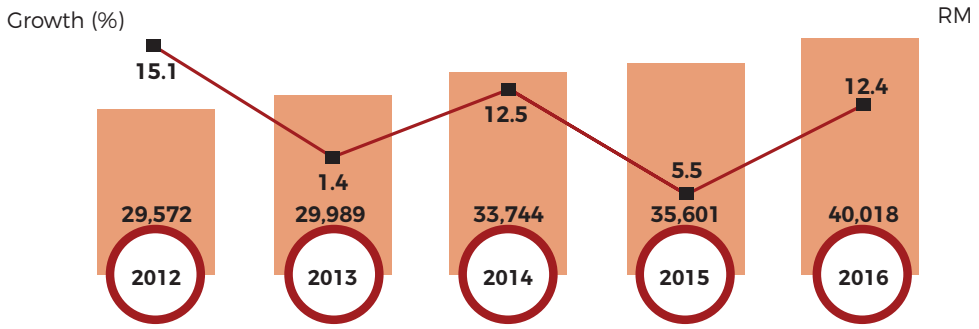

Source: Department of Statistics, Malaysia

## PRODUCTIVITY PERFORMANCE

The construction sector recorded an impressive productivity growth of 12.4% valued at RM40,018 in 2016 as compared to 5.5% in 2015.

The sector had set a target of 9.6% productivity growth to be achieved in 2020 as outlined in the 11MP (Figure 6.3).

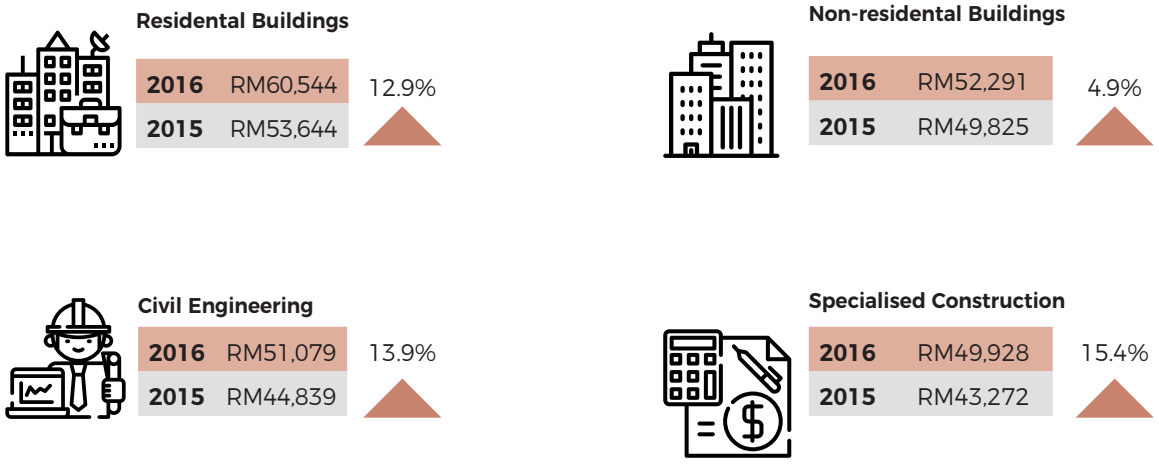
**Figure 6.3: Productivity Performance of the Construction Sector, 2012-2016**




Source: Malaysia Industrial Productivity Database, MPC

Within the construction sub-sectors, specialised construction activities registered the highest productivity growth of 15.4% in 2016 followed by civil engineering (13.9%), residential buildings (12.9%) and non-residential buildings (4.9%). More added value was generated in the residential sub-sector in 2016, with the highest productivity level at RM60,544 as compared to other sub-sectors. This was followed by non-residential (RM52,291), civil engineering (RM51,079) and specialised activities (RM49,928) (Figure 6.4). The productivity level registered by all the sub-sectors surpassed the productivity level of RM40,018 by the overall construction sector.

**Figure 6.4: Productivity Performance of the Construction Sub-sectors, 2015-2016**




Source: Malaysia Industrial Productivity Database, MPC

## Labour Cost Competitiveness

The construction sector remained labour cost competitive with productivity growth at 12.4% while labour cost per employee grew by 1.3% and unit labour cost declined by 9.1% (Table 6.2). The competitive trend also reflected in other construction sub-sectors, though civil engineering sub-sector shows a decline in labour cost per employee in 2016 as the dependency on low-skilled workers is more prominent in this labour intensive sub-sector.

**Table 6.2: Labour Cost Competitiveness for the Construction Sector, 2016**

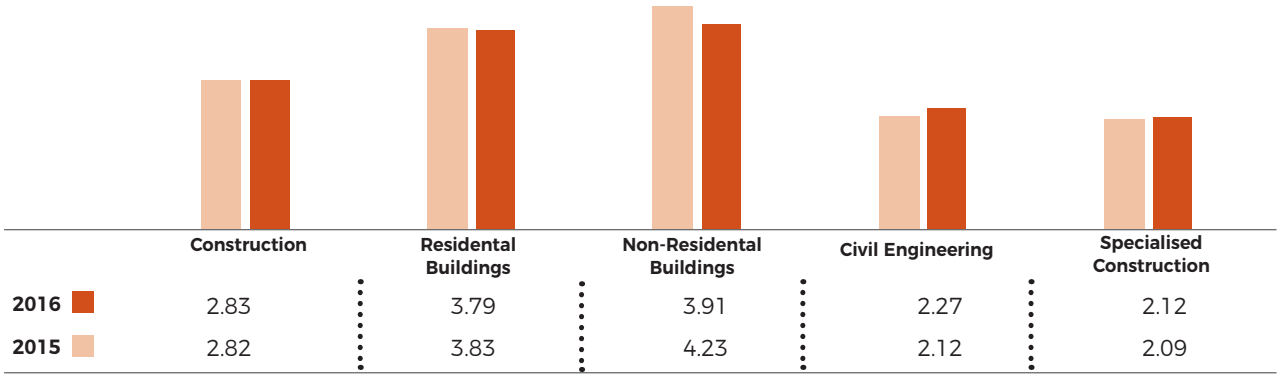
| | Productivity Growth (%) | Labour Cost per Employee Growth (%) | Unit Labour Cost Growth (%) |
|---|---|---|---|
| **Construction** | **12.41** | **1.28** | **-9.11** |
| Residential buildings | 12.86 | 3.72 | -7.00 |
| Non-residential buildings | 4.95 | 4.03 | -5.62 |
| Civil engineering | 13.92 | -3.43 | -11.80 |
| Specialised activities | 15.38 | 0.16 | -13.50 |

Source: Malaysia Industrial Productivity Database, MPC

## Capital Productivity

The construction sector registered a marginal capital productivity growth of 0.3% to the value of 2.83 in 2016 as compared to 2.82 in 2015. Within the construction sub-sectors, civil engineering registered the highest capital productivity growth of 7.0%, indicating that assets had been efficiently used in generating value added (Figure 6.5).

**Figure 6.5: Capital Productivity, 2015-2016**

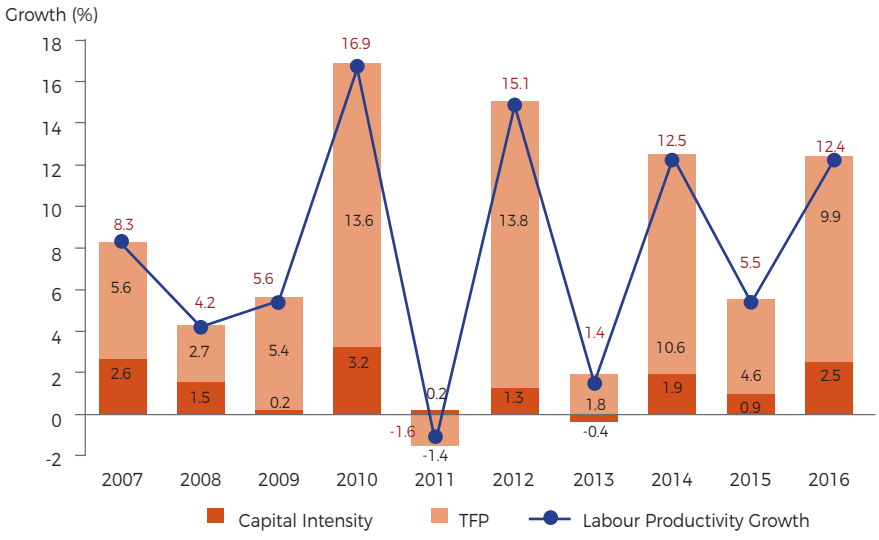



Source: Malaysia Industrial Productivity Database, MPC

## Sources of Labour Productivity

By separating labour productivity into capital intensity and TFP growth, analysis showed that the annual labour productivity growth of the construction sector between 2007 and 2016 was due to the higher contribution in TFP relative to capital intensity except in 2011 (Figure 6.6).

**Figure 6.6: Source of Labour Productivity Growth of the Construction Sector, 2007-2016**




Source: Malaysia Industrial Productivity Database (MIPD), MPC

The increased demand for high quality construction mega projects had provided opportunities for the sector to adopt advanced construction technology and techniques to better improve the productivity and efficiency.

Demand intensity was the main contributor to the high TFP registered from 2012 to 2016. This was due to mega infrastructure projects in the improvement of road and rail networks, namely the Damansara-Shah Alam Highway (DASH), Sungai Besi-Ulu Kelang Elevated Expressway (SUKE), West Coast Expressway (WCE), double-tracking rail project between Johor Bahru and Padang Besar, and the MRT project in the Klang Valley.

The increasing adoption of Building Information Modelling (BIM) and Industrialised Building System (IBS) in government projects also contributed to the efficiency of the construction sector besides the stronger demand. Under CITP, the use of IBS will be intensified while more professionals with the ability to specify IBS had been trained to facilitate a wider adoption of the system. A total of 356 professionals comprising 46 architects, 201 engineers and 109 quantity surveyors have been exposed to IBS and modular construction designs and CITP has set a target of 5,000 professionals to be trained by 2020.

BIM is also being promoted as one of the best multi-disciplinary collaborative frameworks as it enables designers, contractors and suppliers to reduce their cost besides increasing quality and achieving designs that would normally prove impossible without digital design and fabrication. Efforts are being geared towards to training as many practitioners as possible in BIM. The establishment of the MyBIM Centre and BIM Satellites had successfully trained 633 building professionals on BIM. Furthermore, the BIM Object Library has been set up as a reference centre to support the development and adoption of BIM and modern construction methods. These productivity initiatives had resulted in a significant contribution of TFP to the productivity growth of the construction sector.

CITP has also given special emphasis towards accelerating the productivity growth of the construction sector through close monitoring of six initiatives and 44 KPIs related to productivity. The CITP-led initiatives had demonstrated that the productivity thrust performed extremely well in the construction sector in 2016 with improved achievements of 93% as compared with the other thrusts in quality, safety and professionalism (84%), environmental sustainability (83%) and internationalisation (91%).

### DILEMMA OF PROFESSIONAL SERVICES IN ADOPTING BIM

Professionals in the architectural and engineering fields, namely architects, quantity surveyors and engineers are directly linked to the construction industry. These professional service providers in the construction industry are the link between the building industrial production processes and the manufacturing and services sectors.

The new paradigm of technology through BIM has gradually replaced Computer-Aided Design and Drafting (CAD). BIM provides an integrated working platform where the functions of planning, designing, engineering, quantity surveying and land surveying are in a single working file. Therefore, experts in various construction disciplines need to have knowledge on the BIM software.

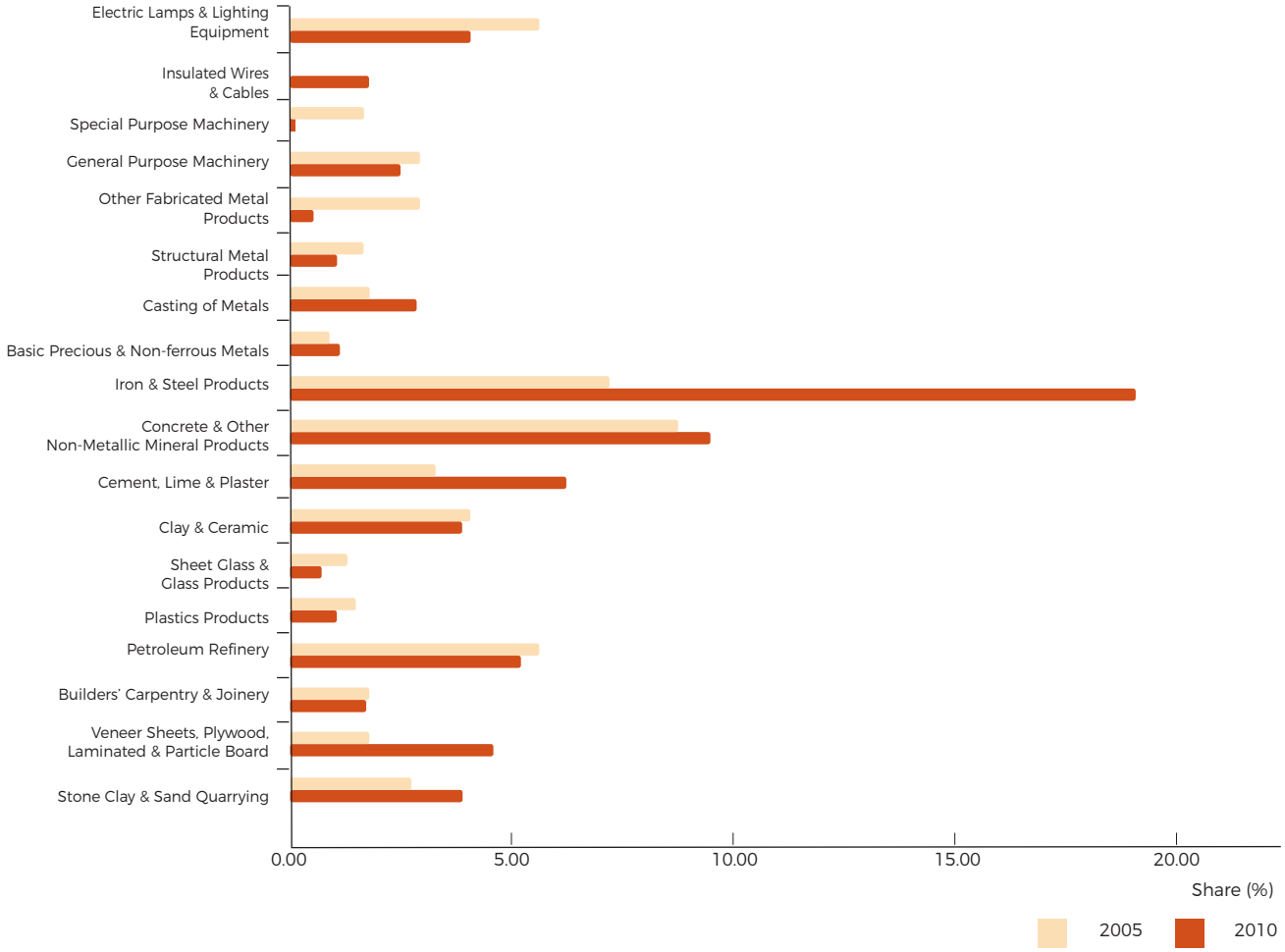
Larger corporations and government agencies have begun insisting on using BIM in their development projects. Although some architects and engineers have started using the software for their work, they are still facing a dilemma as the use of BIM has yet to be regulated besides the lack of a national standard on BIM usage. The professionals use their own ways of implementing BIM or adopt foreign BIM protocols. It is recommended that a BIM standard for Malaysia to be developed to avoid confusion and inconsistency, particularly when local authorities had imposed the compulsory use of BIM for building plan submissions.

Source: Regulatory Review Final Report: Professional Services to the Construction Industry, MPC

## Composition of Intermediate Inputs in the Construction Sector

In 2010, the majority of the intermediate inputs used in the construction sector were from local suppliers at 74.8% (2005: 65.9%) while imported intermediate inputs comprised 25.2% (2005: 34.1%). The most important inputs used by the construction sector were iron and steel products with a share of 19.1% (2005: 7.2%) followed by concrete and other non-metallic mineral products with a share of 9.5% (2005: 8.7%) and cement, lime and plaster with a share of 6.3% (2005: 3.3%) (Figure 6.7).

**Figure 6.7: Share of Intermediate Inputs to Total Input of the Construction Sector, 2005 and 2010**




Computed from: Input-Output Table 2005 and 2010; Department of Statistics, Malaysia

The sources of the intermediate inputs remained unchanged from 2005 to 2010, except for iron and steel products, sheet glass and glass products, metal castings, general purpose machinery, special purpose machinery, electric lamps and lighting equipment. Intermediate inputs such as iron and steel products, sheet glass and glass products and metal castings demonstrated a shift towards more domestic sources at 59.4% (2005:22.4%), 64.3% (2005:38.3%) and 87.9% (2005: 0.9%) respectively. This indicated that the local suppliers were becoming more competitive and capable in meeting local demand for construction-related products. Intermediate inputs such as general purpose machinery, special purpose machinery, electric lamps and lighting equipment shifted towards more dependence on imported sources at 70.6% (2005:57.4%), 64.5% (2005:13.5%) and 92.9% (2005: 54.5%) respectively (Table 6.3). This presents an opportunity for would-be investors to evaluate the potential of producing such items locally.

**Table 6.3: Sources of Intermediate Inputs of the Construction Sector, 2005 and 2010**

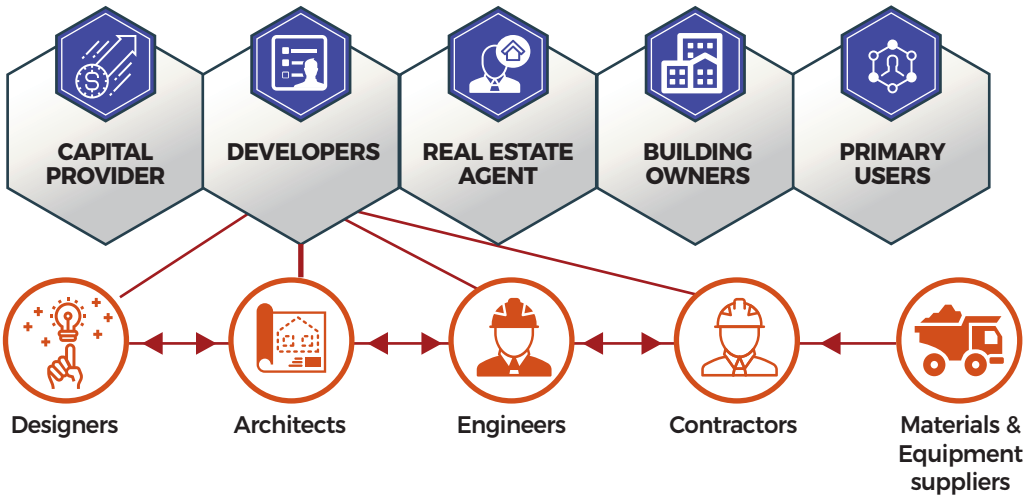
| Contiribution (%) | Domestic | Imported | Domestic | Imported |
|---|---|---|---|---|
| | 2010 | | 2005 | |
| Stone Clay and Sand Quarrying | 90.57 | 9.43 | 97.31 | 2.69 |
| Veneer Sheets, Plywood | 86.73 | 13.27 | 80.65 | 19.35 |
| Builders' Carpentry and Joinery | 99.98 | 0.02 | 98.62 | 1.38 |
| Petroleum Refinery | 69.30 | 30.70 | 76.22 | 23.78 |
| Plastics Products | 69.17 | 30.83 | 77.03 | 22.97 |
| Sheet Glass and Glass Products | 64.30 | 35.70 | 38.25 | 61.75 |
| Clay and Ceramic | 69.58 | 30.42 | 85.10 | 14.90 |
| Cement, Lime and Plaster | 92.24 | 7.76 | 92.70 | 7.30 |
| Concrete & Other Non-Metallic Mineral Products | 93.29 | 6.71 | 94.92 | 5.08 |
| Iron and Steel Products | 59.41 | 40.59 | 22.36 | 77.64 |
| Basic Precious and Non-Ferrous Metals | 7.55 | 92.45 | 9.44 | 90.56 |
| Casting of Metals | 87.95 | 12.05 | 0.85 | 99.15 |
| Structural Metal Products | 83.64 | 16.36 | 85.49 | 14.51 |
| Other Fabricated Metal Products | 54.55 | 45.45 | 83.11 | 16.89 |
| General Purpose Machinery | 29.40 | 70.60 | 42.64 | 57.36 |
| Special Purpose Machinery | 35.53 | 64.47 | 86.54 | 13.46 |
| Insulated Wires and Cables | 12.11 | 87.89 | n.a. | n.a. |
| Electric Lamps and Lighting Equipment | 7.05 | 92.95 | 45.46 | 54.54 |

Computed from: Input-Output Table 2005 and 2010, Department od Statistics, Malaysia

## FACTORS AFFECTING CONSTRUCTION VALUE CHAIN

In general, the value chain in the construction sector consists of components such as house-builders and commercial property developers, professionals or designers, materials and components suppliers, and contractors. The main players in this sector are the developers who own the construction projects and work closely with contractors as well as professional services providers such as designers, architects and engineers. In terms of handling materials, equipment supplies and workforce, they are under the purview of contractors.

