

The Future of ASEAN *Time to Act*



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Executive Summary

ASEAN - A Unique Growth Story

The year 2017 marked the 50th anniversary of ASEAN, (the Association of Southeast Asian Nations), which is a unique achievement considering the conflicts and poverty which characterised the region in the first half of the 20th century. Since the inception of the ASEAN 5 (Indonesia, Malaysia, Philippines, Singapore and Thailand) in 1967, the association has not only doubled in membership to include Brunei Darussalam, Vietnam, Lao PDR, Myanmar and Cambodia, but has also successfully weathered both the Asian financial crisis of 1997 and the global economic crisis of 2008-09, to make it the sixth-largest economy globally at present. Along this remarkable growth journey, ASEAN has managed to balance economic growth with human development to lift millions of people out of poverty across the entire region.

ASEAN's growth has been powered by its people, with the establishment of a formidable labour force and the subsequent creation of a wealthier middle class driving domestic consumption. More than 100 million people are estimated to have joined ASEAN's workforce over the past 20 years and another 59 million are projected to be added by 2030, making ASEAN the third-largest labour force worldwide, behind only China and India. Strengthening employment has fuelled the growth of the ASEAN middle class, which is associated with a higher willingness to pay for quality, convenience, and choice, driving the demand for more discretionary and aspirational product categories in the coming years. A growing and more advanced workforce, together with increasing local consumption, has enabled ASEAN to continue to attract substantial FDI despite rising volatility in capital flows worldwide – thus establishing itself as the fourth most popular investment destination globally, and the second-largest destination in Asia after China.

Although ASEAN as a collective group of nations has made some impressive progress in the past 50 years, regional variations remain in the economic and social status of its individual markets. At present, ASEAN's economy remains highly concentrated in its three leading markets (Indonesia, Thailand, and the Philippines), which collectively account for more than 60 percent of the regional GDP. From a GDP per capita perspective, Singapore and Brunei Darussalam led the group with figures at 13 times and seven times the regional average, respectively, in 2016. On the other hand, although CLMV (Cambodia, Lao PDR, Myanmar and Vietnam) markets remain among the least developed (by GDP per capita) in the region, they are well poised for growth, recording some of the strongest GDP growth rates (more than 6 percent) in 2016. Acknowledging these variations, ASEAN established the three pronged ASEAN Community agenda in 2015, which focuses not only on economic aspects (AEC), but also on political security (APSC) and socio-cultural issues (ASCC) such as health and education. The AEC has made some progress toward its goals, including most notably a reduction in trade tariffs where almost 99 percent of tariff lines in ASEAN are expected to be at 0 percent levels by the end of 2018. However, across such a vast and diverse set of nations, these measures constitute merely the beginning of what is needed in order to facilitate economic growth and human development across ASEAN.

Time to Act

A number of immediate challenges, including a slowdown in short-term economic growth, weak workforce productivity, over dependence on external trade and major voids in infrastructure and national institutions have raised questions about the sustainability of ASEAN's growth story. Underlying these challenges is the fact that the share of population aged 65 and older is projected to reach close to 2.5 times the current levels in Asia as a whole by 2050. Consequently, the demographic window to push growth across many ASEAN markets is closing, although at different rates. Therefore, ASEAN as an economic bloc and its individual countries need to make reforms with a sense of urgency, to maximise the growth impact driven by their current demographic dividend, and to prepare themselves for longer-term growth after this window closes.

ASEAN and its individual nations, need to progress from an era of passive growth and take more proactive measures to continue to attract investments, develop its institutions, and evolve its people and technological capabilities. The private sector will also have a major role to play in strengthening the region's growth prospects over the coming years, but this will require companies not only to provide new products and services, to meet varying consumer preferences, but also to work more closely with governments to develop the right conditions for businesses to prosper.

Going forward, we see significant growth opportunities for the private sector across a number of industries in ASEAN — including automotive, financial services, consumer goods, medical devices, fuel refining, telecommunications and transportation. However, given the dynamics and challenges of ASEAN, along with the ever evolving and demanding needs of

consumers in the region, companies will need to adopt innovative strategies to succeed. As we will see in the following chapters, there are a number of common themes to these new strategies, such as localised production and the development of regional hubs to serve ASEAN consumers (automotive and medical devices), as well as the adoption of digital capabilities to produce and transport goods, and serve and communicate with consumers (e.g. financial services, consumer goods and telecommunications). Partnerships and alliances together with vertical integration will also play a more significant role – particularly cross-sector and with industry disruptors (Fintech) – as companies try to stay relevant and competitive, and meet consumers expectations in a profitable manner (e.g. fuel refining, transportation).

ASEAN can be proud of what it has achieved in the past 50 years, but the time of passive growth is over. Global trade and consumer markets are evolving, and therefore ASEAN and its individual nations need to acknowledge this and proactively develop business environments which are conducive to local production, intra-ASEAN trade and serving local consumers. This will take time, and so companies looking to grow across the region need to be equally proactive and innovative in developing and executing strategies which will fulfil the potential of ASEAN. Global growth needs ASEAN to act now and grab hold of its future.



David Wijeratne

Partner, Growth Markets Centre Leader
PwC Singapore



Chapter 1: The ASEAN journey

A story for growth

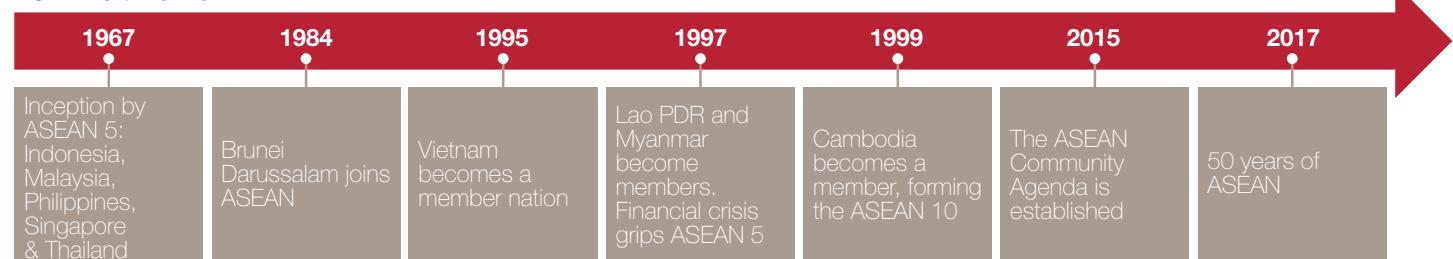
In 2017, ASEAN (the Association of Southeast Asian Nations) celebrated 50 years of peace and prosperity, an achievement which is all the more remarkable given the diversity and conflict which characterised the region over the first half of the 20th century. Over the past half century, ASEAN has successfully weathered economic headwinds such as the Asian financial crisis of 1997 and the global economic meltdown of 2008-2009, maintaining strong and steady economic progress, even after doubling its membership to 10 member nations by 1999. Since then, the region's GDP has more than quadrupled, from US\$577 billion in 1999 to US\$2,551 billion in 2016, making it the sixth-largest economy worldwide.¹

What is ASEAN?

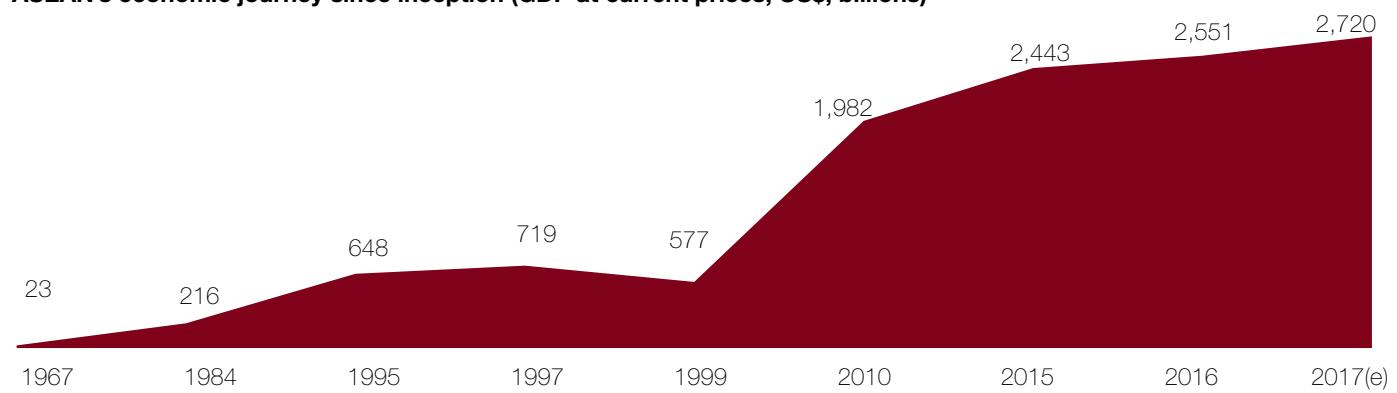
The Association of Southeast Asian Nations, or ASEAN, was established in August 1967 with the signing of the ASEAN Declaration (or the Bangkok Declaration) by the five founding members: Indonesia, Malaysia, the Philippines, Singapore, and Thailand — also known as the ASEAN 5. Brunei Darussalam joined ASEAN in January 1984, followed by Vietnam in July 1995, Lao PDR and Myanmar in July 1997, and Cambodia in April 1999 — together making up the current 10 member states, or the ASEAN 10.²

Figure 1.1: ASEAN's Timeline since Inception

ASEAN's timeline



ASEAN's economic journey since inception (GDP at current prices, US\$, billions)



Source: ASEAN Secretariat, 2017; WEO Database, IMF, October 2017

Lifting nations out of poverty

Among the most notable achievements over these years has been ASEAN's ability to drive economic prosperity across its 10 member nations, thereby lifting millions out of poverty. Notwithstanding the inclusion of new low-income members and the onslaught of the Asian financial crisis in the late 1990s, ASEAN's per capita GDP crossed US\$4,000 in 2016 (in current prices), 33 times the level in 1967 (US\$122). As a consequence, only 14 percent of ASEAN's population was estimated to still be living below the poverty line (US\$1.25 purchasing power parity per day) when last assessed in 2015, as compared with almost half the population in 1990. In achieving this, ASEAN surpassed its U.N. Millennium Development Goal (MDG), which targeted reducing poverty levels to 24 percent by 2015. What is more remarkable is that this reduction was not restricted to the major economies, but also included the less developed CLMV markets (Cambodia, Lao PDR, Myanmar, and Vietnam), where poverty rates have fallen from 66 percent of the population in 1990 to 18 percent in 2015.³

Quality of life

Along its growth journey, ASEAN has been able to balance economic growth with human development, leading to notable improvements in living standards in the past 50 years. In this regard, improvements in health and education have been key to enabling social prosperity within the region. As highlighted by the United Nations Development Programme, development "is about expanding the richness of human life, rather than simply the richness of the economy in which human beings live."⁴

Improvements in healthcare access and living conditions (the availability of safe drinking water, improved sanitation facilities, etc.) have led to a sharp reduction in the under-5 mortality rate in ASEAN, reaching a figure of 26 per 1,000 live births in 2016, against a global average of 41. This reduced infant mortality rate, combined with a dramatic increase in life expectancy, rising from 56 years in 1967 to 71 years by 2016, has built ASEAN's demographic dividend, which will be key to sustaining its economic growth in the short to medium term.⁵

Education levels have also improved, with net enrolment in primary education in the region touching 96 percent in 2016, far exceeding the global average of 89 percent — and contrary to expectations, the CLMV markets are leading the way with an enrolment rate of 98 percent in 2016, growing by more than 10 percentage points since 2010 (87 percent). However, whilst this positive trend has begun to spread to



secondary and tertiary education, there is still some way to go yet. Net secondary education enrolment percentages in leading ASEAN economies (Indonesia 75 percent, the Philippines 67 percent, Malaysia 68 percent) still lag those in more mature emerging markets such as Poland (92 percent) and Brazil (81 percent), and this issue is even more acute in the CLMV markets (Lao PDR 54 percent, Myanmar 48 percent). And even though enrolment in tertiary education has doubled since the year 2000 and the ASEAN average for gross tertiary enrolment (36 percent) is higher than that of markets such as India (27 percent) and South Africa (19 percent), it does remain lower than other emerging markets, such as China (43 percent), Brazil (51 percent), and Poland (68 percent).⁶

Therefore, if ASEAN is to continue its growth story and achieve its true potential, it cannot be satisfied with enabling just universal primary education — it must also drive access and enrolment all the way through to tertiary education, promoting both vocational and professional degree programmes.

“*While ASEAN currently enjoys a number of positive tailwinds, the delivery of continued economic growth, and hence development, is not necessarily guaranteed. Governments, for instance, need to reaffirm and deepen commitments to improving the business environment while industry, small and large, must invest in future skills and capabilities if they are to capture higher value, benefit from the ongoing digital revolution and upgrade national industrial structures. ”*

Andrew Staples
Editorial Director
The Economist Corporate Network
The Economist Group

A diverse group

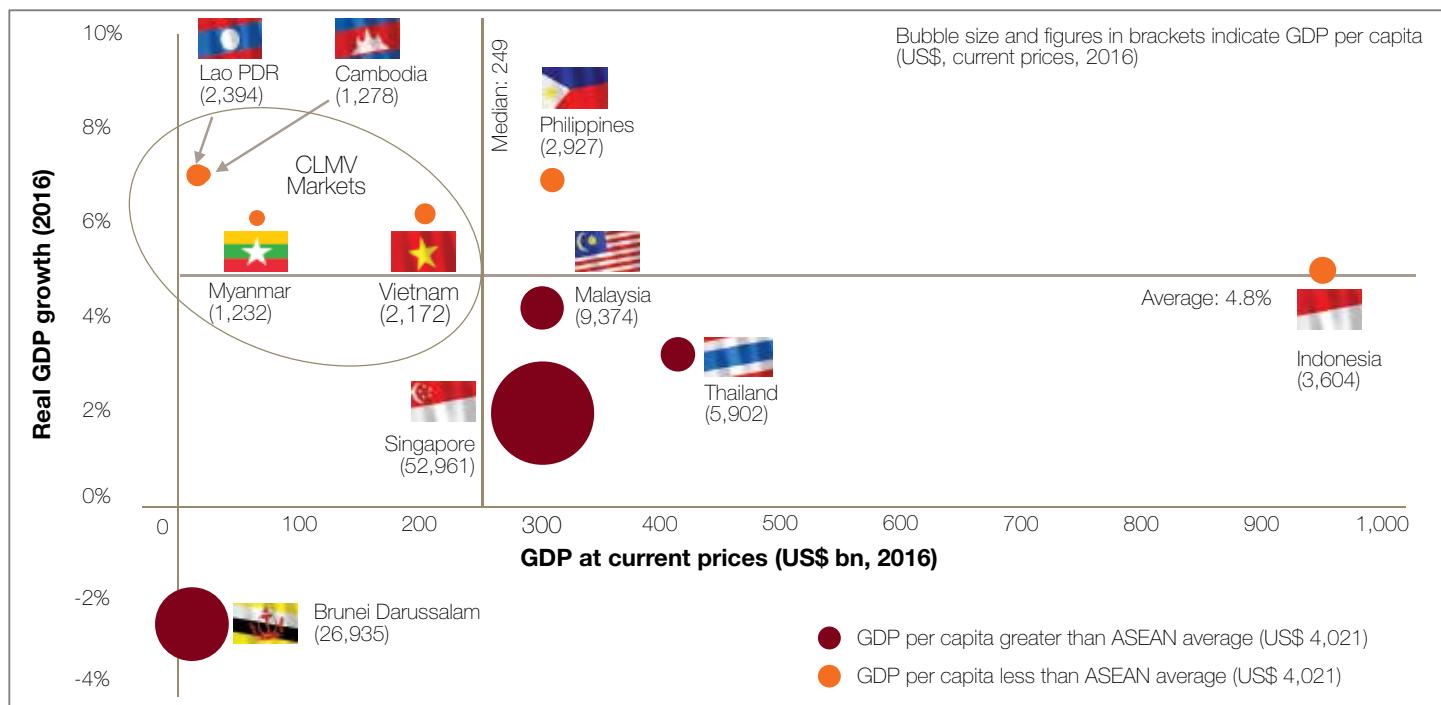
Although ASEAN as a group has made some impressive progress in the past 50 years, regional variations remain in the economic and social status of the individual markets. Understanding these variations between individual countries will be essential for both governments within ASEAN and corporations, if they are to identify and prioritise targets to achieve further growth. Private-sector players will need to view existing economic and social gaps within less developed parts of ASEAN as opportunities for growth, targeting less penetrated markets through new growth strategies and by developing stronger capabilities that could enable profitable growth, as discussed in the chapters that follow.

At present, ASEAN’s economy remains highly concentrated in its three leading markets (Indonesia, Thailand, and the Philippines), which collectively accounted for 64 percent of the regional GDP in 2016. Variations in GDP per capita are also significant; Singapore and Brunei Darussalam led the group with GDP per capita figures at 13 times and seven times the regional average, respectively, in 2016. On the other hand, although CLMV markets remain among the least developed (by GDP per capita) in the region, they are well poised for growth, recording some of the strongest GDP growth rates (between 6 and 7 percent) in 2016.⁷

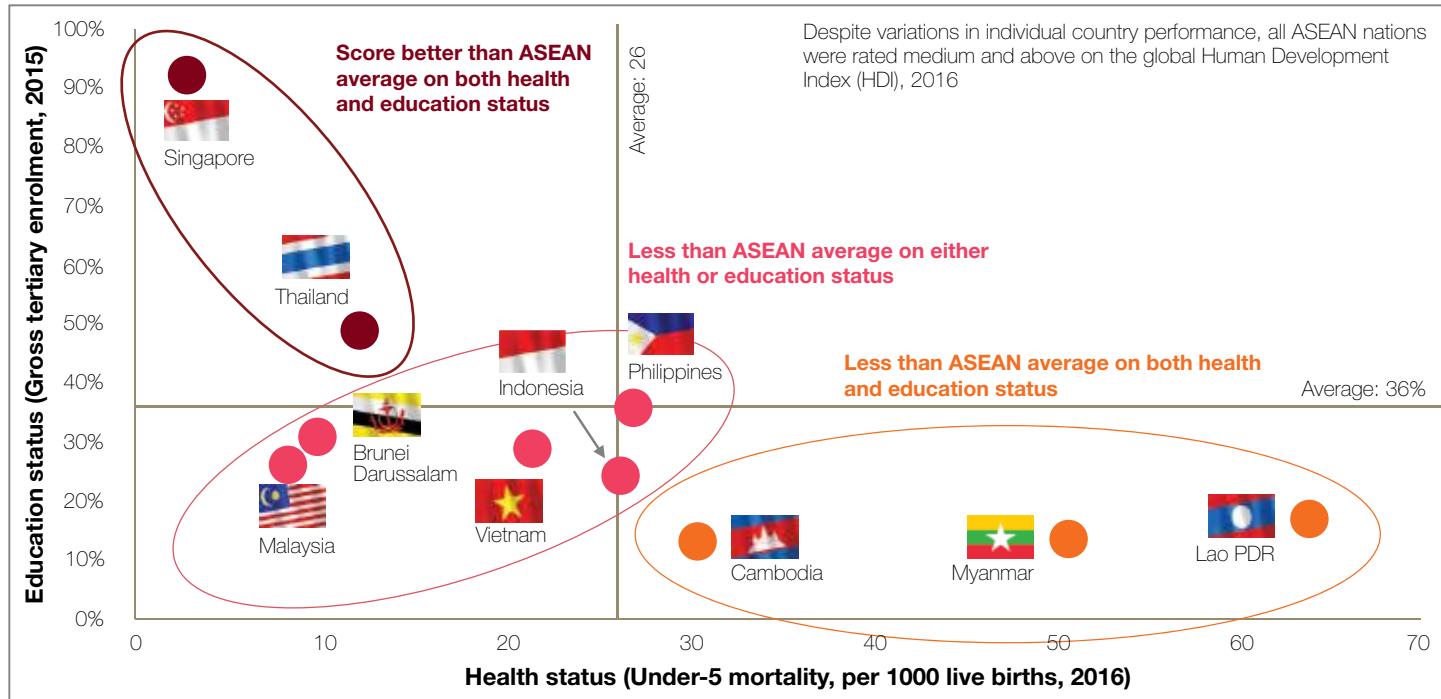
This variation is even more pronounced from a human development perspective, where Singapore and Thailand score significantly well on both health and education metrics; Brunei Darussalam, Vietnam, Malaysia, the Philippines, and Indonesia are above the global average in either under-5 mortality or tertiary education enrolment; and the CLM markets show significant scope for improvement across both areas.⁸

Figure 1.2: Economic and Social Variations in ASEAN Markets

Economic development of ASEAN nations



Human development of ASEAN nations



Source: ASEAN Secretariat, 2017; WEO Database, IMF, October 2017; World Bank, 2018

Acknowledging the need to achieve more cohesive growth through greater regional cooperation, ASEAN established the ASEAN Community agenda in 2015, aimed at establishing a deeper and more unified ASEAN identity by 2025. Contrary to common belief, the ASEAN community agenda looks beyond purely economic aspects, and comprises three key pillars, as detailed in Figure 1.3.

1. **ASEAN Political–Security Community (APSC):** To increase political and security cooperation and strengthen ASEAN's capacity in responding to regional and international challenges.
2. **ASEAN Economic Community (AEC):** To develop an integrated, cohesive, and inclusive ASEAN economy that supports high economic growth, is resilient to global economic volatilities, and narrows the development gap between member nations.
3. **ASEAN Socio-Cultural Community (ASCC):** To improve the quality of life of people through cooperation that is people centred, is socially responsible, and promotes sustainable development.

Figure 1.3: Focus Areas — Three Pillars of the ASEAN Community

| Focus areas | 1 ASEAN Political–Security Community | 2 ASEAN Economic Community | 3 ASEAN Socio-Cultural Community |
|-------------|---|--|--|
| | <ul style="list-style-type: none">• Establish programmes to strengthen the judiciary and legal infrastructure.• Establish benchmarks in governance and share best practices.• Identify mechanisms to combat corruption, promote human rights.• Promote understanding of defence policies and security perceptions.• Strengthen research on peace, conflict management, and resolution.• Strengthen humanitarian assistance, post-conflict capacity building.• Intensify counter-terrorism efforts, combat transnational crimes. | <ul style="list-style-type: none">• Facilitate seamless movement of goods, services, capital, and labour.• Improve competitiveness by fostering knowledge creation and protection, and by strengthening regulations.• Enhance cooperation in Transport, ICT, E-commerce, Energy, Agriculture, Tourism, Healthcare, Minerals, Science & Technology.• Strengthen the role of the private sector, MSMEs, public-private partnerships, and the civil society in ASEAN integration.• Integrate ASEAN with the global economy through trade and economic partnership agreements. | <ul style="list-style-type: none">• Initiate multi-sectoral and multi-stakeholder engagements to build a more inclusive ASEAN community.• Address issues related to health, social protection, women's empowerment, poverty eradication, and education.• Establish a community that balances environmental sustainability with social and economic development.• Enhance capacity to respond to natural disasters, health hazards (biological, chemical, nuclear), and climate change.• Build institutions that push creativity, innovation, and entrepreneurship. |

Source: ASEAN Community Blueprints, 2015

Focusing on the economic aspects, since its creation, the AEC has made some progress toward its goals, including most notably a reduction in trade tariffs^a, where now almost 96 percent of tariff lines^b in ASEAN are at 0 percent levels, and this is expected to rise from 96 to 98.7 percent in 2018. Furthermore, almost 70 percent of intra-ASEAN trade flows are also now tariff free. Other achievements include the ongoing harmonisation of technical standards (across segments such as electronics and electrical equipment, cosmetics, and pharmaceutical products); a drive towards greater labour mobility accomplished by recognising experience and accreditations across ASEAN for eight professions (engineering, nursing, architecture, medicine, dentistry, tourism, surveying and accountancy); the finalisation of a 10-year action plan (ASEAN IPR Action Plan 2016-2025) to boost innovation; and the documentation of regional guidelines on competition policy.⁹

However, across such a vast and diverse set of nations, these measures constitute merely the beginning of what is needed in order to facilitate economic growth and human development across ASEAN. Foreign companies operating in the region would argue that there is still much to do in order to facilitate intra-ASEAN trade to fulfil its potential on the global stage as a powerful trading bloc. ASEAN governments, however, see these goals through a domestic lens, which is understandable given the developing economic maturity of most of these countries. Nevertheless, in a global economic environment which is becoming increasingly competitive and protectionist, ASEAN needs to move on from the era of passive growth and take more proactive measures to attract investments, develop strong institutions, and evolve its people and technological capabilities.

“

ASEAN's impact has been significant. ASEAN is a partnership focused on the great economic concerns of our time such as trade, infrastructure, policy and security. This partnership has evolved to include social prosperity benefits of health, employment and education - the foundations of the social contract. The ASEAN partnership will continue to serve the member countries as they face these challenges together. ”

Irhoan Tanudiredja

Territory Senior Partner

PwC Indonesia

“

PwC's latest World in 2050^c report suggests that ASEAN economies should continue to be relatively strong performers in the long run. But fulfilling this potential will depend on making further progress on infrastructure investment, education and skills, innovation and institutional development. ”

John Hawksworth

Chief Economist

PwC UK

^a “Tariffs” are customs duties levied on merchandise imports, to give a price advantage to locally produced goods over similar goods which are imported (World Trade Organization).

^b “Tariff lines” are products defined at a highly detailed level for the purpose of setting import duties (World Trade Organization).

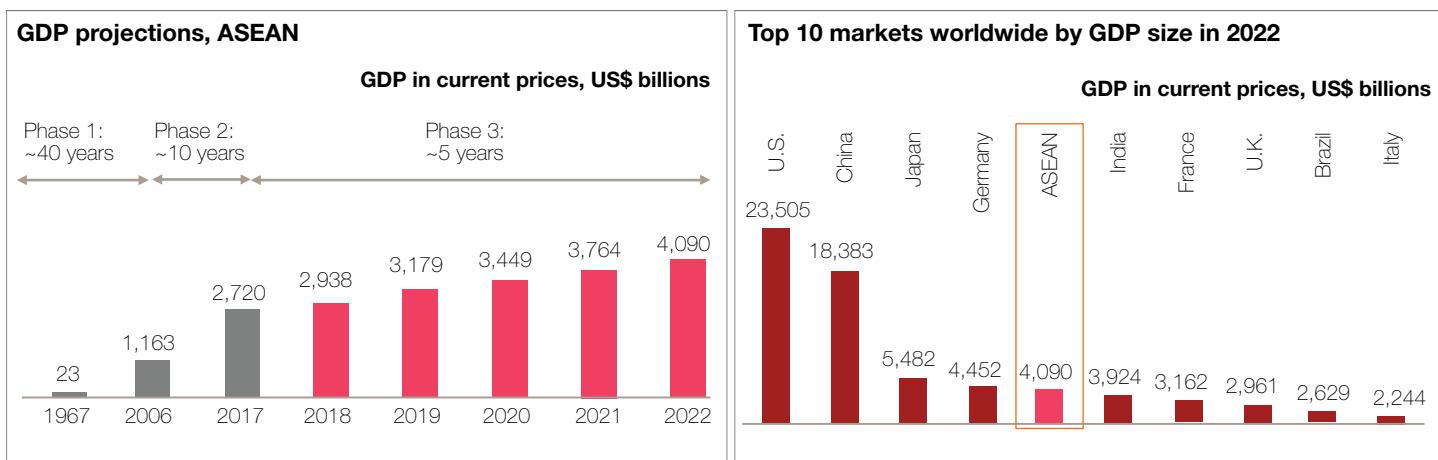
^c PwC report titled, The World in 2050, The long view – how will the global economic order change by 2050?, February 2017

Significant growth in the short term

ASEAN continues to move strongly on the growth path. Its GDP is projected to touch US\$4 trillion by 2022, when it is forecast to become the fifth-largest economy worldwide. Going forward, we see the onset of a significant phase in ASEAN's growth journey over the next five years, a phase that is unprecedented in ASEAN's history in terms of the impact being achieved

in such a short period of time. This will further translate into significant growth opportunities across sectors, as detailed in the following chapters of this report. This growth will be driven primarily by emerging markets within the region, which are witnessing major policy reforms and infrastructure investments that will boost their respective economies in the coming years.¹⁰ (See following sections on Growth Leaders in ASEAN)

Figure 1.4: Economic Growth Phases in ASEAN



Phase 1:

Represents approximately the first four decades since inception in 1967, indicating the time taken for ASEAN to become a US\$1 trillion economy by 2006-07.

Phase 2:

Represents the next decade in which ASEAN consolidated its position in the world economy, adding another US\$1.5 trillion to its annual GDP by 2016-17.

Phase 3:

Represents the upcoming phase in ASEAN's growth journey, with the region projected to add another US\$1.5 trillion to its annual GDP by 2022. Phase 3 marks a strong growth opportunity, denoting the same quantum of growth in ASEAN's economy as in Phase 2, but in almost half the time span.¹¹

Source: WEO Database, IMF, October 2017

Growth Leaders in ASEAN

Indonesia



2016 GDP: US\$ 932 billion

2022 GDP: US\$ 1,580 billion

Real GDP growth (2016-22): 5.4%

Indonesia is expected to have surpassed the trillion-dollar GDP mark by 2017, recording stable growth over the next few years

- Diversified exporters such as Indonesia have maintained stable growth despite global markets witnessing uncertainties in commodity prices in recent years. Having retained a healthy growth rate between 5 and 6 percent since 2010, Indonesia is estimated to have surpassed US\$1 trillion in GDP size in 2017.
- Factors such as stable household consumption, public spending on infrastructure, and an anticipated recovery in commodity prices are expected to maintain annual GDP growth of above 5 percent until 2022.¹²

Policy reforms have played a key role in responding to commodity risks, but more focus is required to sustain growth

- Key reforms initiated in recent years include the removal of fuel subsidies in 2014–15 and the announcement of 16 economic packages over 2015–17, focusing on areas such as foreign direct investment (FDI) liberalisation, deregulation, tax reforms, and reductions in permits/procedures for businesses.
- Although reforms have helped Indonesia jump 19 positions in the “Ease of Doing Business” ranking for 2018, the country requires greater focus on areas such as the ease of starting businesses and in enforcing contracts, where it continues to record a much weaker performance.¹³

Thailand



2016 GDP: US\$ 407 billion

2022 GDP: US\$ 586 billion

Real GDP growth (2016-22): 3.3%

Back on the upward trajectory, Thailand is projected to record lower but stable growth over the coming years

- Thailand matured into an upper-middle-income economy in 2011, driven by strong growth of above 7 percent between 1985–95 and stable growth of around 5 percent after the Asian financial crisis, until the global economic slowdown in 2008–09.
- However, the economy then experienced a tough time, achieving just 0.9 percent growth in 2014 with political instability impacting local consumption, investments and exports.
- The economy has recovered strongly since then and is projected to remain on a growth path until 2022, being driven by improvements in political conditions such as an expected return to civilian rule in 2018–19, growing private consumption, and rising infrastructure investments.¹⁴

Infrastructure investments mark a key focus area for the government to boost economic growth going forward

- Thailand’s government is prioritising infrastructure investments to boost growth. It plans to invest US\$51 billion on multiple infrastructure projects by 2021 (announced as part of the 2nd PPP Strategic Plan released in December 2017), especially on transport projects involving rail, roads, air transport, and ports.¹⁵

Note: Countries arranged in decreasing order of the size of the economy (GDP in current prices, 2016)

The Philippines



2016 GDP: US\$ 305 billion

2022 GDP: US\$ 543 billion

Real GDP growth (2016-22): 6.7%

The Philippines will remain the third-largest ASEAN economy, while growing at twice the rate of Thailand by 2022

- The Philippines is projected to grow at a significant rate, 6.7 percent per year until 2022, surpassing US\$500 billion in GDP by 2022.
- Growth will be driven by rising infrastructure investments and a steady flow of remittances that will continue to push consumer spending. Household consumption is also being encouraged by an expansionary monetary policy that supports consumer lending.¹⁶

The country's "Build, Build, Build" program will push growth going forward

- Public spending on infrastructure projects is targeted to rise to 7.4 percent of GDP by 2022, as compared with an average of only 2.6 percent of GDP spent over the last 50 years.
- The government targets spending between US\$160 billion and US\$180 billion between 2017-22 on infrastructure projects, and plans to complement borrowings with higher revenue generation enabled through tax reforms (the comprehensive tax reform package).¹⁷

Malaysia



2016 GDP: US\$ 297 billion

2022 GDP: US\$ 500 billion

Real GDP growth (2016-22): 4.9%

Malaysia's current GDP is expected to expand significantly, by US\$200 billion by 2022

- Malaysia is projected to record stable annual GDP growth of approximately 5 percent between 2016-22, touching US\$500 billion in GDP by 2022.
- Growth in the fourth-largest ASEAN economy (together with Singapore, by GDP size) is expected to be driven by multiple factors, including stabilising global commodity prices, improvements in global demand for Malaysian exports of electric and electronic goods, and rising infrastructure spending.¹⁸

Infrastructure will be a priority area going forward

- The government plans to increase infrastructure spending in the next few years, especially in sectors such as transportation and logistics, digital connectivity, and utilities — aligned to its target of becoming a high-income economy by 2020-21.
- It is estimated that about 85 large-scale projects are currently active in the country (in the announcement to execution stage), representing a total investment value of US\$124 billion.¹⁹

Note: Countries arranged in decreasing order of the size of the economy (GDP in current prices, 2016)

Growth Leaders in ASEAN

CLMV Markets



Strong GDP growth should push Vietnam beyond the US\$300 billion GDP mark by 2022

- Vietnam, the largest economy in the CLMV group, is projected to reach US\$327 billion in GDP by 2022, recording growth of 6.2 percent annually between 2016-22.



Myanmar will lead percentage growth in GDP in ASEAN, pushed by rising investments

- Myanmar is projected to surpass the US\$100 billion mark in GDP by 2022, recording the highest annual growth rate in the ASEAN region (7.5 percent per year) between 2016-22.



Exports will remain the driver of economic growth in Cambodia

- Economic growth in Cambodia (6.6 percent per year between 2016-22) is expected to be driven by surging exports from the garment and footwear

- Growth is expected to be driven by improvements in domestic consumption, rising FDI, and growth in manufacturing exports over the coming years.²⁰

- Growth will be driven by private investments in infrastructure and non-commodity sectors such as light manufacturing and hospitality. Investments have also gained momentum since liberalisation in 2011 and the election of a civilian government in 2015.²¹

industry and improvements in tourism, real estate, and construction activities, making it a US\$34 billion economy by 2022.



Growth in Lao PDR led by growing investments and rising exports in the region

- Lao PDR's GDP has more than doubled since 2010 and is projected to maintain strong growth (7 percent per year) to reach US\$27 billion by 2022, led by rising investments in the power sector,

increased exports to ASEAN neighbours, and strong growth in the services and construction sector.²²

Note: Countries arranged in decreasing order of the size of the economy (GDP in current prices, 2016)

Structural drivers of growth

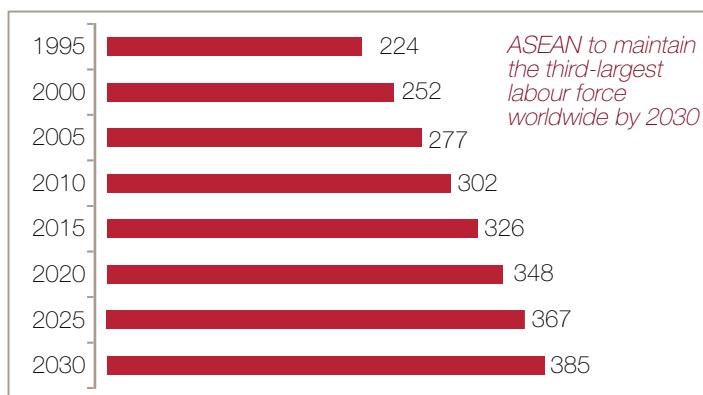
People power

These impressive forecasts are underpinned by the region's formidable labour force and the emergence of a wealthier middle class over the coming years. In terms of supply-side factors driving growth, a significant expansion of the region's labour force has been a major contributor to ASEAN's growth story so far, with more than 100 million people estimated to have joined ASEAN's workforce over the past 20 years. The trend is also expected to continue in the medium term, although at a slower pace than before. The International Labour Organisation estimates that ASEAN will record the second-largest growth in labour force worldwide between now and 2030 (behind only India); another 59 million people are projected to enter its workforce by 2030. ASEAN would continue to represent the third-largest labour force worldwide, behind only China and India, accounting for a total of 10 percent of the global labour force by 2030. In fact, ASEAN's labour force will be more than twice the size of the next ranked market, the United States, with 175 million in its labour force by then. However, ASEAN also faces the risk of underutilising this demographic opportunity, if it fails to generate quality employment at the required scale while training this growing workforce in the skills needed to shift to higher-value-add jobs in time to boost productivity levels.²³

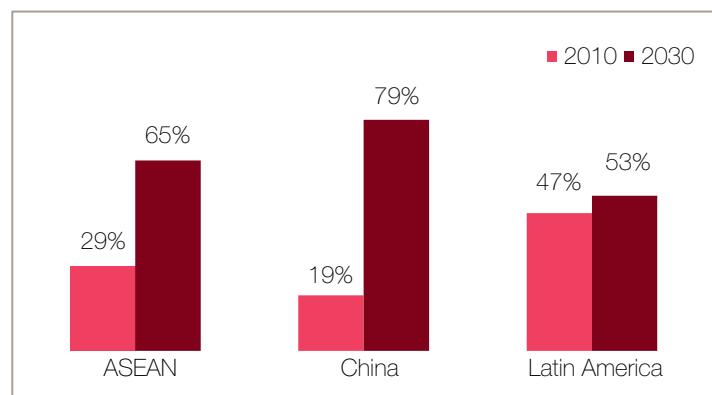
As for the demand-side factors impacting economic growth, the region is poised to witness the expansion of ASEAN's middle-income segment (defined as US\$10 to US\$100 in daily expenditure). This group is projected to represent two-thirds of the overall population by 2030, compared with only 29 percent in 2010. This emerging middle class, which is associated with a higher willingness to pay for quality, convenience, and choice, will drive the demand for more discretionary and aspirational product categories in the coming years. However, to target these growth opportunities, companies will need to align business strategies with shifts in consumption patterns being witnessed in the region. Online retail will increasingly challenge the traditional brick-and-mortar model, with consumers demanding more personalised products and services, through an integrated omnichannel experience. Consumers are also expecting higher quality and safety standards, combined with improved visibility of orders and quicker order fulfilment. Together, these shifts will also create new growth challenges, increasing the need for companies to innovate to meet local tastes and business conditions, while anticipating changing market needs with greater agility.²⁴

Figure 1.5: Growth in Labour Force and the Middle Class in ASEAN

Labour force in ASEAN, millions



Share of middle-income class in overall population



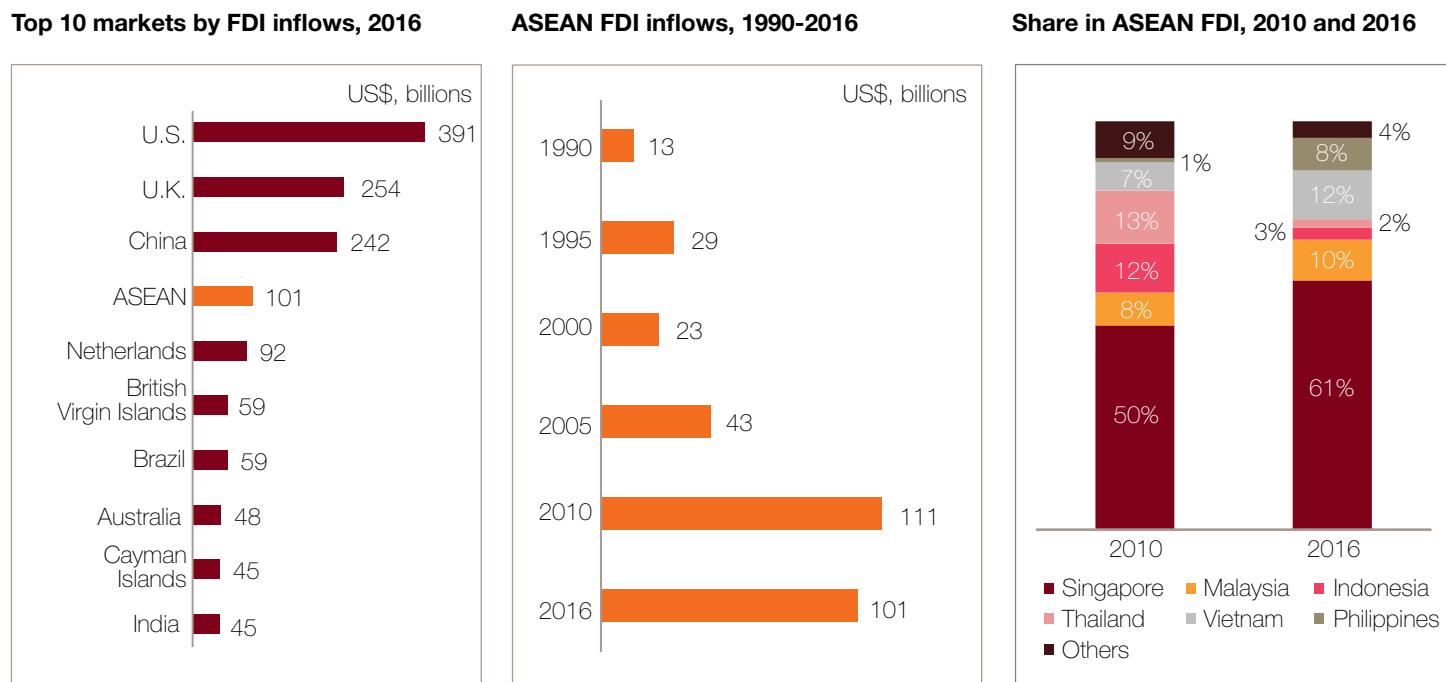
Source: ILO estimates, July 2017; Quarterly Global Outlook, UOB Global Economics & Markets Research, 2015

Leading destination for FDI

A growing and more advanced workforce, together with increasing local consumption, has enabled ASEAN to continue to attract substantial FDI despite rising volatility in capital flows worldwide. ASEAN has not been immune to this volatility, and FDI inflows into the region have dropped in recent years, in line with global outflows from emerging markets — but it has still managed to attract significant investments to enable it to record seven times growth between 1990 and 2016, resulting in it becoming the fourth most popular investment destination globally, and the second-largest destination in Asia.²⁵

ASEAN's FDI inflows have been driven mainly by investments in the region's manufacturing (from Japan, South Korea, and other ASEAN countries) as well as the financial services sector (from China, Australia, the E.U., and the U.S.). Intra-ASEAN investment also rose significantly (14 percent year-over-year in 2016), representing the largest source of investment for the agriculture and mining sectors. Singapore and Vietnam attracted the most investments in ASEAN in 2016 — and contrary to the downward trajectory of global flows, FDI in CLMV markets rose by 8 percent year-over-year in 2016, mainly flowing into manufacturing and infrastructure sectors.²⁶

Figure 1.6: Foreign Direct Investment in ASEAN



Source: United Nations Conference on Trade and Development (UNCTAD), 2017

Fiscal strength

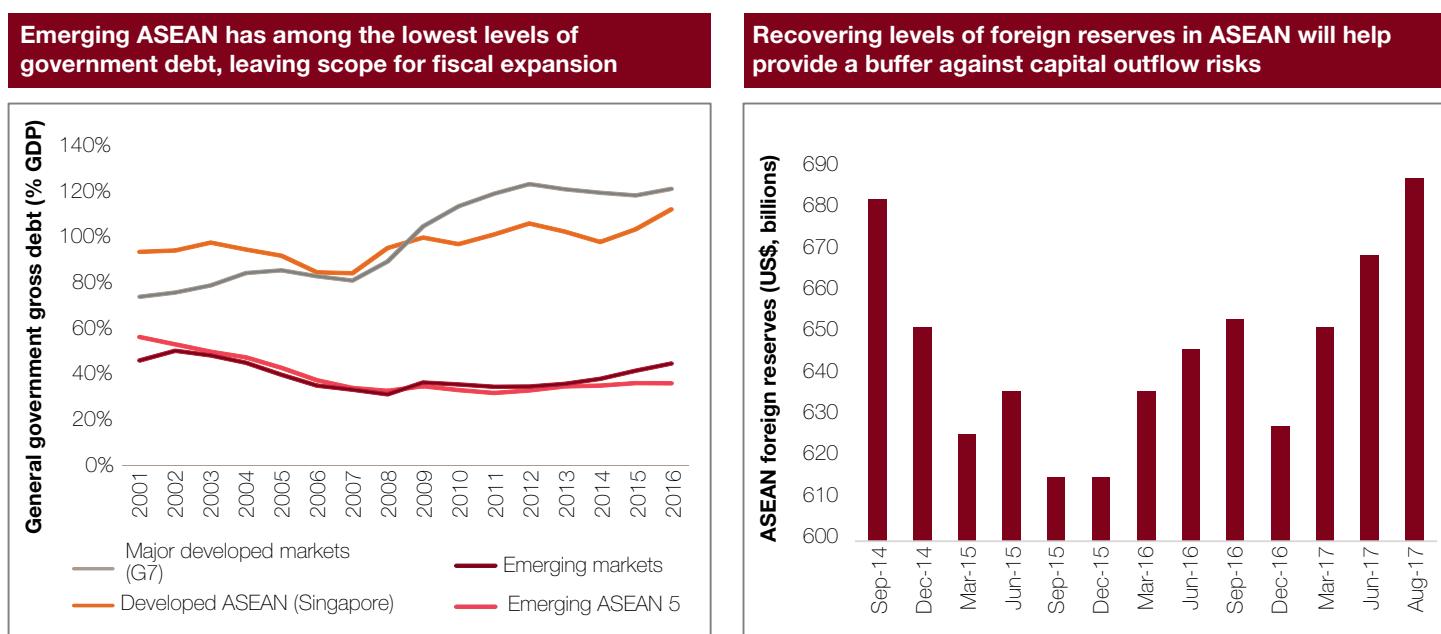
Formidable workforce, consumption, and investments are not the only elements which make ASEAN a strong region for growth. Its lower levels of debt exposure and its recovering foreign reserves also help it weather volatility in global markets and differentiate it from other investment destinations.

The relatively low levels of government debt in emerging ASEAN markets establish a much stronger position to combat growth risks by improving a government's ability to make investments in focus sectors, and to adopt fiscal policies that push economic expansion. In contrast, high government debt levels, as seen in many developed markets worldwide, add to growth risks by lowering the capacity of governments to provide a financial stimulus to drive any recovery measures that may be required. Moreover, expectations with respect to rising interest rates in the U.S. could increase debt-servicing costs for markets with significant dollar-denominated debt in the coming years.

As shown in Figure 1.7, emerging ASEAN markets enjoyed some of the lowest government debt levels (39 percent of GDP) in 2016, lower than the average for emerging markets worldwide (47 percent), and much lower than figures recorded for leading developed economies or G7 nations (120 percent).²⁷

In addition to low government debt, ASEAN countries have also strengthened their position to safeguard against capital flow volatility by building stronger foreign exchange reserves. Strong foreign reserves indicate stability and offer protection in relation to short-term debt repayments. Reserves play an important role in defending against external shocks, helping countries manage any significant outflows of capital. Foreign reserves in ASEAN grew strongly in 2017, recovering to the high levels seen in 2013–14, with Indonesia and Thailand leading growth since 2014. All of this does, however, prompt the question of why these markets have not invested more in core infrastructure, education, and training to fuel domestic growth.²⁸

Figure 1.7: Government Debt and Foreign Reserves in ASEAN

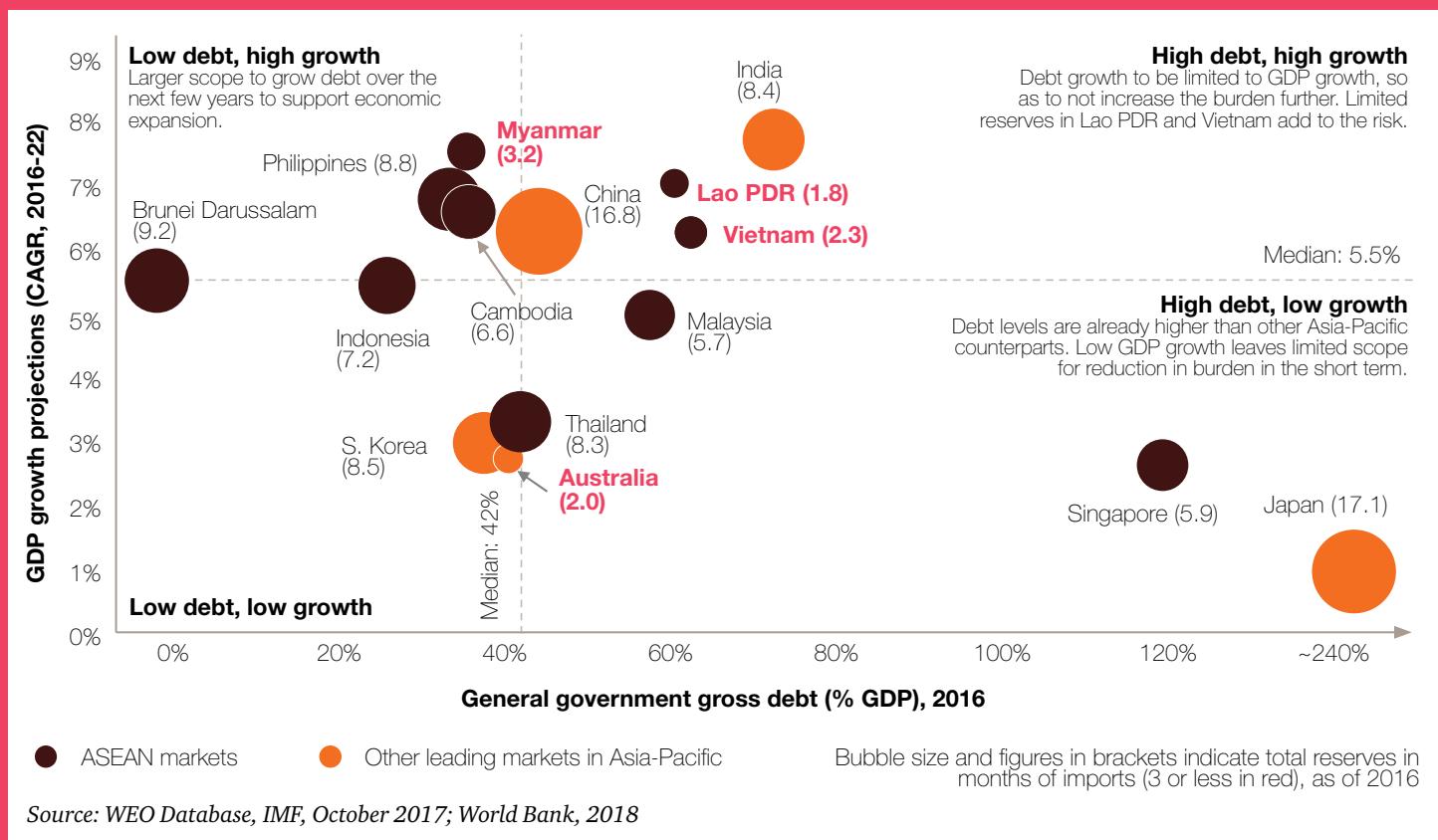


Source: WEO Database, IMF, October 2017; UOB Global Economics & Markets Research, February 2017

Fiscal leverage in ASEAN markets

Indonesia, the Philippines, Cambodia, and Brunei Darussalam show significant potential among ASEAN markets to adopt fiscal levers that can drive economic growth

Figure 1.8: Fiscal Opportunities for Growth in ASEAN (and Leading Asia-Pacific Economies)



Leading ASEAN and Asia-Pacific markets could be split into the following quadrants, based on key parameters such as projected GDP growth (2016-22), gross government debt (as a percentage of GDP), and the size of total reserves (calculated as the number of months of imports of goods and services they could pay for). As a rule, it is expected that reserves should be able to cover three months' worth of imports, although the criteria could be further relaxed for developed markets with more established institutions.²⁹

High debt, low growth: These markets (Singapore, Japan, and Malaysia) seem to have relatively lower fiscal leverage, as debt levels are already higher than those of their Asia-Pacific counterparts. Lower GDP growth also leaves limited scope for reduction in the burden in the short term. However, debt concerns will be less applicable to markets such as Singapore, which has invested in assets sufficient to cover debt servicing costs, and therefore enjoys stronger credit risk ratings than many other markets with lower debt-to-GDP ratios.³⁰

High debt, high growth: These markets (China, India, Lao PDR, and Vietnam) have higher debt levels and would need to limit any increase in debt to the rate of GDP growth, so as to not increase the burden further on the economy. Limited reserves in Lao PDR and Vietnam also pose a risk to taking on more debt.³¹

Low debt, high growth: Governments in these markets (Brunei Darussalam, Indonesia, the Philippines, Cambodia, and Myanmar) have greater scope to increase debt — if budgets are unable to meet investment needs — considering strong support provided by a fast-growing economy, which will help manage the overall level of debt burden. However, Myanmar has just enough reserves to be considered safe for protection against an external crisis and could be at a higher risk owing to its less developed institutions. Overall institutional improvements will also be key to improving the creditworthiness of these economies, to improve their access to funds from global markets.³²

Low debt, low growth: These markets (Thailand, South Korea, and Australia) could consider increasing government spending to push growth in the coming years, as they have greater scope to increase debt compared with many other Asia-Pacific markets — although low GDP growth and expectations of rising interest rates will restrict the extent to which governments could increase their debt burden.³³



Threats to ASEAN's potential

A number of challenges — including a slowdown in short-term economic growth and productivity, major voids in infrastructure and institutions, and changing global trade and production dynamics — have raised questions about the sustainability of ASEAN's growth story, which compounds the need for broader integration across the region.

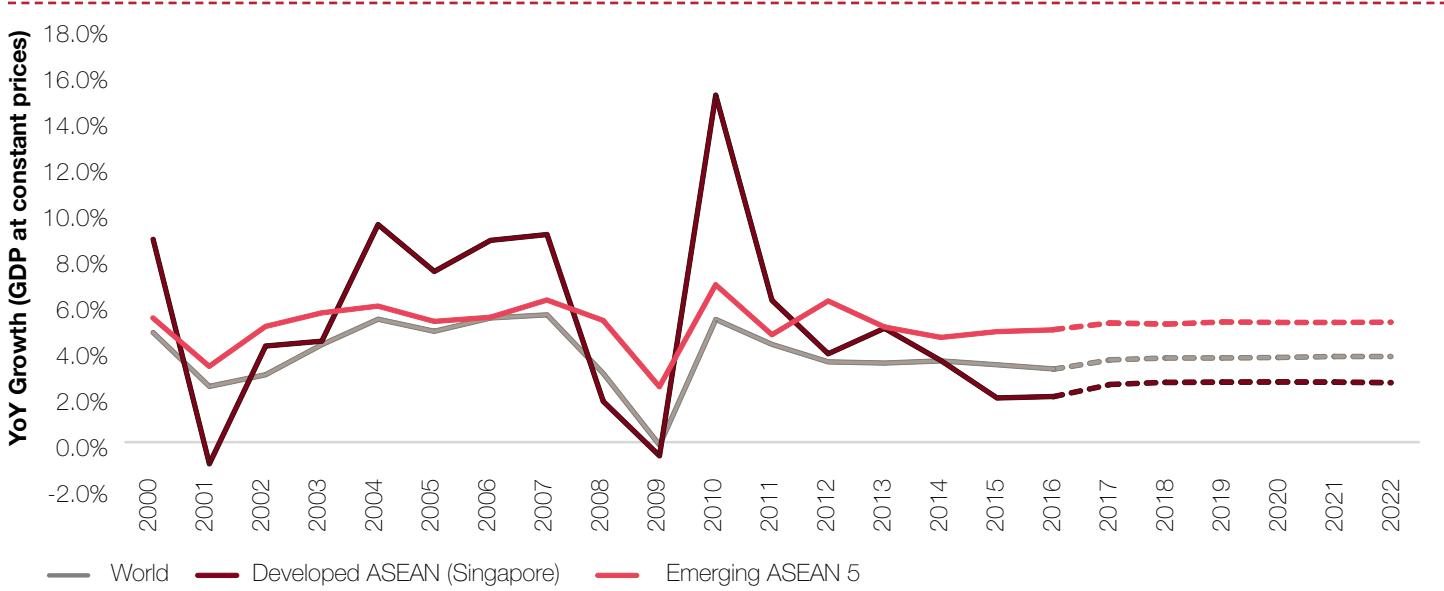
Slowing economic growth

Annual GDP growth in leading ASEAN economies (both emerging and developed) has been on a downward trajectory since peaking in 2010 — with global uncertainties resulting in somewhat stagnant growth projections in the short term. GDP growth in Singapore (or developed ASEAN) dropped below the global average to 2.0 percent in 2016, and although growth is

expected to revive to 2.6 percent per year over the next five years, it is projected to remain below the global average by 2022.³⁴

The emerging ASEAN 5 markets (Indonesia, Malaysia, the Philippines, Thailand, and Vietnam) have not been immune to this slowdown either, experiencing a drop in growth to 4.9 percent in 2016, after a high of 6.9 percent in 2010. Even though these markets are expected to regain some momentum in the coming years — thanks in part to a revival in Chinese and European demand — growth is projected to stagnate at 5.3 percent per year until 2022, similar to figures recorded at the start of the millennium. Both scenarios are in fact reflective of a broader slowdown in global economic growth; 2016 recorded its weakest figures (3.2 percent) since the financial crisis of 2008-09.³⁵

Figure 1.9: Real GDP Growth Trends, ASEAN and the World



Source: WEO Database, IMF, October 2017

Weak labour productivity

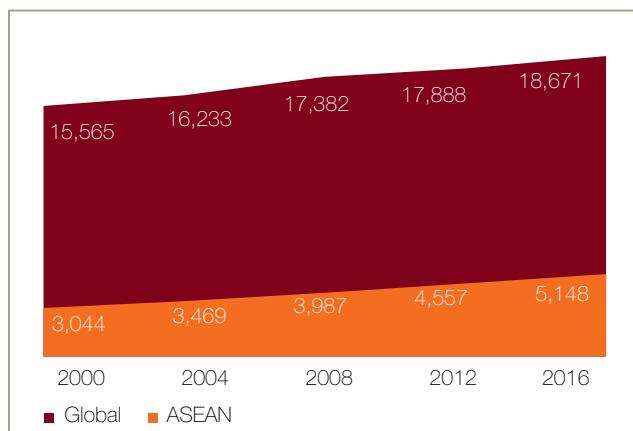
In an ever more competitive global economy, stagnating productivity growth is becoming more of a concern. In the ASEAN region, the time available to address productivity issues varies across markets, depending in part on population ageing patterns and on the scale of the gap to be covered to remain competitive. Despite the improvement in productivity throughout ASEAN in this millennium, industry figures indicate a major gap between ASEAN and global markets, highlighting an opportunity for ASEAN to improve through interventions such as investments in human capital, infrastructure development, institutional improvements, and digital technology adoption. Digital technologies can significantly impact productivity; a single point improvement in a nation's digital connectivity score could lead to more than a 2 percent increase in productivity and national competitiveness.³⁶

Developed ASEAN markets such as Singapore and Brunei Darussalam, which have more advanced institutions and infrastructure, as well as ageing populations, will need to focus on increasing technology adoption to counter declining productivity growth.

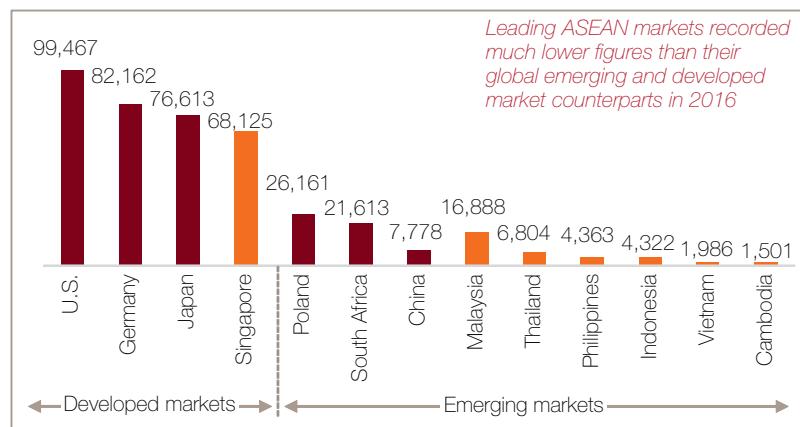
For example, Singapore recorded only 0.2 percent growth in labour productivity in 2015-16, as compared with more than 2 percent annual growth over 2000-10. On the other hand, emerging economies, with weaker institutions and business environments, have more levers to pull to improve productivity. Fast-rising wage levels will soon dilute the low-cost advantage enjoyed by many emerging ASEAN markets, increasing the need to improve worker productivity to balance growing labour costs. Some ASEAN markets are estimated to have recorded among the highest real wage increases worldwide in 2017, with Vietnam (7.2 percent), Thailand (5.6 percent), and Indonesia (4.9 percent) leading the trend — these figures being much higher than the global average of 2.3 percent. These wage increases coupled with an ageing population in certain markets, such as Thailand, Malaysia, and Vietnam, will put further pressure on these economies to strengthen their institutions and capabilities in order to achieve higher productivity, and thus strengthen their long-term economic prospects.³⁷

Figure 1.10: Labour Productivity, ASEAN and the World

Labour productivity, 2000-16



Labour productivity, select markets, 2016



Note: Labour productivity figures indicate output per worker (GDP in constant 2005 USD)

Source: International Labour Organization, November 2017

External trade dependence

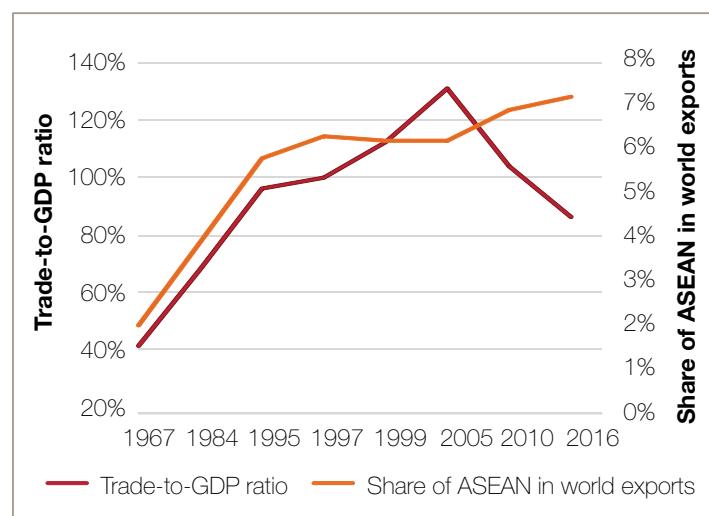
The importance of trade to ASEAN's economy has increased significantly since 1967. The trade-to-GDP ratio rose from 43 percent in 1967 to a peak of 131 percent in 2005, before dropping to 87 percent in 2016. However, the recent figure is still much higher than the global average of 56 percent in 2016. Over this time, ASEAN's share of global exports has also risen, from only 2 percent in 1967 to 7 percent by 2016, indicating the rising importance of trade to ASEAN's economic prospects. However, global trade growth has been on a downward trajectory since 2012, threatening growth in trade-dependent economies such as ASEAN. For example, growth in the volume of world merchandise trade slowed to 1.3 percent in 2016 from 2.6 percent in 2015, which is the lowest growth rate in volume since the financial crisis of 2008-09. Global merchandise exports also fell 14 percent by value in 2015, and another 3 percent in 2016.³⁸

Adding to the region's concerns, extra-ASEAN trade continues to dominate ASEAN exports, accounting for 75 percent of exports in 2016 — which face significant risks associated with a high level of dependence on external partners, especially China and the U.S.³⁹

China represents ASEAN's largest trading partner, with ASEAN exports to the country (by value) increasing at an average 10 percent per year over 2007-14, to a point of representing 15 percent of ASEAN trade in goods in 2015. However, a recent slowdown in the Chinese economy amidst its restructuring efforts has impacted trade with ASEAN, resulting in a drop in exports of 6 percent in 2015 and another 1 percent in 2016.⁴⁰

Moreover, rising protectionist sentiments in Western markets (such as in the U.S.) could further threaten ASEAN's trade growth. In fact, a recent study by the World Bank pointed out growing policy uncertainties emanating from such protectionist sentiments as the major factor behind the slowdown in global trade in 2016. Therefore, going forward ASEAN will need to take more measures to increase its intra-ASEAN trade flows — to not only serve the fast-growing domestic consumer base, but also counterbalance risks emanating from significant dependence on external trade partners.⁴¹

Figure 1.11: ASEAN Dependence on Global Trade



Source: ASEAN Secretariat, 2017

Infrastructure gaps

A vast majority of ASEAN is still in the developing stages of its growth journey. Eight out of 10 ASEAN markets fall in the middle-income and low-income brackets (as defined by the World Bank), collectively representing around 88 percent of the region's GDP in 2016.⁴² Similar to the case in other developing parts of the world, infrastructure limitations continue to slow the pace of growth in these ASEAN economies. Significant gaps exist across a range of sectors, for example, power, utilities, the social sector (housing, health, and education), transportation and logistics, and digital connectivity. Besides reducing the productive capacity of the workforce, these gaps increase the cost of doing business for companies, thus impacting national competitiveness while limiting market access and social well-being. For example, driven by infrastructure issues, logistics costs represented about 9 percent of GDP in Germany and 12 percent in Brazil in 2016, while they stood at 21 percent of GDP in Vietnam and 26 percent in Indonesia.⁴³