**Value Chain in the Construction Sector**




## Contractors

Contractors in Malaysia are divided into categories or grades based on their paid-up capital and tendering capacity. The categories ranged from small contractors (Grade G1-G3) to medium-sized contractors (G4-G5) and big-scale contractors (G6-G7) (Table 6.4). The sector is highly fragmented with 90% of the contractors being SMEs (G1-G5). The grading system is only applicable for government projects. A more holistic grading system for contractors is required to ensure a certain level of standard among small contractors. To ensure greater consistency, it is imperative to extend the grading system to private projects as well (Table 6.4).

**Table 6.4: CIDB Contractor Grades**

| Grade | Paid-up Capital (RM) | Tendering Capacity (RM) |
|---|---|---|
| G1 | 5,000 | < 200,000 |
| G2 | 25,000 | <500,000 |
| G3 | 50,000 | <1,000,000 |
| G4 | 150,000 | <3,000,000 |
| G5 | 250,000 | <5,000,000 |
| G6 | 500,000 | <10,000,000 |
| G7 | 750,000 | No limit |

Source: Construction Industrial Transformation Programme (CITP) 2016-2020

## Machinery and Equipment

The construction sector sets strong linkages, particularly within the manufacturing and services sectors, as contractors get their supplies of materials and equipment from these sectors. The manufacturing sub-sectors such as other non-metallic mineral products, iron and steel, machinery and equipment and fabricated metal also play an important role to support the construction industry.

Nonetheless, Malaysia's machinery and equipment industry has yet to produce and support the need for heavy machinery and equipment such as cranes, forklifts, bulldozers, excavators, dumpers, loaders and others as required by the construction sector. Local companies mainly act as distributors for international brands in terms of heavy equipment. As the majority of the contractors are SMEs, they normally own simple machinery and equipment such as concrete mixers, scaffolding and lifting equipment. Such limitations also affect the capability of the SMEs to scale up and operate in large-scale projects.

## Materials

Building materials typically comprises about 30% to 50% of the construction cost before factoring in the cost of logistics and transportation, with an additional cost of steel and concrete accounting for another 15%. As the government-led mega projects take priority over private sector projects, large projects such as the Klang Valley MRT may often result in shortages for crucial materials like cement and steel, and may cause construction costs to rise. Prices of both cement and steel tend to fluctuate according to global market demand.

**INDUSTRY 4.0: BUILDING THE DIGITAL ENTERPRISE**

Amidst the digital transformation taking place in earnest, manufacturing construction companies have to factor in this technological change. Technologies such as 3D printing, BIM and the integration of design and off-site component-based assembly are evolving fast and coming of age.

A study conducted by Price Waterhouse Coopers (PwC) revealed that one of the challenges for the construction sector is its fragmented supply chain. As a result, advanced digitalisation and integration of the horizontal value chain with suppliers, customers and other value partners are slower when compared with the vertical value chain.

The spread of the Internet and sensoring equipment have been cited as having the potential to transform the construction industry in terms of equipment monitoring and repair, management and ordering, energy conservation, tagging, and tracking safety. The biggest challenges faced by engineering and construction companies revolve around the absence of a digital culture and proper training. The expected benefit from digitalisation will result in increased revenue and cost reduction in engineering and construction are 2.7% and 3.4% per annum respectively for the next five years.

**Additional revenue** **2.7%** per annum

**Cost reduction** **3.4%** per annum

Expected benefit from digitalisation over the next five years

Source: www.pwc.com/industry4.0

## ISSUES AND CHALLENGES

The long-term goals of the construction sector are being addressed through the implementation of CITP and with its recommendations expected to be realised by 2020. Short-term recommendations may be quickly adopted and implemented within businesses or on-going projects as they do not involve any regulatory approval and only require the management to make a firm commitment to change. As the construction sector is still labour-intensive, CITP aspires to transform this sector towards higher knowledge-content, sustainable practices, internationalisation and productivity-driven. To achieve these goals, various issues have to be addressed holistically.

### Quality of Labour

Being a labour-intensive industry that relies heavily on human capital, efforts must be made to upskilling workers through enhanced training in specialised areas that will result in low dependency of unskilled labour inputs and generate higher quality outputs. In addition, obtaining higher grade technology requires significant capital investment that needs to be supported with high-skilled workers who can optimise the utilisation of capital.

The relatively challenging working conditions and seemingly limited upward career movements associated with low wages and a daily wage system have, however, dampened the interest of locals to work in the industry. This has created gaps that had been filled by unskilled foreign workers. There needs to be greater clarity in policy decisions over the medium and long term on the issue of foreign workers and steps to attract a higher number of locals into the industry

through greater automation and incentives. Such decisions can help towards the sustainability of productivity when there is greater clarity on regulatory enforcement and incentives for local companies to invest in automation.

### Delays in Modernisation

Japan, Finland and other developed countries have witnessed building methods such as prefabrication, industrialised building systems (IBS) and automation marking the transition of the construction industry being technology-intensive from labour-intensive. The reason for this transition was simple: advanced building methods reduce costs, offer workers better pay and help to save lives. It takes about 400 people to build a typical 30-storey building using conventional building methods. However, armed with IBS and automation systems, the same building can be built by a crew of 70 workers within a shorter time in an endeavour that also offers much better pay and work conditions.

Without regulations to enforce standardised building designs such as those that exist in countries that have adopted them, IBS component manufacturers in Malaysia also risk spending a lot of money to create mould designs that may have limited demand. Businesses would feel more confident about establishing factories to supply IBS components provided there is a standardisation of building designs. Some skillsets such as plastering and bricklaying would not be required anymore and most of the buildings would require little or no additional concrete supplies. With guaranteed demand, mass production becomes not only possible, but necessary. This would quickly translate into lower costs for players in the value chain and help make IBS more affordable.

Currently, Malaysia's construction industry is experimenting with partial IBS projects that use walls between multi-residential buildings. Partial IBS projects are more challenging than conventional projects because they require investment in BIM expertise and technology.

Contractors with practical knowledge of BIM are very rare and often expensive. Even very large Malaysian property developers have to import skilled experts, particularly professional engineers to certify IBS designs, without which these building methods cannot take off. Beside professional workers, IBS also requires specialised hoisting equipment and there are very few such hoists in Malaysia.

Another challenge to IBS adoption is the high cost of transporting IBS components from manufacturing plants to the building sites as they are not spread throughout the country. This calls for a serious re-evaluation of the business potential and risks over the medium to long term.

### The Movement of Ringgit

Generally, the majority of local developers have not been badly impacted by the weakened ringgit except for high-end projects that require imported building materials. Based on the IO table 2010, there has been an increase in imported intermediate inputs such as clay and ceramics to 30% (2005:14.9%). The weakened ringgit has also contributed to an additional burden of 2% to 3% in development costs from intermediate inputs such as imported tiles or marble. Some developers have shifted sourcing to local suppliers to mitigate the impact. Developers have estimated that the lower ringgit may cause construction costs for new development projects to rise by 10% to 15%.

The cement industry faced a higher input cost as some items such as coal, which is used as an energy source, and gypsum, that controls the hardening of cement are all imported. The use of imported clinkers also add costs to the overall supply chain.

## CONSTRUCTING PRODUCTIVITY TO NEW LEVELS

As the 11MP marches towards 2020, the country is now striving to reduce its dependence on low-skilled labour. In this respect, the way forward for the construction industry is clear – greater automation. This may need short-term recommendations by CITP to be quickly adopted and implemented within businesses or on-going projects as they do not involve any regulatory approval and only require the management to make a firm commitment to change. The cost benefits are clear. However, a major stumbling block for IBS to be adopted lies in changing the industry's mindset towards modern methods of construction. IBS can be summarised as a process of integrated manufacturing and construction under a well-planned organisation to

improve quality through construction standardisation and reduction of labour intensity.

Other crucial issues hindering the wider implementation of modern construction methods are the limited enforcement of IBS requirements, attraction of cheap labour, cash flow problems among contractors, and minimal economies of scale for small developers. Foreign labour remains a pertinent issue in the construction industry as local workers are less keen to participate due to the uncomfortable working environment, safety at construction sites and the practice of wages being paid by the day.

Therefore, more needs to be done to address discrepancies in various policies related to the construction industry. They need to be ironed out among local players and policymakers where more engagements are needed to smoothen out the hiccups on thorny issues and inconsistent policy. Currently, the construction sector has achieved 64% of the targeted productivity level of RM61,900 to be achieved by end of 11MP. In order to realise this goal, the sector needs to grow by at least 11% annually.


Innovation
Branding
Solution
Marketing
Analysis
Ideas
Success
Management
Business Strategy

07

# Public Sector Productivity

# Public Services

eRezeki™

## RM100M

The eRezeki and eUsahawan initiatives were launched last year to target key communities such as youth, SMEs, digital entrepreneurs and the B40 with an initial allocation of RM100 million.

## e-Visa

**258,794**

E-VISA APPROVED IN 2016

ONLINE RENEWAL FOREIGN WORKER/MAID THROUGH MYEG

myeg

## POPULATION PER DOCTORS

There is at least 1 doctor for 656 citizen in 2015 compared to 1 doctor for 791citizen in 2011

Total Beds in Government Hospital

**45,087**

## RM2.5B

The housing sub-sector is allocated a sum of RM2.5 billion or 5.5% of total Development Expenditure (DE) to build affordable houses for the poor and low-income groups as well as quarters for civil servants.

PR1MA Malaysia

RUMAHKU, KOMUNITIKU

As of January 2017, a total of 260,188 units have been approved by its board and some 132,352 units are being constructed. A total of 1,377,639 people have registered for PR1MA homes nationwide.

Measuring public sector productivity dwells into how well each government department or agency converts input resources (labour, materials, machines) into goods and services. It means producing efficient and effective performances out of limited government resources. In technical terms, it is represented by both efficiency (output per unit resource) and effectiveness (quality output). Generally, it is about ensuring value for taxpayers' money since public resources largely come from taxes.

Over the years, improvements in public sector efficiency and effectiveness have been made through increasing workers motivation and skills, strengthening management systems and performance measurement coupled with incentive schemes, reorganising jobs and work processes, reengineering the bureaucracy, budget reform, service quality improvement and the application of technology and operational innovations.

The current fiscal environment and ongoing demographic challenges make the task of improving public sector productivity even more pressing. Austerity also provides opportunities for the Government to be creative and disruptive in its drive to change the way it operates, more so than in times of relative economic stability. The private sector also relies on the public sector for services and for clear, consistent and appropriate regulations. Consequently, how well these activities are delivered by the public sector directly affects how well the private sector is able to perform.

## THE IMPORTANCE OF PUBLIC SECTOR PRODUCTIVITY

The public sector faces a productivity imperative to strengthen its service delivery to the Rakyat. Growth in various programmes, new national priorities and the Rakyat's demand for a greater level of choices, convenience and customer service. All these require the Government to do more and doing it even better in an era of doing it best within the same levels of spending. Public sector spending is always a starting point for understanding public sector productivity. While the focus on cost is important, particularly during periods of fiscal challenges, productivity is also about understanding how to optimise inputs into service delivery outcomes.

Productivity is ultimately related to money, and money does much to explain how and what the Government has delivered in the best interests of the Rakyat. The appraisal of the governmental performance is necessary to explain the rational use of public resources within the country for the Rakyat's benefit as well.

The public sector is the largest employer in the country at the federal, state, municipal and statutory body levels. It is therefore a major service provider, particularly business services (which also affect the cost of resource inputs such as labour or technology) and social services (which affect labour quality). In order to operate, the public sector has to rely on tax resources. Public expenditure is financed largely by taxation and taxpayers have an interest in how the government uses the proceeds from their tax payments (Table 7.1). Similarly, users also have a right to information about the quantity and quality of the services being offered. The performance of public sector is therefore of great interest to taxpayers, those who use its services and those who provide the services in order for the Government to assess the success of its performance.

**Table 7.1: Public Sector Accounts, 2012-2016**

| RM Billion | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Revenue | 207.9 | 213.4 | 220.6 | 219.1 | 217.9 |
| Expenditure | 252.4 | 253.5 | 259.1 | 257.8 | 257.2 |
| Operating Expenditure | 205.5 | 211.3 | 219.6 | 217.0 | 211.2 |
| Development Expenditure | 46.9 | 42.2 | 39.5 | 40.8 | 46.0 |
| Overall Surplus/ Deficit | -42 | -38.6 | -37.4 | -37.2 | -38.5 |

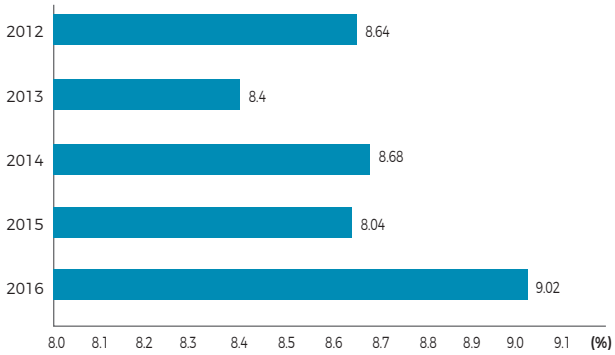
Source: Department of Statistics, Malaysia

The importance of productivity in the public sector should be given due emphasis as the sector contributes significantly to the Malaysian economy and society. This sector, comprising 1.3 million employees, contributed to 9% of Malaysia's total employment in 2016 (Figure 7.1).

This will lead to a huge impact on the productivity performance of the country as the sector accounted for nearly 30% of Malaysia's GDP (Figure 7.2). The consistency of government spending as an element of growth is also in line with rising GDP, as noted under 11MP (Figure 7.3).

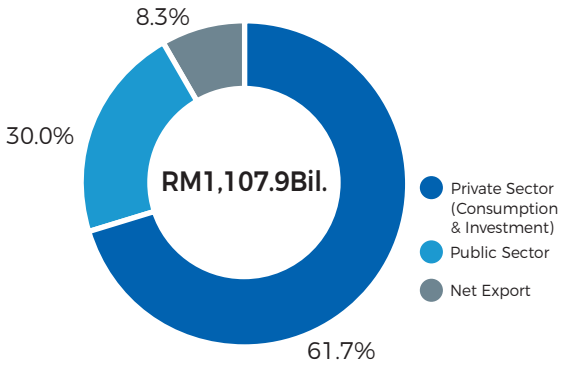
These factors mean that any changes in the public sector often result in having an impact on productivity and pose significant economic implications. The policy or programme action of governments often facilitate productivity gains through the efficient and effective use of resources. Similarly, the opposite outcome arises when there is a waste or mismanagement. Thus, it makes the need for measurement of the public sector extremely important.

**Figure 7.1: Percentage Share of Public Sector to Total Employment, 2012-2016**



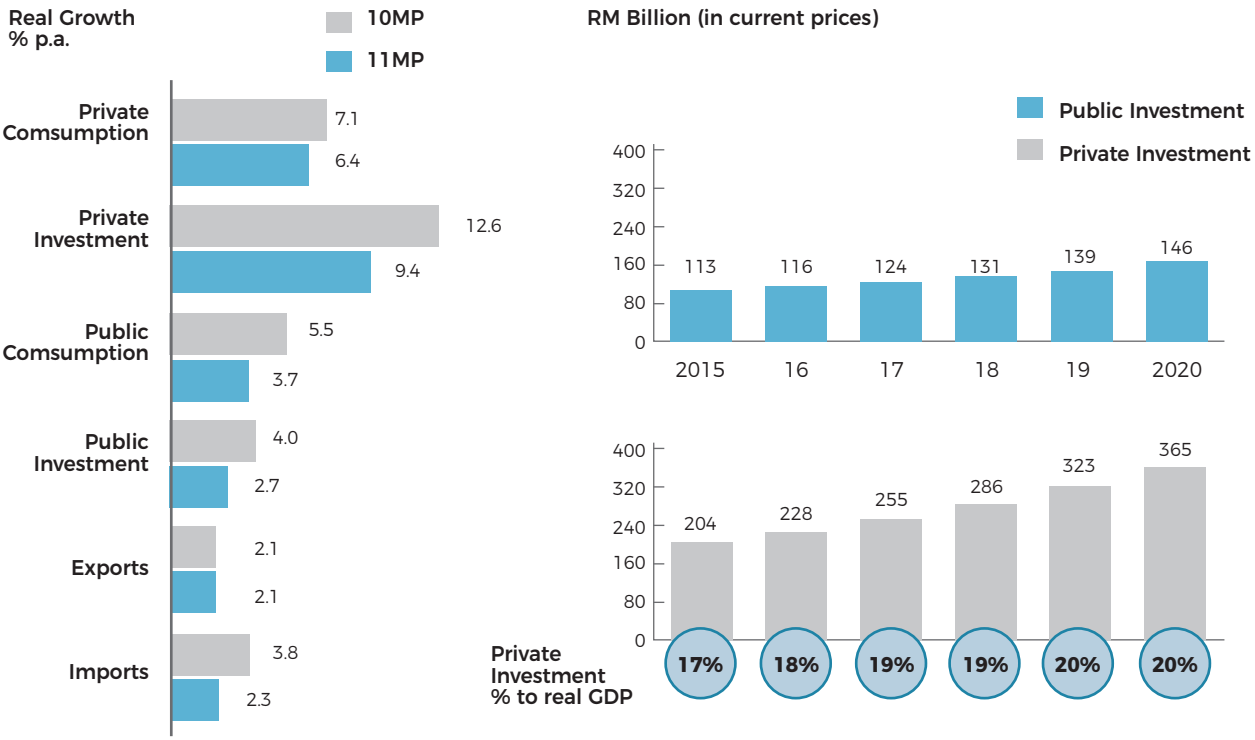

Source: Department of Statistics, Malaysia

**Figure 7.2: Share of GDP by Expenditure Components, 2016**




Source: Bank Negara Malaysia and Department of Statistics, Malaysia

**Figure 7.3: GDP by Expenditure, 2011-2020**




Source: Eleventh Malaysia Plan (11MP)

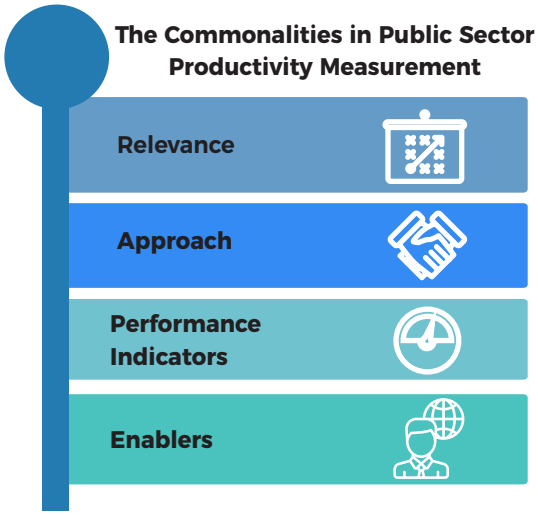
## SIGNIFICANCE OF MEASURING PUBLIC SECTOR PRODUCTIVITY

One strategic benefit of further developing productivity measures for the public sector would be the ability to benchmark externally with other comparable services. This has already occurred in some instances but more importantly, measuring public sector productivity would result in greater opportunities for such benchmarking.

Public sector productivity often gets overlooked in the national productivity debate. Productivity discussions and analyses have traditionally focussed on "market sectors" where goods and services are traded and more easily valued in monetary terms. In contrast, output in public sector is by nature difficult to define or place a value. The difficulty in measuring "outcomes" in public service often makes it complicated for estimating productivity in this sector.

As such, methodologies to measure public sector productivity are imperative so that more effective strategic measures can be identified to provide input for policy evaluation. This is especially so for the assessment of goals related to KPIs and budget allocation. One also has to bear in mind that the measurement of public sector is different from the methodology used for private sector.

Under the 11MP, the Government is committed to transforming the public service by becoming more Rakyat-centric and improving its efficiency and productivity. Service delivery will be further enhanced and executed with greater speed and accuracy through innovative and creative approaches while continuing to uphold a high level of integrity.




Measuring public sector efficiency is about the relationship between the output it produces and the input it uses. As for the public sector, the output refers to the services provided to the Rakyat and the input is the form of funding from the Government coffers. An efficient organisation would be one that produces the maximum possible outputs given its inputs, or one that produces a certain level of outputs with the minimum amount of inputs. The process of measuring an organisation's efficiency can therefore be broken down into three steps. Firstly, its inputs and outputs need to be defined and measured. Secondly, it is necessary to define what is feasible, in other words, what outputs can be achieved for any given set of inputs. Finally, the organisation's actual inputs and outputs are compared with a set of feasible inputs and outputs.

While the portraits for efficiency and effectiveness are useful when considering some of the transactional activities undertaken by governments as well as providing a focus for benchmarking good practices, it must be stressed that the public sector needs to consider to change the way it operates. This is to enable the public sector to be more attuned and oriented towards productivity goals.

International practices have proven that it is possible to improve public sector productivity through better definitions and measurements. This suggests that Malaysia can learn from other advanced countries such as Australia, the United Kingdom (UK) and European Union members. Among the Asian region, the Asian Productivity Organisation (APO) has developed a public sector productivity framework to benefit its member countries.

## Australia

Public sector productivity has been on Australia's agenda since the late 1980s when the country focused on governmental reforms. Following various initiatives, including those which emphasised programme management and budgeting, output and accountability and technical outcomes with performance indicators, Australia's current efforts at the federal level are focused on initiatives which are considered to be more achievable.

This was done by reforming management frameworks through better aligning of public management expectations and processes and undertaking shared outcomes projects in encouraging the public service sector to work across silos to achieve outcomes. Australia also standardised processes to get the benefits of scale such as in ICT procurement and alignment of human resource systems.

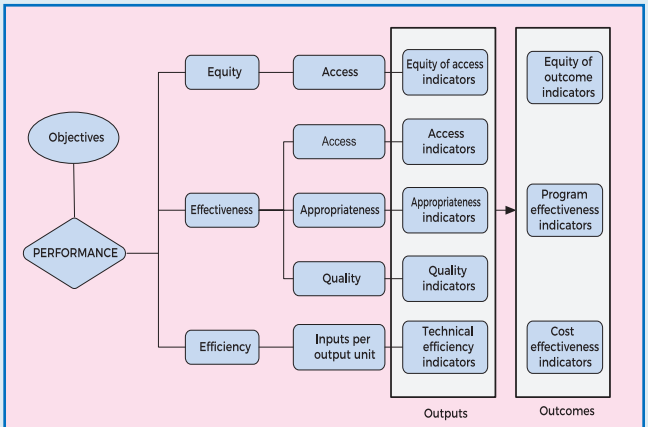
At the state level, productivity efforts have been more successful due to more direct links to service delivery. For example, hospital funding is based on a mix of performance indicators for quality adjustments while school funding attaches focus on prospective improvements by students.

### MEASURING PUBLIC SERVICE PRODUCTIVITY: THE AUSTRALIAN APPROACH

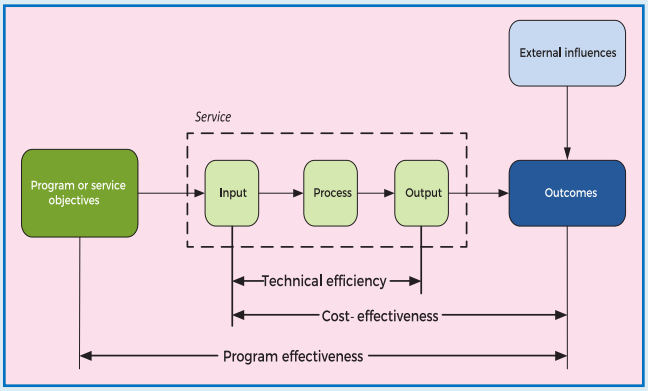
The Australian framework depicts on outcomes, consistent with demand by governments for outcome oriented performance information. This outcome information is supplemented by information on outputs. Output indicators are grouped under equity, effectiveness and efficiency headings.

The framework reflects the service process through which service providers transform inputs into outputs and outcomes in order to achieve desired policy and programme objectives. For each service, governments have a number of objectives that relate to desired outcomes for the community. To achieve these objectives, governments provide services and/or fund service providers. Service providers transform resources (inputs) into services (outputs). The rate at which resources are used to make this transformation is known as 'technical efficiency'.

**Framework of Performance Indicators**




**Service Process**




The impact of these outputs on individuals, groups and the community are the outcomes of the service. The rate at which inputs are used to generate outcomes is referred to as 'cost effectiveness'. Often, outcomes (and to a lesser extent, outputs) are influenced by external factors. The following diagram distinguishes between technical efficiency (the ratio of inputs to outputs) and cost-effectiveness (the ratio of inputs to outcomes), and also recognises that other influences affect overall programme effectiveness (the extent that outcomes achieve the objectives of the service).

Source: Performance Reporting Approach, Council of Australian Government (COAG), Australia

## The United Kingdom

The UK Centre for the Measurement of Government Activity (UKCeMGA) was set up within the Office for National Statistics (ONS) following the 2005 Atkinson Review, a year-long study into the measurement of the UK Government's output and productivity. The review found that in the absence of final consumer prices for different types of non-market output, the Government has to find other ways to reflect quality. Work on public service productivity analysis in the UK is particularly focused on the aspects of service quality that may change over time, and techniques for incorporating measures of quality. The UK uses multi-factor productivity to measure public service sector productivity, where the volume input measure is the aggregate of all inputs including labour, intermediate consumption and capital. For output, the UK applies the principle to capture the 'value-added' of public services to the economy. This approach recognises that outputs need to contribute to outcomes. For example, there would be little point in allocating public money to health treatments that do not have any impact on health. That has been a significant shift from the traditional means of measuring public service sector productivity, where outputs are considered to be equal to inputs. Instead, the UK approach emphasises on quality change.

### MEASURING PUBLIC SERVICE PRODUCTIVITY: THE UK APPROACH

ONS's approach on productivity of public services is estimated by comparing the growth in the total amount of output with growth in the total amount of inputs used. Productivity will increase when more output is being produced for each unit of input, compared with the previous year.

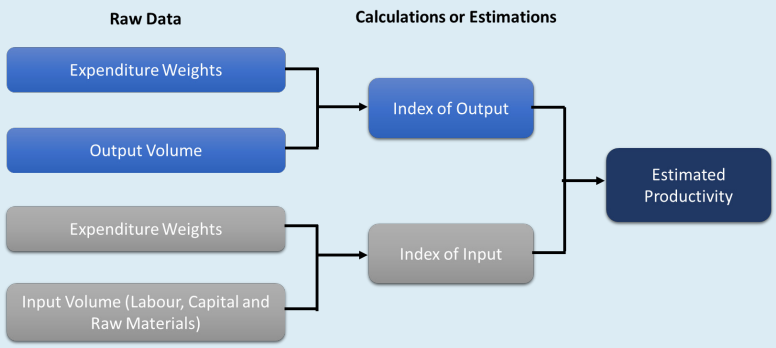
Total public sector productivity estimates are based on the ratio of output to inputs. Total public sector output and inputs indices are calculated by aggregating output and inputs for the following service areas. Total public sector productivity is then calculated by dividing this index of output by the index of inputs.

$$P_t = O_t / I_t$$

where, P = Productivity
O = Output
I = Input
t = Time

The methodology for calculating aggregate inputs, output and productivity involves several stages. An overview of the process is provided in the following diagram.

**Overview of Procedures for Productivity Measures**




Source: Office of National Statistics (ONS), United Kingdom

## The European Union

In 2001, the EU released a handbook on price and volume measures in national accounts. The EU's methodology, which is similar to that of the UK, provides directions for measuring non-market outputs (education, health, social security, defence and general public administration), using methods that are independent of expenditure on inputs.

The EU handbook notes that although there are challenges in measuring non-market outputs (as no market prices existed), four criteria have been cited for governments to consider.

In order to cover all services produced and provided to external users, ancillary activities should not be counted. These services should be weighted by the cost of each type of output in the base year and should be defined in as much detail as possible; and be quality-adjusted.

To determine quality adjustment, the EU handbook provides three options. They are in the direct measurement of the quality of the output, measuring input quality and using outcomes to measure the effectiveness of the public service. A direct measurement of the quality of the output itself refers to surveys on the quality of public services like in education, school inspection reports. As for measuring input quality, it covers areas like employee compensation and using outcomes in areas like monitoring the decline or rise in crime rates.

EU countries have had some successes with these measures and have applied them most successfully to the health and education sectors (Table 7.2). There were still some challenges when applying the same concepts across different sectors. For example, there is no consensus on what constitutes outcomes, which also makes it difficult to compare performances across EU countries.

**Table 7.2: Inputs, Processes, Outputs and Outcomes for Education and Health Sector**

| | Health | Education |
|---|---|---|
| Input | What the health system uses in order to provide its output. | What the education sector uses in order to provide its output. |
| Process | The individual actions carried out by the health sector in delivering a completed treatment. | The individual actions carried out by the education sector in delivering teachings. |
| Output | The quantity of healthcare received by patients, in terms of complete treatments, adjusted to allow for the qualities of the services provided. | The quantity of teaching received by students, adjusted to allow for the qualities of the services provided. |
| Outcome | The change in health status due to health sector interventions. | Varies according to countries based on respective education agenda. |

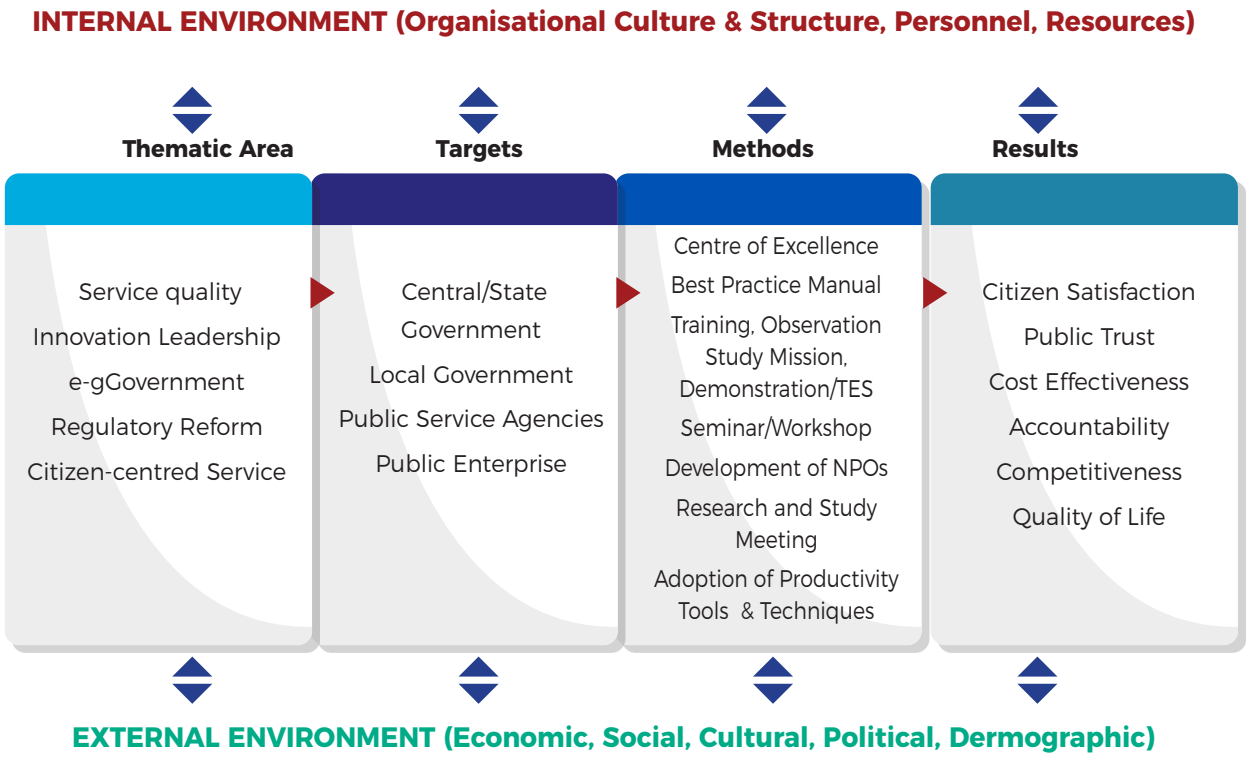
Source: Office for National Statistics (ONS), United Kingdom

## Asian Productivity Organisation

APO Public-sector Productivity Programme Framework addresses vital elements that are considered to be the most pressing and relevant to enhancing productivity in the sector within the Asia-Pacific region (Figure 7.4). Five thematic areas have been identified as priority areas for engagement, namely service quality, innovation leadership, e-Government, regulatory reform, and citizen-centred services.

To promote, revitalise and sustain productivity enhancement effectively in the public service sector in the above areas, complementary efforts are necessary to strengthen the capacity of APO member countries. The Public-sector Productivity Framework also endeavours to look at three levels of capacity development: institutional, organisational, and individual. It focuses on two aspects of public sector productivity, where the public sector is to provide an environment conducive to improving quality of life of citizens and the productivity of businesses; and improving productivity in the public sector itself.

**Figure 7.4: APO Public-sector Productivity Programme Framework**




Source: Asian Productivity Organisation (APO)

Although the measurement is applied by most member countries, there is no single focus through which to consider when measuring public sector productivity. While some believed that the public sector's tendency to prioritise spending reduction is tantamount to increasing productivity, the APO measurement's intention is focused on organisational efficiency. At the same time, other cases suggest that the focus should be more on the effectiveness or quality of outcomes. It can be difficult to measure the bottom line in the public sector because even if governments are as efficient as possible, there are often competing objectives unrelated to cost savings. The public sector has an obligation to serve the greater good, and in these instances, a different, more balanced kind of productivity lens should be applied. Therefore, the main challenge in the public sector is in using both lenses, and not just prioritising one or the other to achieve better balanced outcomes.

## EFFICIENCY IMPROVEMENTS OF PUBLIC SECTOR

Malaysia's public service sector has been undergoing tremendous changes and restructuring since the 10MP period. The aim is to make it more effective and efficient in serving the needs of the Rakyat and nation. Improvements in its effectiveness have been supported by a number of reform initiatives aimed at better service delivery while improvements in efficiency have been driven primarily through the betterment of work practices and digital government.

Since the launch of the Government Transformation Programme (GTP) in 2009, various initiatives have been implemented to be in line to the APO's Public-sector Productivity Programme Framework.

There has been considerable success in number of areas in enhancing public sector productivity. They include regulatory reform, service quality, e-Government and citizen-centric services.

### Regulatory Reform

Regulatory reform enables the Government to improve regulatory quality by reforming regulations that pose unnecessary obstacles to competition, innovation and economic growth while ensuring that regulations will efficiently serve important economic, social and environment objectives.

In Malaysia, the Regulatory Impact Analysis (RIA) is conducted to systematically identify and assess the expected effects of regulatory proposal, using a consistent analytical method such as impact analysis. It is a comparative process which is based on determining the underlying regulatory objectives sought and identifying all the policy interventions that are capable of achieving them. Since 2014, 355 Regulatory Coordinators (RC) have been registered with MPC, who are MPC's representatives in overseeing the implementation of regulatory quality system. Regulators at various departments and agencies can make enquiries through phone calls, emails, walk-ins or through the GRP portal.

As of 2016, a total 140 Regulatory Notification Forms (RNF) has been received compared to 41 in 2014. Follow-up action will be done through the RIA process for every regulatory proposal and by giving advisory service as well as hands-on workshop on RIA (Table 7.3)

RIA can help to ensure that regulations are as efficient and effective as possible. Effective regulations are those that achieve the policy objectives for which they were made. Efficient regulations are those that meet their objective in a cost efficient manners to all affected parties.

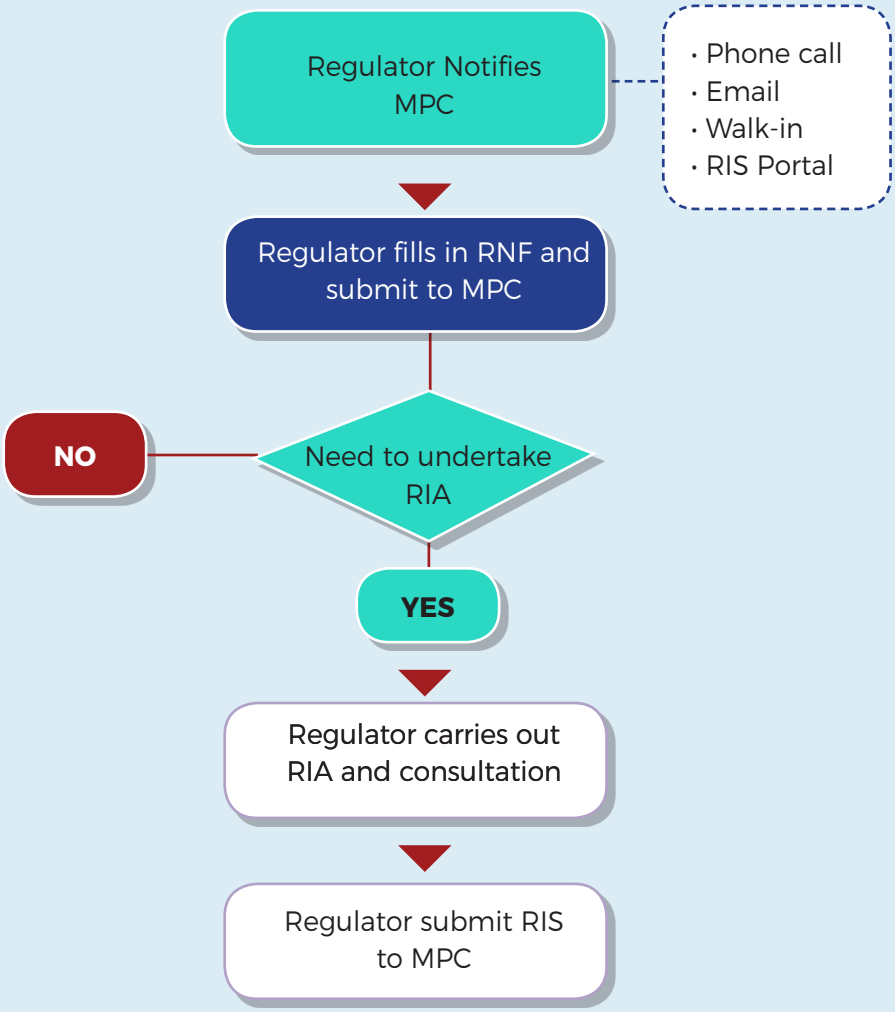
**Table 7.3: List of Regulatory Impact Analysis, 2014-2016**

| No. | Activities | 2014 | 2015 | 2016 | Total |
|---|---|---|---|---|---|
| 1. | Enquiries Attended | 53 | 26 | 14 | 93 |
| 2. | Regulatory Notification Form (RNF) Received | 41 | 54 | 45 | 140 |
| 3. | Proposal Undertaking RIA Process | 30 | 35 | 4 | 69 |
| 4. | Advisory Services | 16 | 8 | 16 | 40 |
| 5. | Hands-on Workshop on RIA | 17 | 11 | 7 | 35 |
| 6. | Regulatory Impact Statement (RIS) Submission | 5 | 7 | 5 | 17 |
| 7. | Registration of Regulatory Coordinators | 297 | 22 | 36 | 355 |
| 8. | Top Management Briefing | 8 | 11 | 1 | 20 |

## ASSESSING THE NEEDS FOR REGULATORY IMPACT ANALYSIS

In order for regulators to determine the need for RIA in developing new or reviewing existing regulations, there is a need for regulators to notify MPC and submit the Regulatory Notification Form (RNF) to MPC. MPC will then assess the submission and validate the need for RIA.