Enhancing the scale and quality of infrastructure could have a significant economic impact on these markets, more so in helping them manage looming issues related to productivity and job creation challenges. For example, estimates indicate that a 10 percent increase in paved road density could result in a 1 percent increase in trade and a 5 percent improvement in economic growth across Asia. Another study highlights that a 10 percentage point rise in broadband penetration could boost GDP growth by 1.4 percentage points in low- and middle-income economies worldwide.⁴⁴

The gaps are considerable. Total infrastructure investment needs in ASEAN from 2016 to 2030 are estimated to be around US\$2.8 trillion, indicating an annual investment requirement of US\$184 billion, equivalent to 7 percent of ASEAN's GDP in 2016. These high requirements will need to be financed through a mix of strategies, including tax reforms, public debt, and private-sector investments (from both domestic and foreign companies). The large extent of these

gaps presents many opportunities for companies to participate in developing infrastructure which will lay the foundation of future growth across ASEAN. These opportunities include participation across various levels, from investing in infrastructure projects, to providing engineering, procurement, and construction (EPC) services, to owning and operating assets such as power plants or oil refineries, based on the level of private involvement permitted by sector regulations. Realising the importance of this growth pillar, leading ASEAN markets such as Indonesia, Malaysia, Thailand, Vietnam, and the Philippines have already announced multiple initiatives to push infrastructure development. As a percentage of GDP, Vietnam's spending on infrastructure was among the highest in major ASEAN economies. Overseas investments such as those made through China's Belt and Road Initiative are also being considered to seek international cooperation in this objective, especially for large-scale railway projects in the region.⁴⁵

“

ASEAN is the most promising and exciting region of the world's growth markets. It is a big winner from China's further rise and growing outbound investment, but also heavily exposed to geopolitical shifts driven by the emergence of China. So many of the biggest current and future global trends – the rising middle class, the digitalization of the economy, potential labor market shocks from automation, the infrastructure gap, and many others – all will play out in ASEAN and shape its future. ”

Alexander Kazan
Chief Strategy Officer
egX at Eurasia Group

Institutional voids

As is the case in most emerging economies, the business environment in ASEAN is still maturing and is marked by institutional gaps that weaken international investor confidence and the region's growth pace, more so during periods of global uncertainty. Corruption issues, in particular, feature as a major concern for businesses operating in the region, as highlighted by many past editions of the ASEAN Business Outlook Survey conducted by the U.S. Chamber of Commerce. In the 2017 survey, a majority of businesses in the region (65 percent), with the exception of Singapore and Brunei Darussalam, named unfair and inefficient law enforcement practices as a major challenge, with those operating in CLMV markets facing stronger pressures to pay bribes to obtain essential permits and government services. Besides corruption, lack of regulatory clarity continues to impede ASEAN growth. A significant percentage of businesses (42 percent) indicated that consultations between the government and the private sector were limited while new laws and regulations were being developed; this factor was a major concern for companies in Indonesia (70 percent), Myanmar (61 percent), Brunei Darussalam (53 percent), and Thailand (52 percent).⁴⁶

Historically, companies have struggled to understand the institutional voids that characterise growth markets, including within ASEAN. They have often taken institutional foundations in more mature parts of ASEAN (such as in Singapore) for granted, and are therefore caught off guard when they find these foundations lagging in other emerging economies in the region. Business leaders across ASEAN will need to account for these voids when devising their growth plans for the region and then develop the necessary local capabilities to mitigate regulatory and security related risks. Stronger skills will be required to proactively engage and work with government stakeholders, while adopting more robust risk management frameworks and practices. Companies could also explore the deployment of more advanced technology solutions (such as Internet of Things-based monitoring tools or blockchain-based smart contracts to minimise any supply chain disruptions), to profitably target growth opportunities within the ASEAN region.⁴⁷

Limited monetary leverage

Monetary easing is an important tool for markets worldwide to push economic growth. However, changing global dynamics, led by rising interest rates in the U.S., have put limits on exercising this option to drive growth in emerging markets (including those in ASEAN) in the near term. The U.S. Federal Reserve increased interest rates for the sixth time in March 2018, since its first hike in over a decade in December 2015, in contrast to monetary easing in Japan and Europe. Expectations of further U.S. rate hikes will continue to strengthen the U.S. dollar, putting pressure on emerging markets and companies with high amounts of U.S. dollar-denominated debt, especially in the energy sector. This may also trigger further capital outflows from emerging markets, exerting downward pressure on local currencies, thus forcing many markets to increase interest rates to counter the trend.⁴⁸

Central banks in emerging markets, including those in ASEAN, could therefore continue to face this growth dilemma in 2018 — raising interest rates would hamper the growth outlook, but monetary easing would widen the differential between them and the U.S. and thus lead to capital outflows. Therefore, with limited scope for monetary easing in such a global climate, policymakers in ASEAN will have to rely more on fiscal levers to push growth going forward, such as by increasing government spending in areas having a strong cross-sector impact across the economy, including infrastructure development, skill building, and the social sector.⁴⁹

Industry 4.0 and digital disruptors

The global production landscape has undergone significant changes over the past few decades, with companies spreading their supply chain networks across multiple locations worldwide to benefit from cheaper labour, regulatory incentives, and proximity to growing consumer markets. Driven by these trends, the past few decades have also seen ASEAN emerge into a major production and logistics centre as part of these global value chains or GVCs. It is estimated that 66 percent of ASEAN exports are accounted for by participation in GVCs, making the region the second-largest regional grouping worldwide in terms of GVC

presence, behind only the E.U. (which has a 70 percent share). This indicates the importance of the industrial sector to the region's growth prospects; rising industrial activity has been a major factor behind steady economic growth and improved per capita incomes recorded historically in many of the region's economies.⁵⁰

However, the advent of "Industry 4.0," marked by adoption of new technologies such as the Internet of Things, advanced robotics, 3D printing, and artificial intelligence (AI)/augmented reality (AR)-based systems, could threaten this growth story in the longer term — unless ASEAN markets start preparing themselves for the shift. ASEAN's core value proposition of lower labour costs will fade away over the coming decades, as rising protectionist sentiments build the political case and new technologies improve the economics of retaining or reshoring production within the shores of the developed parts of the world. Improving digital connectivity across the region will be the first step in this direction; with more advanced production hubs such as Singapore and Thailand taking the lead in testing new solutions, and in developing best practices to improve adoption across key segments such as the small and medium-sized enterprises (SME) sector. The ageing populations in these markets further make the case to push for technology adoption in order to counter potential labour gaps in the longer term. However, relatively younger economies such as Indonesia and the Philippines would need to take care of a much greater dilemma: balancing the need for job creation with adequate technology adoption to remain competitive in the new production landscape.⁵¹

In this respect, integration of ASEAN into a single market could have a significant upside to the region's industrial sector, seeking new value propositions to continue attracting global production to its shores. With expectations of "mass customisation" being brought about by Industry 4.0, a unified ASEAN market would boast of a large consumer base that could push growth in local production to meet its requirements for more personalised products coupled with quicker order fulfilment. The seamless movement of labour would enable ASEAN to address talent gaps and job creation challenges; meanwhile, easier movement of capital,

goods, and services will help develop stronger end-to-end regional value chains for products — with more mature production centres focusing on R&D, design, and high-tech components, and low-value production and assembly being undertaken in the less advanced centres.⁵²

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The digital economy presents businesses, particularly micro-SMEs, the potential to benefit from new opportunities and test out more flexible business models to cater to growing consumer needs at lower costs. To develop an enabling and conducive environment for businesses to benefit from the digital economy, an ASEAN e-Commerce Agreement complemented by a series of capacity building activities is underway. As part of Singapore's efforts, nine "Singapore Centres" have been established in major cities around the world. They serve as points of contact through which Singapore-based companies seeking to enter the specific market can obtain relevant information and get plugged into the local business networks. ”

Dr. Koh Poh Koon

Senior Minister of State
Ministry of Trade and Industry
& Ministry of National Development
Singapore

A closing window to act

Regional measures

As we can see, growth in ASEAN is not uniform, and the individual countries face their own sets of challenges, which, if left unaddressed, will prevent them and ASEAN as a region from achieving their growth potential. This is a real threat to ASEAN's continued rate of growth. The region needs to take a more proactive approach in maintaining its growth trajectory — most importantly, it must strengthen intra-ASEAN trade and investment flows to counter risks emanating from external markets.

Intra-ASEAN trade

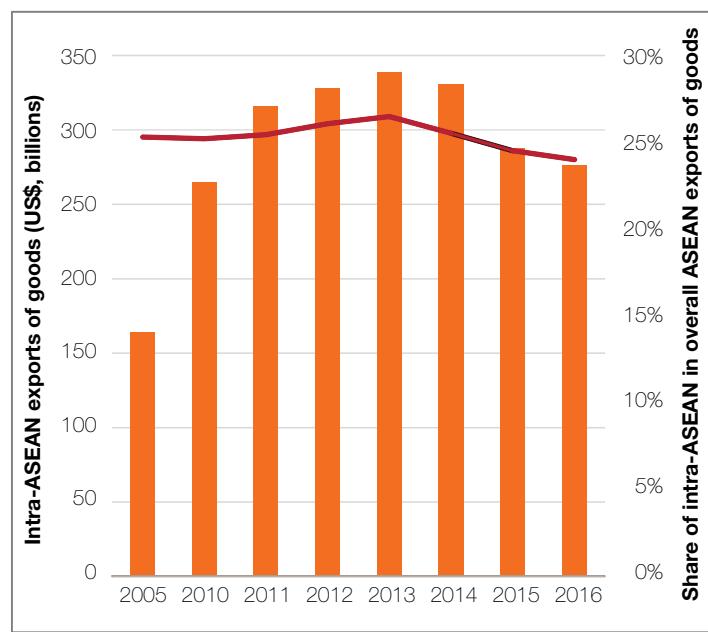
Whilst overall ASEAN trade has continued to grow substantially since ASEAN attained its 10-member structure in 1999 (although at a slower pace in recent years), intra-ASEAN contribution to this trade has remained stagnant over the past decade. It grew to

25 percent of overall exports in 2005 from 21 percent in 1999, but was still 24 percent in 2016. The share has in fact declined in recent years, falling from a peak of 27 percent recorded in 2013. It also appears that the importance of intra-regional trade in ASEAN lags behind that in other economic blocs, such as the North American Free Trade Agreement (NAFTA) and the European Union (E.U.). Intra-NAFTA trade had already surpassed extra-NAFTA trade by five years after NAFTA's implementation, and intra-E.U. merchandise exports also represented a significant percentage of overall E.U. exports, ranging from 40 to 85 percent across member states, as of 2016.⁵³

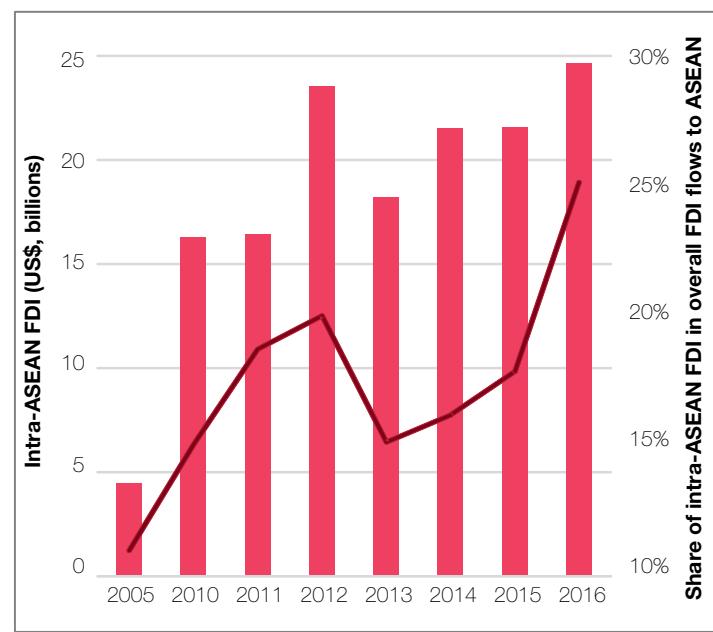
In order to offset part of the risk emanating from the rising dependence on external partners, the proportion of intra-ASEAN trade needs to be enhanced by strengthening regional cooperation, especially by reducing non-tariff trade barriers. Looking ahead, changing economic conditions such as improvements in ASEAN's per capita income levels, rising household

Figure 1.12: Intra-ASEAN Trade and FDI

Intra-ASEAN Trade, 2005-16



Intra-ASEAN Foreign Direct Investment, 2005-16



Source: ASEANstats, ASEAN Statistics Web Portal, 2017

consumption, and a continuing shift in global manufacturing to new low-cost ASEAN locations will further drive intra-ASEAN trade in the coming years.

Intra-ASEAN FDI

Compared with intra-regional trade, intra-ASEAN FDI is a positive story; regional investments represent a quarter of overall FDI inflows into ASEAN in 2016. Intra-ASEAN FDI remained at low levels, below US\$9 billion per year, till 2009. However, since the global financial crisis, intra-ASEAN investments have grown significantly, consistently recording more than US\$15 billion of investments per year and reaching their highest levels, US\$24.7 billion (25 percent of overall FDI), in 2016.⁵⁴ Intra-ASEAN FDI also has significant potential to grow in comparison with other regional blocs such as the European Union, where intra-E.U. FDI has exceeded extra-FDI flows for most of its history. In fact, the shares of intra- and extra-E.U. investments in total FDI inflows are expected to become relatively equal in the coming years — much more balanced than the 25/75 percent intra–extra regional split in investments in ASEAN at present.⁵⁵

Reducing non-tariff barriers

As part of its ongoing focus on driving economic growth through trade, ASEAN has made strong strides in reducing intra-regional trade tariffs over the past decade. As highlighted earlier, already 96 percent of tariff lines and 70 percent of intra-ASEAN trade flows are tariff free. However, counterbalancing the impact of these steps, ASEAN markets have seen a consistent rise in the number of non-tariff measures, or NTMs^d, which has restricted growth in intra-ASEAN trade and investments, despite the reduction in direct tariff rates. These non-tariff trade barriers include a mix of import-

related and export-related policies, and have grown substantially, from 1,634 measures in the year 2000 to a high of 5,975 measures in 2015, across ASEAN markets.⁵⁶ In terms of the type of NTMs, a majority of these barriers (43 percent) are technical barriers to trade (TBT)^e, which are import restrictions related to technical product requirements; 33 percent are in the form of sanitary and phytosanitary (SPS)^f measures (related to public health and safety), and 13 percent are export-related restrictions. Reduction in TBT measures would need to be prioritised to improve the extent of intra-regional cooperation within ASEAN going forward, especially norms related to discriminatory treatment of certain products, discrepancies in standards across markets, and lack of transparency in assessment procedures.⁵⁷

As shown in Figure 1.13, NTM coverage ratios^g are also high at present, with a number of countries having all product lines covered by one or the other NTM (i.e. they have 100 percent NTM coverage), besides only Malaysia, Indonesia, Brunei Darussalam, and Myanmar. Considering where action could be prioritised, Singapore, the Philippines, and Cambodia seem to stand out as markets with a particularly large extent of measures in place; they are the only markets with 100 percent NTM coverage and a large share of TBT restrictions (above 40 percent share in NTMs) at present. A separate academic study on the nature of these restrictions also highlights Malaysia and Indonesia as markets in the region with relatively more restrictive nature of policies, requiring a review (and removal) of any prohibitive measures that could be hampering growth in regional trade.⁵⁸ A vast majority of NTMs in Malaysia (70 percent) have been issued by the Ministry of Health, and specific segments such as food industry norms could be looked into as priority areas to initiate change.

^d “NTMs” are policy measures — other than ordinary customs tariffs — that can have an economic effect on international trade in goods by changing quantities traded, or prices, or both (UNCTAD).

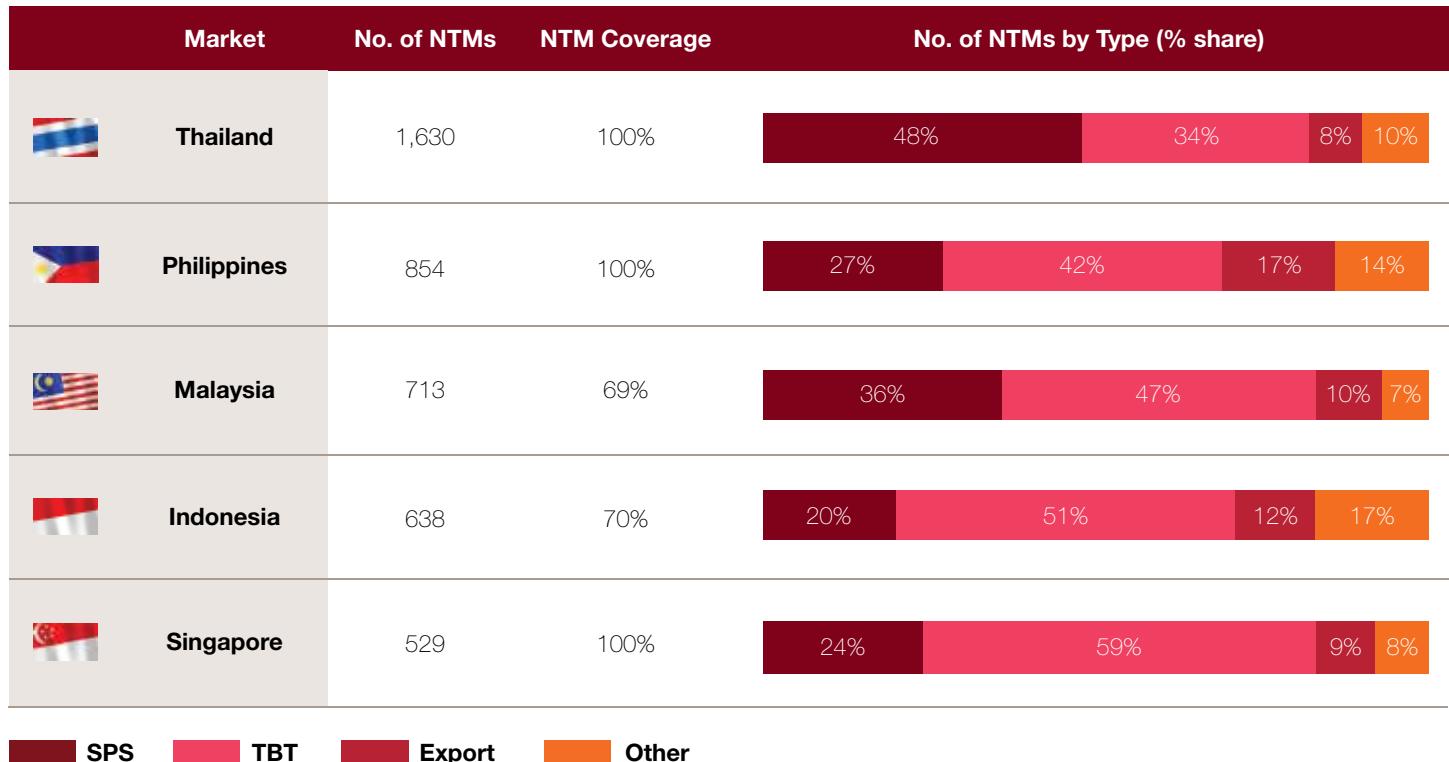
^e “TBT” measures are NTMs related to technical regulations, and procedures for assessment of conformity with technical regulations and standards. For example, labelling requirements requiring refrigerators to carry a label indicating their size, weight and electricity consumption level (UNCTAD).

^f “SPS” measures are NTMs that are applied to protect human or animal life from risks arising from additives, contaminants, toxins, or disease-causing organisms. For example, there may be restrictions on imports of dairy products from certain countries (UNCTAD).

^g The “NTM coverage ratio” indicates the percentage of product lines covered by one or more import-related non-tariff measures (UNCTAD).

Figure 1.13A: Extent of Non-Tariff Measures (NTMs) in ASEAN

Non-tariff measures (NTMs) in ASEAN, 2015 – Top 5 markets by number of NTMs

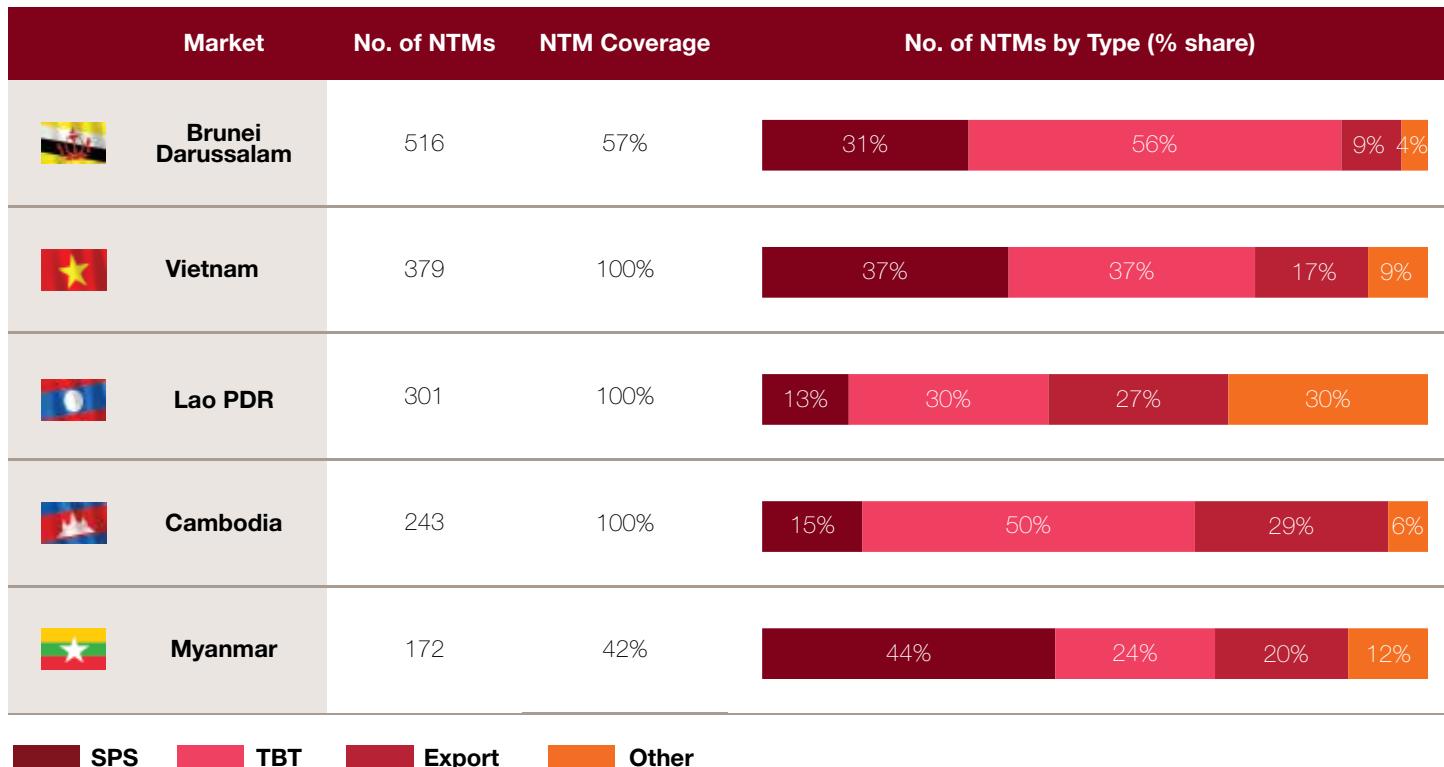


Source: ERIA-UNCTAD, April 2016



Figure 1.13B: Extent of Non-Tariff Measures (NTMs) in ASEAN

Non-tariff measures (NTMs) in ASEAN, 2015 – Other markets by number of NTMs



Source: ERIA-UNCTAD, April 2016



Country actions

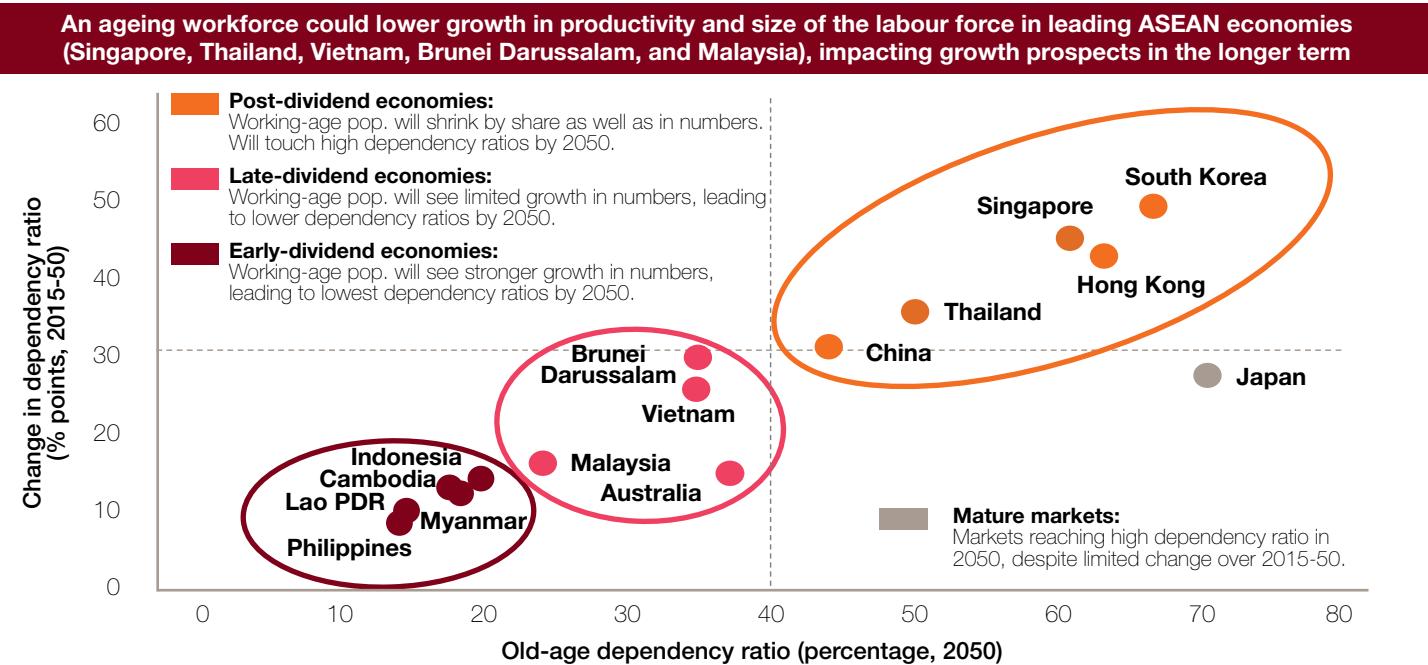
Demographic patterns are in a state of flux, not only in ASEAN but across the larger Asian continent, with the share of population aged 65 and older projected to reach close to 2.5 times the current levels in Asia by 2050. Consequently, the demographic window across many ASEAN markets is closing as well, although at different rates. ASEAN as an economic bloc and its individual countries need to make reforms with a sense of urgency, to maximise the growth impact driven by the current demographic dividend, and to prepare themselves for longer-term growth after this window closes.⁵⁹ Singapore and Thailand stand out as the fastest-ageing markets in the region, experiencing the beginnings of a post-demographic dividend stage. These markets are projected to register a notable drop in the working-age population, reaching higher levels of old-age dependency ratios by 2050 (61 percent in Singapore, 50 percent in Thailand).

Other ASEAN markets, such as Malaysia, Brunei Darussalam, and Vietnam, are also ageing, though at a more moderate pace. These markets are projected to

record only limited growth in working-age population in the coming years, and to reach high dependency ratios by 2050 as well, although the ratios will be lower than in Singapore and Thailand. In the longer term, an ageing workforce could lower growth in productivity and the size of the labour force in these leading ASEAN economies while increasing fiscal costs — thus beginning to impact economic prospects post-2025 — unless strong countermeasures are initiated.⁶⁰ On the other hand, countries such as Indonesia, the Philippines, and the CLM markets have some of the youngest populations in the region and will see their working-age population increase significantly in the coming decades. Their old-age ratios by 2050 will be among the lowest. Though these markets will continue to enjoy a demographic advantage, different sets of interventions will be required to maximise their potential, as explained in the sections that follow.⁶¹

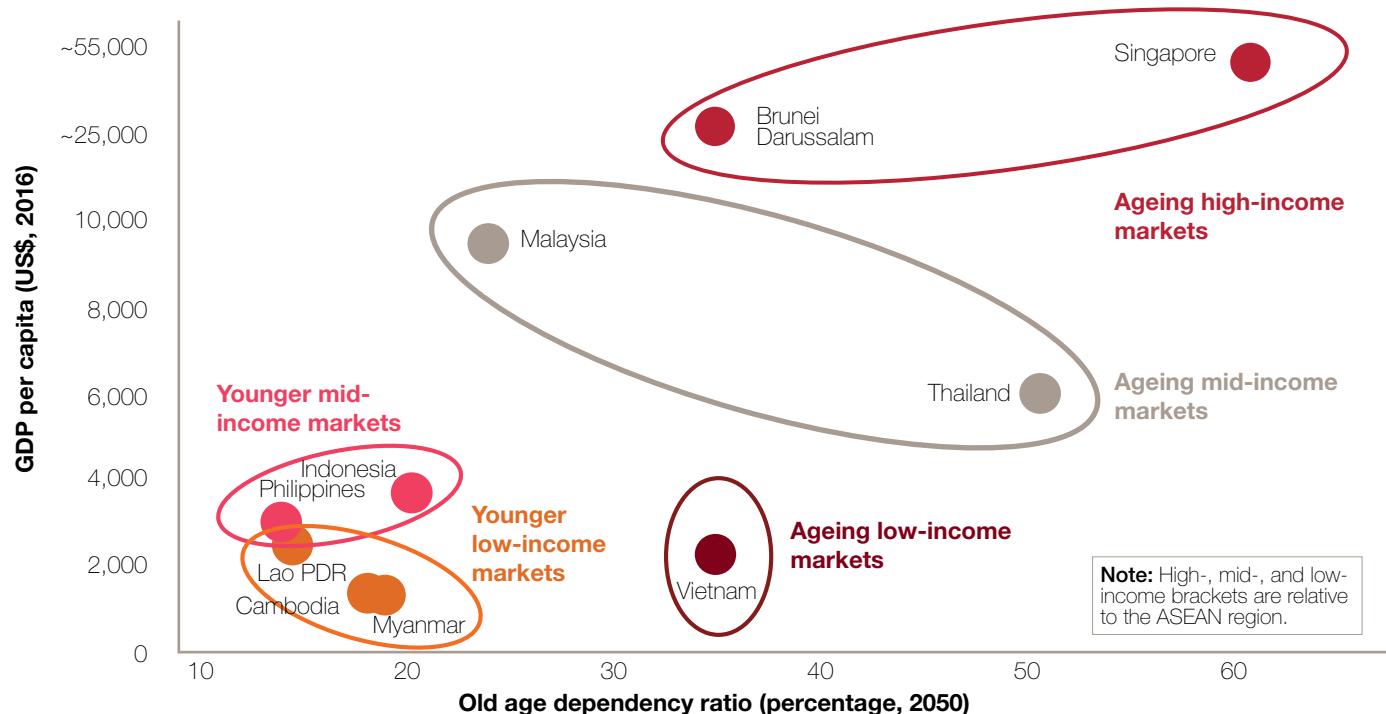
Given this scenario, we see five categories of markets emerging across ASEAN (see Figure 1.15) based on their current economic position and pace of demographic transition, which reflects the time each has to act.