In cases when RIA is required, the regulators have to carry out RIA and in consultation with the support facilitated by Regulatory Coordinators (RCs) and MPC. Subsequently, regulators need to submit their Regulatory Impact Statement (RIS) to MPC. MPC will assess the RIS and table to NDPC for endorsement. After a decision has been officially announced, the RIS will be published by MPC and posted in the GRP portal (www.grp.mpc.gov.my).




Note:
1. RNF and RIS can be downloaded from GRP Portal (www.grp.mpc.gov.my)
2. Regulator – an authority, usually a department within a ministry or a statutory body established by an Act of Parliament. The regulator has the authority to develop, review and maintain the regulations that it enforces.
3. Regulatory Coordinators (RC) are officers appointed by a Ministry or a Regulator under the requirements of the National Policy on the Development and Implementation of Regulations (NPDIR). They act as the focal points for the Ministry or Regulator to oversee the implementation of NPDIR

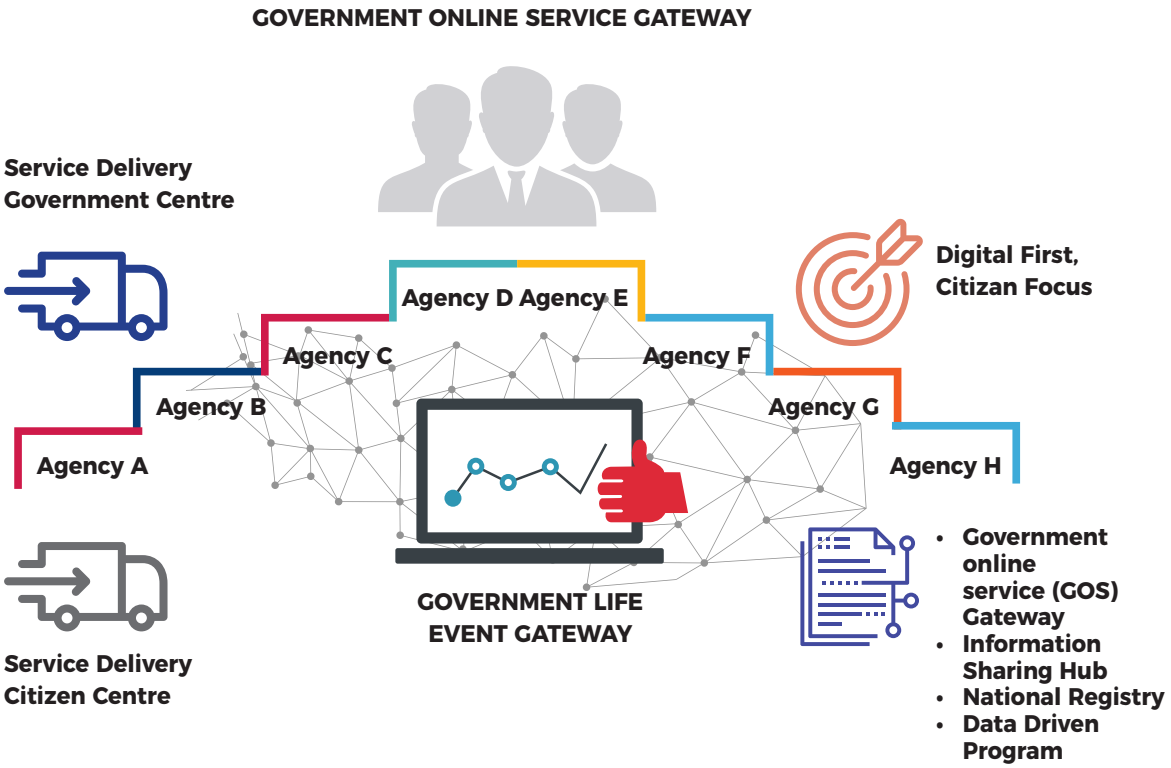
## Service Quality

Service quality focuses on achieving service excellence by continuous incremental improvements in the quality of services offered by public sector organisations. This was proven by Hospital Sultan Ismail in Johor Bahru, which managed to reduce the waiting time to 30 days from 120 days at its Orthopaedic Specialist Clinic and Oncology Treatment Centre. It had adopted the World Health Organisation's standard to increase the number of patients treated at the centre by 60% to 48 patients from 30 patients a day.

## e-Government

e-Government is the use of ICT in the operations of public sector organisations to improve overall productivity. e-Government refers to the use of communication, content and infrastructure (CCI) technology to enhance access to and delivery of Government services to the Rakyat and businesses. e-Government is expected to foster a better business environment, strengthen good governance, broaden public participation and improve the productivity and efficiency of government agencies.

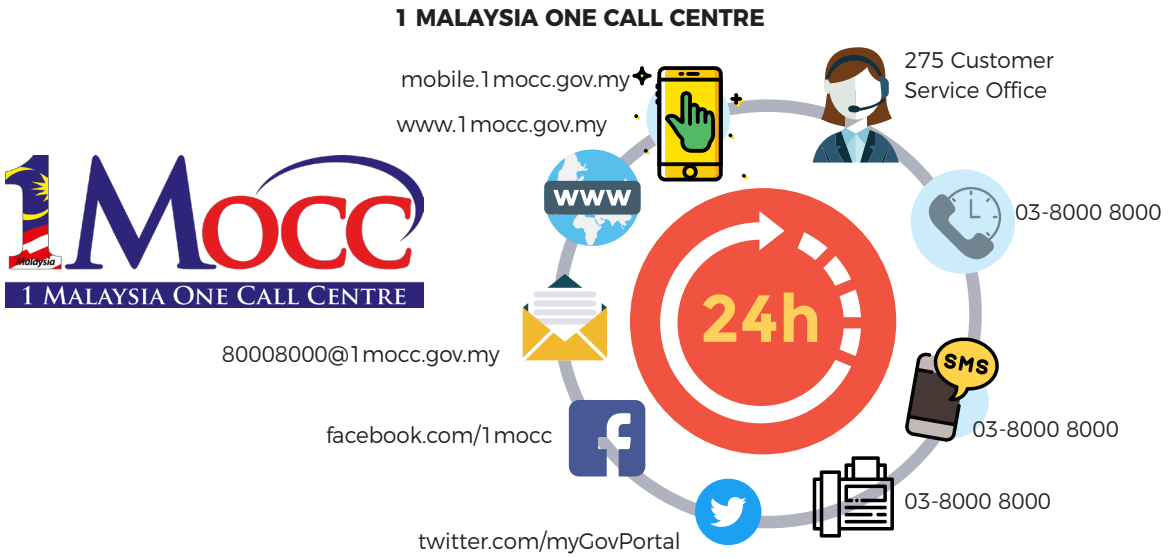
The Government Online Services (GOS) Gateway has been designated as the single gateway for all government services. This will require a shift within government departments and agencies from delivering services in silos previously to a more integrated approach. It is being implemented in four clusters -- business, education, health and welfare. The GOS Gateway is an integral part of the government's 'Digital First, Citizen Focused' strategy.




## Citizen-centric Services

Citizen-centric services involves evaluating citizens' expectations, measuring service performance, ensuring accountability, and improving the capacity of the public sector. Government services are being made even more convenient for access through the 1Malaysia One Call Centre (1MOCC), where multiple ministries and agencies can be reached at one, easy-to-remember phone number. Through this service, the Rakyat can access information on relevant government services without having to determine which is the right department they need to contact for a particular enquiry. The centre also

reduces the distance between the providers and users of government services and its service delivery takes on a low-cost approach by consolidating the customer service infrastructure of different agencies under one roof.

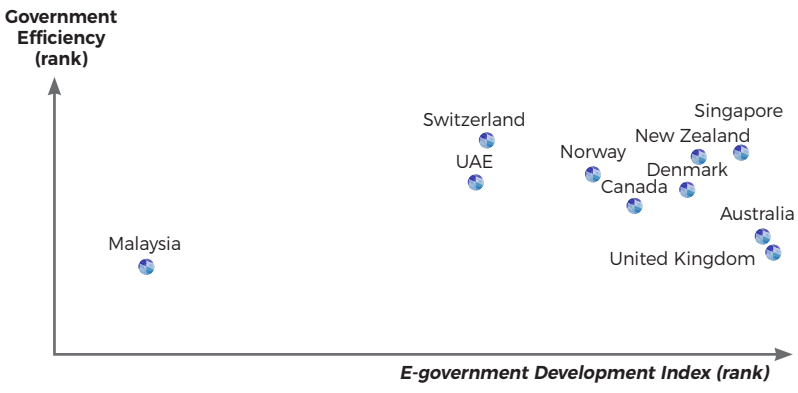



Under the National Blue Ocean Strategy (NBOS), the introduction of Urban Transformation Centres (UTC) by converting underutilised buildings has resulted in cost savings of RM1.5 billion to the Government with 15 one-stop centres operating nationwide. UTCs are regarded as one of the effective Government's efforts to provide the urban community with key government and private sector services under one roof. UTCs have also transformed the working practices of the Government by providing convenience to the Rakyat.

## INTERNATIONAL COMPARISON AND BEST PRACTICES

Several comparisons have been made with selected countries such as Singapore, Denmark, New Zealand, and the United Kingdom in the area of public sector efficiency (Figure 7.5). It has been shown that in order to be a productive and competitive, Malaysia must have an efficient public sector that can pursue continued development and improvements in various areas. They include e-Government innovations, establishing a robust telecommunications infrastructure, investing in the development of human resources, expanding the usage of e-government facilities, extending the service delivery and being efficient in managing its resources. These improvements will be manifested in greater public trust, cost-effectiveness, increased accountability of public resources, higher national competitiveness, and a better quality of life.

**Figure 7.5: Correlation between e-Government Development Index and the Government Efficiency**

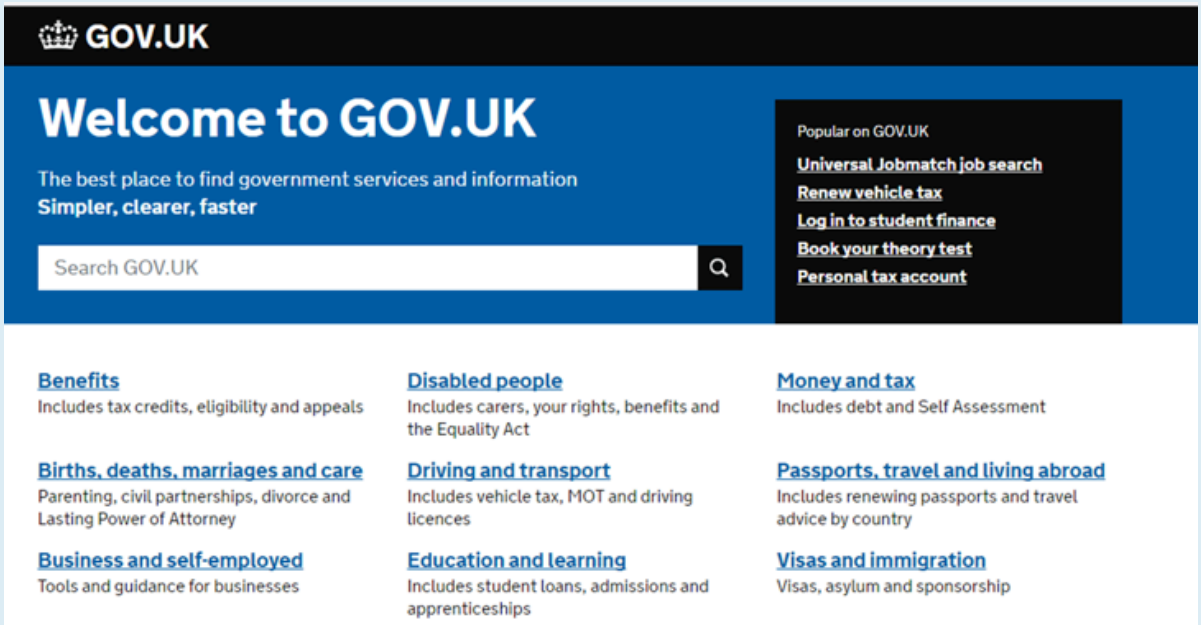



Source : IMD World Competitiveness Yearbook 2016, UN E-Government Survey 2016

## BEST PRACTICES OF DIGITAL GOVERNMENT: THE UK EXPERIENCE

The United Kingdom was recogsnised as the top ranked country in the UN e-Government Survey for digital government as it has e-information, e-consultation and e-decision making in place.

E-information is when the Government provides people with information via ICT channels in order to help them make informed choices at the next stage of consultation. E-consultation is when the people are consulted on a particular policy, service or project through ICT channels. E-consultation encourages truly participatory policy-making as public consultation e-tools are applied at all stages of the policy-making life-cycle. Gov.uk, the portal of the UK Government is the home page that invites visitors to have a look at its policies, check announcements and publications and engage in consultations. The site is also presented in a simple and accessible manner. By clicking on the "Consultations" button, visitors can select a policy topic proposed by the Government, express an opinion and read the consultation's outcome when it closes, along with the Government's position towards contributions provided to the public.




The third level of the e-participation model, which is e-decision making, refers to a process in which people provide their own inputs into decision-making processes. The Gov.uk portal interlinks all three e-participation domains into one process. Publishing policy drafts – the supply of other relevant documents and information – for public consultation (e-information) also allows for constructive and informed feedback. The Government publishes its position on the feedback received from the public. It then explains any changes in the proposed policy options taken as a result of consultation by highlighting what has been taken into account and what has not and why. Such a holistic approach to e-participation expands the scope and meaning of participatory decision-making.

## QUANTIFYING PUBLIC SECTOR PRODUCTIVITY IMPROVEMENTS

The Government is committed to transforming the public service to provide efficient service delivery and be more Rakyat-centric. In line with this, the 11MP has placed strong emphasis on raising productivity of the public sector. The aspiration is to deliver more accessible public services, enhancing productivity, and raising the efficiency and effectiveness of service delivery.

A key element has been the drive to increase productivity through opening up public services to new forms of challenges by making public service markets more dynamic and competitive. For instance, the adoption of NBOS initiatives, which has seen more collaborative actions involving over 80 ministries and agencies, has enabled the Government to formulate high-impact, low-cost national programmes to benefit the Rakyat. Key initiatives to enhance the public sector and transform it towards greater productivity including strengthening its service delivery with the Rakyat at the centre, rationalising public sector institutions for greater productivity and performance, and pursuing a digital government.

As part of the ongoing improvement efforts, Malaysia continues to benchmark and monitor its rankings in various global indices such as the WYC by IMD, the e-Government Development Index (EGDI) by the UN and the Corruption Perception Index by Transparency International (TI).

The public sector is poised to roll out several creative and innovative approaches to bolster the quality of its delivery system. Focus will be on creating a more Rakyat-centric government to boost the efficiency and productivity of the public service. In pursuing citizen-centricity, the Government will continue to benchmark its performance internationally. Major targets during the 11MP include moving into the top 10 of the Government Efficiency sub-index of the WCY Index, propelling into the top 15 of the Online Service sub-index of the UN EGDI, and scaling to the top 30 of the Corruption Perception Index.

The noble aspiration for Malaysia to become a developed and competitive nation must be supported by a Rakyat-centric public service with high productivity. The major imperative in this effort will be to reinforce productivity in the public service through an entire-government approach. This will be supported by a lean and agile organisational structure, competent talents, effective delivery of projects, and efficient services at various levels.

The Government will have to step up its delivery in an effective and efficient manner to meet rising public expectations, population dynamism and technology trends. The role of the Government as a facilitator and catalyst for development becomes more important than ever.

This requires new models of service delivery with the public sector comprehensively transformed. This is to be achieved by encouraging innovation and openness, and accelerating its pace of responsiveness and delivery. To attain such high quality levels of services delivery, the public sector must fit its purpose, be fit for the Rakyat, and be fit for the future. Only then will the pace of Malaysia's transformation and transition towards an advanced economy gather even greater momentum.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08

# Transformation through Collaboration: The Key to Increase Productivity

Productivity growth is the key to providing sustainable improvements in living standards rather than the sheer accumulation of capital and labour inputs. In this context, Malaysia needs to explore new ways of challenging the frontier. This transformation can only be possible through strong collaboration and partnership among the Government, academia and industries. For transformation to become truly successful across various sectors, these components as well as individual participants must strive to have a common purpose to innovate together and co-create the future. The ultimate aim is to drive structural changes in the national economic and social landscape far beyond the scope of what any organisation or person can pursue alone.

Innovation and technology can sustain productivity growth indefinitely and increase the country's income per capita. Today's technology has the potential to enable a very different level of business and productivity performance, but only when accompanied by a thoughtful redesign in ways how a business is done on a more productive basis.

Productivity is often regarded as a long-haul marathon without a finishing line, but as long as the participants have confidence and keep working together, they will be rewarded with success by staying the course in the race.

## URGENCY FOR GREATER PRODUCTIVITY PROGRESS

Several initiatives have been undertaken to boost productivity in Malaysia since the mid-1990s. These resulted in productivity improvements over the years but the level of productivity progress is relatively slower by international comparison. The 11MP has set a relatively high labour productivity growth target of 3.7% per year to realise Malaysia's aspiration to become an advanced nation with high income in 2020. Various research studies conducted by international organisations and most recently through MPB revealed that five common traits or challenges needed to be tackled urgently to boost productivity – having an adequate talent pool, advanced technology, competitive industry structure, transparent business environment and productivity mindsets. It was found that Malaysia is still dependent on low-skilled labour. Such a situation calls for improved policies or strategies related to labour supply to be clearly spelt out in order for proper planning to meet the demands of the future economy.

Investments in technology and digitalisation were also relatively limited. Their low adoption across enterprises had affected the ability of businesses to transform as evidenced by the relatively poor digitalised infrastructure. Lack of collaboration between academia and industry had also led to low commercialisation of R&D.

In terms of industry structure, many relatively small enterprises were limited by their ability to invest in productivity improvements. Key sectors of the economy have yet to establish dominance in higher value activities. Many government funding and incentives in the past did not function as strong levers to boost productivity.

The local business environment is still bogged down by regulatory burdens across many sectors. Inconsistent interpretation and application of regulations are still a major business dampener while the regulatory constraints and nuances between federal and state governments also create additional roadblocks towards improving enterprise productivity. These obstacles need to be eliminated or reduced in order to ensure that the cost of doing business in Malaysia would not be more than twice found in developed countries.

Cultivation of productivity mindsets needs to be intensified as such mindsets are still lacking among most local enterprises. This has been due to their limited understanding of the benefits of productivity at the enterprise level. They were still unclear on how productivity is measured although 95% of enterprises polled in an MPB survey agreed with the importance of productivity. This reflected that most enterprises were usually content with their present status.

In recognising these challenges, the Government has vowed to continue its efforts to enhance productivity and that more programmes will be introduced to ensure greater traction and improvement.

## ADDRESSING KEY CHALLENGES

A coordinated structural reform is necessary for Malaysia to achieve the productivity improvements needed to become a high income nation. Forward-looking companies should take the initiative to collaborate across the value chain and look to each other as potential partners, rather than as competitors to stay competitive, advance and achieve sustainable growth.

The 11MP has earmarked productivity as a game changer and an important agenda for Malaysia to have sustainable productivity growth.

The MPB has set the tone to uplift productivity in the country by calling for holistic approach at the national, sectoral and enterprise levels. The Organisation for Economic Co-operation and Development (OECD) and World Bank have also proposed a wide range of approaches to boost the nation's productivity in Malaysia's Economic Assessment Report and The World Bank Economic Monitor report respectively.

The Government has since taken note of the various proposals and recommendations related to quality of education, talent pool, skills mismatches and R&D by enterprises and academia to spur greater productivity growth. As a follow up, it has initiated efforts to increase collaboration among government, academia and industries in a more holistic approach to achieve better productivity outcomes.