Figure 1.14: Population Ageing in ASEAN and Other Asian Economies



Source: International Monetary Fund, 2017; World Population Prospects, U.N. Population Division, 2017

Figure 1.15: Categories of ASEAN Markets by Income and Demographic Trends



Source: International Monetary Fund, 2017; World Population Prospects, U.N. Population Division, 2017

“
All too often, nationalism trumps regionalism in ASEAN and if the group is to realise the potential of the single economic community, a harder-edged commitment to integration may be necessary. For governments this means finding the political will to face down vested interest groups, roll back non-tariff barriers, and strengthen institutions. Concomitantly, industry must embrace competition and discover regional markets rather than seek protection from friendly policy makers. ”

Andrew Staples
Editorial Director
The Economist Corporate Network
The Economist Group

“
The 50th anniversary of ASEAN in 2017 was cause for justified celebration. But new challenges are rising, especially those of the Fourth Industrial Revolution. Technological change brings exciting solutions to persistent problems, yet is disrupting jobs and economic development pathways. The countries of ASEAN have every chance of harnessing these disruptions for their benefit, but success will require a new approach to policy-making, and new commitment to regional cooperation. ”

Justin Wood
Head of Asia Pacific
Member of the Executive Committee
World Economic Forum

Ageing high income markets

Singapore and Brunei Darussalam

Key characteristics

These markets have a limited demographic window available to maximise their growth potential — Singapore is projected to reach a high value of old age dependency ratio (>25 percent of working age population) by 2025, with Brunei Darussalam reaching these levels by 2040. However, both markets have achieved the highest GDP per capita levels in ASEAN (>US\$25,000 in 2016), which helps reduce the welfare burden on governments, as compared with ageing mid-income or ageing low-income nations.⁶²

“

Holding ASEAN's chairmanship in 2018, Singapore will play a pivotal role in shaping the region's future, by setting the agenda for stronger and more inclusive growth in the coming decades. Existing challenges and future opportunities in ASEAN can be fully addressed only through innovation, by leveraging new technologies and by designing new business models. With its focus on advanced research and technology, and the support of robust institutions, Singapore could pave the way for ASEAN to become a more digitally connected economy by 2025. ”

Oon Jin Yeoh

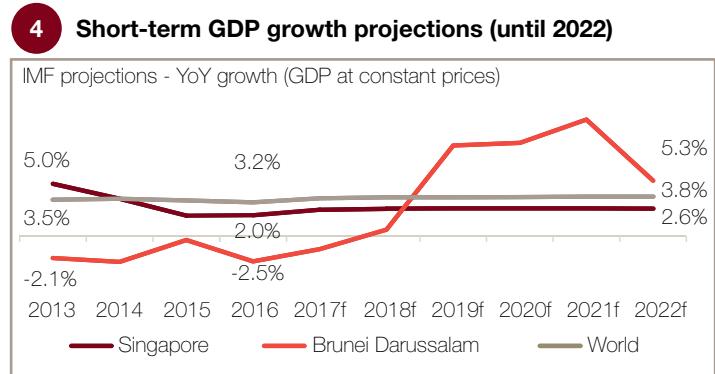
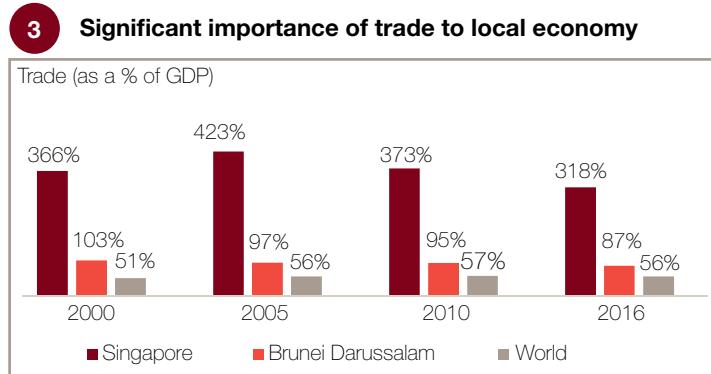
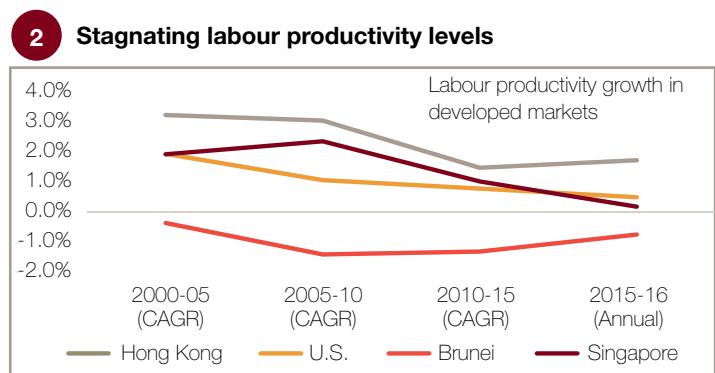
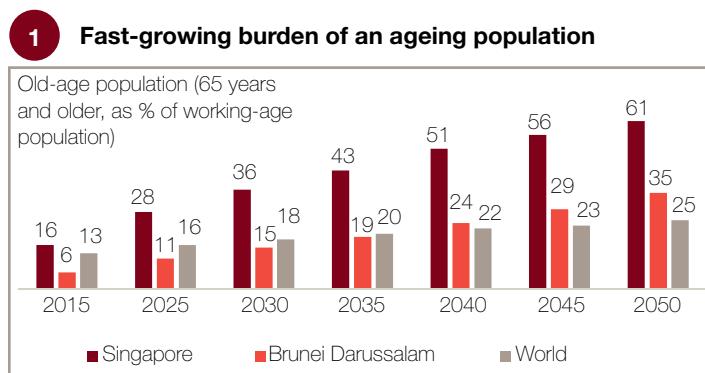
Executive Chairman and Senior Partner
PwC Singapore

Growth concerns

The growing fiscal burden of an ageing population will be accompanied by a reduction in the working-age population, reducing the size of the labour force available to drive the economy forward. According to the U.N., the working-age population in Singapore will start declining post 2021-22, making it more challenging to revive GDP growth that is expected to remain below the world average until 2022. An older population could also impede worker productivity, thus exacerbating the slowdown in productivity growth currently being witnessed in Singapore and the decline being seen in Brunei Darussalam. Lastly, high dependence on trade by both countries could also be a risk factor in the near term, considering rising uncertainties in the global trade climate.⁶³



Figure 1.16: Major Trends Governing “Ageing High-Income” Markets in ASEAN



Source: U.N. Population Division, International Labour Organization, World Bank, International Monetary Fund, 2017

Proposed interventions

Policy interventions will be key to reducing the impact of ageing, through short-term interventions such as addressing talent gaps through inward migration, and long-term reforms targeted at improving the labour force participation of women and older age groups. ICT (information and communications technology) adoption and skill development, especially within SMEs, will be central to improving productivity (and to stronger economic growth) — more so considering the limited scope for a push through other levers such as infrastructure improvements or institutional changes in more advanced economies. Given the central importance of trade to the economy, Singapore could also play a leadership role in building stronger regional value chains in the future — by leading the regional agenda for reduction in NTMs, by strengthening local expertise in high-value-add activities, and by transforming into a centralised digital hub via which companies could monitor and manage supply chains across the region.⁶⁴

Ageing mid-income markets

Thailand and Malaysia

Key characteristics

With an ageing population, these two markets also have a limited demographic window available to maximise economic growth. Thailand is projected to reach a high value of old age dependency ratio (>25 percent of the working-age population) by 2030, giving it a slightly longer time frame than Singapore to make suitable interventions, while Malaysia has much more leverage, reaching higher ratio levels only by 2050. In terms of their economic status, these markets represent the more mature emerging economies in the region, having moderate GDP per capita levels between US\$5,000 and US\$10,000 in 2016.⁶⁵

Growth concerns

Short-term GDP growth projections remain below the ASEAN 5 average for emerging markets; issues of an ageing population and a large productivity gap with global markets weaken the prospects of an economic push in the longer term. These maturing economies are also witnessing strong growth in wage levels (Thailand and Malaysia have some of the highest minimum wage rates in ASEAN), which increases the need to improve worker productivity to counter growing labour costs, in order to remain competitive. Their high dependence on trade also poses growth risks amidst rising protectionist sentiments in global markets.⁶⁶

“
*ASEAN has made positive changes throughout the region, but disparities still exist in quality of life, infrastructure and economic prosperity. With an ageing population and rising labour costs, Thailand needs to now focus on higher value-added activities and ways to boost intra-ASEAN trade. **”***

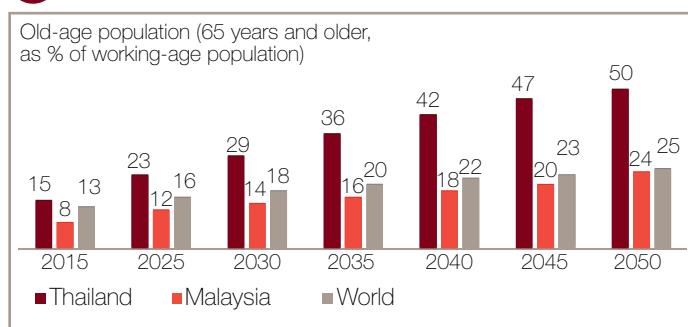
Sira Intarakumthornchai
Territory Senior Partner
PwC Thailand

“
*Malaysia has always been a trade and investment friendly country known for its ease of doing business. It looks to be on a steady growth path over the next 20 years - although we can expect some short term ups and downs as a matured emerging economy. The introduction of sustainable economic reforms, a focus on technology and education, and efforts to address the wage gap will help support Malaysia’s positive growth. **”***

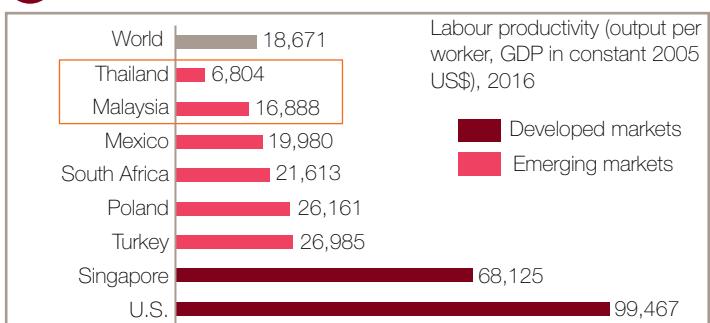
Sridharan Nair
Managing Partner
PwC Malaysia

Figure 1.17: Major Trends Governing “Ageing Mid-Income” Markets in ASEAN

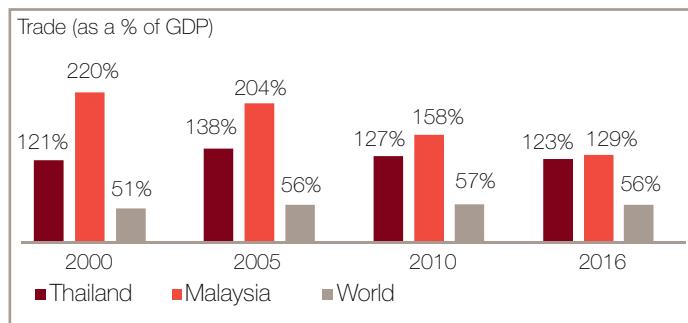
1 Growing burden of an ageing population



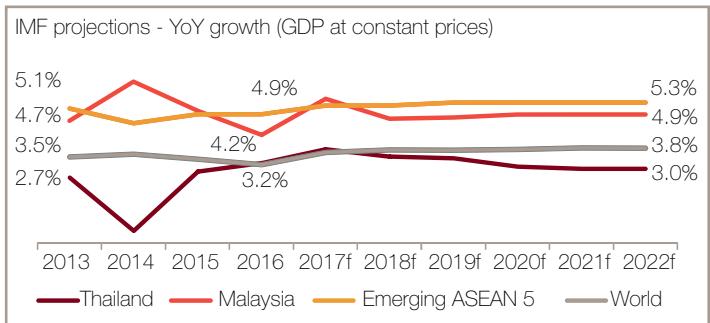
2 Large productivity gap with global markets



3 Significant importance of trade to local economy



4 Short-term growth below ASEAN average (until 2022)



Source: U.N. Population Division, International Labour Organization, World Bank, International Monetary Fund, 2017

Proposed interventions

Enabling structural shifts toward higher value-add activities in production (such as is being planned in China) will be key to remaining competitive, amidst a quickly disappearing labour cost advantage. Share of medium and high-tech manufacturing remains at only around 40 percent of manufacturing value-add in both markets, indicating scope for improvement. Healthcare and skill development (vocational training, tertiary education) infrastructure will need to be strengthened to manage an ageing population and improve human capital — coupled with investments in physical and digital connectivity infrastructure to push growth. Finally, these markets also need to take a lead in cutting down on non-tariff measures to boost intra-ASEAN trade going forward, as they collectively account for a significant proportion, 40 percent, of NTMs currently in place across ASEAN.⁶⁷

Ageing low-income markets

Vietnam

Key characteristics

Vietnam stands out as the only market in this category in ASEAN — facing higher socioeconomic growth pressures associated with population ageing at lower income levels. The country is ageing at a steady pace, surpassing the world average post-2030, to touch more than 25 percent in old age dependency ratio by 2040. However, despite notable improvements in poverty reduction in the last few decades, Vietnam continues to feature among ASEAN nations with the lowest GDP per capita levels (<US\$2,500 in 2016).⁶⁸

“

Understanding Vietnam, its prospects and opportunities, as well as its challenges and complexities are important for investors who want to succeed in Asia's rising economy. Having a one-size-fits-all mindset will be counter-productive if investors are keen to pursue sustainable growth in this dynamic country. Foreign companies will benefit from recognising what makes Vietnam different from other economies, to create a viable, and successful go-to-market strategy. ”

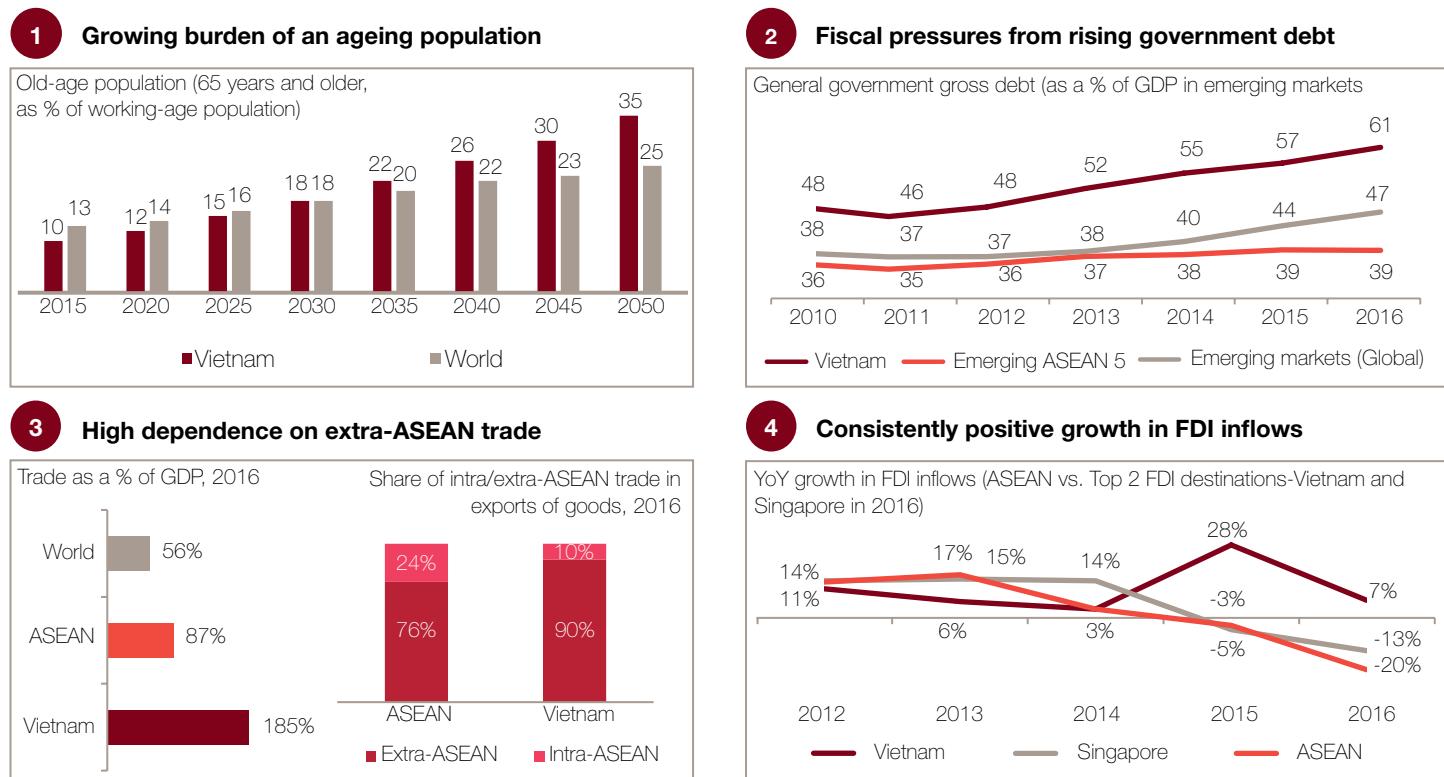
Quynh Van Dinh Thi
General Director and Partner
PwC Vietnam

Growth concerns

Short-term projections remain strong; Vietnam's GDP is expected to grow by 6.2 percent per year until 2022, higher than the ASEAN average. However, long-term prospects remain challenging as the economy is burdened by concerns over “elderly poverty.” An ageing population could substantially push government spending in areas such as healthcare, welfare, and pensions — increasing troubles for a country which already has much higher levels of government debt than other emerging markets worldwide and thus limited fiscal leverage. Significantly higher dependence on extra-ASEAN trade than is the case in most regional markets further adds to its growth risks, considering the changing global trade dynamics discussed earlier.⁶⁹



Figure 1.18: Major Trends Governing “Ageing Low-Income” Markets in ASEAN



Source: U.N. Population Division, International Monetary Fund, ASEANstats, UNCTAD, 2017

Proposed interventions

Vietnam is one of a few countries to consistently record positive growth in FDI in ASEAN in recent years, mainly thanks to growing investments in manufacturing. Policy reforms designed to attract further FDI will be key to finance growth going forward, especially in sectors with a large productivity impact such as infrastructure and manufacturing — shifting focus over time from labour-intensive production to higher value-add segments such as electronics and automotive. Vietnam also has limited foreign reserves at present (<three months' worth of imports), and these reserves need to be strengthened to safeguard against risks emanating from capital outflows or high debt repayments. Lastly, Vietnam needs to balance its overdependence on global value chains by building up ASEAN as a major source of demand for exports in sectors such as agri-products, fertilisers, and electronics.⁷⁰

Younger mid-income markets

Indonesia and the Philippines

Key characteristics

Vietnam and the Philippines are at an “early dividend” stage in their growth journey and are projected to record the largest additions in working-age population in ASEAN in the coming years. These economies are also among the largest emerging markets in the region, accounting for 49 percent of ASEAN GDP and 56 percent of ASEAN’s working-age population at present — rising to a majority 52 percent of GDP by 2022 and 61 percent of working-age population by 2050. In terms of economic status, these markets accounted for less than moderate GDP per capita levels (US\$2,500 to US\$5,000) as of 2016 — though higher than the lowest income group (CLMV markets) in ASEAN.⁷¹

“
*This is a pivotal time for Indonesia. The pace of change is accelerating and bringing new challenges and opportunities. A young and aspirational population will be a key driver of growth but challenges remain to provide adequate quantity and quality of employment. Digital transformation will offer new markets and social prosperity while disrupting established industry. A new entrepreneurship will call for government to support a vibrant SME sector and enhance the ease of doing business. **”***

Irhoan Tanudiredja
Territory Senior Partner
PwC Indonesia

Growth concerns

Substantial additions to the working-age population increase the pressure to create more jobs in the coming years, and to adequately prepare the youth to contribute effectively to the national economy. Although short-term projections are strong for both markets, sustainable growth in the longer term will largely depend on their capacity to exploit the demographic dividend to their advantage — by focusing not only on the quantity but also on the quality of jobs being created. Infrastructure gaps also remain an area of concern, restricting labour productivity (which was below the ASEAN average in 2016), and thus the overall economic potential.⁷²

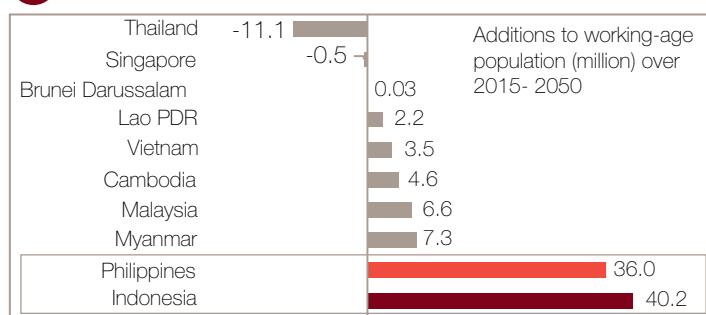
“
*The private sector can contribute in strengthening the country’s status as a leading ASEAN economy. By refocusing attention on the fastest-growing cities in the Visayas and Mindanao regions, the Philippines can speed up growth that is inclusive and sustainable. **”***

Alex Cabrera
Chairman and Senior Partner
PwC Philippines

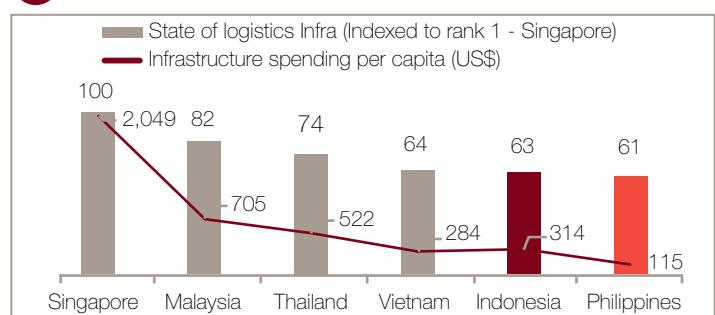


Figure 1.19: Major Trends Governing “Younger Mid-Income” Markets in ASEAN

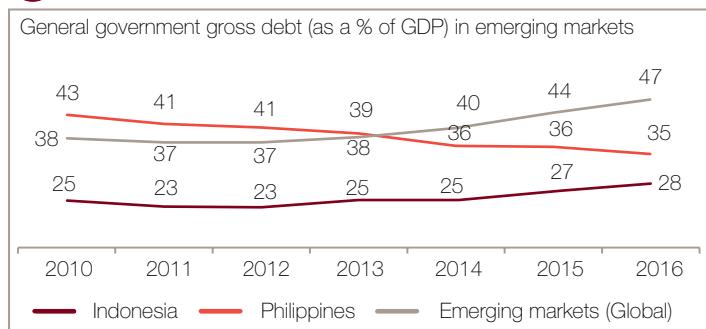
1 Largest additions to working-age population



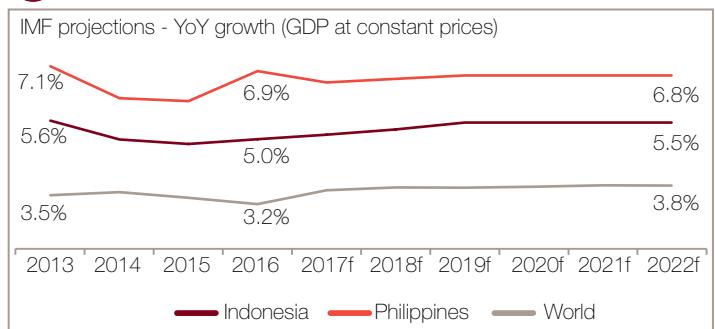
2 Significant gaps in infrastructure over peers



3 Higher fiscal leverage to push growth



4 Strong short-term GDP growth projections (until 2022)



Source: U.N. Population Division, World Bank — LPI and PwC analysis, International Monetary Fund, 2017

Proposed interventions

Policy shifts will be required to foster entrepreneurship and strengthen the SME sector in both Vietnam and the Philippines — acting as engines of job creation. Currently, both markets are placed below a rank of 140 (out of 190 nations) on the ease of starting a business, indicating the need for institutional reforms. Adoption of new digital solutions across sectors (e.g. financial services, healthcare, and supply chain) will be essential to improving the economics of targeting untapped segments or remote regions — thus increasing social well-being and their contribution to the formal economy. Investments in infrastructure will need to be prioritised. Both markets boast of a much stronger fiscal position than their ASEAN counterparts, which could be explored to partly finance development projects, supported by private-sector investments and policy reforms.⁷³

Younger low-income markets

Cambodia, Lao PDR and Myanmar

Key characteristics

Cambodia, Lao PDR and Myanmar have some of the youngest populations in the region, with old-age dependency ratios staying below 20 percent by 2050, and an additional 14 million people projected to join their collective workforce by then. Although these countries are among the smaller economies in the region (each <US\$70 billion in GDP in 2016), accounting for only 4 percent of ASEAN GDP at present, they represent the fastest-growing cluster in the region in the short term (GDP CAGR >6.5 percent over 2016–22). In terms of economic status, these markets fall within the lowest-income group along with Vietnam, with GDP per capita levels of less than US\$2,500 in 2016.⁷⁴



Growth concerns

Similar to other “frontier growth markets” worldwide, these ASEAN economies face significant challenges related to infrastructure gaps, less developed institutions, and lagging human development performance. Poor infrastructure (logistics, power, digital, etc.) remains a major impediment to maximising the cluster’s growth potential, reducing national competitiveness, sector productivity, and corporate profitability. Furthermore, these markets currently have a weak human capital ranking, which will require a greater focus, considering the workforce additions expected in the longer term.⁷⁵

“

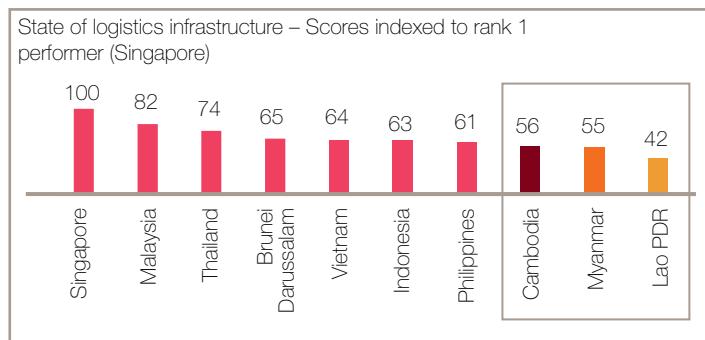
Myanmar has emerged as one of the fastest growing economies in ASEAN, recording a steep rise in FDI in recent years. A young and expanding workforce will continue to push the economy, but additional reforms are required to sustain investments and create new jobs, whilst skill development is key to improving long-term productivity. ”

Chao Choon Ong
Country Managing Director
PwC Myanmar

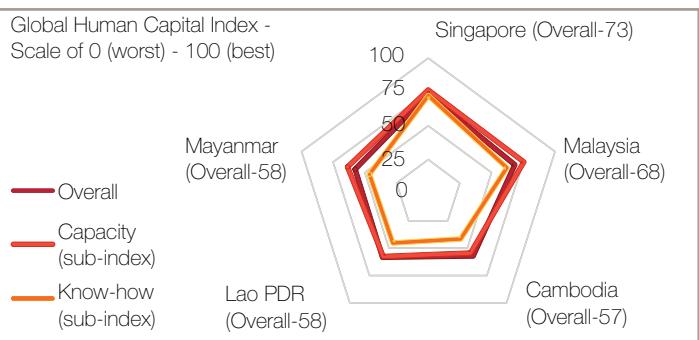


Figure 1.20: Major Trends Governing “Younger Low-Income” Markets in ASEAN

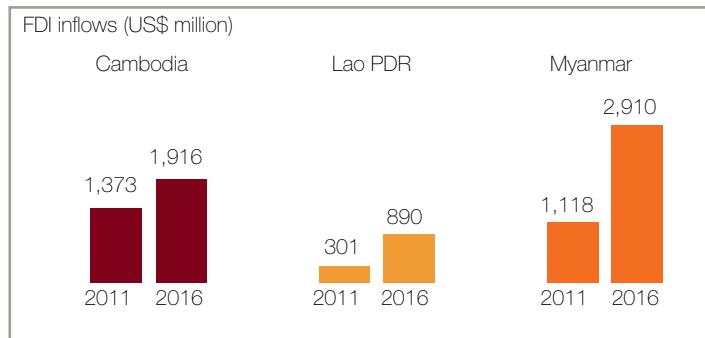
1 Prevalence of major infrastructure gaps



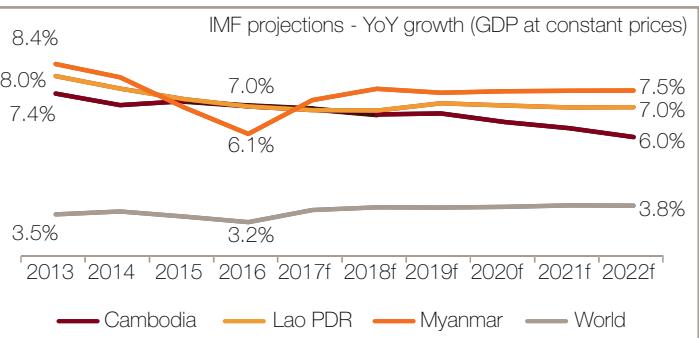
2 Need for improvements in human capital



3 Strong growth in FDI over past 5 years



4 Fastest-growing cluster in ASEAN (until 2022)



Source: World Bank — LPI, World Economic Forum, UNCTAD, International Monetary Fund, 2017

Proposed interventions

Job creation needs to take a priority, focused on generating more productive employment for the expanding workforce. Reforms designed to further strengthen FDI levels in sectors such as light manufacturing and infrastructure will be key to realising this objective. In addition to this, digital adoption will need to be fostered to improve access to basic services (e.g. healthcare, education, financial services) in order to improve social well-being and strengthen human capital, and thus to push growth. Skill development will require not only strengthening of formal education programmes (secondary and tertiary education) but also interventions from the private sector in enhancing on-the-job training, to enable continuous improvements in worker productivity. And finally, although Cambodia is well placed in terms of a stronger fiscal position, Myanmar and Lao PDR will need to strengthen foreign reserves to safeguard against additional debt or external risks.⁷⁶

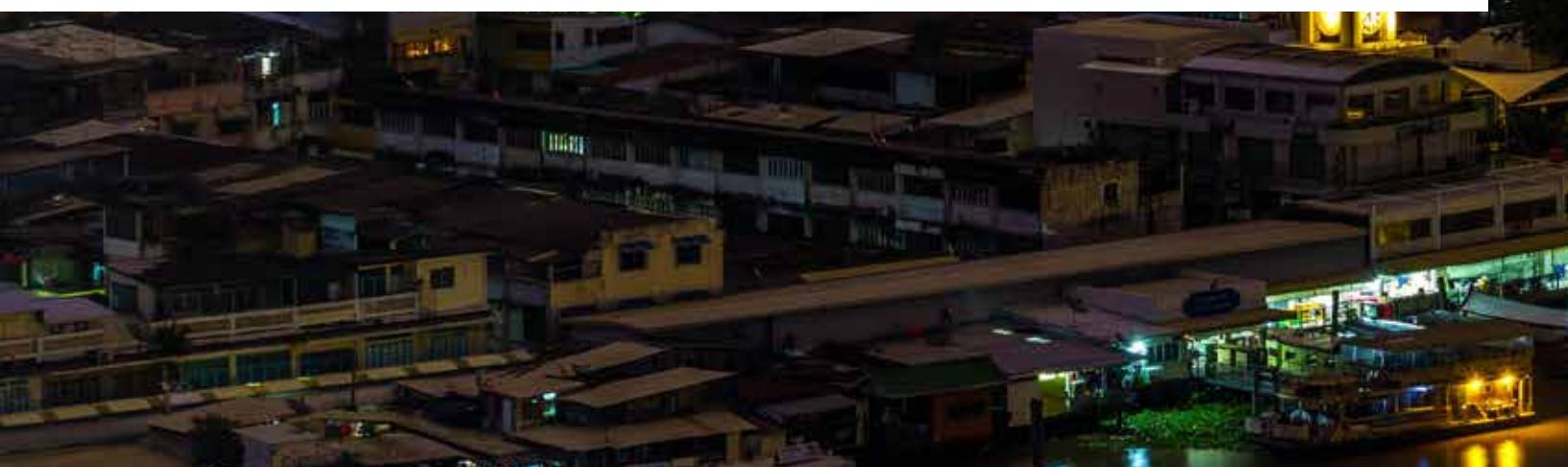


Conclusion

ASEAN has made remarkable progress over the past 50 years, not only in terms of achieving strong economic growth, but also in translating the benefits of its economic success into notable improvements in the living standards of its people. However, a lot more remains to be done, mainly to reduce economic and social disparities between its member nations. Despite rising global uncertainties, short-term growth projections for ASEAN remain stronger than those for most global markets, supported by the region's sound economic fundamentals. Nevertheless, new challenges are also beginning to emerge that could threaten this growth, necessitating decisive moves on the regional integration agenda in the coming years. Long-term growth prospects will depend largely on the success of initiatives aimed at improving intra-regional trade and investments — supported by targeted interventions to address the changing demographic patterns and varying socioeconomic priorities governing different ASEAN markets.

The private sector will have a major role to play in making these interventions in ASEAN, and thus in strengthening the region's growth prospects over the coming years. This will require companies not only to provide new products and services, to meet varying consumer preferences, but also to work more closely with governments to develop the right conditions for businesses to prosper. Going forward, we see significant growth opportunities for the private sector in numerous industries in ASEAN — such as automotive, financial services, consumer goods, refined fuels, medical devices, transport and telecommunications.

However, market dynamics in the region remain in a state of flux as consumer needs and business conditions experience major shifts that will require companies to adopt new growth strategies to achieve success. These shifts have also deepened CEO concerns over investment gaps, rising pressure on margins, and growing business risks in recent years — which will require focus on developing and executing strategies that are relevant for the varying markets of ASEAN.