### A HOLISTIC APPROACH TO UNLOCKING PRODUCTIVITY POTENTIAL

MALAYSIA PRODUCTIVITY BLUEPRINT
Driving Productivity of the Nation

MPB emphasises that productivity improvements must be executed differently from now on to fast track the attainment of productivity goals. They have to encompass executing productivity initiatives in a holistic manner and accompanied by strong coordination and governance as well as making productivity as part of a day-to-day culture.

In addressing productivity holistically at the national, sectoral and enterprise levels, MPB pinpoints that it must start with a set of immediate national-level priorities (including 11MP targets) to be implemented over the next 12-24 months. Targeted initiatives must be customised along with sector-specific challenges, prioritised and rolled out in stages. MPB stresses that enterprises will only benefit from productivity gains if concerted efforts are taken to address challenges at the national and sectoral levels.

This holistic approach calls for strong coordination and governance as they will be crucial to securing certainty of implementation. An Evolution of Productivity Governance Model is required for three clear roles – advisory, coordination and monitoring, and implementation. Strong coordination is critical to driving implementation on the ground, with rigorous programme management as well. Having many Productivity Nexus will be key to driving action at enterprise-level and raising visibility and transparency of the implementation progress.

By inculcating productivity into the top of the mind as well as a day-to-day culture, MPB maintains that enterprises will be able to understand the relevance and impact of productivity on their bottom line. A feasible method to easily track progress must be in place. It is also essential for government mechanisms to encourage productivity (e.g. productivity-linked incentives) so that enterprises can adopt productivity- tracking as a norm. A continuous national level campaign must also be effected to ensure that the targeted messages are cascaded to key audiences. A dedicated portal (www.wayup.my) has been set up to disseminate productivity-related information and initiatives to the Rakyat.

Source: Malaysia Productivity Blueprint (MPB)

### OECD PROPOSALS FOR PRODUCTIVITY REFORMS

OECD's proposals are focused on areas for reforms to deliver the much needed boost to Malaysia's productivity. The proposals include the quality of education, technology and innovation, labour market, regulatory framework for SMEs and public sector productivity. OECD recommends that the innovation system governance be streamlined through clear mandates for the National Science Council and Research Management Agency. It also proposes that the independence, staffing and financial resources of the competition regulator be enhanced and that merger control powers be strengthened. OECD also calls for an amendment to insolvency laws to facilitate the rescue of viable firms. The introduction of out-of-court insolvency procedures and pursuing further investment liberalisation will boost the services sector's growth and competitiveness. OECD also recommends developing a comprehensive social protection system, including by implementing an employment insurance scheme, and promoting flexible work arrangements and investing more in early childhood care, lifelong learning and reskilling. This far reaching structural reforms requires strong coordination and collaboration to enable Malaysia achieve the much needed productivity improvements for attaining a high income economy.

Source: Boosting Productivity in Malaysia, OECD

### THE WORLD BANK: ACCELERATING PRODUCTIVITY GROWTH THROUGH COLLABORATION

The World Bank highlights that there is a need to further act on the productivity agenda as the core of Malaysia's economic policy. Accelerating productivity growth will require close collaboration between the public and private sectors. Among the findings and recommendations highlighted in a report by The World Bank include identifying skill mismatches in the workforce, increasing innovation and improving infrastructure.

The World Bank stresses that finding workforce with the necessary technical, managerial, or foreign language skills was difficult. This had resulted to high vacancy rates among firms and consequently translated to a lower rate of labour productivity. To overcome this, it recommends an effective education system by providing universal primary and secondary education and promoting both higher education and industry-specific technical training to overcome skills mismatches.

As for innovation, it says that Malaysian firms tend to focus more on non-technical innovation than on technical innovation and R&D. Hence, there is a need to push firms to be more competitive by reviewing policies that hamper competition and adopt competitive neutrality in terms of regulations. It also calls for inculcating an urgency to innovate in both technical and non-technical areas, strengthen the R&D ecosystem, and facilitate technology.

Source: Malaysia Economic Monitor: The Quest for Productivity Growth, World Bank

## EFFECTIVE COLLABORATION: THE KEY FOR SUCCESS

One factor that can help the journey towards enhancing productivity is effective collaboration. This is because collaboration enables the enhancement of knowledge and helps to achieve success as a team. It comes in the form of strong partnership and a common shared vision among stakeholders (industry players and associations, government, and institutions of learning) and community organisations in an industrial cluster. It is a critical component for raising the productivity and competitiveness of the nation as seen in many advanced countries.

The champions of productivity in those countries are usually governments and industry players themselves who vigorously support a cohesive, sustainable and competitive economic ecosystem.

## Bridging the Talent Gap

### *Developing Creative Thinking Skills Among Students*

No matter how ambitious a promotion campaign can be, it has to be properly planned by encompassing the basic factors related to its establishment and implementation. For creative and productive mindsets to start functioning, educators must be retrained to visualise the benefits of such an endeavour that will ultimately assist their students and country in the long run. Ambitious reforms are already underway in higher education to make the curricula more industry-relevant. Funding for education is also now aligned with performance indicators.

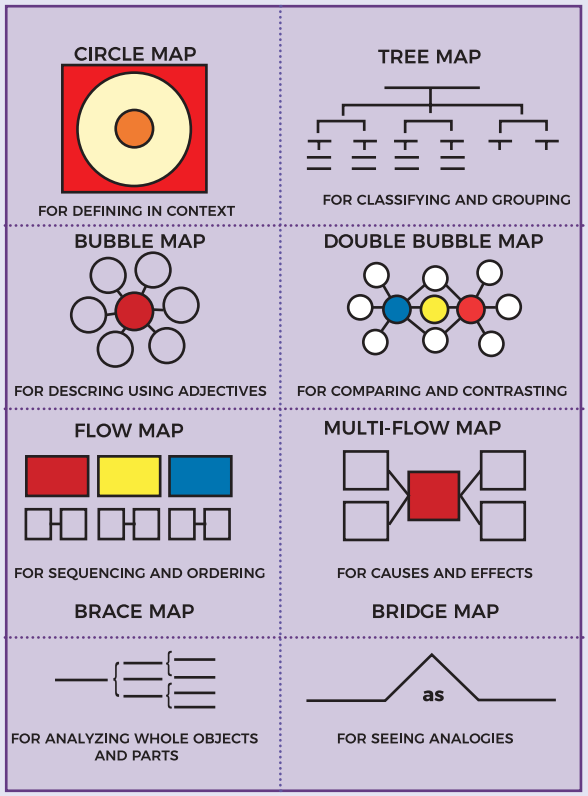
Considerable efforts are also being made to increase the quality of basic education, including reversing a decline in English language proficiency that had already affected one of Malaysia's competitive advantages within the region.

To resolve skills imbalances among job seekers on an accelerated basis, the Government had initiated two programmes -- i-THINK and LeapED -- with private and non-profit organisations.

### INNOVATIVE HOT THINKING

i-THINK, which means innovative THINKing, is a collaborative programme developed with the objectives of nurturing and developing innovative human capital, increasing thinking skills amongst children and equipping future generations with HOT skills. The Ministry of Education started collaborating with Agensi Inovasi Malaysia (AIM) to jointly create the i-THINK project in 2011. By 2015, all schools had been fully exposed to the i-THINK programme.

i-THINK, adapted and adopted from Thinking Schools International has a total of 144,397 teachers have gone through the i-THINK programme. Eight Thinking Maps are being used as a guide to provide a consistent and brain-compatible method for teachers to present information in a meaningful way and for students to learn and retain it. All teachers involved will use the appropriate thinking maps while teaching their subjects.




As a consequence of i-Think programme, the Government has mandated for 10 government schools to obtain the International Baccalaureate (IB) certification. As of April 2016, two schools had already secured IB certification.

Source: The Report: Malaysia 2016, Oxford Business Group

### ACHIEVING LeapED POTENTIAL

The LeapED school transformation programme is a collaborative partnership between the Ministry of Education and Yayasan AMIR Trust Schools Programme (YATSP) to improve student outcomes via a conducive studying environment in the pioneer public school transformation programme. It involves teachers acting as facilitators and children maximising their potential through group work and peer learning. The programme is aimed at improving accessibility to quality and holistic education in Malaysian government schools with a long-term goal of transforming the education delivery system. The programme operates on a five-year gradual release basis, meaning that trust schools are heavily guided in the beginning but left to operate independently at the end. It is aimed at making trust school students under the programme to be able to show confidence and creativity, and an ability to communicate and collaborate, the very qualities that employers are looking for.

The programme has four strategic goals encompassing school leadership, teachers and students, parents and the community. Started in 2011 with only 10 schools, it has now expanded across 62 public schools in Johor, Sarawak, Kuala Lumpur, Selangor, Perak, Negeri Sembilan, Sabah, Terengganu and Pahang. To ensure that all LeapED programmes can be institutionalised in schools as best practices to ensure continuity, the programme has been designed to address specific areas that have a critical impact on sustainable school improvement and transformation.

They range from raising the standard of leadership and management to ensure high quality teaching and learning. It is also about maximising student achievements and potential, and increasing stakeholder involvement through parents and community programmes.

Source: www.leapedservices.com

## *Strengthening Workforce Skills for Innovation*

Talent mobility is an enabler for private companies, governments, academic institutions and NGOs to narrow skill gaps. It also provides remedies on talent shortages and places more people towards greater employability and employment. In response to meeting current industry needs, talent mobility practices can effectively boost labour supply, or better equilibrate supply and demand through changes in the quality of labour. Collaboration among multiple stakeholders is at the core of successful talent mobility practices. Whether at the organisational level, within industries or regions, or across multiple stakeholders, collaboration has enabled stakeholders to grapple effectively with challenges in managing talent pools to enhance growth. In fact, collective action may be the only way to significantly address labour market outcomes. A good example is the industry-led technical upskilling programmes run by the Penang Skills Development Centre (PSDC).

### PENANG SKILLS DEVELOPMENT CENTRE

PSDC pioneered skills industry-led training since 1989 when it provided up-to-date training and educational programmes to support operational requirements and kept employees abreast of technological progress. Located within Penang's Free Industrial Zones, the centre has achieved tremendous success by inviting members of the manufacturing industry that rank among some of the world's renowned corporations to collaborate with academia and the Government.

PSDC's unique paradigm pools resources and management expertise, and allows it to provide invaluable advice and guidance on the latest industrial technological progress leading to Industry 4.0 modules. The centre operates as a non-profit organisation and pools resources from amongst the four Free Trade Zones and four Industrial Estates in Penang with a total of 775 factories, employing more than 170,000 workers to provide leading-edge training and educational programmes in support of industry requirements.

Source: Penang Skills Development Centre (PSDC)

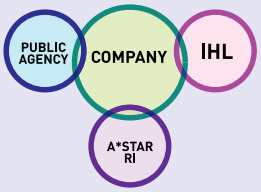
## Leveraging Technology through Smart Collaboration

A crucial component in boosting productivity is smart collaboration among industries and research institutions. It is a vital medium to ensure success in creating innovation, enhancing R&D, boosting the commercialisation rate and improving the productivity and competitiveness of companies. Evidence of the importance of business-research partnerships leading towards successful innovations has grown steadily over the years.

This is an area that Malaysia has to vigorously explore and benchmark successful models implemented by other leading economies. Singapore, for instance, uses the Agency for Science, Technology and Research also known as A*STAR programme, to ensure the success of its R&D efforts. A*STAR actively promotes interaction between research and industry to accelerate the translation of research findings into tangible benefits for Singapore's economy. Singapore's A*STAR Research Institute practises four main engagement models to collaborate public research performers and industries. A*STAR works closely with different industry sectors on various research programmes and projects.

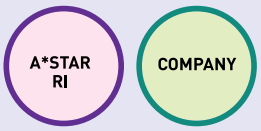
### REACHING FOR A*STAR

A*STAR Research Institute practises four main engagement models:



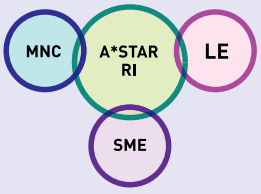

**Many to One Strategic Partnership**

Several public research performers engage with one partner to form a long-term strategic collaboration. This approach aims to deliver impact for partners through the integration of scientific capabilities across multiple disciplines and research performers in Singapore. The joint lab set up between Applied Materials, a global leader in materials engineering, and the Institute of Microelectronics (IME), Institute of Materials Research and Engineering (IMRE) and the Institute of High Performance Computing (IHPC) leverages on their multi-disciplinary R&D capabilities. The joint lab catalyses the development of new processes and techniques to advance the fabrication of semiconductor devices.



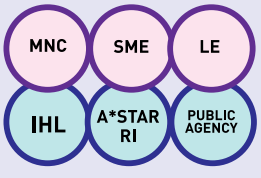

**One-to-One Partnership and Projects**

A*Star works with individual partners on projects in targeted research areas. These partnerships can take various forms, including working on single research projects to partnering up to form joint labs for a pipeline of projects. Delta Electronics, a global leader in high-efficiency power and thermal management solutions, and the Institute of Bioengineering and Nanotechnology (IBN), jointly set up a diagnostics lab to focus on developing technologies for improved infectious disease detection and personalised medicines.




**One to Many Consortia**

In the "One to Many" model, one research institute (RI) will bring together several companies to form a consortia around the RI's core capabilities to collaborate on common research areas, typically in pre-competitive sectors. The Nanoimprint Foundry helmed by the IMRE partners with companies including Toshiba Machine, Micro Resist Technology and Kyodo International to demonstrate the applications of nanoimprint technology and to develop roll-to-roll nanoimprinting.




**Many to Many Consortia**

The consortia consists of multiple public institutions and companies. The goal is to create effective platforms for private and public sectors to collaborate on thematic research areas to enhance research capabilities. The Many-to-Many model is very simple: having many customers and suppliers linked together as a middle platform.

Source: https://www.a-star.edu.sg/

### *Strengthening Research and Science-industry Strategic Partnerships*

In the 11MP, the Government has initiated various initiatives (Appendix C.1) and funding facilities (Appendix C.2) to support research and innovation for industries in Malaysia. This approach involves the development and intensification of industry-academia collaboration through industry-led intermediaries, leveraging on industry associations and chambers of commerce to increase R&D, and drive innovation and productivity.

The methodology covers various initiatives, including research conducted through the Ministry of Education's Public-Private Research Network (PPRN). This is to create a collaborative platform for a cluster of healthcare firms and research-intensive companies based at Universiti Kebangsaan Malaysia. The partnerships also use intermediaries such as Steinbeis Malaysia Foundation, SIRIM-Fraunhofer and PlaTCOM Ventures Sdn. Bhd. to leverage existing research institutions to improve the R&D component in products and processes, and promote the 1-InnoCERT programme by SME Corporation. They also collaborate with industry associations and chambers of commerce as a platform to distribute information on industry-related policies, obtain feedback and conduct industry specific training. Getting higher education institutions to contribute to research and innovation, and providing research with enhanced potential for commercialisation remain a major challenge in Malaysia. Collaborative research between academia and industry will pave the way to create and grow the Malaysian R&D ecosystem. The PPRN programme, science-industry strategic partnerships between academia and industry have so far proven to be able to help improve the associated companies' productivity and competitiveness. The Collaborative Research in Engineering, Science and Technology (CREST) platform, for example, brings academia and companies together to undertake collaborative research to address market needs. It provides SMEs with easy access to critical resources for innovation capacity building. The upgrading of Malaysian enterprises in GVCs can be supported by fostering relations between multinational enterprises (MNEs) and domestic suppliers, including SMEs, through dedicated initiatives and incentives beyond the existing support system.

#### COLLABORATION FOR BRIGHTER FUTURE

WT Plastic Sdn. Bhd. was established in 1991 to manufacture plastic shopping bags. With electricity being a crucial part of the company's operations, its electricity bills have been rather high compared to wages for its workers. In collaboration with researchers from SIRIM-Fraunhofer, the latter proposed an energy-saving measure by using induction heating at the company's factory.

The bulk of the project funding came under the SIRIM Industrial Innovation Model Fund (SIIMF) while WT Plastic bore the remaining 10% of the total cost. Collaboration between the company and Korean advisors subsequently led to the installation of energy-saving induction heaters. The company experienced improvements in power consumption by 40% and reduced the time spent on setting the temperature by 75% from 32 minutes to 8 minutes.

#### SLICING TOGETHER FOR BETTER GAINS

Babarittos Delight is a food truck enterprise founded by a young entrepreneur with a love for street food since his college days. His enterprise sells Mexican food in food trucks. Under the PPRN matching grant, the company collaborated with Sultan Azlan Shah Polytechnic researchers to solve a problem on its manual meat slicing process. An Automatic Meat Slicing (AMS) machine had replaced the manual method of using knives by workers. The new AMS machine can produce 30kg of boneless chicken meat slices in an hour, using only one worker as opposed to six previously. This has led to improved productivity by the company and directly increased its process efficiency and profitability

### PARTNERING FOR GREENER FRYERS

TKS Winwell Equipment Supply Sdn. Bhd. (TKS) undertakes company-aided designing and manufacturing of industrial equipment and food machinery. TKS Winwell approached PlaTCOM Ventures to innovate its production processes for better business viability. TKS bore 10% of the funding and the balance of the matching grant was provided by PlaTCOM Ventures.

The company was concerned with the accumulation of debris, leading to a shorter life span of its fryers for restaurants. A design for a water-based filtration system attached to the frying unit to remove debris was devised. The intervention resulted in more cost-effective, durable and environmental-friendly fryers that had been used in many restaurants that managed to save up to 50% in oil usage. TKS has applied for utility patent, industrial design and trademark registration for its innovation.

Many industry-academia collaborations involving the four strategic partnership models with Steinbeis, SIRIM-Fraunhofer, PlaTCOM Venture, and PPRN have mostly demonstrated one-to-one partnerships. To further accelerate the impact of innovation to productivity, the Government has recognised the need to enlarge the one-to-one partnership model to other expanded models involving more collaborators.

### MaGIC TOUCH FOR MORE START-UPS

The Malaysia Global Innovation and Creativity Centre (MaGIC) was created as a full-service ecosystem to support both local and international entrepreneurs. The entrepreneurship and SME landscape in Malaysia was crowded and fragmented before the establishment of MaGIC as many different agencies and organisations competed to support entrepreneurs. This resulted in considerable duplication and overlap. MaGIC now serves as a one-stop shop for entrepreneurs by providing access to a full spectrum of support. Its mandate takes a broader view of entrepreneurship by encompassing a diverse range of sectors and people as it seeks to spread the message of entrepreneurship.

The blue ocean methodologies at MaGIC also endeavour to minimise risks usually associated with entrepreneurship as risks usually deter people from becoming entrepreneurs. The approach taken by MaGIC is of creating rather than competing and this sets MaGIC apart, especially with its emphasis on collaboration. Such collaboration enables MaGIC to focus not only on helping to grow successful businesses, but also on inculcating a spirit of creativity and entrepreneurship among Malaysians that will contribute to the future success of the nation.

Source: Malaysia Global Innovation and Creativity Centre

## Nurturing a Business-friendly Knowledge Ecosystem

To meet the higher expectations of the Rakyat, the Government is constantly evaluating ways to enhance its public service delivery through improved collaboration to effect a business-friendly knowledge ecosystem. The four Public Service Delivery Strategic Reform Initiatives aim to accelerate the Government's efforts to become more efficient and facilitative. They are the Single sign-on (SSO) system, real-time performance monitoring system, business licensing electronic support system (BLESS), and abolishing licences. Those initiatives have helped industries to accelerate their business processes and access government online services anytime, anywhere.

Through the NBOS initiatives, the Government aims to deliver lower cost, elicit high impact and rapid execution, and reduce unproductive approach of working in silos. Over 80 ministries and agencies are collaborating to formulate and execute creative Blue Ocean Strategy (BOS) initiatives in the public service; community transformation; women, youth and family; safety and security; entrepreneurship; and education. The community transformation includes the setting up of Urban Transformation Centres (UTC), which provide urban communities with key government and private sector services under

### SINGAPORE'S NATIONAL TRADE PLATFORM

By bolstering inter-agency collaboration and coordination as well with the industry players to improving trade facilitation, particularly custom clearance, the Singapore National Trade Platform (SNTP) enables the Government to respond to emerging challenges and maintain the competitive edge over other middle income countries.

The plan has helped SMEs by using cost-effective integrated IT applications to boost their ICT capabilities and productivity, better manage their supply chain by leveraging on electronic data captured. It also connects local SMEs to multiple local or overseas partners to exchange electronic data and documents more efficiently amongst themselves as well as with regulatory authorities. The SNTP enables companies to boost their productivity through the use of tools to support digitalisation and business needs. Businesses can make use of the tools available on the SNTP to digitalise their operations and the SMEs using cost-effective integrated IT applications on the SNTP to boost their ICT capabilities and productivity.

### SINGAPORE: TECHNOLOGY ADOPTION PROGRAMME

Singapore's Technology Adoption Programme (TAP) supports collaboration amongst public sector research institutes, private sector technology providers, Institutes of Higher Learning, Trade Associations and Chambers (TACs) and private sector system integrators. The aim is to identify and translate new technologies into Ready-to-Go (RTG) solutions. These RTG solutions aim to address productivity challenges and give SMEs a competitive advantage. The TAP will support sectors identified for the Industry Transformation Maps (ITMs) to formulate and execute technology adoption roadmaps.

one roof. As the first of its kind service in the world, various UTCs around the country had served more than 12 million people between 2013 to June 2016. As part of the aim to train 35% of Malaysia's workforce to be highly skilled by 2020, the Ministry of Human Resources (MOHR) has implemented five inter-agency initiatives in line with the aspiration to be a developed high-income nation by then. They are the 1Malaysia Skills and Development Scheme (SKK1M); Housewives Enhancement and Reactivate Talent Scheme (HEARTS); Centre for Instructor and Advanced Skills Training (CIAST) Satellite Campus; 1Visit Policy; and the 1Malaysia Skills Training and Enhancement for the Rakyat (1Master).

Regionally, an example of effective government inter-agency collaboration and coordination with industry players towards improving trade facilitation was the establishment of the Singapore National Trade Platform (NTP). The NTP team actively engages industries and companies to participate in a wide range of activities that include interviews, ideation, service concept workshops and usability testing to fine-tune the platform and other offerings. Other government agencies involved in the NTP are the Ministry of Trade and Industry, Ministry of Finance, Ministry of Transport, Civil Aviation Authority of Singapore, Economic Development Board, SPRING Singapore, IE Singapore, Monetary Authority of Singapore and Maritime Port Authority.

## ACCELERATING PRODUCTIVITY AGENDA THROUGH PRODUCTIVITY NEXUS

In order to accelerate the productivity mindset and elicit greater collaboration among the Government, academia and industry players, this requires the establishment of Sectoral Productivity Nexus. It is one of the public-private governance models where the Government plays an enabling role while the private sector leads in implementation efforts. The private sector in this respect refers to industry associations that will have a lead role to deliver on-the-ground implementation of the productivity initiatives. By establishing a strong industry network through leveraging on local industry associations and chambers of commerce, it will help create a shared collective vision of overall development of productivity enhancement. Consequently, it will effect positive spillovers in cross-cutting capabilities

that enterprises can use to benefit each other in a mutually symbiotic manner.

The Productivity Nexus platform will disseminate information on industry-related policies, obtain feedback and conduct specific training as well as share all the best practices from various innovations implemented by industry members. By forming the Productivity Nexus, it is hoped that more on-the-ground acceptance on the common shared vision of achieving greater productivity can be attained. The prerequisites for a progressive society equipped with strong productivity leanings can only be achieved by harnessing creative and innovative talent, acquiring technology, enhancing industry structure, improving the business environment and effect a productivity mindset.

To be able to achieve this, a lot of serious work needs to be done to strengthen the foundation. This requires taking into account in having a properly-designed gameplan to be executed with far-reaching impact premised on achieving greater productivity in its entirety.

The Government has taken note of the talent and skills shortfalls in the school and tertiary education curriculum to meet industry needs. It has initiated several partnerships with the private sector in a collaborative effort to harness talent and sharpen skill sets. Various action plans on the education front will see fruition in years to come. At the same time, the Government has also encouraged industry and academia to collaborate to push forward the productivity agenda as well as greater wealth creation from commercialising R&D. The crux of the matter when racing against time is through greater collaboration among various stakeholders in the productivity agenda. That time is now.

## PRODUCTIVITY NEXUS

The MPB has highlighted the need to establish various sector Productivity Nexus to accelerate the productivity agenda in the country. Productivity Nexus are one-stop centres that assist SMEs to enhance productivity, innovative and capture new growth opportunities.

Supported by MPC, these Productivity Nexus will provide sector-specific productivity expertise and assistance to enterprises by helping them diagnose areas for improvement and supporting implementation of productivity solutions. The target outcomes of each Productivity Nexus are to strengthen collaborative partnerships between academia, large companies and SMEs; and to have a well-developed e-commerce ecosystem. The initiatives will also attract more digital and tech savvy skilled workers; increase productivity levels through future ready skilled workers; and to inculcate a productivity culture mindset among workers.

Each Productivity Nexus is helmed by a leader from industry who also acts as an independent chairman to ensure the success implementation of sector initiatives under the MPB. A governing committee is responsible for the strategic direction and endorsement of MPB activities. The Productivity Nexus will work closely with the Delivery Management Office (DMO) to monitor and track the implementation of productivity strategy against the MPB and 11MP targets.

### IMPLEMENTATION OF PRODUCTIVITY NEXUS

- Industry assosiation to be empowered as key change agent
- The Productivity Nexus will be led by sector champion
- Embed performance management system to incentivise delivery while keeping associations accountable for funds

### ROLE OF PRODUCTIVITY NEXUS

Support sector level initiatives

Empower enterprises to help themselves

Enable enterprises through knowledge sharing

9 Sectors

- Retail and F&B
- Chemicals & Chemical Products
- Electrical & Electronics
- Machinery & Equipment
- Professional Services
- Healthcare
- Agro-food
- Tourism
- ICT

### DESIRED OUTCOMES

**INDUSTRY:**
- Buy-in that productivity has direct benefits for their companies
- Awareness of government resources
- Implementation of productivity enhancement projects at their companies

**GOVERNMENT:**
- Clear linkages between national productivity targets and strategies to reach targets
- Transparent in communication of key policy levers to be implemented in enhancing productivity
- Regular communication on productivity benefits at all levels of government

**YOUTH & STUDENTS:**
- Awareness of benefits for improving individuals productivity
- Professionalising, upskilling and reskilling of workforce

**GENERAL PUBLIC:**
- Topic of productivity is top of mind for Malaysian
- Clear linkages between productivity and country's high income goal
- Public support on government initiatives to improve productivity

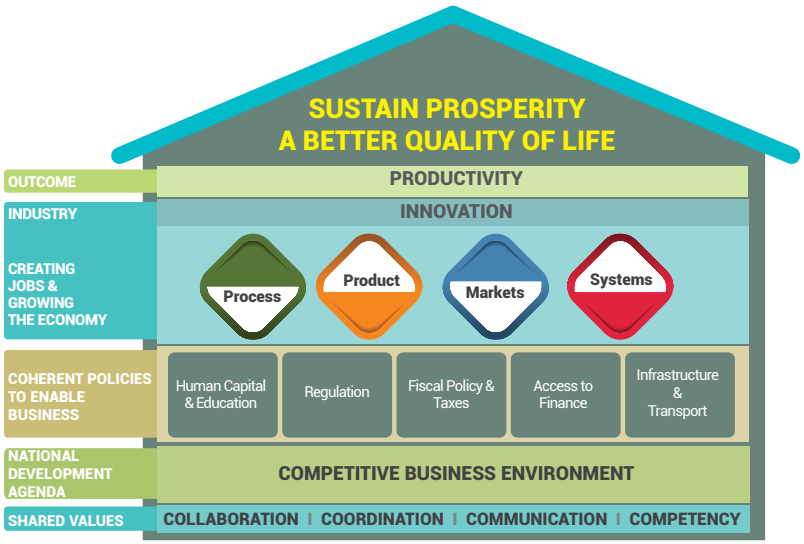
# WHAT IS PRODUCTIVITY?

The Productivity Framework is based on shared Malaysian values that drive national development agenda such as the Economic Transformation Programme, the Government Transformation Plan and the Malaysia Plans. These initiatives form the policy and regulatory foundations of business in terms of human capital and education, regulation, fiscal policy, access to finance and infrastructure.

Policies and initiatives are required to strengthen the foundations of human capital and education, regulation, fiscal policy, access to finance and infrastructure to enhance the country's competitive business environment. This competitive environment is important to create more added value for enterprises, increase employment opportunities, attract investment and talent and create more revenue. It is crucial that the foundation itself encourage businesses to continuously improve their products, processes and systems as these will lead to greater markets through innovation.

Most innovation is incremental and involves a continuous process of applying new techniques, skills or technologies to the business and keeping what works. In this way, production costs are reduced incrementally over time, while product and service quality is improved in response to changing market needs. The innovation is then diffused throughout the industry as competitors copy the practices of these high productivity companies, thereby contributing to economy-wide improvements in productivity. The net result is a real gain in productivity growth.

Innovation and its diffusion is therefore a fundamental aspect of accelerating productivity growth. Successful innovation depends upon the support of sound Government policies and regulations as the foundation of productivity. With these elements in place and working in tandem with each other, Malaysia will be able to sustain its prosperity and provide a better quality of life for all its citizens.




**HOW WILL HIGHER PRODUCTIVITY BENEFIT THE COUNTRY?**

| | | | | |
|---|---|---|---|---|
| Expands capital investment, upgrades technical capabilities of businesses and improves industry competitiveness | Enhances the country's competitiveness, expands its export base and attracts more foreign investments | Increases savings and lowers prices of goods and services | Ensures a higher standard of living by reducing the effects of inflation, creating more employment opportunities and eliminating social conflict as goods and services become more affordable | Develops personal skills and capabilities and leads to higher overall wages and salaries, improved working conditions, better job security and an improved sense of well being |

# APPENDIX A.1: Measuring Productivity

### Terminology and Definition

Productivity is the relationship between the amount of output produced and the amount of input used to produce the output. Higher productivity means achieving more with the same or lesser amount of input resources. An increase in productivity will lead to benefits such as higher standard of living, enhanced competitiveness and better quality of life.

### Methods to Measure Productivity

Productivity may be measured in two ways: the ratio of output to only one input, or the ratio of output to more than one input. The method involving only one input is called the partial factor productivity measure, while the method involving more than one factor input is called the multi-factor productivity measure or total factor productivity (TFP) measure. Both output and inputs are commonly expressed in monetary terms.

# APPENDIX A.1.1: Partial Factor Productivity Measure

The partial factor productivity measure is the ratio of output to one type of input. Measures of output include gross domestic product (GDP), added value and monetary value of production, while measures of inputs include total employed persons, total man-hours worked, capital or fixed assets, labour cost, energy and bought-in materials and services. Examples of partial productivity measures are labour productivity (the ratio of output to labour input) and capital productivity (the ratio of output to capital input).

| VARIABLES | DESCRIPTION |
|---|---|
| **Added Value** | Added value measures the wealth generated by the collective efforts of those who work in an enterprise (the employees) and the capital providers (investors and shareholders). Added value is different from sales revenue or value of production because it does not include the wealth created by the suppliers to the enterprise.<br><br>There are two ways to calculate added value:<br><br>**i) Addition Method**<br><br>This is called the wealth distribution method.<br><br>***Added Value =***<br>***Labour Cost + Interest + Tax + Depreciation + Profit***<br><br>It is called wealth distribution because the added value created is used to pay those who have contributed to its creation in terms of wages and salaries (labour cost) for the employees, interest for capital providers, taxes to the Government, depreciation for capital equipment usage and profits to the owners. |

| VARIABLES | DESCRIPTION |
|---|---|
| | **ii) Subtraction Method**<br><br>This is called the wealth creation method.<br><br>***Added Value =***<br>***Total Output less Bought-In Materials and Services (BIMS)***<br><br>In order to produce goods or services, a company has to purchase the necessary raw materials and other inputs. The difference between the total value of output and total cost of inputs i.e. all inputs and services bought from another company is called added value. |
| **Total Output** | Ex-factory value (Sales - Opening Stocks: Finished goods + Closing Stocks: Finished goods - Carriage outwards - Commission to selling agents - Tax on products)<br>+ Income from industrial services rendered<br>+ Value of sales (from goods purchased for resale without further processing)<br>+ Value of other industrial work done<br>+ Income from other output<br>+ Professional fees received<br>+ Commission and brokerage earned<br>+ Capital expenditure for built / Self-produced<br>+ Closing Stocks: goods in process<br>- Opening Stocks: goods in process<br>+ Closing Stocks: goods purchased for resale<br>- Opening Stocks: goods purchased for resale |
| **Bought-In Materials and Services (BIMS)** | Cost of raw materials<br>+ Packing materials and containers<br>+ Materials used for repairs and maintenance<br>+ Factory requisites & Stationery and office supplies<br>+ Utility, fuels, lubricants & gas purchased<br>+ Cost of goods sold (purchased for resale without undergoing further processing)<br>+ Payments for processing work done by others on materials supplied by company & payments for current repairs and maintenance work done by others on company's fixed assets<br>+ Payments for non-industrial services |
| **Employed Persons (Average for the period)** | All categories of employees, including working directors/proprietors/ partners, unpaid family workers and part-time workers. |
| **Labour Cost** | Wages and salaries (including commissions, bonuses and benefits), remuneration paid to working directors/proprietors/partners, and EPF/ SOCSO paid by employers. |
| **Fixed Assets (Average for the period)** | All physical assets namely transport equipment, computers, machinery and equipment, and furniture and fittings. |

## APPENDIX A.1.2: Decomposition of Labour Productivity Growth

The Solow-Swan model (Solow 1956, Swan 1956) is the starting point for most theoretical analyses of economic growth. Its main conclusion is that the accumulation of physical capital and labour cannot drive sustained, long run growth in output per person, and that this is instead driven by the rate of technological change (productivity growth). The model assumes that the production function takes the form:

$$\boldsymbol{Y = f(A, K, L)}$$

Where $\boldsymbol{A}$ represents technology, and $\boldsymbol{K}$ and $\boldsymbol{L}$ represent capital and labour, respectively. $\boldsymbol{A}$ is chosen as an input to the model, rather than being determined within it, and can be interpreted in terms of the stock of knowledge or innovation, disembodied education and skills, the strength of property rights, the quality of infrastructure and cultural attitudes to entrepreneurship and work. New growth theories build on the Solow-Swan concepts so that technological growth, human capital, and institutions are determined within the model (Solow, 2005). Microeconomic theory has additional insights regarding a country's position on its production possibilities frontier, which represents the most efficient means of producing a range of goods and services. These concepts suggest ways by which a country can improve its economic growth.

Firstly, a country can move to a more optimal position on its domestic production possibilities frontier by changing the combination of products it produces for a given set of inputs. Secondly, a country can 'catch up' to the global production possibility frontier, by adopting more efficient processes and technologies that have been developed elsewhere. Finally, a country that is producing optimally on the global production possibilities frontier can push that frontier outward, through innovation.

TFP indicates the efficiency with which inputs are being used in the production process, and includes pure technological change, $A$, along with changes in returns to scale. Labour productivity (LP) measures the level of output per unit of labour input (such as employee and hours worked). The relationship between LP growth and TFP growth is:

***LP growth = TFP growth + a contribution from growth in capital deepening***

In practice, measured productivity performance is influenced by all the factors that affect the level of production and the use of labour and capital. This includes competition, business cycles, trade, financial markets, regulation, technological change, weather, population growth and ageing, education, infrastructure, geography and structural change. Some of these factors are within the influence of government policy and reform to varying degrees, while others are not.

## APPENDIX A.1.3: Total Factor Productivity Measure

The TFP measure is the ratio of total output to the sum of all input factors. It measures the efficiency of the utilisation of all inputs to produce output. Formerly, the growth accounting technique was utilised to measure TFP, where inputs were limited to labour and capital. But the influence of knowledge-based economic factors in today's globalised economy has necessitated a new approach in measuring TFP known as KLEMS (Capital, Labour, Energy, Materials and Services). The KLEMS methodology utilises more broadly defined input factors in which intermediate inputs such as energy and bought-in materials and services are included in the measurement. Both labour and capital input factors are now decomposed into more detailed segments to enable more detailed analysis in terms of labour quality and quantity for labour input, while capital input is now decomposed into ICT and non-ICT capital.

**Model Specification in Deriving Sources of Long-Term Economic and Productivity Growth**

The production functions are assumed to be separable in these inputs as the starting point:

$$Y_j = g_j(Y_{ij}) = f_j(K_j,\ L_j,\ X_j, T) \tag{1}$$

Where Y is output, K is an index of capital service flow, L is an index of labour service flows and X is an index of intermediate inputs, which consists of the intermediate inputs purchased from the other domestic industries and imported products. Under the assumptions of constant returns to scale and competitive markets, the value of output is equal to the value of all inputs as can be expressed as:

$$P_j^Y Y_j = P_j^K K_j + P_j^L L_j + P_j^X X_j \tag{2}$$

Where $P_j^Y$ denotes the price of output, $P_j^X$ denotes the price of intermediate inputs, $P_j^K$ denotes the price of capital services and $P_j^L$ denotes the price of labour services. Under the standard assumption of profit maximising behavior, competitive markets, such that factors are paid their marginal product, and constant returns to scale, we can define TFP growth $(\Delta \ln t_j)$ as follows:

$$\Delta \ln t_j = \Delta \ln Y_{jt} - \bar{v}_{jt}^X \Delta \ln X_{jt} - \bar{v}_{jt}^K \Delta \ln K_{jt} - \bar{v}_{jt}^L \Delta \ln L_{jt} \tag{3}$$

Growth of TFP is derived as the real growth of output minus a weighted growth of inputs where $\Delta X = X_t - X_{t-1}$ denotes the change between year t-1 and t, and $\bar{v}_{jt}$ with a bar denoting period averages and $\bar{v}$ is the two period average share of the input in the nominal value of output. The value share of each input is defined as follows:

$$v_{jt}^X = \frac{P_{jt}^X X_{jt}}{P_{jt}^Y Y_{jt}}; \qquad v_{jt}^L = \frac{P_{jt}^L L_{jt}}{P_{jt}^Y Y_{jt}}; \qquad v_{jt}^K = \frac{P_{jt}^K K_{jt}}{P_{jt}^Y Y_{jt}} \tag{4}$$

The assumption of constant returns to scale implies $v_{jt}^X + v_{jt}^L + v_{jt}^K = 1$ and allows the observed input shares to be used in the estimation of TFP growth in equation (3). Rearranging (4) yields the standard growth accounting decomposition of output growth into the contribution of each input and TFP (denoted by $A^Y$):

$$\Delta \ln Y_{jt} = \bar{v}_{jt}^X \Delta \ln X_{jt} + \bar{v}_{jt}^K \Delta \ln K_{jt} + \bar{v}_{jt}^L \Delta \ln L_{jt} + \Delta \ln A_{jt}^Y \tag{5}$$

where the contribution of each input is defined as the product of the input's growth rate and its two period average revenue share.