“

The past 50 years have seen ASEAN emerge as a global powerhouse bringing peace and prosperity to millions. However, the next 50 years will bring forth new challenges that will require greater regional trade and investments, adoption of digital solutions and the implementation of new business strategies to achieve far-reaching growth across member nations, balancing economic progress with social development. ”

Sundara Raj

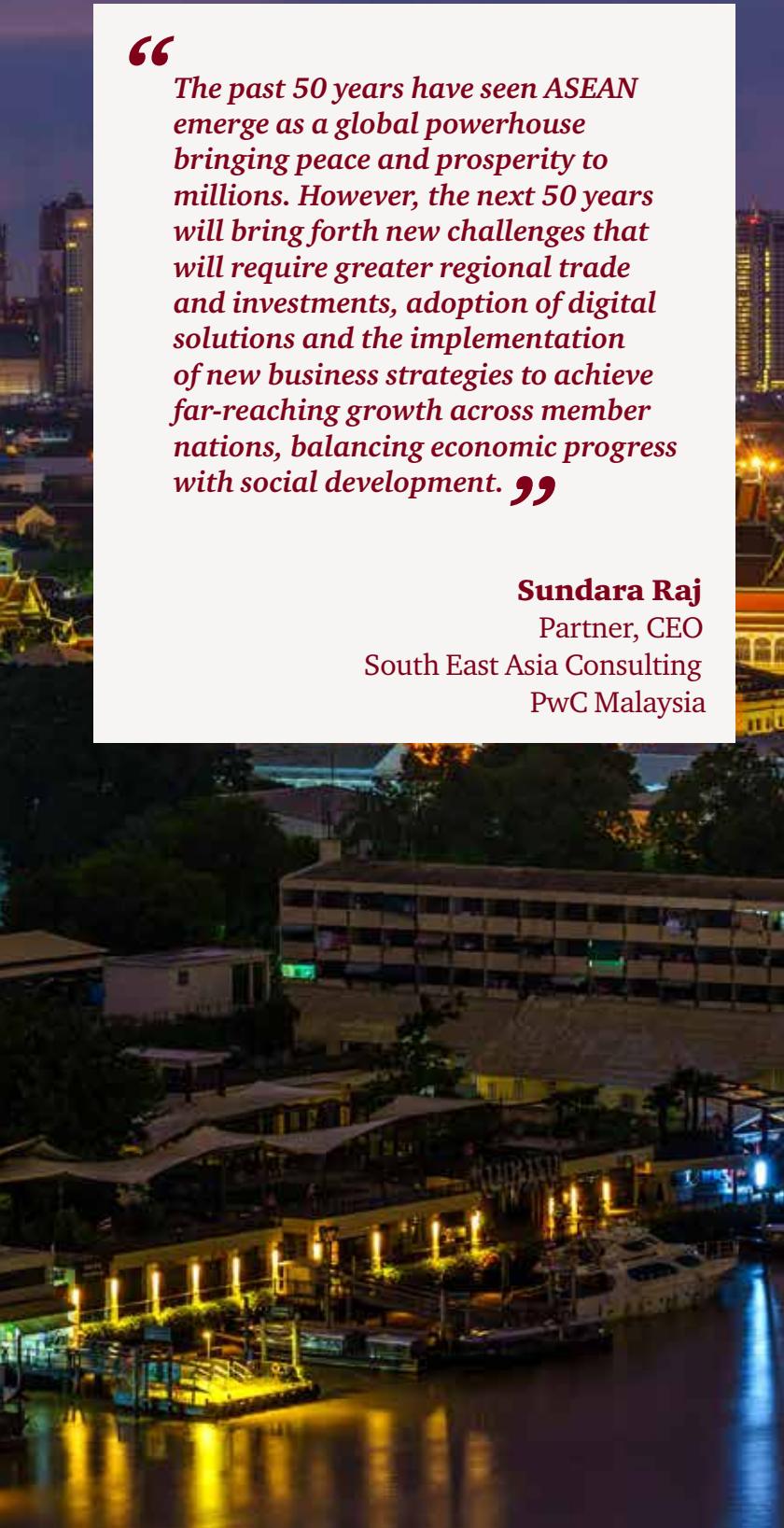
Partner, CEO
South East Asia Consulting
PwC Malaysia

“

The private sector plays an essential role in contributing to the success of the ASEAN economic integration process by providing input and feedback on regional initiatives and agreements. Efforts to strengthen the role of the private sector in the ASEAN economic integration process include increased frequency of engagements between the government and private sector representatives where specific issues of interest and concern are discussed. The ASEAN Business Advisory Council (ASEAN-BAC), as ASEAN's apex private sector body, takes the lead in coordinating suggestions from established business councils and entities in their engagements with various ASEAN officials and Ministers. ASEAN governments remain committed to deepening engagement with the private sector to provide timely responses and to incorporate feedback, where possible, in shaping ASEAN initiatives and agreements so that these remain relevant and useful to businesses. ”

Dr. Koh Poh Koon

Senior Minister of State
Ministry of Trade and Industry
& Ministry of National Development
Singapore



A collage of industrial images. The top half shows a worker in a blue jacket welding a metal structure, with bright sparks flying. The bottom half shows a robotic arm welding a metal frame, with sparks flying. A red abstract background with a grid pattern is centered in the middle.

Chapter 2: Automotive

Manufacturing in ASEAN

Manufacturing has been one of the key sectors contributing to ASEAN's growth, and this is expected to continue with a 6.6 percent compound annual growth rate (CAGR) from 2016 to 2020 (Figure 2.1).⁷⁷ As with many other sectors across ASEAN, the key domestic demand drivers of manufacturing's growth can be attributed to its 600 million consumers and, in particular, the burgeoning middle class, with its rising incomes and consumption. Supplementing this are ASEAN's global exports, that capitalise on the maritime trade routes to other countries, particularly in Asia-Pacific.

ASEAN also continues to have attractive operating costs, such as low labour costs, drawing business from other large manufacturing bases. For example, as China deals with the effects of rising wages and tighter regulations, it is making a transition to higher-value manufacturing; in response, many companies have shifted their lower-value production networks to the ASEAN region. Companies have also increasingly integrated ASEAN into global manufacturing value chains.

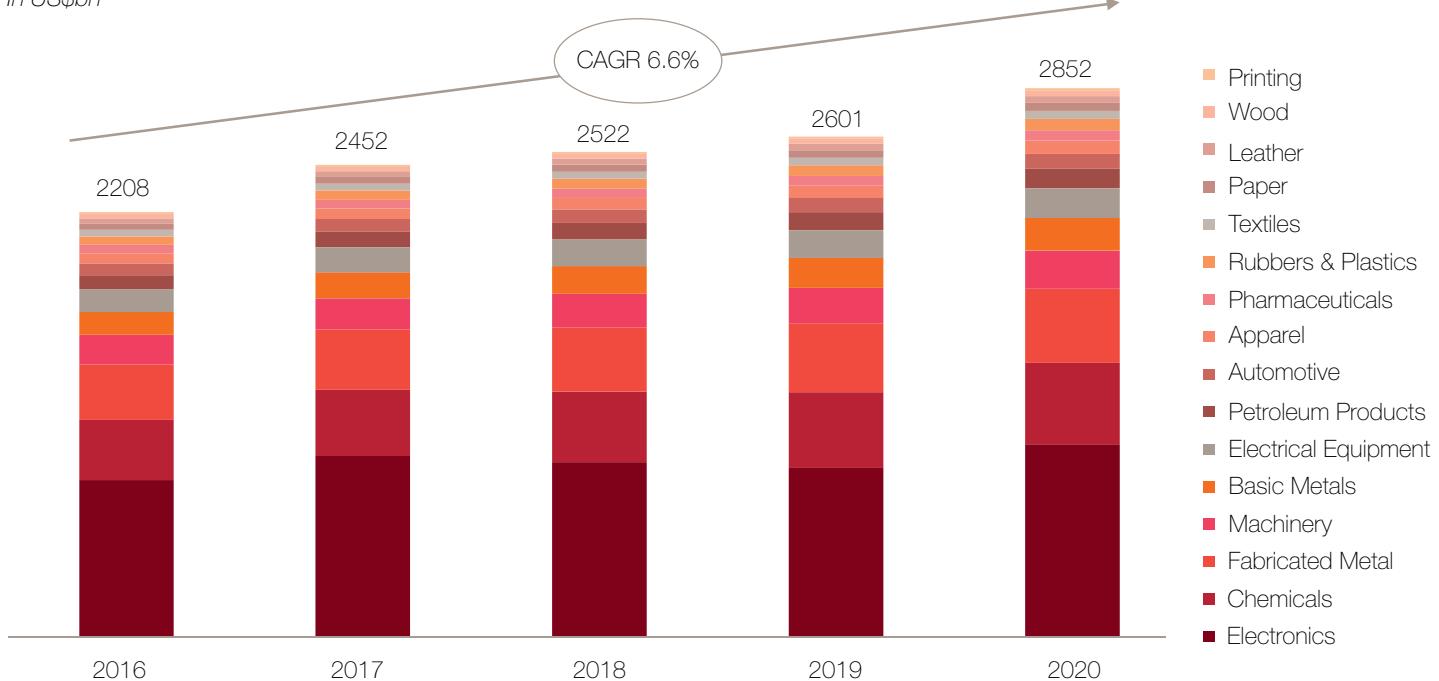
Facilitating this shift are a number of trade agreements within ASEAN, such as the ASEAN Economic Community (AEC) and the ASEAN Free Trade Area (AFTA), as well as global and regional trade agreements such as the Regional Comprehensive Economic Partnership (RCEP). The AEC, for example, encourages the consolidation and formation of a single common market and production base. The prospects are for manufacturers in the region to enjoy greater integration, with a regional policy framework leading to a more coordinated and liberalised policy environment. This environment should reduce barriers to investment, production, and the movement of goods and people. It should strengthen industrial and regional customs cooperation and lead to greater harmonisation of policies and measures among member countries, resulting in greater facilitation of trade and lowered transaction costs. This increases the benefits of localisation, such as in encouraging local content in sourcing.



Figure 2.1: The Manufacturing Industry in ASEAN is Projected to Grow Strongly

ASEAN Manufacturing Industries Value

In US\$bn



Note: ASEAN here refers to Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam

Source: Oxford Economics, BMI

PwC sees broad opportunity for manufacturing in ASEAN going forward, particularly across the automotive and refined fuels subsectors.

As growth markets make a significant shift toward high-tech sectors, we see opportunities in the automotive manufacturing sector, valued at US\$62.5 billion in 2016, and expected to rise to US\$77 billion in 2020, at a rate of 5.4 percent CAGR.⁷⁸ The automotive manufacturing sector will be supported by an increased domestic demand of motor vehicles across passenger and commercial vehicle segments, at 4.2 percent CAGR and 3.9 percent CAGR, respectively, between 2016 and 2022.⁷⁹ The region already sees high export volumes of vehicles, parts, and accessories (US\$42.5 billion in 2016). Automotive makes up the fifth-largest category of products being exported, behind

electrical machinery; nuclear reactors and mechanical appliances; mineral fuels, oils, and products; and iron and steel.⁸⁰

In addition, with Thailand being hailed as the “Detroit of Southeast Asia” and Indonesia strongly competing for “manufacturing hub” status, ASEAN already has a strategic advantage as an automotive production and export hub catering to ASEAN, the wider Asia-Pacific region, the Middle East, and other markets globally. It is also strongly positioning itself as a cost-effective production hub for new energy vehicles such as electric and hybrid vehicles. Across vehicle and aftermarket parts and accessories manufacturing, the pressing need is for manufacturers to establish competitive advantage in order to tap into growing vehicle, parts, and accessories demand.

We also see growth opportunities in the downstream production of refined fuels in ASEAN, as explained in Chapter 6 of this report, driven by a widening gap between fast-rising consumption and limited local capacity. This signals a major requirement to boost domestic production in the coming years — by both setting up new plants and upgrading existing units to improve utilisation and meet stricter fuel quality standards. Although energy demand in ASEAN has grown significantly, 60 percent in the past 15 years, average per capita energy consumption still remains at around half of the global figure, indicating significant scope for growth. A robust economic outlook for ASEAN will continue the steady demand for fuels,

but given the region's inadequate production capacity to meet domestic needs, its reliance on imports will also rise significantly — raising concerns over energy security while increasing the cost burden on regional economies. In light of this, there is rising interest among national governments to strengthen their local refining sectors, ease conditions for private-sector involvement, and create new entry and growth opportunities for both domestic and foreign players. A well-developed refining sector will also provide a strong support base to petrochemical manufacturing in the region, which is witnessing a significant surge in demand aligned with ASEAN's economic growth.⁸¹



Automotive in ASEAN

Motor vehicle manufacturing

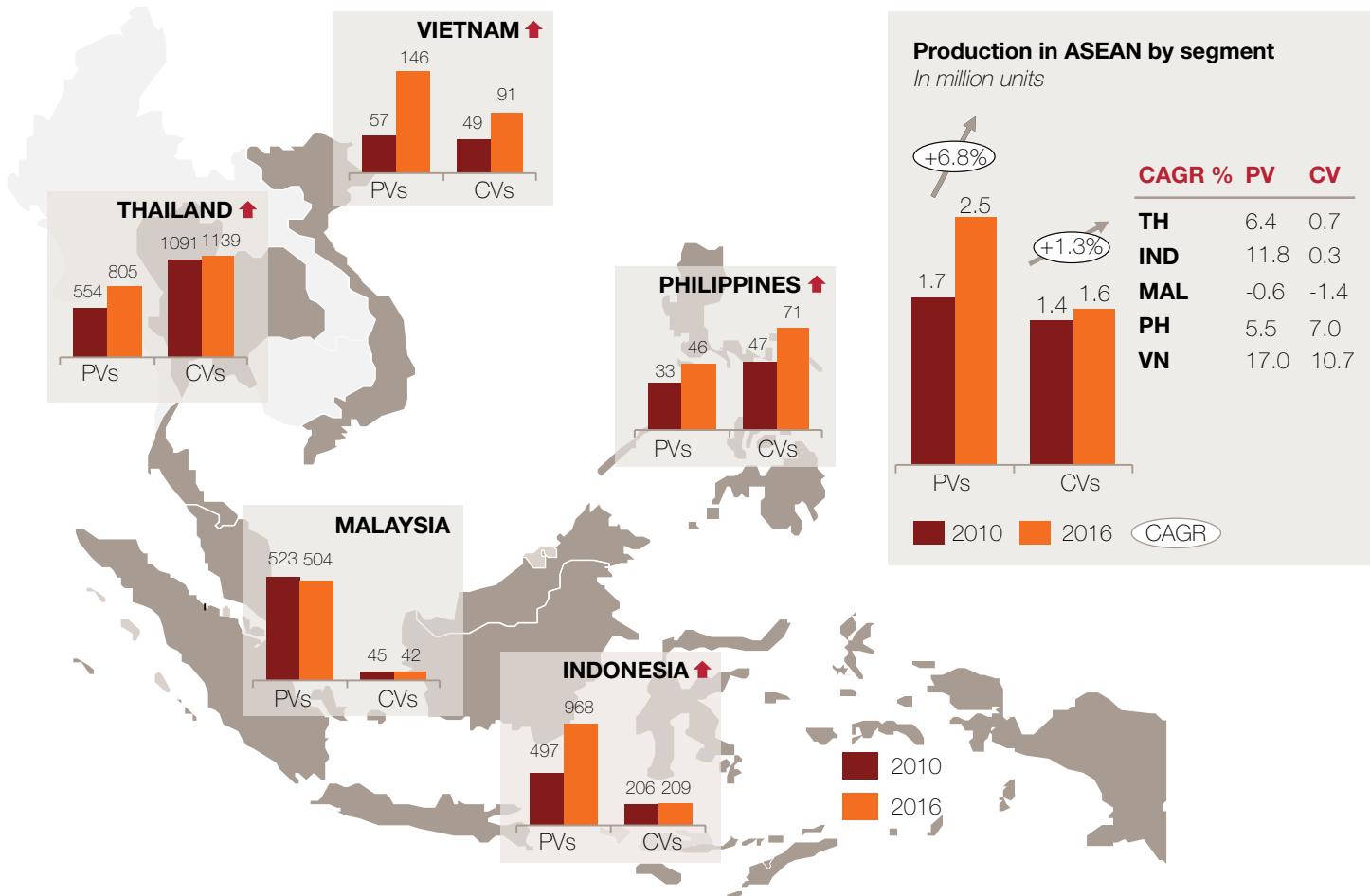
ASEAN's automotive manufacturing industry is projected to grow, owing to continued demand across the region and globally. In 2016 the production of passenger and commercial vehicles rose to just over 4 million across the five major producing markets. These were led by Thailand and Indonesia and followed by Vietnam, the Philippines, and Malaysia, with all but Malaysia experiencing good growth. Passenger vehicles (PVs) have led the growth, at a 6.8 percent CAGR between 2010 and 2016, compared with commercial

vehicles (CVs), whose growth has been at a 1.3 percent CAGR over the same period (Figure 2.2).⁸² Key production markets for PVs have been Thailand, Indonesia, the Philippines, and Vietnam, whilst the production of CVs has been centred in the Philippines and Vietnam. Vietnam in particular has seen strong production volumes across both PVs and CVs, despite starting with a low base. As the largest automotive production market in ASEAN, Thailand exports more globally (completely built-up units or CBUs) than it sells domestically, while Indonesia competes for regional production hub status supported by strong local demand.

Figure 2.2: Production of Vehicles in ASEAN Grew, Led by Passenger Vehicles

Production of passenger and commercial vehicles in ASEAN, 2010-2016

In thousand units



Note: ASEAN here refers to Indonesia, Malaysia, Philippines, Thailand and Vietnam

Source: BMI, ASEAN Automotive Federation

Aftermarket

The global automotive aftermarket will continue to grow at a stable rate of around 5 percent CAGR from 2017 through 2021; by industry value, the U.S. and Asia-Pacific will each account for almost one-third of the market, although Asia-Pacific will experience a higher rate of growth.⁸³ ASEAN is expected to grow at a 9.6 percent CAGR from 2015 to 2030, to US\$55 billion, dominated by passenger vehicles as the largest segment (66 percent, US\$10.1 billion).⁸⁴

The ASEAN aftermarket industry is composed of retail and wholesale sales of vehicle parts and services, with tyres forming the largest segment in the parts markets and general automotive repairs dominating the services segment.⁸⁵ The industry is driven by fast-growing car ownership and usage as a result of rising urbanisation in the emerging regions of ASEAN.

ASEAN's aftermarket network is crowded. This is particularly evident in Indonesia. Original equipment manufacturers (OEMs) lead the market share, but they are facing increasing competition from non-genuine part players. Until recently, OEMs had a practical monopoly across the sector, and they still dominate through their dealerships. The replacement products provided by these companies are more expensive, but end-users are often willing to pay for the genuine parts.⁸⁶

However, whilst many consumers in Indonesia prefer genuine parts and desire quality assurance, price and convenience continue to be key considerations. Some customers cannot afford to purchase genuine branded parts. Thanks to liberalisation policies, independent garages in Indonesia are growing their share of the market with such customers, but their lack of scale restricts their ability to grow faster.⁸⁷



“

Between 2017 and 2024, Autofacts estimates the total light vehicle assembly volumes in the ASEAN region will likely increase by 48%, from 3.9m to 5.8m units, for domestic and export markets. While the top 3 countries (Thailand, Indonesia, and Malaysia) are expected to show significant growth, various incentives from their governments to stimulate the automotive manufacturing sector as well as improvement of infrastructure may boost volumes further for smaller markets, such as Vietnam, the Philippines and Myanmar. ”

Tsukasa Watanabe
Asia Pacific Leader
PwC Autofacts

The future for automotive manufacturing

The potential of ASEAN's automotive manufacturing sector is evident as it continues to affirm its role as a regional and global hub for cost-effective manufacturing, taking on the gap left by China and the rising cost of production there, and backed by strong demand growth in the region. For these reasons we believe that automotive manufacturing growth is set to continue in the years ahead.

Investments

Automakers have been investing heavily in ASEAN manufacturing in recent years. Established Japanese players, for instance, have been investing to enhance existing manufacturing plants, while smaller new entrants such as French, Korean, Indian and Chinese players have partnered or set up joint ventures with local partners to invest in manufacturing facilities across ASEAN. In the past year, Thailand has witnessed a US\$14.5 million investment in commercial vehicle manufacturing by Tata Motors to drive production of pickup trucks and mini trucks; in Indonesia, a Chinese-American automotive joint venture has invested US\$700 million in a new auto manufacturing facility with a production capacity of 120,000 cars per year (Figure 2.3).⁸⁸

Figure 2.3: Highlights of Growing Investments in Automotive Manufacturing in ASEAN

| Thailand | Indonesia | Malaysia | Philippines | Vietnam |
|--|---|---|--|--|
|  <ul style="list-style-type: none">Tata Motors invested US\$14.5mn to tool up Bangchan's assembly plant with production capacity of 8,000 pickup trucks and 2,500 mini trucks per yearFuso's new wholly owned subsidiary Daimler Commercial Vehicles will make and sell trucks under Fuso with an annual production capacity of 3,000 unitsFOMM will invest in a new production facility to produce four-seater EVs and will have an annual installed capacity of 5,000 units per year |  <ul style="list-style-type: none">A Chinese-American automotive joint venture invested US\$700mn in a new facility with production capacity of 120,000 cars per yearHyundai will set up a CV production plant in a JV with a local company with production capacity of 1,000 units a year with scope of expansionLippo Group and two leading Japanese automakers launched the Meikarta project to build a US\$21bn industrial centre near Jakarta, targeting auto and electronics |  <ul style="list-style-type: none">Go Auto Group and its Chinese partner, Great Wall Motors allocated up to US\$504mn in investment until 2021 to upgrade its assembly and production facilities in KedahFrance's Groupe PSA and Malaysia's Naza Corp Holdings will set up a joint venture, Naza Automotive Manufacturing (NAM), with capacity for 50,000 vehiclesIn 2016, Bosch announced its US\$36mn investment plan to remodel its Penang plant |  <ul style="list-style-type: none">In 2016, two leading Japanese automakers joined the Comprehensive Automotive Resurgence Strategy (CARS) as participating carmaker and committed an initial US\$172mnHyundai invested US\$38mn in its first Philippine assembly facility as a part of CARS programme in 2017Hyundai partnered with a local NGO Plan International to inaugurate the Hyundai Dream Center Philippines, a training and education hub for technicians |  <ul style="list-style-type: none">French automaker Groupe PSA invested in production of two new SUVs through partnership with local partner Truong Hai at its existing plant, and plans to sell two new SUVsHyundai signed an agreement with Vietnamese partner Thanh Cong Group to produce a range of cars locallyVingroup planned to invest US\$3.5bn to set up a manufacturing and R&D complex to produce sedans, SUVs, and motorbikes |

Source: BMI Research, Reuters, Go Auto, Bloomberg, company websites

Regional manufacturing hub

ASEAN's importance as a regional automotive manufacturing hub will be further reinforced by rising manufacturing costs. Global automotive costs are estimated to grow at a CAGR of 6 percent due to increasing intra-industry and labour costs. Among the top three vehicle-producing nations, China, the U.S., and Germany, China's costs, whilst still lower, have been rising sharply as compared to the other two. Within ASEAN, costs in Thailand and Indonesia have

been rising at a much slower pace than China's and they remain far cheaper manufacturing countries.⁸⁹ Thailand's status as a regional production hub for automakers is also reinforced with an efficient port infrastructure, and its automotive manufacturing sector will continue to mature, as more automakers invest in R&D and high-tech plants to produce alternative fuel vehicles. BMW, for example, has invested in its Rayong plant in Thailand to boost the production of its plug-in hybrid electric vehicles and electric car batteries.

“

In the mid to long term, the ASEAN region is expected to be a key growth engine for the global auto sector with new investments from China, France, Germany, India, Japan, South Korea and USA. ”

Tsukasa Watanabe
Asia Pacific Leader
PwC Autofacts

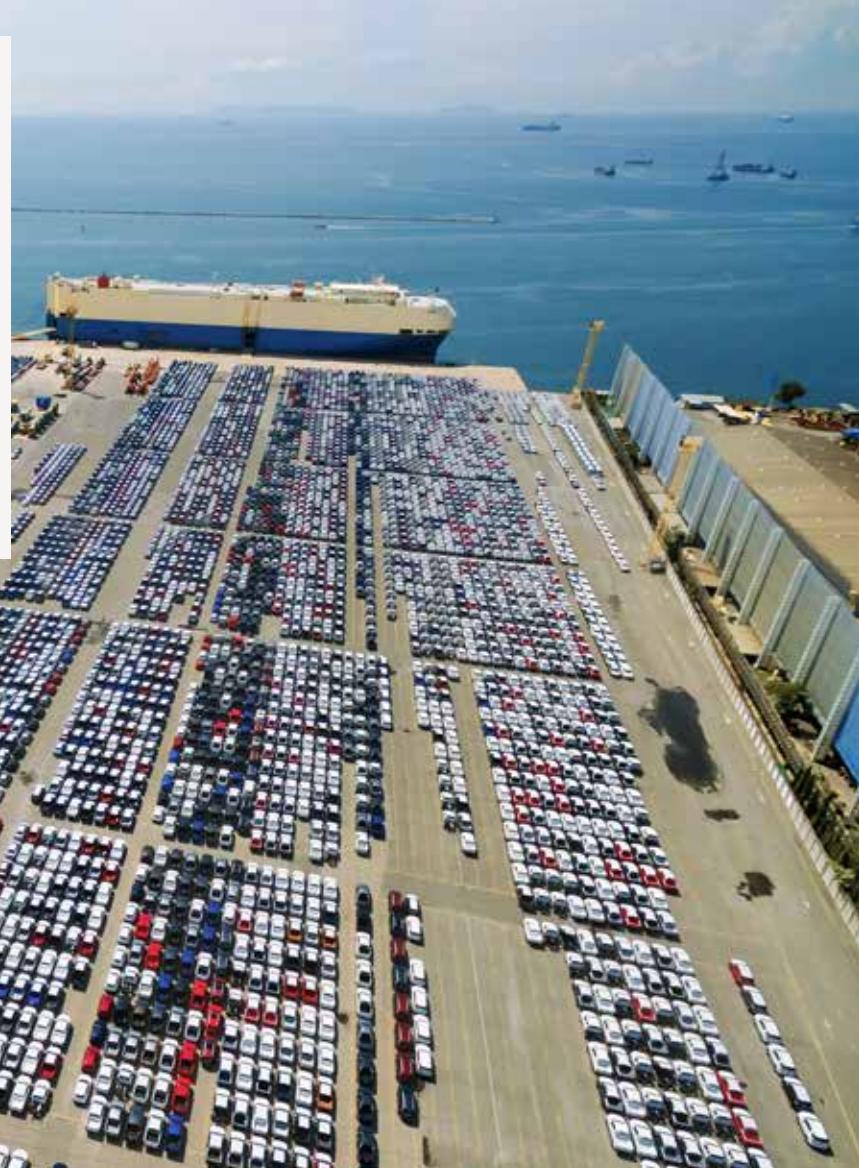


Figure 2.4: Growing Presence of Automotive Parts Manufacturers in ASEAN

Major Global Automotive Part Manufacturers in ASEAN

| Top Global Suppliers (by sales, 2016) | HQ | Operations in ASEAN countries | | | | | | | | | |
|--|---|-------------------------------|----------|-------------|-----------|----------|--------|----------|------|---------|---------|
| | | Indonesia | Malaysia | Philippines | Singapore | Thailand | Brunei | Cambodia | Laos | Myanmar | Vietnam |
| Robert Bosch |  | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | ✓ |
| Continental |  | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | |
| Denso |  | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ | ✓ |
| Magna International |  | | | | | ✓ | | | | | |
| ZF Friedrichshafen |  | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | ✓ |
| Faurecia |  | | ✓ | | | ✓ | | | | | |
| Lear Corp |  | ✓ | | ✓ | ✓ | ✓ | | | | | ✓ |
| Valeo |  | ✓ | ✓ | | | | | | | | |
| Aptiv/Delphi Technologies |  | ✓ | ✓ | | | ✓ | | | | | ✓ |
| Yazaki Corporation |  | ✓ | | ✓ | ✓ | ✓ | | ✓ | | | ✓ |
| Sumitomo Electric |  | | ✓ | | ✓ | ✓ | | | | | |
| JTEKT Corporation |  | | ✓ | ✓ | ✓ | ✓ | | | | | |
| Thyssenkrupp AG |  | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | ✓ |

✓ Operations in Singapore are mostly sales offices or R&D centres

Source: PwC analysis, company websites, annual reports

Regional suppliers

ASEAN's manufacturing attractiveness for the automotive industry is further enhanced by a rich presence of automotive component manufacturers, especially in Thailand, and also in Indonesia, Malaysia, the Philippines, and Vietnam. The presence of high-quality automotive component suppliers supports the growing trend toward sourcing from within the region (as demonstrated by established Japanese automakers).

Currently in ASEAN, major automotive suppliers have established a presence in key manufacturing hubs, reflecting greater production capacity and volumes. Thailand, as the more mature location, has the richest presence of the top automotive suppliers in the region (Figure 2.4). Indonesia and Malaysia lag slightly behind. Less mature automotive manufacturing markets such as the Philippines and Vietnam feature

No major player

No major player except a Japanese parts producer

only half of the supplier presence we see in Thailand. Even fewer suppliers have set up shop in nascent markets such as Cambodia, Myanmar, and Laos. Meanwhile, Singapore is used mainly as a sales office or R&D centre.

Domestic consumers

The region's production attractiveness is further enhanced by an estimated 300 million-plus domestic consumers living in urban areas, among which about three in every 20 households own a car.⁹⁰ This propensity to buy is enhanced by recent improvements in the road networks. Owners of two-wheeled vehicles are now upgrading to four-wheeled vehicles and are being assisted in doing so by lower interest rates and flexible auto financing packages, such as those offered by the Indonesian and Philippines governments.

SUVs will continue to be a key demand segment across ASEAN consumer markets. SUV sales have displayed resilience amidst the often fluctuating demand in passenger vehicles in the region. Their popularity can be attributed to their ability to cater to large family sizes; large storage spaces; and a premium image, look, and feel. Given the price sensitivity of Southeast Asian consumers, however, compact SUVs, which are lighter and more fuel efficient, are likely to remain popular.

The growth of commercial vehicles is more closely tied to an improving economy and business environment; increasing construction activity, especially in transportation infrastructure; and a growing energy and utilities infrastructure industry. For example, Thailand's construction activity will drive local demand for commercial vehicles.

Aftermarket

Indonesia remains the largest aftermarket, accounting for a 35 percent revenue share or US\$5.3 billion of the market by 2026; however, strong vehicle sales in the Philippines and Vietnam are expected to drive subsequent growth in their respective aftermarket sectors.⁹¹ This growth will come in part from out-of-warranty passenger vehicles, as owners begin paying for repairs.



Key challenges

Intense competition

ASEAN's automotive sector is a crowded competitive landscape. The motor vehicle segment is dominated by established Japanese manufacturers, which enjoy a market share majority. For example, in Thailand's passenger car segment, six Japanese players made up 89 percent of new vehicle sales in 2017, and the remaining 11 percent was divided among 20 players from the U.S., Europe, Korea, China, and Japan. U.S. and European brands dominate the luxury vehicle segment.⁹²

The situation is similar for commercial vehicles, where the market is dominated by Japanese players and the remaining market is shared among smaller Japanese, European, Chinese, Indian, and Korean players. In Thailand's commercial vehicles segment, including one-ton pickups and SUVs, six Japanese manufacturers made up 88 percent of the market in 2017, and the remaining 12 percent was shared among 23 other players.⁹³

Given that ASEAN consumers are very brand conscious, brand familiarity and brand impressions are key purchase decision drivers. In this vein, ASEAN consumers see Japanese vehicles as being reliable and a good value, whereas Western brands are perceived to be more premium. On the other hand, Chinese, Indian and Korean vehicle brands are newer to ASEAN customers and also exhibit weaker brand equity levels.

Industry disruptors

New mobility services such as ride sharing, ride hailing, and car rental services have become a global phenomenon and are changing the way consumers perceive car ownership, especially in urban areas. Consumers are quick to adopt even highly complex and expensive technology if it provides convenience and ease.

In a similar fashion to smartphone adoption in emerging markets, benefits offered by mobility services are likely to drive technology leapfrogging

and rapid adoption. We are already witnessing high rates of adoption in ASEAN. In Indonesia, for instance, smartphone penetration of ride-sharing apps has been consistently rising in the last three years.⁹⁴

Despite the early impact of mobility services, car sales are still expected to outpace them and losses in car sales will likely be very small, thanks in part to the desire of those in the new middle class to own a vehicle. Furthermore, it is expected that ride hailing and carpooling will drive up usage of vehicles which may also mean greater vehicle turnover and shorter lifespan, further limiting the impact on vehicle sales.⁹⁵ Therefore, we can expect that in the near to mid-term, the impact on shared and new mobility services will still be fairly limited. However, automakers, suppliers, and other mobility players ought to position themselves well for the longer-term industry impact of shared mobility.

Part alternatives and price sensitivity

For the automotive aftermarket sector, the main demand challenges relate to price and the presence of alternatives to genuine parts, such as counterfeit parts and lower-quality imported parts. As a developing region, ASEAN has generally lower affluence levels than do developed markets. Consumers with lower incomes and less spending power tend to be more price sensitive, opting for cheaper alternatives in the aftermarket; in fact, their knowledge and appreciation of genuine parts may be lower. The choice of lower-priced parts also becomes more likely after the typical warranty period of about three years for new vehicles.

Furthermore, parts alternatives, such as counterfeit parts, can often be very similar to originals, and even reputable garages can unwittingly sell counterfeit parts. The expanded industry presence of imported low-quality and cut-price parts has harmed the ability of automakers, independent parts suppliers, and domestic companies to compete at the low end of the industry. The alternative parts distort the supply side of the market, thereby reducing the feasibility and competitiveness of the local aftermarket manufacturing scene.

Rising operating costs

Given the demand-side challenges and rising operating costs across the region, it is an ongoing challenge to maintain profit margins in automotive manufacturing across ASEAN.

It is not only the presence of automotive suppliers that varies; the infrastructure reliability and presence of skilled labour is also inconsistent across the region. There are always trade-offs to be made. Where a country like Thailand has the ability to support end-to-end manufacturing with a rich network of small and large, foreign and local automotive suppliers along the vehicle production supply chain, it is also more expensive to operate in. However, in a country like Vietnam where operating costs such as labour wages are lower, the presence of suppliers is spottier, and infrastructure may not be as developed.

Labour costs — Minimum wages may continue to rise across ASEAN markets, and workers in Malaysia, Thailand, and Myanmar have already rallied for wage increases of more than 50 percent for 2018 although they continue to be low enough to retain the presence of companies investing in manufacturing in the region.⁹⁶

Productivity costs — There is much room for growth in productivity levels compared to minimum wages in the region. Many ASEAN countries have high ratios of minimum wages relative to value-added per worker. For example, the Philippines registers 65 percent, Vietnam 68 percent, Lao PDR 47 percent, Myanmar 46 percent, while countries like Thailand and Malaysia have a narrower minimum wage to productivity gap, registering 36 percent and 20 percent respectively.⁹⁷ Comparatively, developed economies' ratios are at much lower levels such as U.K. at 25 percent, Korea at 30 percent, Germany at 31 percent.⁹⁸ The Vietnam Institute for Economic and Policy Research reported that growth in the minimum wage was higher than growth in labour productivity, at 5.8 percent and 4.4 percent, respectively. The misalignment of productivity and wage growth will lead to gradually diminishing economic competitiveness, cause greater unemployment, affect the profits of enterprises, and harm investors' confidence in the country.

Hidden costs — The lack of good infrastructure such as roads, highways, and ports contributes to logistical delays in the transport of automotive components which could lead to a loss in revenue. Added to this, traffic congestion and a lack of reliable electricity supply disrupt productivity and production schedules, creating serious quality issues. Indonesia, for example, has struggled to build new ports and the surrounding infrastructure necessary to cope with rising demand for capacity and traffic at its current port in Jakarta.

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To create a successful ASEAN strategy, auto companies must take full advantage of Free Trade Agreements. However, they can be complex, with opaque local interpretations and inconsistent applications of the rules. It is essential that this risk is appropriately managed because there are increasing numbers of retrospective challenges by authorities involving huge potential liabilities. ”

Paul Sumner

Partner

PwC Thailand

Regulations

ASEAN is rife with differing regulations and policies that increase the complexity for new entrants aspiring to establish a manufacturing presence. For existing players looking to set up a regional production network, these differences such as compliance for imports drive up costs and time taken for movement of goods. Volatile and changing policies also results in a highly unstable operating environment that requires existing players to remain agile and often distracts management from focusing on optimising operations.

In recent years, new taxation policies have been passed in Thailand and Vietnam which impose higher taxes on vehicles that consume more fuel, making them more expensive to own, while encouraging the uptake of vehicles with lower carbon emissions. For example, Thailand has reduced excise taxes (from 17 percent to between 12 to 14 percent), for environmentally friendly vehicles such as "eco-cars" (a designation based on carbon emissions, E85-gasohol and fuel efficiency). However, cars which exceed the carbon emission requirements will incur higher taxes, resulting in higher retail prices and potentially reduced demand. New excise taxes will have the most impact on the commercial vehicles segment and those passenger vehicles with higher carbon emissions.⁹⁹



However, regional trade agreements are likely to impact the trade and manufacturing landscape of the automotive sector across ASEAN. The AEC is expected to be implemented in 2018, and the organisation envisions that countries such as Cambodia, Laos, Myanmar, and Vietnam will eliminate tariffs and operate more seamlessly with a free flow of goods and people across the region.

While the AEC signifies a big step for the region, protectionism still exists and some countries such as Vietnam may take more time to fully appreciate the value of such policies. In January 2018, although the Vietnamese government finally removed tariffs for the import of automobiles from other ASEAN nations, they

subsequently imposed a requirement for emission and safety tests to be done on automobile imports which incurs greater costs for manufacturers.¹⁰⁰

Import regulations also differ across countries. According to import regulations (2014) in Vietnam, imported Completely-knocked-down production (CKD) seats must be broken into separate parts in order to be eligible for reduced tariff rates. If the design of the seat manufacturer does not allow for it to be broken down, the automaker will not be able to enjoy tariff incentives. In one case, the OEM required its seat supplier to localise production in Vietnam.¹⁰¹



Strategies for automotive in ASEAN

As we have seen, OEMs and suppliers face a number of challenges across the vehicle manufacturing and aftermarket sectors in ASEAN, from rising production costs and stagnating profit margins, through to the increasingly competitive business environment. In order to capitalise upon the vast potential of ASEAN, existing and new automotive manufacturers need to consider optimising their business models by enhancing localisation, driving platform sharing, and continuing to diversify investments.

Enhancing localisation

Localisation refers to adapting the automotive value chain such that it leverages local resource advantages and caters to local demand preferences. A localisation strategy focuses on various aspects of the value chain:

- (i) increasing local content in sourcing
- (ii) raising the share of end-to-end, full scale manufacturing rather than just assembly operations
- (iii) designing end products that better target local needs and preferences via conducting R&D activities locally
- (iv) creating a sales distribution system, incentive schemes, and an after-sales network that increases accessibility to and best supports local customer needs

i. Sourcing localisation refers to procuring automotive components from localised foreign suppliers or from domestic suppliers in the local market. Casting the sourcing net more broadly across the ASEAN region allows for automotive players to procure materials more cost-effectively.

ii. Manufacturing localisation involves the establishment of production facilities in the market/region of sale, for the purpose of assembly or even to set up component production facilities such as engine production factories. The ideal is to work towards full scale manufacturing, and raising ASEAN's share of end-to-end manufacturing. This would also help enable greater sourcing of local content as the manufacturer reduces reliance on imports.

iii. Sales localisation focuses on establishing widespread distribution and dealer networks, and after-sales support in local markets so as to extend consumer reach and accessibility. This is implemented through innovative incentive schemes customised to each market that best drives sales effectiveness.

iv. Research and development localisation seeks to customise designs that address the needs of the local and regional market. For example, a regional R&D centre could focus on developing products adapted from global products but targeted to local preferences while still enabling the use of existing manufacturing platforms. R&D efforts can also focus on designing a look and feel of a vehicle body that better caters to local tastes, or develop low cost components that better address the greater cost-sensitivities of consumers. For ASEAN, it could be offering larger vehicles accommodating large household sizes, or developing more fuel-efficient compact vehicles to cater to price-conscious first-time buyers upgrading from two-wheelers.

The localising of all the aspects above addresses key demand challenges by helping reduce the cost of production and increasing the relevance to regional consumers through brand differentiation. Investments in localised production also increase a company's negotiating power with regional and local governments with respect to regulatory and policy changes, as well as the ability to take advantage of existing trade agreements across the region to develop a regional sourcing and production network. This diversification also leads to greater agility in responding to varying government and industry regulations across the region and can help reduce exposure to markets that have more volatile regulatory and business environments.

Platform sharing and integration

Automotive manufacturing platform sharing refers to the use of a common set of design, engineering, and production efforts, as well as components, for the manufacturing of vehicles. Platform sharing is used by many automakers to produce multiple vehicle models that are based on the same mechanical underpinnings, but have varied looks and are marketed differently.

Many major automakers are sharing manufacturing platforms by forming partnerships. For example, Nissan and another leading Japanese automotive manufacturer announced in April 2017 that they were deepening their alliance through platform sharing and establishing synergies via purchasing, suppliers, logistics, services, and technologies.¹⁰² Their key objective is to establish greater competitiveness and double sales volumes in ASEAN and Oceania by 2023, whilst also gaining market share from other key competitors, one of which enjoys a 35 percent share of the market in Indonesia and more than 30 percent in Thailand. In comparison at present, Nissan and the other Japanese automaker own 6 percent and 9 percent of the market in Thailand respectively, and 6 percent and 7 percent in Indonesia.¹⁰³

These two Japanese automotive manufacturers plan to produce pickup trucks from a common platform to address the ASEAN market; next-generation models are targeted to be sold by 2021. This effort is expected to bring US\$438 million in global cost savings in 2017-18 and double these savings in the following fiscal year through the consolidation of logistics, warehouse, training facilities, and after-sales operations.¹⁰⁴

With better cost savings from the use of similar components and more efficient inventory management, automakers can redirect spending to developing remaining components, adapting product models to regional consumers, improving product design, and increasing localisation, to better position themselves in a crowded marketplace. Furthermore, these platform sharing partnerships facilitate scaled production, providing greater bargaining power to justify bigger investments. All this leads to better value for consumers.

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ASEAN is a key region for Japanese automakers to maintain their strong presence while paying close attention to developments of their rivals in the region. Recent announcements on new alliances, which include Renault-Nissan-Mitsubishi and Geely-Proton, could have significant impact in this region going forward in addition to renewed interests from South Korean and Chinese alliance groups. ”

Tsukasa Watanabe

Asia Pacific Leader

PwC Autofacts

Diversifying investments

Whilst most automakers' growth will come from traditional means, ASEAN automakers cannot ignore the threat from disruptors.

Private-hire vehicles, public taxis, and carpooling ventures are growing fast in the region. A ride-sharing business in Southeast Asia which offers private-hire, carpooling, and taxi booking services is becoming increasingly popular. Even though the industry is still nascent, and especially so in emerging markets, many automakers have started to invest in the industry as a means of diversifying and hedging against the shift away from private vehicle ownership. In 2016, a leading automotive manufacturer acknowledged the growth potential of a ride-sharing company with an investment to grow the company's operations in ASEAN. In a similar example, Volvo is in a partnership with a leading ride-sharing company to supply self-driving SUVs to the ride-hailing service provider. These partnerships are part of a trend that is likely to become an important aspect of traditional automobile makers' diversification strategy.¹⁰⁵

Such partnerships could also mean gathering more data and information which could in turn support the vehicle manufacturing business. Partnership models vary from co-financing, forming joint ventures and providing vehicles to mobility service providers, collaborating on gathering data for analytics, to sharing technology know-how such as in traffic estimation to ease urban congestion. The investment arm of a leading Japanese automotive manufacturer, has also invested in a ride-sharing company and provides its cars for ride hailing services, where it also obtains data on driving patterns.¹⁰⁶ In the U.S. in 2016, Daimler

launched Moovel, a mobility service provider, which helps provide commuters a view on how various modes of public transit integrate with a bike or ride-hailing service as a means of getting to a destination.

Another diversification option is the establishment of mobility service divisions. For instance, an American multinational automotive player has set up a car-sharing company called Maven to partner with a global leading ride-sharing company in order to allow drivers to rent its vehicles.¹⁰⁷ In a similar example, Volkswagen AG created a mobility services division under the Moia brand and invested US\$300 million in ride-hailing provider Gett.¹⁰⁸

Diversifying away from traditional automobile vehicle manufacturing allows OEMs to mitigate the risks that global trends may have on the sale of new vehicles. Effectively, this provides existing automotive players a stake in the new industry disruptors. Diversification via partnering with ride-hailing app companies also helps vehicle makers expand their businesses to target industries which will warrant large vehicle fleets, and further, helps them benefit from collecting driver data for feeding back into existing R&D efforts.

Localisation strategy and its significance to the ASEAN automotive industry

Although localisation is not a new concept, the opportune time to fully embrace it in ASEAN is now.

Intra-ASEAN manufacturing value-added inputs in ASEAN's exports have risen dramatically, from US\$56 billion in 1990 to US\$514 billion in 2011.¹⁰⁹

Even so, there is still much headroom for growth in the localisation of sourcing and manufacturing in ASEAN. This is evidenced by a considerable share of foreign value-added materials (or imported inputs) in exports of automobiles from ASEAN. Thailand, with one of the most evolved automotive manufacturing sectors in the region, registers a foreign value-added share at 70 to 80 percent of the total value of exported automobiles based on 20-year trade data between 1990 and 2011.¹¹⁰ This high share of foreign value-add suggests that ASEAN-based local production facilities and capacities are still developing.

With the AEC's aims to drive greater regional integration and policy harmonisation across ASEAN in 2018, it is expected that one possible outcome will be further encouragement for manufacturers to localise sourcing and manufacturing across the region, resulting in additional development of regional value chains and production networks. The reduction and eventual elimination of tariffs (expected by 2018 in the remaining CLMV countries [Cambodia, Lao PDR, Myanmar, and Vietnam]), the reduction of trade barriers, strengthening of customs cooperation, and regional trade agreements such as AFTA will facilitate intra-ASEAN trade, lower transaction costs increase the ease of flow of goods and people across ASEAN countries and help better facilitate regional sourcing.

The benefits associated with localising sourcing and manufacturing via regionalisation of the value chain in ASEAN can enhance competitive growth and drive profit margins. The benefits of localised sourcing and manufacturing will likely increase as ASEAN continues to develop itself as one of the world's biggest manufacturing hub. ASEAN is already a key part of major automakers' large global supply chains, and the way forward looks to be to grow ASEAN's participation in global value chains.

Localisation benefits to key stakeholders

Localisation of sourcing and manufacturing from across the region is expected to bring benefits to automakers, governments, and consumers (Figure 2.5).

For existing manufacturers — Increasing local content and expanding sourcing regionally could be further enhanced by the AEC. As opposed to solely focusing on sourcing in the main country of vehicle assembly, manufacturers can expand sourcing across the region. Manufacturers that are stepping up scale of manufacturing in ASEAN can leverage enhanced trade and foreign direct investment policies to set up production networks regionally, and to optimise material costs, which lowers the cost of production and enables just-in-time production, ultimately resulting in production efficiencies.

For new entrants — Setting up a manufacturing presence in ASEAN is becoming vital to establishing competitive advantage against incumbent players and enabling the sourcing of local content that further increases cost competitiveness.

For ASEAN governments — The localisation of the sector attracts foreign direct investment into the region, in turn driving the maturity of the automotive manufacturing sector. If localisation increases the regionalisation of the automotive value chain and production network, countries with more nascent manufacturing sectors can better position their locational advantages and establish better-defined roles in the regional value chain. For example, Vietnam plays a role in the production of more labour-intensive automotive parts as it is more cost-effective than producing the same parts in Thailand. The region also stands to benefit from reinforcing its production hub status in new product segments such as new energy vehicles.

For consumers — Localisation of sourcing and manufacturing will potentially increase production efficiencies and allow manufacturers to transfer cost savings to consumers, or otherwise deliver greater product value without overly inflated costs. Furthermore, the localisation of sales and R&D will result in end products designed for local preferences, and will better address practical considerations such as fuel efficiencies which are more economical to maintain for an emerging middle-class consumer. In many ways, manufacturers can better differentiate themselves in a crowded group of 20 automakers in markets such as Thailand and Indonesia.

Localisation cost benefits

Sourcing more locally has some obvious benefits, starting with cost reduction. Imported parts incur custom duties from outside ASEAN, and transporting bulky, heavy automotive components is costly. Time is a further consideration; sourcing from automotive suppliers outside ASEAN requires longer transportation time and raises uncertainty in meeting just-in-time (JIT) production schedules. Aside from these direct benefits, one of the biggest positives for localised sourcing is that manufacturers can enjoy policy incentives offered by ASEAN governments. Many emerging markets, including those in ASEAN, use taxation to encourage local content utilisation. Under the ASEAN Free Trade Agreement, only cars with local content of 40 percent originating from the ASEAN region will be able to enjoy zero percent tax for importing within ASEAN.¹¹¹

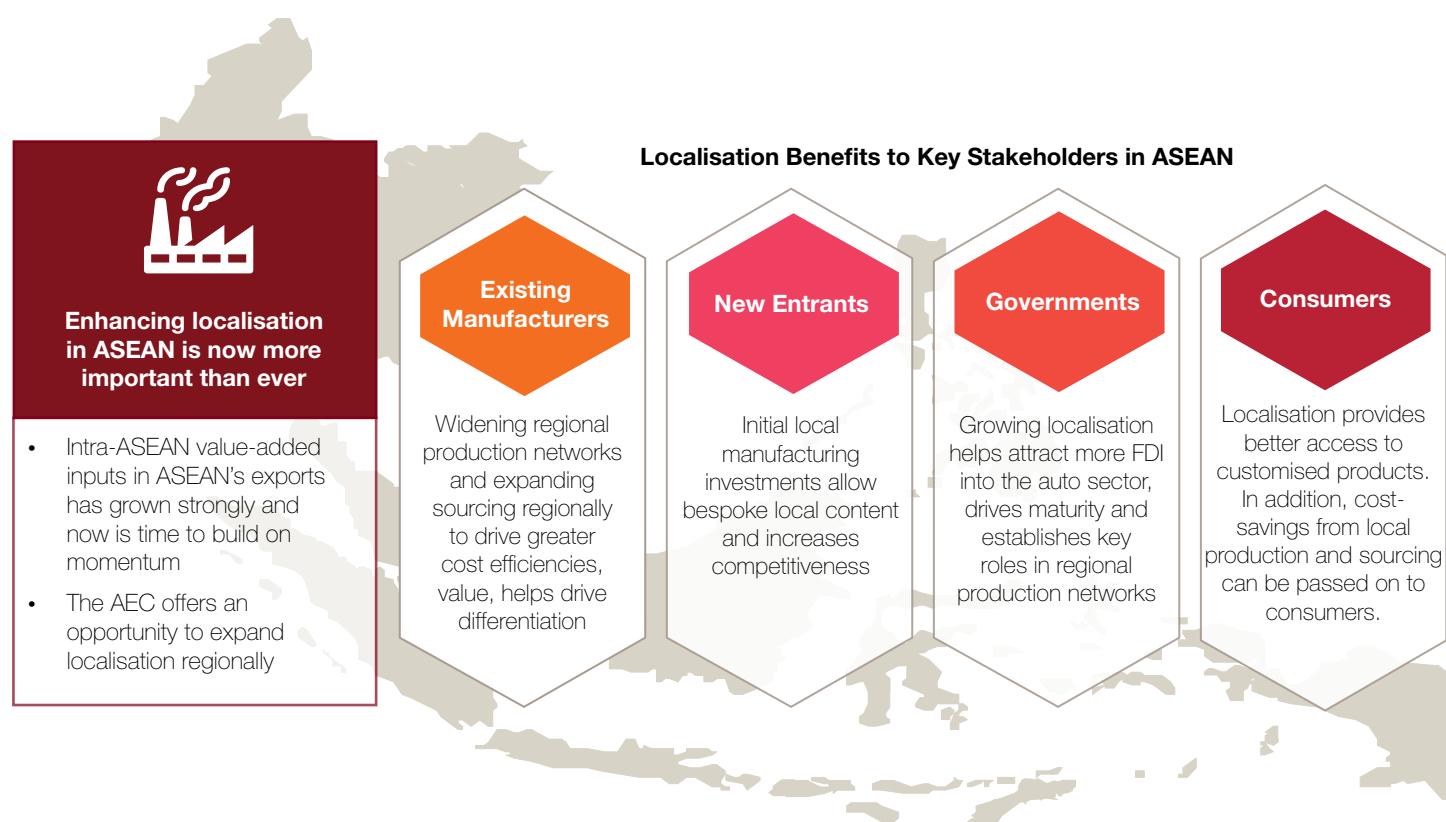
A Japanese automotive manufacturer managed to reduce its sales price by 7.6 percent through establishing a CKD assembly facility with CKD kits imported from Thailand. The company further planned to increase local content from an initial 14 percent to 30 percent within the next 10 years.¹¹²

In another case, Maruti Suzuki India, the largest passenger vehicle maker in the country, reported a 36 percent rise in net profits for the quarter ending in December 2017, even as net sales declined 3 percent. The automaker attributed its strong profit margins to

greater localisation and other factors including foreign exchange and additional cost reduction initiatives.¹¹³

Despite the benefits of localisation, OEMs are often constrained by the availability of suppliers based in the region, and the level of quality and capacity of the locally based suppliers. In addition, local suppliers especially domestic ones may lack of understanding of international processes used by foreign automakers that can cause pain points.

Figure 2.5: Localisation Strategy — Significance and Benefits to the ASEAN Automotive Industry



Source: PwC analysis

Capability requirements for localisation strategy

Automotive players looking to localise sourcing, manufacturing, R&D and sales need to focus on building new capabilities to enable and maximise the impact of their localisation. We have analysed the development of these capabilities in Figure 2.6.

Value proposition

Localisation involves initial investments of time and money into setting up a manufacturing facility, scouting and selecting parts suppliers (which includes an auditing of quality controls and production management), setting up R&D facilities, conducting market research studies, and developing a local sales network. The establishment of manufacturing facilities in particular requires heavy upfront investment that needs a certain scale of production to justify. This means there is a need to achieve a sizable market demand from domestic sales or exports. Greater demand will drive production scale, better utilise capacity, and improve cost efficiencies.

It is therefore important to develop a clear value proposition which includes identifying demand segments either from domestic markets or exports. This also includes identifying targets to determine the most suitable product offering — either low-end first-time buyers or the more aspirational emerging middle class. Manufacturers must consider pricing to cater to local markets and invest in R&D to develop tailored product features. Localisation of sales can be achieved by building wider distribution and dealership networks to create desired reach and access to customers, and managing and incentivising appropriately to maximise sales effectiveness.

Establishing a clear value proposition helps in addressing demand, which drives production scale, and raises confidence for investing more into localising.

Although it may be hard for new entrants to establish demand in a new market in a short time, entering into new partnerships with other automotive players can help increase utilisation rates and maximise capacity of the manufacturing facility. Some players have done exactly that in ASEAN in recent years and are continuing to build on these partnerships. For example, Great Wall Motors has partnered with the Malaysian automotive manufacturer Go Auto Group, where Go Auto will be Great Wall Motors' sole producer and distributor of its SUVs in Malaysia and ASEAN.¹¹⁴

Operating model

Building more local content and localising manufacturing can be done through establishing a regional value chain model, which is likely to be easier to implement with the AEC and its associated policy alignment, customs regulations, and trade agreements.

Regional value chains and regional production networks allows the manufacturer to decide whom to source from, along the value chain. It may be sourcing from the same suppliers that are based in another country in the region or choosing to source some parts from ASEAN-based international suppliers and some from local suppliers.

Without obstacles such as transportation and logistics hurdles, costs incurred moving goods across countries, or even trade barriers, the manufacturer can source more widely across the ASEAN region and access more options and greater flexibility to generate the best value. Manufacturers may opt for lead firms to operate in key parts of their value chain while having lower value-added parts or more specialised parts of the value chain be taken care of by long-established partners or other suppliers.

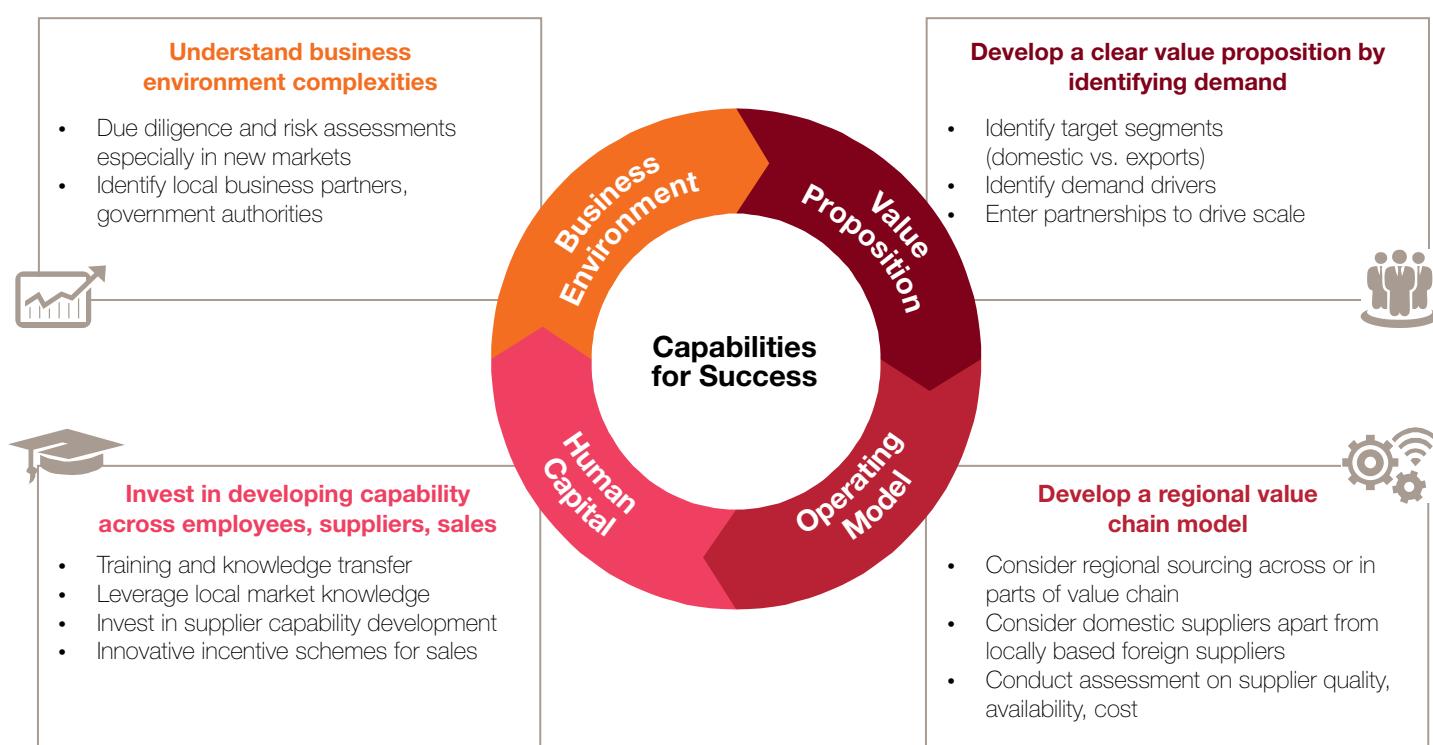
By 2011, about 69 percent of value-added inputs of ASEAN exports were sourced domestically (in-country) or from the broader ASEAN region. The manufacturing sector is the biggest sector, contributing 60 percent of total ASEAN value-added inputs in its exports, out of which the electrical and electronics sector is the most active local-sourcing industry. The automotive and transport equipment industry makes up 2.6 percent of local value-added inputs, indicating room for further growth.¹¹⁵

The trend in ASEAN is still to source in-country rather than regionally, and it is expected that the AEC will enable greater regional sourcing and production

networks across industries. For example, although one of the top Japanese automotive manufacturers in the ASEAN market has established production networks in all the key ASEAN markets, its local sourcing has been concentrated on locally based international players rather than domestic suppliers. This arguably drives further cost savings.

Sourcing from local or locally based foreign suppliers requires a good understanding of the available pool of local suppliers and their reliability, quality of products, ability to meet production timelines, and level of expertise, which may require research and assessment studies.

Figure 2.6: Enabling Capabilities — Automotive Sector in ASEAN



Source: PwC analysis

Human capital

Companies entering a new market, especially an emerging market with a nascent automotive manufacturing sector, often discover a lack of skilled local workers. This requires the automaker to invest in worker training and to focus on knowledge transfer.

From a manufacturing perspective, localising in a new market often requires personnel who are skilled in transferring operating knowledge to a foreign market, which frequently needs to be adapted to local operating conditions and limitations. In addition, there is also a need to leverage local expertise where it comes to understanding the unique gaps in operating in the new market, such as the lack of infrastructure (e.g. roads, ports), transportation hurdles (e.g. traffic congestion), instability of power supply, or cultural nuances involved in managing workers, which may all contribute to low productivity, and even impact production schedules and profitability.

Increasing local content strategy is highly dependent on the availability of suppliers able to meet the quality and cost requirements of the OEM. Automotive companies can consider investing in building supplier development capabilities on the ground. For example, when sourcing from local suppliers, many companies face quality issues and lack of familiarity with international processes as key obstacles to fulfilling potential for low-cost in-country sourcing. Some automakers have created supplier capability development units to support their large supplier network in improving production processes, ensuring product quality, and enhancing project management tools and logistics.

To increase sales localisation, sales approaches will need to be tested in the local consumer market rather than in the home country of the automotive player. This may require the implementation of innovative incentive schemes for dealers as well. For example, certain automakers are paying part of sales margins from the car sales directly to sales staff.



Business environment

In order to effectively localise in ASEAN, it is vital for companies to understand the unique business environments in individual ASEAN markets and to conduct a due diligence assessment of the commercial potential of their investments. Understanding the often less-than-transparent regulations and restrictions on foreign ownership, a focus on building relationships with key government authorities, and an understanding of political volatility is critical to success.

Even with the prospect of AEC, the developing countries across ASEAN still differ to a high degree in regulations and policies, as well as in trade and economic openness. In key automotive production countries such as Thailand, incentives for localisation can result in large reductions of costs for manufacturers.¹¹⁶ Thailand also offers companies that localise corporate tax holidays of up to eight years, and exemptions from import tariffs on machinery.¹¹⁷

One of the most critical success factors in entering emerging markets like ASEAN is to build strong local partnerships with government and government-linked partners. This can help companies better navigate the necessary authorities for approvals and permits, and identify key stakeholders in facilitating processes and negotiating around restrictions or regulations. These relationships are mutually beneficial as the foreign manufacturer looks to tap into local market demand and optimise operating costs while meeting the objectives of the government in generating employment. Working with local companies drives the upskilling, technology know-how, and knowledge transfer benefits to its local partner.



Implementation phases and key challenges

One way to increase localisation is to work toward full-scale production which allows greater local value-add, in addition to the localisation of sales management tactics and localisation of product features. This will help the automaker compete in a marketplace already crowded with more established Japanese players.

However, before the cost benefits of localised manufacturing and sourcing can be fully realised, a significant amount of investment and business planning is needed, especially for a new player. Naturally, new players in the ASEAN market will tend toward a more cautious approach as they test the market. Typically, an automaker goes through three phases in seeking to localise production and drive local content. These are discussed below and depicted in Figure 2.7.

The first phase: Semi-knocked-down (SKD) assembly

At the early stages of an ASEAN expansion programme, an OEM will likely design its new plant in a simple and much scaled-down version of the targeted full-scale production. In this phase, the automaker will look to semi-knocked-down (SKD) kits for assembly. SKD kits are partially-assembled vehicles, which limits local sourcing in the final assembly.

At this stage, the automaker will likely make measured investments and reduce risk by importing parts from its home country or the nearest manufacturing facility, even if this costs more.

This careful approach uses minimal risk whilst testing the market and gives the OEM time to plan for the

next phase which will see an increased amount of investment and local sourcing. With a better understanding of the market structures, having tested the appeal of its vehicles and having achieved a minimum amount of market demand, the automaker is able to make more accurate estimations of production volumes.

In 2011, German Volkswagen (VW) invested US\$408 million to set up an SKD assembly plant in Malaysia in an effort to target rising demand in ASEAN, and set up a partnership with DRB-HICOM, a local automotive manufacturer, assembler, and distributor.¹¹⁸ With an annual production capacity of about 40,000 units, VW started producing the Volkswagen Passat, which was followed by the Polo sedan model, Polo hatchback, and Jetta, on a single assembly line. Over the years, the automaker has employed more than 600 workers, of which a majority are local, who receive training from VW headquarters employees.¹¹⁹ The company has also localised marketing functions, hiring locally based agencies to help with branding and public relations. In 2017, as a further show of commitment, VW launched its Volkswagen Automotive Academy in Malaysia to develop sales effectiveness, which aims to provide complete sales and after-sales training in both technical and non-technical areas.¹²⁰

Upon testing the market via an SKD assembly set up with limited local sourcing and having some confidence of demand in the new market, the automaker is ready to move on to the next phase of production, requiring increased investments to set up a completely-knocked-down (CKD) factory.

The second phase: Completely-knocked-down (CKD) assembly

In the second phase, having gained an appreciation of the local market and ASEAN region, the automaker shifts its focus to scaling up profitably. The OEM now has the confidence to take on greater risks as it considers plant expansion in order to increase production volumes, having established credible and reliable local suppliers.

A plant expansion can be done by way of scaling up from an SKD assembly to an assembly of completely-knocked down (CKD) kits. The CKD kits could be imported from other ASEAN countries, from the automaker's home country, or from other global sourcing locations, such as China. These imported CKD kits allow for more local sourcing of parts, which are then assembled into finished vehicles for sale in these new markets.

As part of developing this part of its expansion strategy, the OEM will look to address its operating costs; one of the ways it can achieve this is to reduce the cost of materials and logistics by sourcing more locally. Sourcing from within ASEAN through existing foreign

suppliers or sourcing through domestic suppliers are viable options depending on costs and the capabilities of suppliers. In this phase, local content achieved in a vehicle ideally reaches 30 percent or more. However, a critical success factor here is a strong understanding of the existing supplier structure within the region of the manufacturing facility as well as associated import duties and logistics costs.