In order to decompose growth at higher levels of aggregation, a more restrictive industry value-added function was defined, which gives the quantity of value added as a function of only capital, labor and time as:

$$V_j = g_j(K_j, L_j, T) \tag{6}$$

where $V_j$ is the quantity of industry value added. Value added consists of capital and labour inputs, and the nominal value is:

$$P_j^V V_j = P_j^K K_j + P_j^L L_j \tag{7}$$

Where $P^v$ is the price of value added. Under the same assumptions as above, industry value added growth can be decomposed into the contribution of capital, labour and TFP ( $A^v$ ).

$$\Delta \ln V_{jt} = \overline{w}_{jt}^{K} \Delta \ln K_{jt} + \overline{w}_{jt}^{L} \Delta \ln L_{jt} + \Delta \ln A_{jt}^{V} \quad (8)$$

where $\overline{w}$ is the two period average share of the input in nominal value added. The value share of each input is defined as follows:

$$w_{jt}^{L} = (P_{jt}^{V} V_{jt})^{-1} P_{jt}^{L} L_{jt}; \quad w_{jt}^{K} = (P_{jt}^{V} V_{jt})^{-1} P_{jt}^{K} L_{jt} \quad (9)$$

In order to define the quality of value added, we assume that the production function is separable in intermerdiate input and added:

$$\Delta \ln V_{jt} = \frac{1}{\overline{v}_{jt}^{V}} (\Delta \ln Y_{jt} - (1 - \overline{v}_{jt}^{V}) \Delta \ln X_{jt}) \quad (10)$$

**Output and Intermediate Input Accounts**

This methodology was introduced by Jorgenson, Gollop and Fraumeni (1987). We define the quantity of output in industry j as an aggregate of M distinct outputs using the Tornqvist index as:

$$\Delta \ln Y_{jt} = \sum_{i=1}^{m} \overline{v}_{ijt}^{Y} \Delta \ln Y_{jt}$$

$\overline{v}_{jt}$ with a bar denoting period averages and $\overline{v}$ is the two period average share of product $i$ in the nominal value of output. The value share of each product is defined as follows:

$$v_{ijt}^{Y} = (\sum_{i} p_{ijt}^{Y} Y_{ijt})^{-1} p_{ijt}^{Y} Y_{ijt}$$

With $P_{ij}^{Y}$ = the basic price received by industry $j$ for selling commodity $i$.

The intermediate input quantity index for industry $j$ is defined analogously by:

$$\Delta \ln X_{jt} = \sum_{i} \overline{v}_{ijt}^{X} \Delta \ln X_{jt}$$

where $v_{ijt}^{X} = (\sum_{i} p_{ijt}^{X} X_{ijt})^{-1} p_{ijt}^{X} X_{ijt}$ with $p_{ij}^{X}$ = the price paid by industry $j$ for using product $i$.

**Labour Accounts**

The aim of the labour accounts is to estimate total labour input so that it reflects the actual changes in the amount and quality of labour input over time. In short, in this method the labour force is subdivided into types based on various characteristics, in this case age, gender and educational attainment. It is further assumed that the flow of labour services for each labour type is proportional to hours worked, and workers are paid their marginal productivities. Hence the corresponding index of labour services input $L$ is a translog quantity index of individual types, indexed by $l$, and given by:

$$\Delta \ln L_t = \sum_l \bar{v}_{l,t} \Delta \ln H_{l,t}$$

where weights are given by the average shares of each type in the value of labor compensation $\bar{v}_{l,t} = \frac{1}{2}[v_{l,t} + v_{l,t-1}]$ and $v_{l,t} = (\sum_l p^L_{l,t} H_{l,t})^{-1} p^L_{l,t} H_{l,t}$ with $p^L_{l,t}$ the price of one hour work of labor type $l$.

**Capital Accounts**

For the measurement of capital services we need capital stock estimates for detailed assets and the shares of capital remuneration in total output value.

The most commonly employed approach in capital stock measurement is the Perpetual Inventory Method (PIM). In the PIM, capital stock ($A$) is defined as a weighted sum of past investments with weights given by the relative efficiencies of capital goods at different ages according to (industry subscripts are suppressed for convenience).

$$A_{k,t} = \sum_{\tau=0}^{\infty} \theta_{k,\tau} I_{k,t-\tau}$$

with $A_{k,t}$, the capital stock for a particular asset type k at time t, $\theta_{k,\tau}$, the efficiency of a capital good of age $t$ relative to the efficiency of a new capital good and $I_{k\ t-\tau}$, the investment in period $t$-$\tau$. Hence with a given constant rate of depreciation $\delta$, different for each asset type, $\theta_t = (1-\delta)^t$ and it follows that the capital stock of a particular asset $k$ at time $t$, $A_{k,t}$ is given by:

$$A_{k,t} = \sum_{\tau=0}^{\infty} (1-\delta_k)^{\tau} I_{k,t-} \quad = (1-\delta_k) A_{k,t-1} + I_{k,t}$$

For the aggregation of capital services over the different asset types it is assumed that aggregate services are a translog function of the services of individual assets. It is further assumed that the flow of capital services for each asset type is proportional to its stock, independent of time. Hence the corresponding index of capital input K is a translog quantity index of individual assets in a particular industry given by:

$$\Delta \ln K_t = \sum_k \bar{v}_{k,t} \Delta \ln A_{k,t}$$

where weights are given by the average shares of each component in the value of capital compensation $\bar{v}_{k,t} = \frac{1}{2}[v_{k,t} + v_{k,t-1}]$ and $v_{kt} = (\sum_k p^k_{kt} A_{kt})^{-1} p^K_{kt} A_{kt}$ with $p^K_{kt}$ the price of capital services from asset type k.

In equilibrium, an investor is indifferent between two alternatives: buying a unit of capital at investment price $p_{kt}$, collecting a rental fee and then selling the depreciated asset for $(1-\delta_k) p_{k,t+1}$ in the next period, or earning a nominal rate of return, $i$, on a different investment opportunity. The equilibrium condition can be rearranged, yielding the familiar cost-of-capital equation:

$$p^K_{k,t} = p^I_{k,t-1} i_t + \delta_k p^I_{k,t} - [p^I_{k,t} - p^I_{k,t-1}] \quad \text{or} \quad p^K_{k,t} = r_{k,t} p^I_{k,t-1} + \delta_k p^I_{k,t}$$

The nominal rate of return can be estimated as follow:

$$i_{j,t} = \frac{p^K_{j,t}K_{j,t} + \sum_k [p^I_{k,j,t} - p^I_{k,j,t-1}]A_{k,j,t} - \sum_k p^I_{k,j,t}\ {}_kA_{k,j,t}}{\sum_k p^I_{k,j,t-1}A_{k,j,t}}$$

Where the first term $p^K_{j,t}K_{j,t}$ is the capital compensation in industry $j$, which under constant returns to scale can be derived as value added minus the compensation of labour.

# APPENDIX A.2: Productivity Indicators

### Labour Competitiveness

Competitiveness in terms of labour cost indicates the comparability of the industry in producing products or services at the lowest possible labour cost.

| RATIO | UNIT | WHAT IT TELLS |
|---|---|---|
| i) Added Value Per Labour Cost<br>= Added Value / Labour Cost | Pure Number | Indicates how competitive the enterprise is in terms of labour cost.<br>A low ratio indicates high labour cost which does not commensurate with added value creation. |
| ii) Labour Cost Per Employee (LCE)<br>= Labour Cost / No. of Employees | Ringgit Malaysia (RM) | Measure the average remuneration per employee.<br>A high ratio means high returns to individual workers and vice-versa. |
| iii) Unit Labour Cost (ULC)<br>= Labour Cost / Total Output | Pure Number | Indicates the proportion of labour cost to total output.<br>A high ratio indicates high labour costs. This could be due to a labour shortage and lack of skilled labour, or indicative of a poor labour mix. It could also be due to high labour turnover. |

### Labour Productivity

Labour productivity is one way of gauging the productivity performance of an industry. The most commonly used indicator is Added Value per Employee.

| RATIO | UNIT | WHAT IT TELLS |
|---|---|---|
| i) Added Value Per Employee<br>= Added Value / No. of Employees | Ringgit Malaysia (RM) | Reflect the amount of wealth created by the company relative to the number of employees it has. It is influenced by:<br>• Management efficiency<br>• Work attitudes<br>• Price effects<br>• Demand for the company's products<br>A high ratio indicates the favorable effects of labour factors in the wealth creation process.<br>A low ratio means unfavorable working procedures such as:<br>• High prices of bought-in materials and services (BIMS)<br>• Time and/or material wastage<br>• Inadequate salary or wages rates |

| RATIO | UNIT | WHAT IT TELLS |
|---|---|---|
| ii) Total Output Per Employee<br>= Total Outputs / No. of Employees | Ringgit Malaysia (RM) | The size of output generated by each employee of the enterprise. |
| ii) Added Value Per Hour Work<br>= Added Value / Total Hours Worked | Ringgit Malaysia (RM) | Reflects the amount of wealth created by the company relative to the number of working hour according to types of employees<br>- Full time<br>- Part time<br>- Self Employed |

### Capital Productivity

Capital productivity indicates the degree of utilisation of fixed assets and how efficient these assets are being utilised. It is defined as Added Value generated per Ringgit of Fixed Assets.

| RATIO | UNIT | WHAT IT TELLS |
|---|---|---|
| i) Added Value Per Fixed Asset<br>= Added Value / Fixed Assets | Pure Number | Indicates the degree of utilization of tangible fixed assets.<br>A high ratio indicates that assets are being efficiently utilised.<br>A low ratio reflects poor assets utilization. |
| ii) Capital Turnover<br>= Total Output / Fixed Assets | Pure Number | This ratio measures the efficiency in capital utilization and/or marketing system.<br>A high ratio indicates efficiency in capital utilization and good marketing system.<br>A low ratio means low turnover of materials, high work-in-progress and fixed assets. |

### Capital Intensity

Capital intensity measures the amount of fixed assets allocated to each employee. It is also known as Fixed Assets per Employee or simply capital-to-labour ratio. This ratio measures whether an industry is relatively capital-intensive or labour-intensive.

| RATIO | UNIT | WHAT IT TELLS |
|---|---|---|
| i) Fixed Assets Per Employee<br>= Fixed Assets / No. of Employees | Ringgit Malaysia (RM) | Indicates whether an enterprise adopts a capital intensive or labor-intensive policy.<br>A high ratio indicates high capital intensity.<br>A low ratio indicates that the enterprise is dependent on labor-intensive methods or that there is low technological input. |

### Process Efficiency (PE)

Process efficiency measures how efficient the business utilises its own resources namely labour, plant, and machinery, and capital to generate added value and minimise the brought-in materials and services.

| RATIO | UNIT | WHAT IT TELLS |
|---|---|---|
| Process Efficiency<br>= Added Value / [(Total Input) - (Bought - in Materials and Service)] | Pure Number | This ratio indicates the efficiency and effectiveness of the process, which is normally affected by production techniques used, technological innovation, managerial and labour skills.<br><br>A high ratio indicates an efficient and effective process system and vice-versa. |

### Profitability

Profitability is measured by surplus per unit of output produced. It is calculated by total output less total input divided by total output. Profitability or surplus will be created when firm manages its input factors effectively.

| RATIO | UNIT | WHAT IT TELLS |
|---|---|---|
| Profitability<br>= Operatting Profit / Total Output x 100% | Per Cent | This ratio reflects the proportion of operating profit in total output.<br><br>A high ratio means that the enterprise is getting high returns.<br><br>A low ratio normally implies high costs. |

### Business Returns

Business returns measure the performance of an enterprise in terms of economic returns, both from the business and financial point of view.

| RATIO | UNIT | WHAT IT TELLS |
|---|---|---|
| i) Return on Assets (ROA)<br>= Operatting Profit / Fixed Assets x 100% | Per Cent | This ratio indicates the return on fixed assets of an enterprise.<br><br>High ratio indicates high return on investment in fixed assets and vice-versa. |
| ii) Total Productivity Measure<br>= Total Output / Total Input | Pure Number | This ratio indicates the amount of total output generated by each unit of input.<br><br>A high ratio indicates a better performance of the enterprise and vice-versa. |

### Other Ratios Related to Productivity

The level of productivity of an enterprise can also be assessed by analyzing at the major components of added value and total output. There are numerous ratios that are pertinent in assessing productivity of enterprise.

| RATIO | UNIT | WHAT IT TELLS |
|---|---|---|
| i) Labour Share in Added Value<br>= Labour Cost / Added Value x 100% | Per Cent | This ratio indicates the proportion of added value which is allocated to labour costs.<br><br>A high ratio may be results of high wage rates or labour intensity and may also means low capital utilisation and vice-versa. |

| RATIO | UNIT | WHAT IT TELLS |
|---|---|---|
| ii) Operating Profit Share in Added Value<br>$= \frac{\text{Operatting Profit}}{\text{Added Value}} \times 100\%$ | Per Cent | This ratio indicates the proportion of operating profit in added value.<br>A high ratio is attributed to high output revenue and vice-versa. |
| iii) % of Materials Consumed in Total Output<br>$= \frac{\text{Materials Consumed}}{\text{Total Output}} \times 100\%$ | Per Cent | This ratio indicates the amount of materials consumed in generating the output of an enterprise.<br>A high ratio means high materials consumption and vice-versa. |
| iv) Added Value Content (AVC)<br>$= \frac{\text{Added Value}}{\text{Total Output}} \times 100\%$ | Per Cent | This ratio can be used to gauge the degree of utilisation of bought-in materials and services, and changes in the price differentials between products and purchases.<br>A high ratio indicates efficient usage of purchase or favorable price differentials.<br>A low ratio means:<br>- High cost of bought-in materials and services<br>- Poor products quality<br>- Low price competition. |
| v) Added Value per Operating Capital<br>$= \frac{\text{Added Value}}{\text{Operating Capital}}$ | Per Number | Indicates how intensively capital is used, eg. degree of fixed assets utilisation, control of stock level and debt level and efficiency of cash management.<br>A high ratio indicates efficient management of capital.<br>A low ratio reflects poor capital utilisation. |
| vi) Capital Share in Added Value<br>$= \frac{\text{Capital Cost (Depriciation)}}{\text{Added Value}} \times 100\%$ | Per Cent | This ratio indicates the proportion of capital costs in added value.<br>A high ratio indicates an inclination towards high capital intensity and vice-versa. |
| vii) % Materials Consumed of Added Value<br>$= \frac{\text{Materials Consumed}}{\text{Added Value}} \times 100\%$ | Per Cent | This ratio indicates the amount of materials consumed in creating the added value of an enterprise.<br>A high ratio means high materials consumption in creating added value of an enterprise and vice-versa. |
| viii) System Conversion Efficiency<br>$= \frac{\text{Throughput}}{\text{(Total Input - Materials Consumed)}}$ | Pure Number | This ratio indicates the efficiency of the conversion system, usually the production system.<br>A high ratio indicates an efficient conversion system and vice-versa. |
| ix) Throughput Ratio<br>$= \frac{\text{Throughput}}{\text{Total Manufacturing Cost}}$ | Pure Number | This ratio indicates the generation of output by the production system.<br>A high ratio indicates the effectiveness of the production system and vice-versa. |
| x) Competitive Edge Ratio<br>$= \frac{\text{Throughput}}{\text{Total Manufacturing Cost + Work - in - Progres (WIP)}}$ | Pure Number | This ratio indicates the generation of output by the production system, including work-in-progress.<br>A high ratio indicates good production management.<br>A low ratio indicates poor production planning and control. |

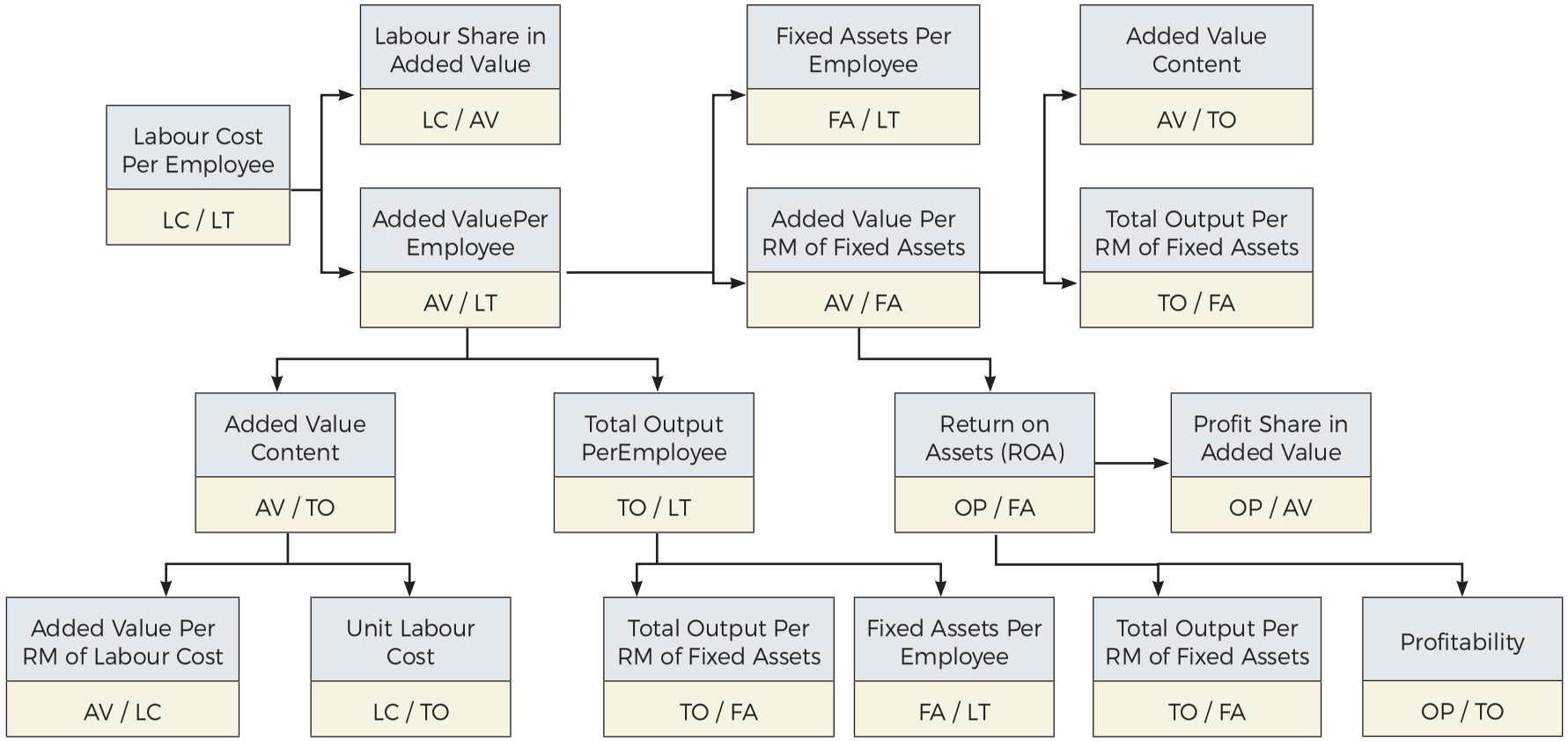
| RATIO | UNIT | WHAT IT TELLS |
|---|---|---|
| xi) Materials Turnover<br>= Total Output / Materials Consumed | Pure Number | This ratio indicates the adequate production method/system, purchasing system and inventory control system of an enterprise.<br>A high ratio means adequate production, purchasing and inventory control system of the enterprise and low wastage of materials due to good quality work and vice-versa. |

### Relations Between Productivity and Profitability

Productivity provides an alternative way of viewing profits. Productivity is about using things better whether by improving the way business is run, or by improving a company's product and producing high added value products. This is in turn increase profitability. Table below will help us to understand the relationship between profitability and productivity.

| CASE | IF | | THEN | |
|---|---|---|---|---|
| | PRODUCTIVITY | PROFITABILITY | WHAT WOULD HAPPEN | WHAT SHOULD BE DONE |
| 1 | High | High | Financial condition is sound and stable | Maintain or further improve productivity |
| 2 | Low | High | High profitability may not be sustained on a long term basis | Improve productivity |
| 3 | High | Low | The company may soon be operating at a loss and may be in the brink of shutdown | Improve profitability by strengthening market strategy, market research, market promotion / advertisements and pricing policy |
| 4 | Low | Low | Shutdown / bankcruptcy | Improve productivity and develop / strengthen market |

## General Linkages Among the Various Productivity Ratios




**KEY:** TO = Total Output
AV = Added Value
LC = Labour Cost
LT = Number of Employees
FA = Fixed Assets
OP = Operating Profit = (TO – TI)

# Appendix B.1: Statistics by Manufacturing Sub-sectors, 2016

| | LABOUR PRODUCTIVITY | | UNIT LABOUR COST PER EMPLOYEE | | UNIT LABOUR COST | |
|---|---|---|---|---|---|---|
| | LEVEL (RM) | GROWTH (%) | LEVEL (RM) | GROWTH | RATIO | GROWTH (%) |
| **Manufacturing** | 106,647 | 1.4 | 34,346 | 5.0 | 0.0577 | 3.1 |
| Food Products | 129,890 | -3.5 | 33,406 | 9.1 | 0.0362 | 14.3 |
| Beverages | 184,176 | 0.7 | 40,002 | 7.5 | 0.0632 | 6.8 |
| Tobacco Products | 441,261 | 19.5 | 82,443 | 7.7 | 0.0571 | -9.8 |
| Textiles | 72,552 | 5.1 | 23,240 | 2.3 | 0.0861 | -2.6 |
| Wearing Apparel | 27,246 | 3.4 | 17,715 | 7.8 | 0.1862 | 4.3 |
| Leather and Related Products | 43,350 | -2.6 | 21,334 | -1.3 | 0.1685 | 1.3 |
| Wood & Wood Products | 47,238 | 5.3 | 21,663 | 3.2 | 0.1119 | -1.9 |
| Paper & Paper Products | 74,536 | 1.5 | 26,591 | -1.0 | 0.0953 | -2.6 |
| Printing and Reproduction of Recorded Media | 62,064 | 0.2 | 33,022 | 9.1 | 0.1731 | 9.1 |
| Refined Petroleum | 3,348,605 | 1.5 | 123,935 | 16.8 | 0.0077 | 10.9 |
| Chemicals & Chemical Products | 322,345 | 2.8 | 51,683 | 2.5 | 0.0395 | -0.2 |
| Basic Pharmaceutical | 99,365 | 1.7 | 33,580 | -0.7 | 0.1277 | -2.3 |
| Rubber & Plastic Products | 87,563 | 0.6 | 30,631 | 6.4 | 0.0819 | 5.8 |
| Other Non- Metallic Mineral Products | 105,761 | 1.7 | 36,660 | 6.4 | 0.0974 | 4.8 |
| Basic Metals | 118,110 | -1.1 | 35,513 | 4.7 | 0.0540 | 5.8 |
| Fabricated Metal Products | 72,637 | 0.5 | 32,668 | 6.9 | 0.0947 | 6.4 |
| E&E | 151,771 | 9.6 | 39,624 | 4.7 | 0.0699 | -2.4 |
| Machinery and Equipment | 100,940 | 3.0 | 37,720 | 2.6 | 0.0935 | -0.2 |
| Transport Equipment | 124,266 | 3.2 | 38,933 | -5.4 | 0.0763 | -8.3 |
| Furniture | 47,031 | 3.6 | 23,041 | 6.0 | 0.1373 | 2.0 |
| Other Manufacturing | 67,095 | -7.5 | 37,530 | 16.6 | 0.1730 | 25.7 |

Source : Malaysia Industrial Productivity Database (MIPD), MPC.