The AEC and the elimination of tariffs on automotive parts and components within the region reduces the ease and cost of entering into new markets especially in more nascent manufacturing but high-demand growth markets like the Philippines and Vietnam.

One example is Truong Hai Auto Corporation, a Vietnamese car, bus, and truck manufacturer, which assembles vehicles for various brands, including Korean automaker Kia, Japanese automaker Mazda, and French brand Peugeot, all from CKD kits. Some labour-intensive parts, such as wire harnesses, and other parts, including seats and truck frames, are produced in different workshops. These parts are assembled with the CKD kits into completely-built-units (CBUs).



The third phase: Full-scale production

Automotive manufacturers tend to progress to this final stage after they have achieved greater acceptance in the market and have established long-term, reliable production volumes, achieved by catering to domestic demand as well as exports to regional and global markets. At this point a full-scale factory is able to meet its true value-add to the local and regional economy, through much higher local content sourcing, 70 percent or more, in order to fully leverage tariff reductions.

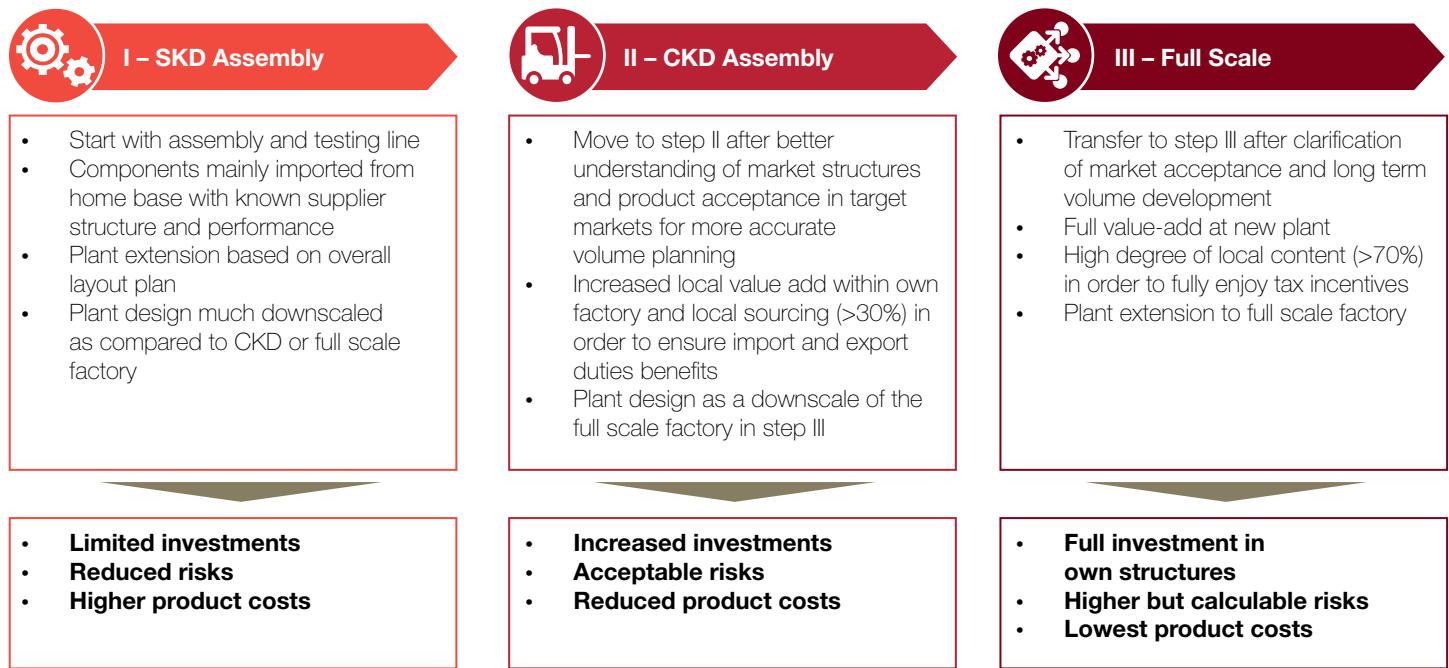
As with an CKD factory, a full-scale factory warrants larger investments in setting up the automaker's own structures and facilities but has a greater ability to bear increased risks while further driving down production costs with maximised local sourcing.

Consider one of the leading Japanese automotive players that assembles vehicles in nine plants across five ASEAN countries. One of its SUV models developed for emerging economies, sold in the Philippines, is reasonably priced at US\$30,000. A complex and integrated supply chain across the ASEAN region underlies the production of its pickup trucks. Produced in Thailand, its pickup trucks also contains parts sourced from Cambodia, such as wire harnesses supplied by Yazaki Products. In fact, some of the parts produced in the Philippines, such as the manual transmissions, are transported to Thailand for assembly, and then reimported into the Philippines for sale.¹²¹

For new and existing players, establishing partnerships to drive scale and leverage local or established foreign automakers' existing plants helps mitigate initial investment risks. A good example of a partnership designed to enable entry into the ASEAN market comes from an American automaker, which paid a price in an earlier attempt to enter the region alone. In 2015, it shut down its 40,000-units plant producing compact multipurpose vehicles, citing high material costs, complex logistical challenges, and weak market demand owing to stiff competition from Japanese players. In 2017, the automaker reentered Indonesia, investing US\$700 million in an assembly plant, but this time in partnership with two Chinese automaker that own a 44 percent share in the joint venture.¹²²

Local partners do offer multiple benefits, especially in emerging market regions where policies tend to be more protectionist. Local partnerships become an effective way to navigate murky market regulations, leverage established connections with local government authorities, bridge language and cultural gaps, and even tap into established networks such as dealer and real estate networks. Hyundai, for example, announced in September 2017 its plans to set up a commercial vehicle production base in Indonesia via a 50–50 joint venture with a local company, with an initial capacity of 1,000 units and scope for expansion.¹²³

Figure 2.7: Driving Localisation by Scaling Up Local Manufacturing Enables Higher Local Content



Source: PwC analysis



Case study: Isuzu's “3+2” localisation strategy leverages ASEAN's strategic advantages

Isuzu Motors' manufacturing location strategy is spread across three major manufacturing bases and two support hubs, in a “3+2” model (Figure 2.8). The three major manufacturing bases are Japan, Thailand, and an ASEAN regional production network, with two support hubs being China and India.

Figure 2.8: Isuzu's Localisation Strategy Leverage ASEAN's Strategic Advantages



In Isuzu Motors' manufacturing model, each production base has a strategic advantage. In this case, Japan produces commercial vehicles for developed countries. Thailand, being the largest pickup truck-producing country, focuses on light commercial vehicle production. ASEAN is then made a regional base for manufacturing commercial vehicles catering to emerging markets – with a plant set up in Indonesia in 2015, also the automaker's third global production

hub after Japan and Thailand. Separately, a planning and engineering centre has been set up in Thailand in 2014 to develop new commercial vehicles, parts and components catering to emerging markets.

This plays to the key strengths of each location, as Isuzu is able to leverage free trade agreements within ASEAN to source for components from the most cost-effective markets. Japan possesses the necessary expertise and

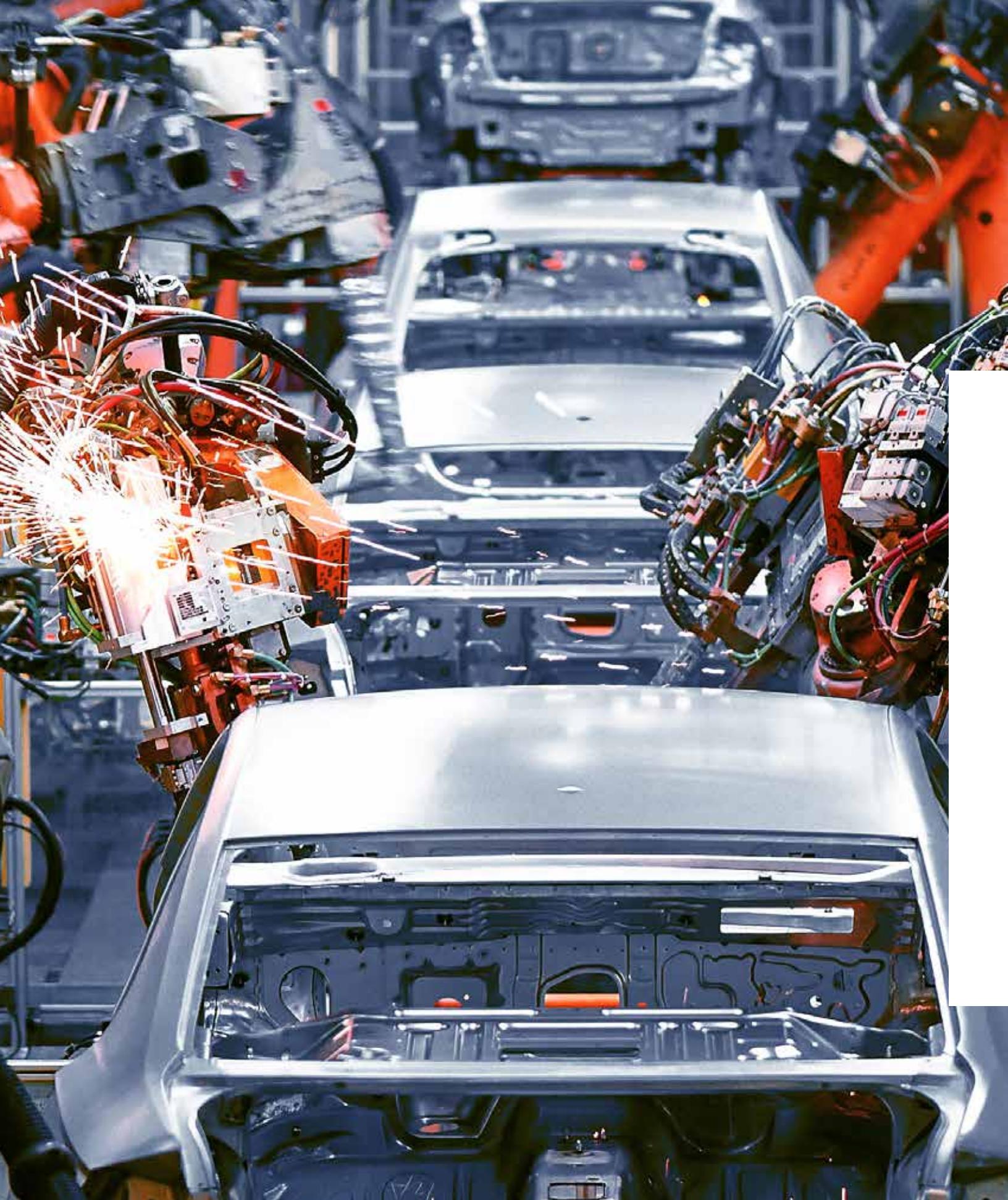
advanced technology capabilities to produce vehicles for developed countries, and Thailand's large one-tonne pickup truck production offers cost efficiencies and a presence of suppliers for an end-to-end manufacturing value chain.

The two support hubs provide increased local sourcing and additional manufacturing support, specifically producing light commercial vehicles in China and light commercial vehicles catered to emerging markets in India. In India, Isuzu recently invested US\$438

million in a facility to produce 120,000 trucks a year. The automaker is also at 70 percent localisation levels working toward the end goal of a fully localised product by 2019.

Isuzu is also investing in localised distribution and marketing. It is increasing its involvement in the local distribution process through setting up marketing operations in ASEAN, particularly focusing on Indonesia, Malaysia, Vietnam, and the Philippines.¹²⁴







Conclusion

The ASEAN automotive manufacturing landscape shows positive growth potential as its economies expand, backed by the region's fast-growing, youthful middle class and rising household incomes. This growth is expected to drive urbanisation and infrastructure growth is expected to increase demand for vehicles, especially as two-wheeler owners switch up to four-wheelers. This demand in turn will build up the aftermarket.

For automakers, the region poses significant challenges: an overcrowded competitive market and entrenched consumers' preference for existing Japanese brands; industry disruptors and their potential long-term impact on vehicle ownership and usage; and shifts in taxation and non-tariff barriers that are likely to impact the production networks and trade of vehicles across the region.

Various strategies to address these challenges have been established and leveraged, but they are particularly relevant now given the AEC timeline, wherein the CLMV countries are set to remove remaining tariffs. In anticipation of this, automakers looking to establish a bigger foothold in the region

can look to increase localisation more holistically — in sourcing, manufacturing, sales, and R&D. This will offer greater competitiveness, more localised products, and greater differentiation. Ultimately, a manufacturer can move from having solely a CKD/SKD production presence to a full production facility supported by a high level of local content sourced from across the region. Hurdles, such as lack of scale due to lower demand will remain. In this case, entering a region in partnerships can help, and is especially useful if a foreign automaker partners with a local player in a less familiar new business environment.

The extent and method of localisation in ASEAN varies across automakers. In a broader context, ASEAN's role as a regional value chain and its significance as part of automakers' larger global value chain varies from player to player. Beyond the Japanese makers, other players are still exploring a successful ASEAN model, such as with the recent Chinese-American automotive joint venture reentry and efforts by newer players like Tata Motors. However, the future is clear, and automakers should be determined to identify an ideal model especially now with the AEC timeline, if they are to be best positioned to capture ASEAN's future growth.



A photograph showing a person's hands interacting with an ATM. One hand is inserting a blue debit card into the card reader slot, while the other hand holds a brown leather wallet with a finger pointing towards it. The background is a plain, light-colored wall.

Chapter 3: Financial Services

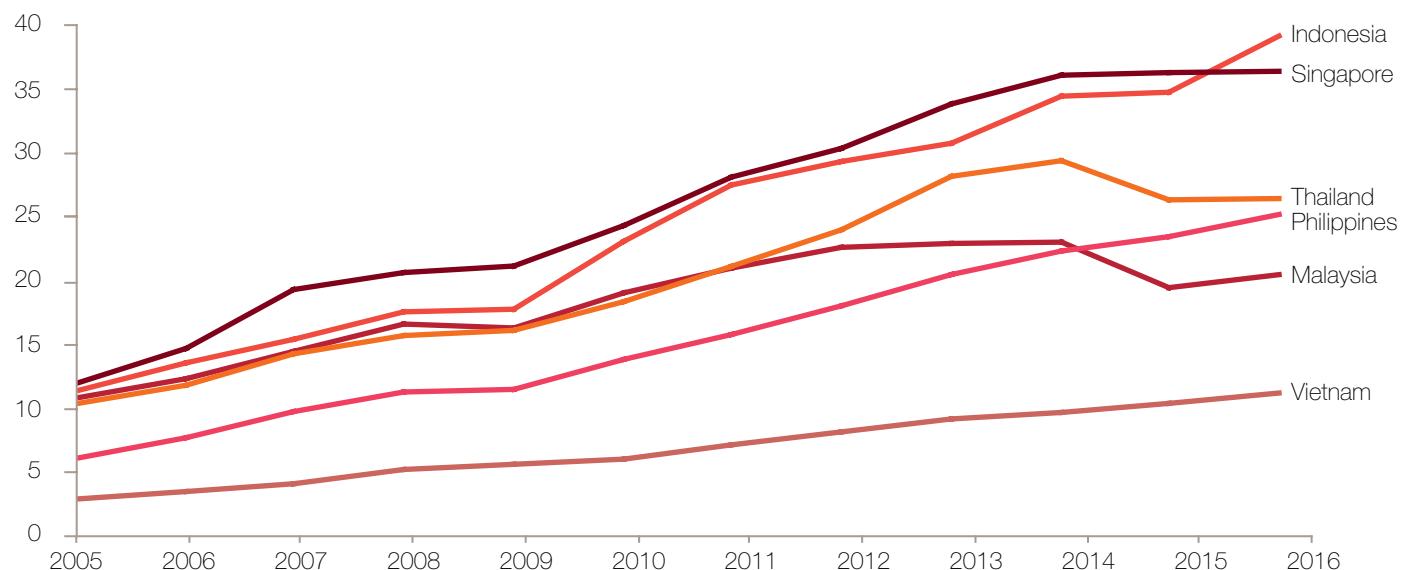
Financial services in ASEAN

Since the Asian financial crisis in 1997-1998, ASEAN has been strengthening its financial institutions to protect itself from similar future threats; in doing so, it has built a strong foundation for growth. Steps to strengthen financial institutions include setting up the ASEAN Bonds Market Initiative in 2002, which supports the development of local currency bond markets in an effort to limit both currency mismatch and maturity mismatch on regional balance sheets (major factors in the 1997 crisis). In addition to this, in 2010, ASEAN countries also established the Chiang Mai Initiative Multilateralization, a region-wide network of swap agreements, and the ASEAN+3 Macroeconomic Research Office, a surveillance unit accompanying the Chiang Mai Initiative.¹²⁵

This institutional maturity has been complemented by policy liberalisation and the reduction of red tape, which has in turn facilitated domestic savings amongst Southeast Asian consumers, increasing domestic capital availability, and creating an attractive environment for foreign direct investment.

As shown in Figure 3.1, the financial services industry has historically been led by more developed economies such as Singapore. However, in 2016, Indonesia overtook Singapore to become the largest financial services market in ASEAN in terms of financial gross value add (GVA).¹²⁶ As Neil Parekh, General Manager Asia, National Australia Bank (NAB) sees it "ASEAN growth opportunities have been split into two: Indonesia and the rest of ASEAN."

Figure 3.1: Financial GVA of Selected ASEAN Countries — Historical Trends, US\$ bn 2005-2016



Source: Asia Development Bank, BMI

The future of ASEAN financial services

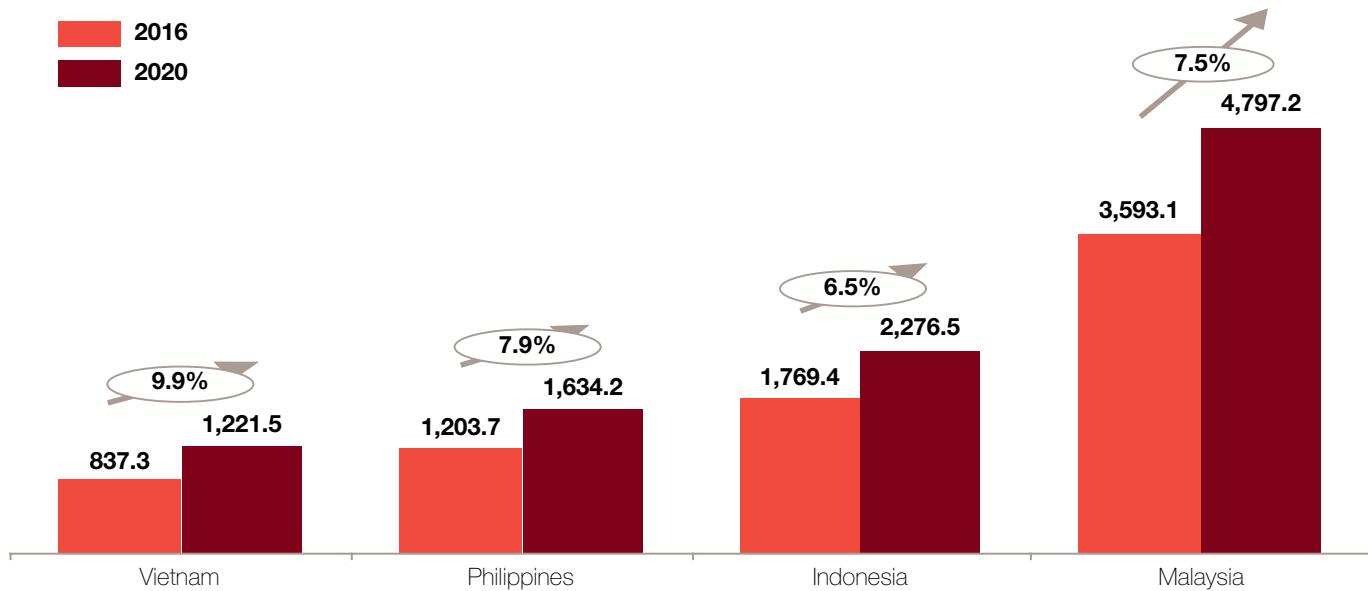
The financial services sector in most ASEAN countries has shown steady growth from 2005 to 2016 (figure 3.1), however this is expected to slow down in the period from 2016 to 2025. For example, Indonesia's financial services sector will slow from CAGR 11.4 percent (2005-2016) to CAGR 9.4 percent (2016-2025). Despite this, financial services sector in ASEAN is still expected to outpace mature markets, driven by:

1. a dramatic increase in the utilisation of banking services
2. the advancement of digitisation (Fintech)
3. continued ASEAN integration through the ASEAN Banking Integration Framework

Rising middle class

There are already some 87 million "middle class" ASEAN households with incomes exceeding the level at which they can begin to make significant discretionary purchases. Fuelled by increased urbanisation and subsequent rising consumption levels, this middle class is set to reach to around 116 million households by 2020. Their rising disposable income will spur a greater need for financial instruments that can facilitate the purchase of services and higher-value products. By 2020, the size of the consumer spending pie in the region is expected to hit US\$2 trillion.¹²⁷

Figure 3.2: Middle 60 Percent Income Population — Disposable Income Projections, US\$ per Capita, 2016-20



Disposable income is also set to rise between 6.5%-10% CAGR in coming years

Note: ASEAN here refers to Indonesia, Malaysia, Philippines, Thailand and Vietnam

Sources: BMI, World Bank

Advancement of digitisation

Lack of financial access remains a key limitation of Indonesia, Vietnam, the Philippines, and Cambodia, which host 74 percent of the total population of ASEAN. Total banking penetration in emerging ASEAN markets is very low: Indonesia is at 36 percent, the Philippines and Vietnam both at 31 percent, and Cambodia at 22 percent. Insurance and wealth management penetration is even lower, due to the majority of the population not holding bank accounts.¹²⁸

Growing internet penetration and the proliferation of affordable smartphones, supported by lower data costs and the increasing speed of transactions, will accelerate the growth and potential of digital banking services across ASEAN and promote widespread financial inclusion. This increase in the penetration of digital banking is being driven by a large young, urban population with a cultural affinity for technology and a willingness to adopt new digital trends.

The rise in smartphone penetration rates are driving the usage of digital wallet innovation in a region where card penetration remains relatively low, especially in markets such as the Philippines, Vietnam, and Indonesia. Penetration will continue to rise as devices evolve to store biometric data, which will significantly improve the security of digital financing, and whilst Singapore has the strongest growth in e-wallet users

due to its high internet and smartphone penetration, other countries are following suit. For example, between 2013 and 2015, the Philippines experienced growth of 25 percent in its e-wallet transactions, indicating a rising inclination in consumer behaviour toward going cashless. However, although the e-wallet user base is rising, there is a clutter of e-wallets in the markets which is creating confusion in consumers' minds and therefore an active user base is still lagging. Too many platforms are competing for a small customer pool, and only the strongest wallet players with the best value propositions will survive and consolidate the growth opportunity in the coming years.¹²⁹

National digital payment platforms in Thailand (PromptPay) and Singapore (PayNow) will provide the needed push towards digital transactions, peer to peer transactions and are the most effective driver towards a cashless society. The payment platforms enable the transfer of funds using a mobile phone with only a mobile number and a lower fee is charged than with digital transactions from traditional banks. PromptPay was launched in January 2017 and within 10 months a third of the population was signed up (24 million registrants).¹³⁰

Singapore's PayNow and Thailand's PromptPay will soon be linked, driving cashless transactions across the region, and creating a roadmap for other ASEAN countries.



ASEAN banking integration framework

In 2011, ASEAN central bank governors adopted the principles of the ASEAN Banking Integration Framework (ABIF), which aimed to provide ASEAN banks with the opportunity to operate in foreign ASEAN markets on domestic terms. By 2015, all member states had signed the agreement, and by the end of 2018, it is expected that the ASEAN 5 (Indonesia, Malaysia, the Philippines, Singapore, and Thailand) will all have bilateral deals with other ASEAN states regarding banking integration, and all ASEAN states will have at least one bilateral banking agreement with another ASEAN state by 2020.

Key opportunities and benefits of the ASEAN Banking Integration Framework:

- **Reciprocal, bilateral market-opening agreements**

A partner's central bank will nominate certain domestic banks to be "Qualified ASEAN Banks" (QAB), which are able to operate on the same terms as domestic banks in countries the QAB's home country has signed an agreement with.

- **Reduced red tape and new opportunities**

A QAB's ability to compete at the same liquidity, capital, and governance standards offers significant growth opportunities in previously closed-off or unprofitable markets.

- **Eased expansion of banks from mature ASEAN markets**

Banks based in countries such as Singapore, where entry capital requirements are 3.5 times those of Indonesia, may be able to more easily enter developing countries with lower capital requirements. The most innovative ASEAN banks will be able to expand value-added capabilities and innovative solutions to other ASEAN markets, which would increase financial access and address customer pain points. For example, Singaporean banks such as DBS are at the forefront of digital banking capabilities which could be leveraged in the future by customers in Indonesia and possibly other ASEAN markets, where currently the domestic banks lag in digital innovation.¹³¹

Key challenges for the ASEAN banking industry

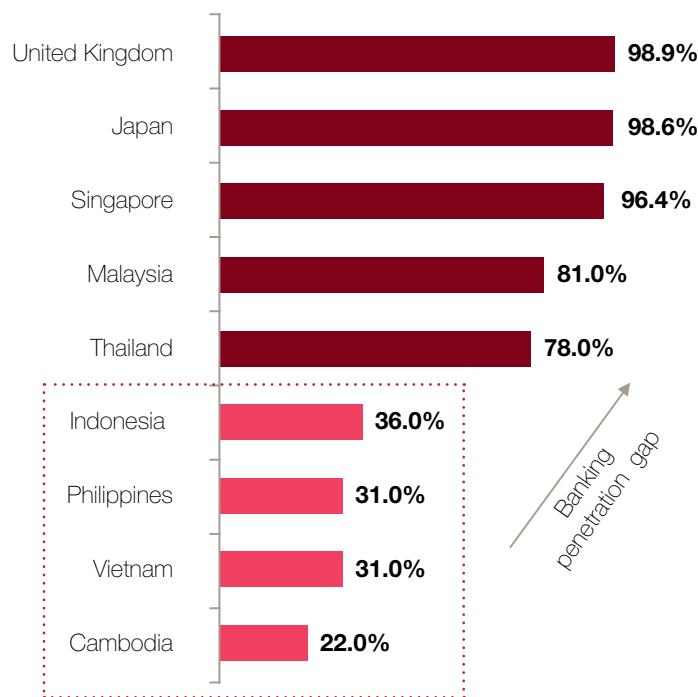
There are a number of challenges to expanding financial inclusiveness across ASEAN and maximising growth within the sector. These include lack of access to banking services, low utilisation rates of financial products, and a cultural dependence on cash.

Financial access

A key challenge to growth in ASEAN is the lack of financial access to banking, insurance, and asset management services. Indonesia (in which 36 percent of the population has access to banking), the Philippines, Vietnam, and Cambodia are lagging behind in banking penetration compared with Thailand (78 percent), Malaysia (81 percent), and Singapore (96.4 percent).¹³² Insurance penetration (Life and Non Life gross premiums as % of GDP) is even worse, with very low penetration in countries such as Thailand (5.4 percent), Malaysia (4.1 percent), the Philippines (1.9 percent), Vietnam (1.7 percent), Indonesia (1.6 percent), and Cambodia (0.3 percent), compared with mature ASEAN markets such as Singapore (10.5 percent).¹³³

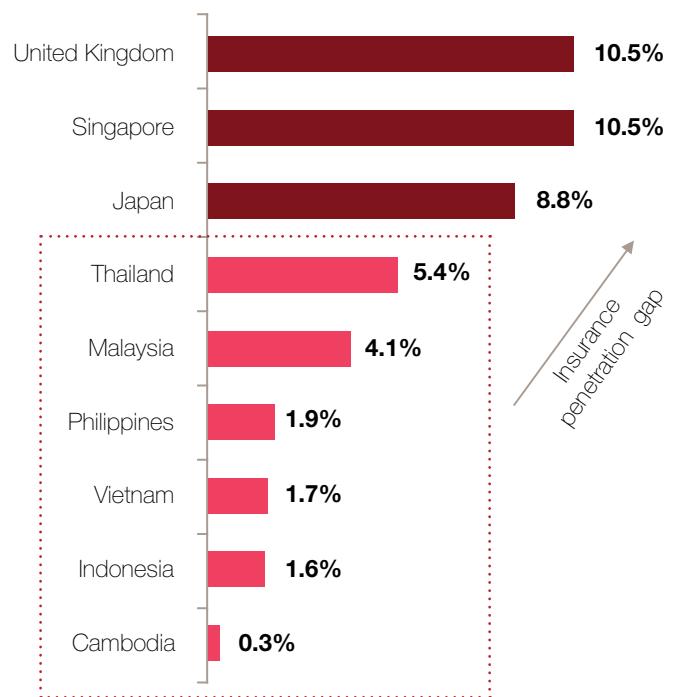
Asset management is in an even more nascent stage, with fewer than 6 percent of individual retail customers investing in the financial markets across ASEAN markets, except in Singapore (28.9 percent).¹³⁴ Low penetration limits opportunities for banks, as their strategy is constrained to addressing only a small portion of the whole population in the region.

Figure 3.3: Total Banking Penetration, Population with Bank Accounts, 2014



Source: World Bank

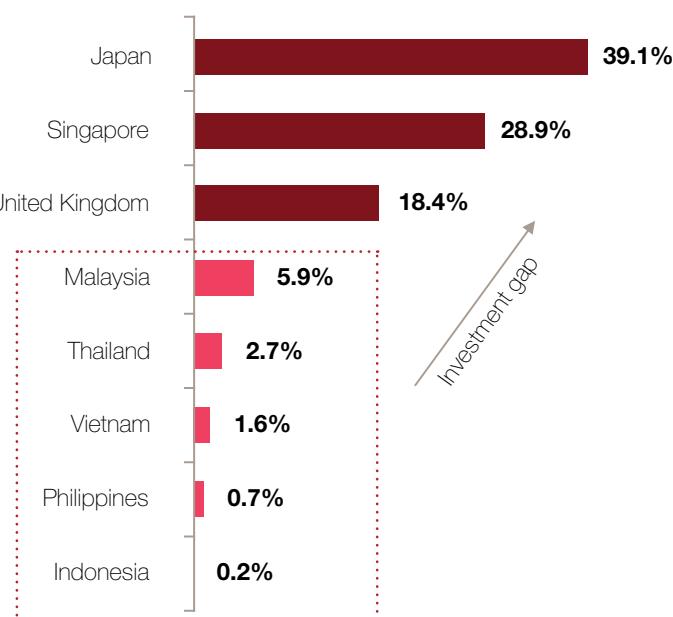
Figure 3.4: Total Insurance Penetration, Premium Percentage of GDP, 2015



Source: BMI



Figure 3.5: Retail Customer Investment Penetration
(Number of Retail Customers Invested in Financial Markets, % of Population, 2015)



Note: Singapore figures are from 2014

Source: ASEAN Local Market Stock Exchange websites

ASEAN countries such as Cambodia, the Philippines, Vietnam, Indonesia, and Thailand have significant infrastructure gaps, including a very low number of banking branches and ATMs, especially outside the major urban areas. This is most notable in Indonesia, whose 12,000 islands make it very costly to provide banking distribution across the archipelago.

Banks are further constrained from on-boarding new customers due to lack of a regulatory framework for e-KYC (know your customer). For example, the Philippines requires a “wet signature” by the customer, and KYC infrastructure gaps such as unique national ID with real-time electronic verification capabilities are required to identify and verify new customers.¹³⁵

This lack of infrastructure not only constrains the on-boarding and delivery of financial services, but also restricts a bank's ability to promote financial literacy and demonstrate how financial services can improve a customer's standard of living as well as protect and offer a return on their disposable income. Furthermore, banks have failed to communicate digital innovations that could reduce the barriers to financial inclusion. The lack of awareness of banking solutions and their benefits has led to large sections of the ASEAN population not engaging with any formal financial services institutions.

The utilisation of banking services is further affected by the lack of a traditional credit history in most ASEAN markets, limiting credit access, especially for small and medium-sized enterprises (SMEs). Currently ASEAN countries such as the Philippines (where only 11 percent of the population has a record at a credit bureau), Vietnam (42 percent), Indonesia (46 percent), and Thailand (53 percent) have relatively low credit bureau coverage compared with mature markets such as the U.S. (100 percent). SMEs account for more than 95 percent of total companies in ASEAN, but a large number of SMEs in ASEAN do not have access to financing. Aside from low credit bureau coverage and banking infrastructure, a critical barrier in achieving a trusted credit history is the lack of proper documentation in the informal economy and a reliance on cash.¹³⁶

Cash society

Due to the aforementioned infrastructure gaps and lack of financial awareness, cash is still the preferred mode of payment in ASEAN countries such as the Philippines (where cash is preferred by 75 percent of all survey respondents), Indonesia (73 percent), and Thailand (70 percent).¹³⁷ This high utilisation of cash is eroding financial institutions' profits, as they are unable to recover the high operational costs of ATMs and branches. Key challenges to transitioning from cash to debit or credit card transactions are a lack of Point of Sale (POS) penetration, low interoperability, and low payment volumes. Added to these challenges are transaction fees which are subject to the scale of the merchants business and the high cost of the specialised POS terminals, potentially resulting in a reduction of operating margin. Financial institutions are also losing out on additional revenue streams from digital transaction fees from merchants and customers.