# APPENDIX B.2: Statistics by Services Sub-sectors, 2016

| | LABOUR PRODUCTIVITY | | UNIT LABOUR COST PER EMPLOYEE | | UNIT LABOUR COST | |
|---|---|---|---|---|---|---|
| | LEVEL (RM) | GROWTH (%) | LEVEL (RM) | GROWTH (%) | RATIO | GROWTH (%) |
| Services | 68,166 | 2.8 | 26,050 | 2.3 | 0.382 | -0.5 |
| Utilities | 185,146 | -8.6 | 13,000 | -20.6 | 0.070 | -13.1 |
| Wholesale and retail trade | 68,089 | 3.2 | 18,736 | 5.6 | 0.275 | 2.3 |
| Food & beverage and accommodation | 24,952 | -2.3 | 14,214 | 3.1 | 0.570 | 5.5 |
| Transportation and storage | 62,510 | 3.0 | 35,222 | 3.2 | 0.563 | 0.2 |
| Information and communication | 313,383 | 11.0 | 29,571 | 10.8 | 0.094 | -0.2 |
| Finance & Insurance | 217,060 | 4.7 | 32,319 | 1.0 | 0.149 | -3.5 |
| Real estate & Business services | 44,429 | 3.4 | 25,822 | 3.8 | 0.581 | 0.4 |
| Government services | 62,028 | 5.3 | 28,785 | -2.4 | 0.464 | -7.3 |
| Health | 35,223 | 5.4 | 20,934 | 3.2 | 0.594 | -2.1 |
| Education | 50,520 | 1.5 | 34,649 | -0.9 | 0.686 | -2.4 |
| Other services | 75,628 | 9.8 | 10,296 | -1.2 | 0.136 | -10.0 |

Source : Malaysia Industrial Productivity Database (MIPD), MPC.

# APPENDIX C.1: Main Initiatives to Support Research and Innovation Under Eleventh Malaysia Plan

| MAIN INITIATIVES | ACTIONS TO BE IMPLEMENTED |
|---|---|
| **ENTERPRISE INNOVATION** | |
| **Strengthen governance mechanisms** | – Establish the Research Management Agency to decrease the number of overlaps and low-impact programmes<br>– Expand the 1Dana Portal to become a one-stop archive for R&D&C&I projects (i.e. facilities, intellectual property or different expertise available)<br>– Promote an innovative corporate culture in medium-sized and large companies to enable them to be sustainable and gain a competitive advantage using different existing programmes (i.e. National Corporate Innovation Index, Intellectual Capital Future Check) |
| **Enhance demand-driven and applied research** | – Streamline public sector funding for R&D&C&I projects to ensure better returns<br>– Reinforce funding of applied research for resolving national problems and improving well-being (i.e. climate change), and contributing to the development of new products and industries<br>– Enforce demand-driven research using science-industry strategic partnerships in order to improve companies' productivity and competitiveness as well as the R&D commercialisation rate |
| **Development and intensification of industry-academia collaboration through intermediaries** | – Continue simplification of science-industry collaboration through newly created industry-led intermediaries: Steinbeis, SIRIM-Fraunhofer and PlaTCOM<br>– Enforce contract research conducted through the Ministry of Education's Public Private Research Network<br>– Create a collaborative platform for a cluster of healthcare firms and research-intensive companies based at the Universiti Kebangsaan Malaysia and provide clear guidelines for remuneration, equipment use and intellectual property ownership |
| **Promote and increase private financing of R&D&C&I** | – Strengthen the participation of private financial institutions, venture capital and angel investors in R&D projects to decrease the share of public participation<br>– Expand Technology Park Malaysia Angel Chapter and SME Investment Programme<br>– Investigate possibilities for equity crowdfunding to broaden the number of investors and give more opportunities to innovative start-ups and SMEs to receive financing<br>– Improve the innovation environment by giving a transparent explanation of risk mitigation and management challenges |
| **INNOVATION IN THE MANUFACTURING SECTOR** | |
| **Leverage intermediaries to increase innovation and R&D activities** | - Use intermediaries such as Steinbeis Malaysia Foundations, SIRIM-Fraunhofer and PlaTCOM Ventures Sdn. Bhd. to leverage existing research institutions to improve the R&D component in products and processes<br>- Promote the 1-InnoCERT programme bt SME Corporation to complement intermediates partnership |

| MAIN INITIATIVES | ACTIONS TO BE IMPLEMENTED |
|---|---|
| **ENTERPRISE INNOVATION** | |
| **Leverage industry associations and chambers of commerce to drive innovation and productivity** | - Use industry associations and chambers of commerce as a platform to disperse information on industry-related policies, obtain feedback and conduct specific trainings |
| **Promote intellectual property rights sharing and protection** | - Develop IP sharing and protection guidelines to protect interests and ensure fair returns to researchers and manufacturers<br>- Introduce a 'pay per use' mechanism in public laboratories and R&D facilities in order to both reduce R&D costs for manufactures and small research institutes and increase the returns of facilities' investments |
| **Adopt life cycle assessment** | - Encourage manufacturers to use green production processes to recover materials from waste to reduce the use of raw materials and develop the remanufacturing industry |
| **Streamline industry development to multilateral environmental commitments** | - Increase strategic co-operation with developed economics in the field of technology, innovation and R&D to ensure compliance with environmental requirements and reduce compliance-related costs |
| **Introduce performance-based incentives** | - Introduce incentives that will have clear key performance indicators, a validity period and exit policy to increase productivity and stimulate innovations |
| **SOCIAL INNOVATION TARGETS** | |
| **Strengthen collaboration using a whole-society approach** | - Shift from a government-centralised approach to society level in order to improve collaboration between all levels of society (government, non-governmental organisations, citizens, etc)<br>- Establish a task force that will include ministries, non-governmental organisations, community-based organisations and private sector representatives that will co-ordinate the design, planning and delivery of social service programmes<br>- Define clear key performance indicators, monitoring and evaluation tools to improve the expertise of non-governmental organisations and community-based organisations |
| **Develop a social financing model** | - Facilitate public-private partnerships to promote private sector investments in social services delivery<br>- Introduce a 'payment by results' approach where investors receive reimbursement from the government when th agreed results are achieved |
| **Promote higher order thinking skills to develop a dynamic society** | - Scale-up existing higher order thinking skills programmes with the purpose of improving the critical thinking, leadership and communication skills of the current and future workforce<br>- Give priority to science and mathematics in education in line with the 'Higher Education Blueprint 2015-25' (MOE, 2015)<br>- Increase the number of higher order thinking skills to 10,000 schools by 2020 |

*Source: OECD Reviews of Innovation Policy : Malaysia 2016*

# APPENDIX C.2: Main Funding Schemes to Support Research and Innovation in Malaysia

| PHASE | MINISTRY | MAIN SUPPORT SCHEME | MAIN BENEFICIARIES AND TARGETS |
|---|---|---|---|
| **Basic research** | Ministry of Higher Education | Exploratory Research Grant Scheme (ERGS) | Grants for academics for supporting untested ideas, projects in emerging areas, new approaches (up to three years, MYR 100,000 per year) |
| | | Fundamental Research Grant Scheme (FRGS) | Grants to academics for fundamental research (up to three years, MYR 250,000 maximum per project) |
| | | Long Term Research Grant Scheme (LRGS) | Grants to academics for fundamental research that involves extensive scope and longer duration and requires high commitment approaches (up to five years, MYR 3 million per year) |
| **Applied R&D** | Ministry of Communications and Multimedia | Creative Industry Development Fund (CIDF-SKMM) | Loans to Malaysian small and medium-sized enterprises (SMEs) for the publication, purchase of assets or other related activities for the commercialisation of local creative industries (MYR 5 million per project) |
| | Ministry of Health | Ministry of Health Research Grant | Grants to research and development projects whose goal is to improve health and enhance health service delivery according to national and Ministry of Health priorities |
| | Ministry of Higher Education | Prototype Development Grant Scheme (PRGS) | Grants to public and private institutions' academics whose research output requires prototype development, including proof of concept, evaluation, up-scaling, pre-clinical testing and field testing (up to two years, MYR 500,000 maximum per project) |
| | Ministry of Science, Technology and Innovation | Science Fund | Grants for research scientists and engineers from government research institutions, government STI agencies, and public and private institutions of higher learning with accredited research programmes which carry out basic research R&D projects contributing to the discovery of new ideas and the advancement of knowledge in applied sciences, focusing on high impact and innovative research (up to 2.5 years, MYR 500,000 maximum per project) |

| PHASE | MINISTRY | MAIN SUPPORT SCHEME | MAIN BENEFICIARIES AND TARGETS |
|---|---|---|---|
| **Pre-Commercialisation** | Ministry of Finance | Cradle Investment Program Catalyst (CIP Catalyst) – Pre Seed | Conditional grants for entrepreneurs and individuals with innovative, technology-based ideas in the ICT, non-ICT and high growth technology industries (up to one year, MYR 150,000 maximum per application). |
| | | Cradle Seed Venture Fund 1 (CF1) | Funding of early-stage technology start-ups with high growth potential to cultivate an entrepreneurship ecosystem and innovation and stimulate the local economy through job creation (MYR 3 million maximum per company) |
| | | University-CIP Catalyst (U-CIP Catalyst) | Conditional grants for researchers and inventors, private and public universities, colleges, institutes of higher education and commercialisation units with technology-based ideas in the ICT, non-ICT and high growth technology industries (up to one year, MYR 150,000 maximum per application) |
| | Ministry of Science, Technology and Innovation | Pre-commercialisation Fund (InnoFund) | Funding for micro-business and individuals (Enterprise Innovation Fund ) as well as for non-governmental organisations and community groups (Community Innovation Fund) that are involved in the development or improvement of new or existing products, processes or services with elements of innovation (12-18 months, MYR 500,000 maximum per project; MYR 50,000 for individuals) |
| | | Pre-commercialisation Fund (TechnoFund) | Funding to researchers, SMEs, institutions of higher learning, research institutes and STI agencies involved in the development of new technologies, intellectual property registration procedures and R&D outputs commercialisation (up to 30 months, MYR 3 million maximum per application). Priority is given to projects supported by the ScienceFund or those having InnoCert recognition |
| | Ministry of Communications and Multimedia | Product Development and Commercialisation (PCF) | Funding for Malaysia Status Companies involved in market-driven, innovative product development with high commercial potential and realistic technical and commercial targets (up to 18 months, MYR 750,000 maximum per project) |

*Source: OECD Reviews of Innovation Policy: Malaysia 2016*

# LIST OF ACRONYM AND ABBREVIATION

| | |
|---|---|
| 10MP | Tenth Malaysia Plan |
| 11MP | Eleventh Malaysia Plan |
| 1Master | 1Malaysia Skills Training and Enhancement for the Rakyat |
| 1MOCC | 1Malaysia One Call Centre |
| 9MP | Ninth Malaysia Plan |
| A*STAR | Agency for Science, Technology and Research |
| ADTEC | Advanced Technology Training Centre |
| AI | Auto Insert |
| AIM | Agensi Inovasi Malaysia |
| AMS | Automatic Meat Slicing |
| APO | Asian Productivity Organisation |
| APS | Automation Paddle Wheel System |
| AWS | Air Watering System |
| BEC | Business Excellence Community |
| BIM | Building Information Modelling |
| BLESS | Business Licensing Electronic Support System |
| CAD | Computer Aided Design and Drafting |
| CAGR | Compounded Annual Growth Rate |
| CIAST | Centre for Instructor and Advanced Skills Training |
| CIDB | Construction Industry Development Board |
| CIM | Computer Integrated Manufacturing |
| CITP | Construction Industry Transformation Programme |
| CO2 | Carbon Dioxide |
| CPO | Crude Palm Oil |
| CREST | Collaborative Research in Engineering, Science and Technology |
| CURE | Cutting Red Tape |
| DASH | Damansara–Shah Alam Highway |
| DFTZ | Digital Free Trade Zone |
| DMO | Delivery Management Office |
| DOSH | Department of Occupational Safety and Health |
| E&E | Electrical and Electronics |
| EFTPOS | Electronic Funds Transfer at Point of Sale |
| EPU | Economic Planning Unit |
| EGDI | e-Government Development Index |
| EPX | Electronic Payment Exchange |
| ETP | Economic Transformation Programme |
| EU | European Union |
| F&B | Food and Beverage |
| FDI | Foreign Direct Investment |
| FFB | Fresh Fruit Bunches |
| GDP | Gross Domestic Product |
| GFCF | Gross Fixed Capital Formation |
| GMI | German Malaysia Institute |
| GNI | Gross National Income |
| GRP | Good Regulatory Practice |
| GTP | Government Transformation Programme |
| GVC | Global Value Chain |
| HDPE | High Density Polyethylene |
| HEARTS | Housewives Enhancement and Reactivate Talent Scheme |
| HM | Hot-Melt Adhesives |
| HOT | Higher Order Thinking |
| HRDF | Human Resource Development Fund |
| IB | International Baccalaureate |
| IBN | Institute of Bioengineering and Nanotechnology |
| IBS | Industrialised Building System |
| ICC | Innovative and Creative Circle |
| ICT | Information and Communication Technology |
| IHPC | Institute of High Performance Computing |

| | |
|---|---|
| IKM | Institut Kimia Malaysia |
| IMD | International Institute for Management Development |
| IME | Institute of Microelectronics |
| IMRE | Institute of Materials Research and Engineering |
| IoT | Internet of Things |
| iSHARP | Integrated Shrimp Aquaculture Park |
| IT | Information Technology |
| i-Think | Innovative Thinking |
| ITM | Industry Transformation Maps |
| KADA | Kemubu Agricultural Development Authority |
| KETS | Key Enabling Technologies |
| KLEMS | Capital, Labour, Energy, Material and Services |
| KPI | Key Performance Indicators |
| LDPE | Low Density Polyethylene |
| LTE | Long Term Evolution |
| MADA | Muda Agricultural Development Authority |
| MaGIC | Malaysia Global Innovation and Creativity Centre |
| MARDI | Malaysian Agricultural Research and Development Institute |
| MATRADE | Malaysia External Trade Development Corporation |
| MBEF | Malaysia Business Excellence Framework |
| MBL | Modernising Business Licensing |
| MIGHT | Malaysian Industry-Government Group for High Technology |
| MIMS | Melon Industrial Management Solution |
| MIPD | Malaysia Industrial Productivity Database |
| MNE | Multinational Enterprises |
| MOHR | Ministry of Human Resources |
| MPB | Malaysia Productivity Blueprint |
| MPC | Malaysia Productivity Corporation |

| | |
|---|---|
| MRT | Mass Rapid Transit |
| MWI | Malaysia Well-Being Index |
| NAP3 | Third National Agriculture Policy |
| NBOS | National Blue Ocean Strategy |
| NCCIIC | National Construction Industry Information Centre |
| NDPC | National Development Planning Committee |
| NGO | Non-Government Organisation |
| NIHL | Noise Induced Hearing Loss |
| NKEA | National Key Economic Areas |
| NPDIR | National Policy on the Development and Implementation of Regulations |
| NTP | National Trade Platform |
| OECD | Organisation for Economic Co-operation and Development |
| OER | Oil Extraction Rate |
| ONS | Office for National Statistics |
| PBT | Local Government Authority |
| PKPA | Foreign Personnel Skills Recognition |
| PP | Polypropylene |
| PPRN | Public-Private Research Network |
| PSDC | Penang Skills Development Centre |
| PSMB | Pembangunan Sumber Manusia Berhad |
| PwC | Price Waterhouse Coopers |
| QSP | Quality, Safety and Professionalism |
| R&D | Research and Development |
| RAM | Rating Agency Malaysia |
| RAPID | Petronas Refinery and Petrochemical Integrated Development |
| RC | Regulator Coordinators |
| RI | Research Institute |
| RIA | Regulatory Impact Analysis |
| RIS | Regulatory Impact Statement |
| RNF | Regulatory Notification Form |

| | |
|---|---|
| RTG | Ready-To-Go |
| RURB | Reducing Unnecessary Regulatory Burden |
| SBA | Solvent-Based Adhesives |
| SCADA | Supervisory Control and Data Acquisition |
| SEDS | Socio-Economic Development Strategies |
| SFC | Sterilised Fresh Fruit Bunches Conveyor |
| SIIMF | SIRIM Industrial Innovation Model Fund |
| SIRIM | Scientific and Industrial Research Institute of Malaysia |
| SKK1M | 1Malaysia Skills and Development Scheme |
| SME | Small and Medium Enterprises |
| SMM | Sharp Manufacturing Corporation (M) Sdn. Bhd. |
| SNTP | Singapore National Trade Plan |
| SOC | System on a Chip |
| SPH | Smart Productivity Hub |
| SSL | Self-Sufficiency Level |
| SSO | Single Sign-On |
| STEM | Science, Technologies, Engineering and Mathematics |
| SUKE | Sungai Besi-Ulu Kelang Elevated Expressway |

| | |
|---|---|
| TAC | Trade Associations and Chambers |
| TAP | Technology Adoption Programme |
| TFP | Total Factor Productivity |
| TI | Transparency International |
| TKPM | Permanent Food Production Park |
| TRX | Tun Razak Exchange |
| TVET | Technical and Vocational Education and Training |
| UK | The United Kingdom |
| UKCeMGA | UK Centre for the Measurement of Government Activity |
| ULC | Unit Labour Cost |
| UPS | UYM Plant Supplement |
| UTC | Urban Transformation Centres |
| UTM | Universiti Teknologi Malaysia |
| VS | Vertical Steriliser |
| WBA | Water-Based Adhesive |
| WCE | West Coast Expressway |
| WCY | World Competitiveness Yearbook |
| WG | Working Group |
| YATSP | Yayasan AMIR Trust Schools Programme |
| YES | Year End Sales |

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