Inappropriate financial service propositions

Usage of value-added services in financial services remains low in ASEAN owing to a lack of understanding as to the true needs of potential new target segments. Value-added services such as distributing wages through financial institutions are much less common in ASEAN countries such as Vietnam (where only 7.8 percent of population receive their salaries through financial institutions), Indonesia (6.6 percent), the Philippines (6.3 percent), and Cambodia (3.2 percent), compared with mature markets such as Singapore (39.7 percent) and the U.S. (43.35 percent). Although lack of financial awareness is a challenge, it is compounded by banks not creating propositions designed for these new customers. Many banks in ASEAN are still promoting traditional financial products without understanding customer needs or tailoring their offers to individual needs. Therefore, banks operating in ASEAN need to create propositions that appeal and cater to the new middle class.¹³⁸



Strategies for financial services in ASEAN

Acknowledging both the tremendous potential within the ASEAN financial services sector and also the current challenges to financial inclusiveness and profitability, financial institutions seeking expansion and growth across ASEAN should consider adopting broader digital financial services, more relevant middle-class propositions, and strategic partnerships.

Digital financial services

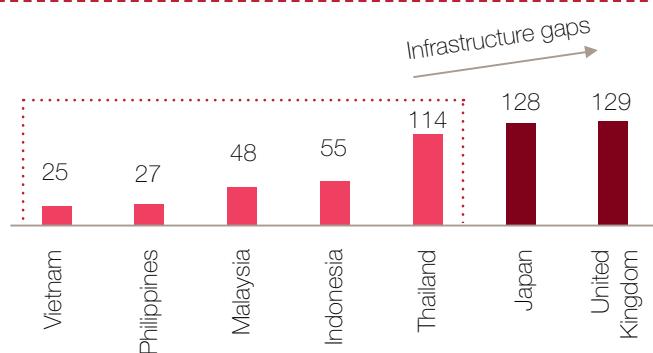
Digital financial services have the ability to address many of ASEAN's key banking challenges in access to services and financial literacy, operational costs, utilisation, and cash dependence. Other emerging markets provide many examples of banks managing to overcome similar challenges and achieve broad-based financial inclusiveness.

One of the key advantages of digital technology is its low-cost scalability. The current costs of manual transactions (cash, over the counter) across ASEAN are not sustainable, particularly when taking into account the size and scale of the addressable market. Banks which are looking to serve ASEAN's ever-expanding middle class need to consider how best to adopt digital solutions to reach this market at a lower cost. Mobile banking (estimated at a cost of US\$0.17 per customer) and online banking (US\$0.09) transactions are a fraction of the cost of those at traditional banking channels such as branches (US\$1.36 per customer) and even ATMs (US\$0.61 per customer).¹³⁹

Furthermore, digital financial services can be executed remotely, eliminating a customer's need for travel to a bank branch or another physical point to conduct financial transactions. This flexibility is especially convenient in ASEAN, where branch and ATM penetration is low (as shown on Figure 3.6), especially in more rural areas or across archipelagos. Digital access not only reduces operational costs, but also enhances the individual customer experience.

From a SME perspective, cash transfers are subject to leakage, and it is difficult to track movement of cash, particularly when multiple entities are involved. Digital transactions, in contrast, can be recorded at each transaction point; and now thanks to biometrics and personal verifications, this channel is becoming even more secure than hard currencies. Finally, digital financial services enable financial institutions to assess the creditworthiness of borrowers, using transaction history, without the need for additional documents.

Figure 3.6: ATM Penetration, ATM per 100,000 Population, 2016



Source: World Bank Database, 2016

At present, most ASEAN banks have basic digital banking capabilities, including mobile applications, online banking platforms, bill payments, and digital interbank transfers. However, many lack such key capabilities as digital new account opening (limiting digital banking penetration), mobile wallets, QR scan-to-pay options (limiting cashless transactions), and digital financial planning tools (limiting wealth management and insurance access).

Singapore banks are the leaders in digital banking in ASEAN as a result of high smartphone penetration and support from the Singaporean regulatory authorities, primarily the Monetary Authority of Singapore, which has been actively promoting the establishment of clear, digital-friendly rules.

Singapore's DBS is the pioneer in this space and was named "world's best digital bank" by Euromoney in 2016 for its innovation and capabilities. In 2015, DBS introduced digital account opening services for wealth management customers in Singapore, and expanded this to SMEs in 2016. DBS has also innovated in the area of artificial intelligence, by developing digital financial planning services for their wealth management customers.¹⁴⁰

DBS' digital mobile wallet is an emerging solution currently boasting more than 300,000 registered wallet users. This was followed by KBank and Siam Commercial Bank, both in Thailand. However, these examples are anomalies. More banks need to follow suit. Singaporean banks are the most likely to push innovation in the digital space into markets outside Singapore similar to what DBS has done in launching a digital bank in Indonesia.

A lack of digital infrastructure readiness and unaccommodating regulatory frameworks for digital banking/fintechs have prevented the rise of banking digitisation outside Singapore.

Singapore's conditions stand in stark contrast to those of its regional neighbours, such as Indonesia, where despite high levels of mobile penetration and demand for basic banking services, digital banking remains in its infancy.

“

Consumer behaviour is changing rapidly and businesses need to keep up to date with changing payment demands. The average consumer wants their payments done instantly without having to go to the bank. This is why DBS believes in working with corporates to implement new digital solutions for their customers and partners. One example would be the insurance industry, where we have collaborated with insurers to enable instant payments to policyholders. Powered by our application programming interface (API)-based instant settlement solution, DBS IDEAL RAPID, claims can be directly credited to policyholders' bank accounts, eliminating the need for cheques. ”

Benjamin Yeo
Managing Director
Financial Institutions Group
DBS Bank

Digital on-boarding

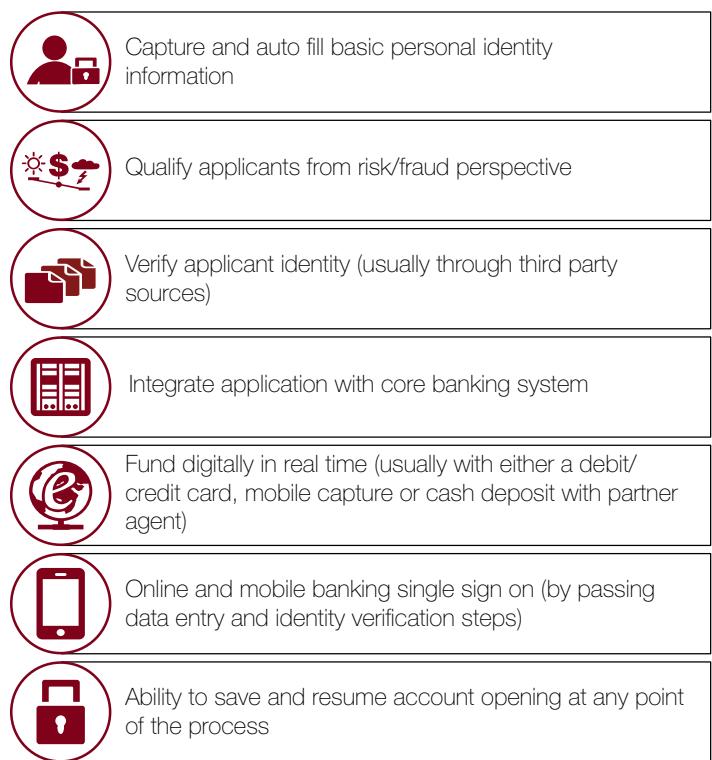
Digital on-boarding is a key gap for the majority of large banks in ASEAN (except in Singapore), with most institutions relying on employee-assisted on-boarding even though most regulators accept electronic signatures. However, traditional on-boarding is not able to address the scale of opportunity across ASEAN in a cost-efficient manner.

Digital identity, or e-KYC, is a key driver of digital on-boarding. In some ASEAN countries, such as the Philippines, bankers' associations have established an industry-wide facility for digital identity management.

Smartphones may be the most obvious way to digitally on-board new customers; however, adoption, whilst fast improving, varies across the region. To overcome this, banks can work with partners such as merchant groups, telecom companies, and postal services to enable customers to sign up for a bank account without visiting a branch.

Regardless of the channel, digital on-boarding, whether capturing basic personal details or verifying and depositing funds, needs to be easy and convenient. Failure to provide ease and convenience will result in customers losing faith and trust in the channel and reverting to visiting branches or not signing up with the bank at all.

Figure 3.7: Digital On-boarding Implementation Considerations



Source: Financial Brand, PwC analysis

Example:

DBS launches Digital bank in India with digital on boarding facility¹⁴¹

Background: In 2016 DBS Bank, Singapore's largest and a leading bank in Asia, launched a digital bank in India and then replicated this in Indonesia in 2017.

Value Proposition: DBS was the first mobile only bank in India bringing together ground breaking technology from biometrics to artificial intelligence. Account opening was easily done online using a smart phone, and for customers without a smartphone they were able to utilise DBS partner outlets in 500 coffee shops (Café Coffee Day) with no paperwork. Customer authentication was done using the government issued Aadhaar card, a biometric enabled ID. 90 percent of customer queries are handled by a digital assistant who supported the account opening process as well as advised how to use various services once the account was opened. DBS went from launching in April 2016 to 1.5 million customers by August 2017.

QR Pay and Scan

One of the key challenges across ASEAN is the lack of point of sale (POS) facilities at merchants. The costs, both for the banks and the merchant, limit such facilities' adoption to the more affluent urban areas. However, mobile wallets with QR scan capabilities enable banks to drive the cashless agenda in payments without requiring these expensive POS terminals.

A QR code is a two-dimensional code within a black-and-white square that can be read by a smartphone camera, a POS terminal, or other devices such as a smart watch. The customer simply needs to scan the QR code and enter the transaction amount and then the money is transferred instantly, with or without POS infrastructure being present. The technology is especially beneficial for banks in ASEAN, where POS penetration is below 0.5 percent but smartphone penetration has exceeded 40 percent.¹⁴² China has proved the success of this model. The lack of a widespread POS infrastructure across the large Chinese market made the relatively inexpensive QR code payments systems very compelling for merchants.

In February 2016, the Indian government launched Bharat QR, which was the world's first fully interoperable (ability to accept payments in multiple payment networks) QR code payments system.

Together with leading payment providers, and 50 to 60 Indian banks, Bharat QR enabled merchants across India to accept QR payments from bank accounts as well as e-wallets. A unified QR with interpretability enables any acquirer to use a single specification to create a QR code which can be used by any credit card, e-wallet, or bank account across India. Bharat QR is also linked to unified payment interface, an app enabling person-to-person payments.

Implementation considerations for QR Pay and Scan:

- **Standardised QR code:** Banks create a QR code which is common to other institutions. Usually a government has a standard unified QR code. Singapore's payment council, is implementing common QR code specifications "Singapore Quick Response Code" which can accept payments by domestic and international payment schemes.
- **Placement:** QR code placement should catch the eye and read from any angle.
- **Size and Quiet Zone:** Include minimal white borders equal to the width of two modules around all four sides of the code.
- **Incentives:** Promotions and offers for customers' uptake (e.g. cash back offer or discounts).¹⁴³

Example: Sacombank Introduced QR Pay¹⁴⁴

Background: One of Vietnam's largest banks was the first in Vietnam to introduce a quick payment method in 2017 using QR scan pay at merchant point of sale. Sacombank is pushing cashless payments amongst its customers in a very cash friendly region.

Value Proposition: Sacombank is expanding cost effective payment acceptance options for merchants instead of using a card to pay with expensive POS terminals. To promote QR pay and drive and switch customers from cash, Sacombank utilised incentives such as cash back offers -30 percent for dining, -20 percent for supermarkets, fashion shops and cosmetics and -10 percent for other spending. To expand its reach Sacombank entered into a deal with UnionPay International providing Sacombank customers with access to global union pay merchants and vice versa for UnionPay customers with Sacombank merchants.

Robo-advice

Wealth management advice is traditionally targeted towards the high net-worth segment and costly to provide; its accessibility across ASEAN is limited, once again, to branches accommodating high-net-worth individuals. However, through robo-advice, ASEAN's emerging middle class could access financial advice at an affordable price, which would drive a new segment into wealth management services.

Robo-advice refers to a Web-based platform for automated wealth management services and advice including portfolio allocation and investment recommendations based on the risk appetite of investors. Robo-advisors economically provide financial advice to the mass market as they are available at much lower costs than traditional wealth management advisors (e.g. a fixed fee of 0.15 to 0.89 percent of assets under management [AUM], compared with a fee of 1 to 2 percent of AUM for traditional advisors).

Robo-advisors also have much lower minimum portfolio requirements compared with traditional wealth managers and are able to provide real-time investment recommendations, thereby delivering an enhanced customer experience.¹⁴⁵

Banks should determine the type of relationship they want to develop:

1. Give customers a seamless robo-advisor service using the bank's brand.
2. Send customers to a third party with the bank's brand to provide advice via robo-advisor.

Robo-advisors can be developed and serviced in-house to avoid excessive setup fees, or banks can choose to develop a front-end solution whilst linking the platform to brokerages and technology providers using Application Platform Interface. Alternatively, custom-built solutions can be created by partnering with broker-dealers and technology providers.



Implementation considerations and options for Robo-advisors:

- 1. Build a complete robo-advisor:** Although this option is costly and requires IT infrastructure, it offers complete customisation and maximum control for the bank.
- 2. Build a robo-advisor front end, linked to a broker-dealer/technology provider:** A bank can remain in charge of the look and feel of the customer experience but limit in-house management, by using a third party's financial planning back-end technology.
- 3. Partner with a broker/technology provider to develop a customised solution:** A bank can work with a partner to develop three critical components of robo-advice: brokerage features, a diverse investment program, and a front end interface.
- 4. Refer customers to a partner third-party digital investment and robo-advice platform:** This option requires the least amount of investment and work for the bank and shifts regulatory responsibilities to the third party. A potential disadvantage is putting distance between the customer and the bank.



Alternative lending platforms

One of the key constraints to growth across ASEAN is the lack of financing options available to SMEs with no credit history. In fact, more than 50 percent of SMEs in ASEAN do not have access to financing because they lack formal credit.¹⁴⁶

Marketplace lending, or peer-to-peer lending, can develop a trusted alternative credit scoring for an SME, by leveraging technology and alternative credit histories gained from different data footprints from lenders and borrowers directly without going through a traditional intermediary.

ASEAN banks could learn from these peer-to-peer players and develop hybrid lending platforms, combining regular balance sheet lending with off-balance-sheet lending via peer-to-peer marketplace lending.

Traditional banks can fund portions of the loan to SMEs and consumers with traditional balance sheet lending and fund part of an unwieldy loan through marketplace platforms. Marketplace lending platforms can help banks service unwieldy loans without the burden of legacy costs and fixed infrastructure.

A key feature of peer-to-peer lending is utilising alternative credit scoring for SMEs and clients without a formal credit history. This is done via three main sources as shown below:

Sources of analysing alternative credit history

Figure 3.8: On-boarding Implementation Considerations

| | |
|--|---|
|  | Online —Digital footprints in social media are used to evaluate variables such as stability, income, and size of professional networks |
|  | Mobile —Long trails of calls and payment data from clients' mobile usage and payment history are used to assess financial strength |
|  | Cash flow analysis — Analysis of business invoices or proof of receivable finances |

Source: DBS, Financial Brand, and PwC analysis

Consideration of implementation of alternative lending:

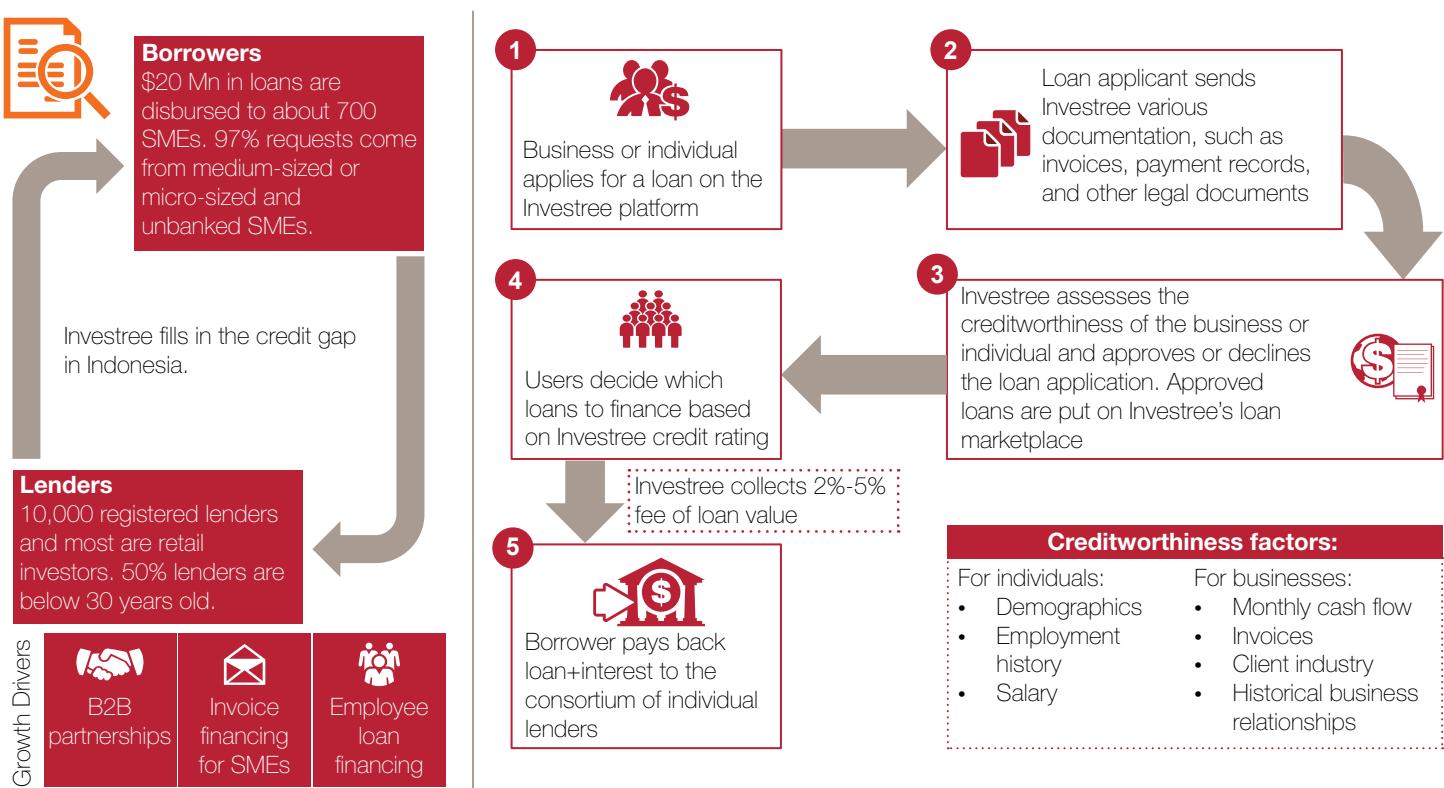
When implementing an alternative lending strategy, banking institutions ought to consider the following components:

1. **Delivery Channels:** Choice of delivery channel would depend on end customer. For example a SME loan would be best served via web interface while personal loan via mobile application.
2. Back-end system usually would have three components:
 - a. Origination which integrates with front end channel
 - b. A marketplace component where actual matchmaking happens and needs to be integrated with risk management system
 - c. Servicing and Collection: Management of loan life cycle post approval and disbursement till closure
3. Risk Management System: Integrating various data points on the customer to produce risk profile
3. Third Party Point Solutions can be sourced rather than the bank building it from scratch, including payment processing, accounting, cash flow management, fraud check, verification and authentication, credit scoring, electronic signatures, analytics, document management and SMS/mail.

Example:
Alternative lending platform: Investree

Investree is a peer-to-peer lending service in Indonesia which uses non-traditional methods to assess individuals and businesses without a formal credit history for financing. Following the approval of a loan application and Investree's internal credit-risk assessment, Investree users, individual investors, then decide which loans to finance based on the interest rate and Investree credit rating (see Figure 3.9).

Figure 3.9: Investree Alternative Lending Process



Source: Investree, TechinAsia, e27, PwC analysis

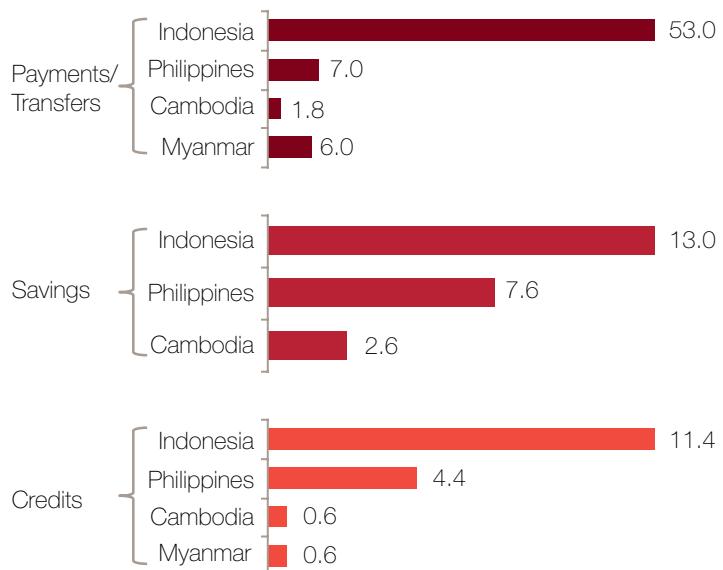
Digitisation benefits

As we have seen, digital solutions can take a number of forms whilst overcoming the challenges inherent in the ASEAN banking sector. Digital financial services are able to overcome many of the sector's ASEAN infrastructure barriers, including access to ATMs, branches and POS terminals. They also facilitate a reduction in costs to serve customers, as digital channels are scalable at lower cost than labour and physical infrastructure. A key challenge that financial digital services are able to overcome is the lack of credit history data. Digital services are able to utilise alternative online and offline data to support potential customers who do not have a traditional credit history.

Supporting this view, the Asian Development Bank has identified Indonesia and the Philippines as hosting the most sizable of the opportunities across payments, savings, and credit services which digital banking addresses. As shown in Figure 3.10, in payments opportunities, moving from cash to digital payments can address US\$53 billion worth of unmet needs in Indonesia and US\$7 billion worth in the Philippines. In savings and credit needs, digital financial services can address needs worth US\$24.4 billion in Indonesia and US\$12 billion in areas such as SME financing.¹⁴⁷



Figure 3.10: Financial Service Gap Addressable by Digital Solutions, US\$ Billion



Source: Asian Development Bank, 2015

Digital financial service challenges

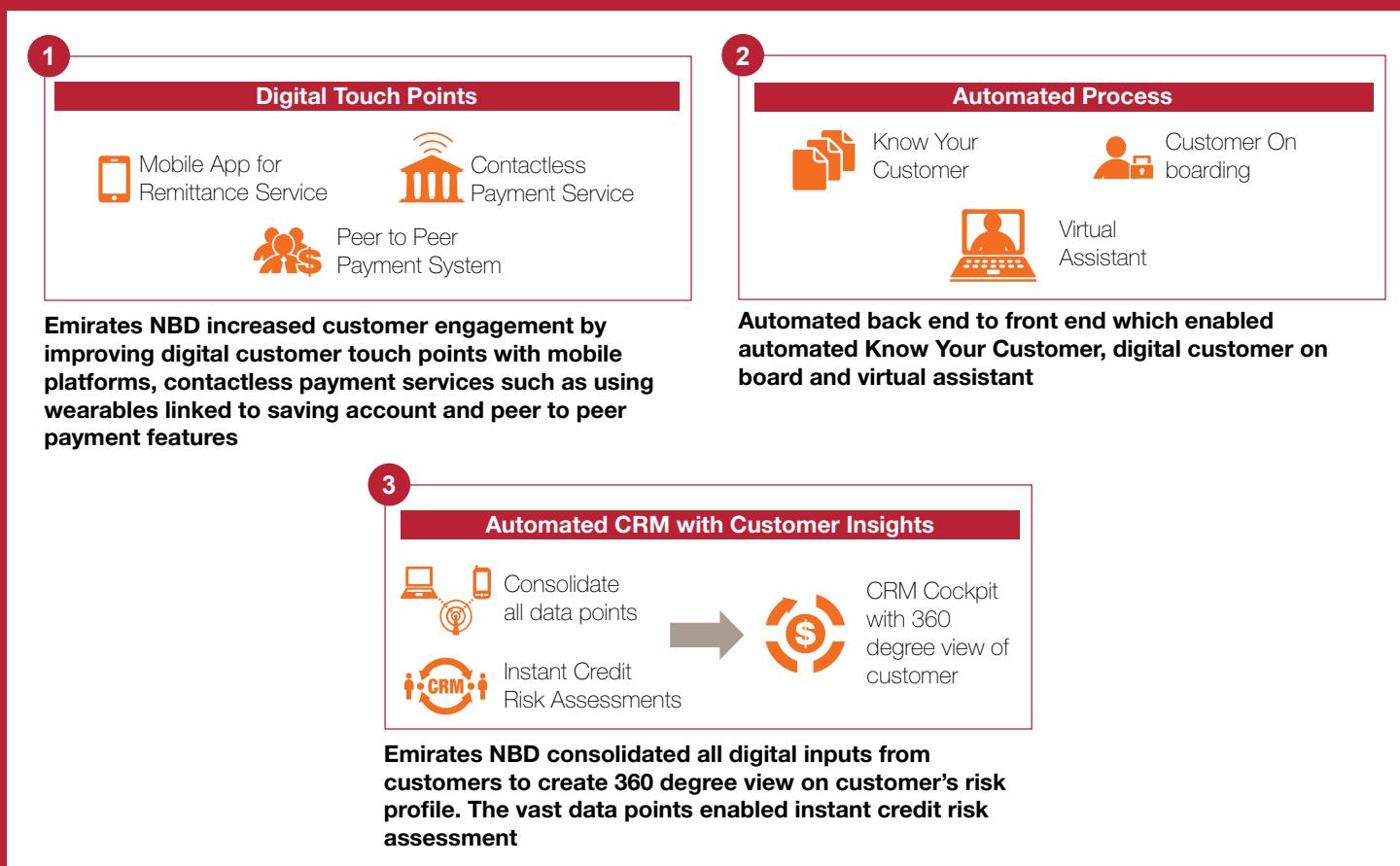
Although digital financial services provides various opportunities for banks to tap into new growth opportunities, banks must consider certain challenges, including:

- An underdeveloped technology ecosystem and readiness: ASEAN has a diverse set of digital readiness for banks, with Singapore banks leading and Philippines and Thailand banks lagging in digital banking infrastructure.
- Government involvement: Without government initiative in areas such as streamlining regulation, developing standardised e-KYC, and providing standardised channels (e.g. Singapore is developing standardised QR code standards), it will not be possible to reap the benefits of digital financial services.

Case study: Emirates NBD¹⁴⁸

Emirates NBD Bank based in Dubai is one of the Middle East's leading banks. The bank was an early adopter of digital banking, and in 2012 it began its digital transformation with the aim of increasing revenue and customer engagement. The bank started with establishing a 'Head of multichannel and CRM' on its leadership team. The senior executives made digital transformation a top priority and set out a clear strategy connecting digital initiatives to clear business objectives. The bank's business objectives included introducing innovating solutions, increasing digital touch points, improving customer processes, (e.g. on-boarding) reducing operating costs and designing a seamless customer experience. To identify digital initiatives the bank crowdsourced ideas across staff levels, established a matrix framework to prioritise initiatives according to customer problems, established cross functional leadership teams, and streamlined the digital initiative approval process.

Key Digital Transformation Highlights



Emirates NDB Bank's digitising strategy drove online and mobile transactions by 50 percent and saw 35 percent of calls migrate to a digital channel and the automation of back-office processes has resulted in a 10 percent reduction of fulltime employee costs. A particularly successful part of the digitalisation implementation was through the creation of its digital remittance service, DirectRemit. The service permitted cross-border remittances in under 60 seconds. DirectRemit proved so popular, revenue from the remittances services increased by 24 percent in 2016 alone.

Customer-centric propositions

Utilisation is key to the growth of financial services across ASEAN; however, it is currently hampered by poor financial literacy and the inaccessibility of banking services, which themselves are not designed for the new middle-class ASEAN customers.

The lack of financial awareness and literacy has limited financial services usage by the emerging middle across ASEAN, so it is critical for banks to improve access and usage in the era of fintech and digital financial services. Awareness and education on financial services should go hand in hand, with awareness driving adoption and education driving usage. For this reason, these programs should be coordinated.

One possible approach is a business correspondent model, which can be used to understand customer needs and to educate those in the last mile who are without access to branches. Business correspondents are retail agents engaged by banks to provide banking services at remote locations without branches or ATMs. The agents perform a variety of functions such as identification of borrowers, collection of small deposits, disbursal of low-value credit, recovery of principal/collection of interest, sale of insurance, and delivery of low-value remittances. These agents also educate customers and increase financial awareness, as well as work to understand customer needs and pain points.

For example, a leading bank in India, now uses such a model, with business correspondents across India; kiosks in remote areas of India provide functions similar to those offered at a bank branch.

As part of their drive to attract and retain newly educated potential customers, ASEAN banks ought to also consider new ways to improve customer engagement by providing tailored solutions, and improving the transactional experience. Although half of ASEAN adults, a far smaller proportion of them actually utilise it on a frequent basis; many have opened accounts for significant life events such as a home or car loan, but then failed to utilise these accounts for everyday life.

ASEAN banks could expand their customer base and enhance utilisation through providing more customised products with tailored features, including solutions to help with monthly cash flow challenges. Banks can also empower customers by enabling them to decide their own features; for example, Turkey's Garanti Bank lets its customers personalise their credit cards.

Example: Garanti Bank in Turkey¹⁴⁹

Background: Garanti is Turkey's third largest private bank that has spearheaded personalised banking services with its "Flexi Card". The bank saw a customer need as early as 2006, and empowered consumer choice in personalising the look of their credit cards as well as the structure of their account, including interest rates, reward points and credit card fees.

Value Proposition: With Garanti Bank's "Flexi Card", users are able to tailor the features of their card to their personalising needs. Customers are able to set over ten parameters of the card such as reward rates/types, interest rate and card fees. E.g. lower interest rates lead to lower bonus rates or card fees can be reduced to zero with a minimum monthly spend requirement. The physical appearance of the "Flexi Card" can also be customised as users choose amongst colors, images, or even upload their own images.

As part of developing more customer-centric propositions, ASEAN banks ought to also consider how they can address the emerging middle class from a more holistic point of view, providing financial services solutions for each part of their life. Currently retail banking, wealth management, and insurance operate independently and promote products separately, especially for the emerging middle class.

The effect of this siloed product offering approach is that customers do not feel that the bank is right for their needs, or at best they utilise only one product instead of the full suite. Banks need to reorganise their business operating model to look at what the customer is trying to achieve, and then provide a holistic services package, bundling various financial services together based on the needs of the customer that they are targeting.

For example, during a customer's first home purchase, he or she will require a suite of financial services related to the purchase. At present, the home purchaser would need to separately acquire a mortgage, house insurance, and wealth management services to finance the home. However, in the future, ASEAN banks could package all three services together and sell the packaged solution to the customer, thereby addressing a new customer base with an enhanced experience.

Benefits

Developing customer-centric solutions and propositions will enable banks to retain their existing customers, whilst also attracting new ones to drive the usage of value-added services by providing tailored solutions to address pain points and increase customer financial awareness. Banks will also be able to cross-sell products and solutions (as mentioned above) as a bundle for specific financial needs (e.g. buying a car, financing a house). As customer engagement and pain points are addressed, it is easier to drive incremental revenues.

Increasing the customer base can provide sustainable revenue-earning opportunities as the new customer segment of the emerging middle class grows. As their incomes rise, so will demand for higher-value-added solutions to increase their standard of living.

Challenges

However, to drive customer-centric solutions, banks have to adjust their operating model, invest in customised products, and provide bundled solutions, which can be time consuming and expensive. But if customer pain points are not addressed in the next few years, Fintech companies, telecommunications providers, and non-banking financial institutions will help customers in a more cost-effective way, utilising their own financial services platforms.



Partnerships

Partnerships provide ASEAN banks with an option to bridge the gaps they are experiencing in addressing the needs of the region's new middle class. Partnering with non-banking institutions will enable synergies in driving financial access, usage, and digital financial services.

- **Access to a new customer base:**

Telecommunications, postal services, and social media in ASEAN have larger customer bases than banked customers; banks can leverage this new customer pool quickly.

- **Last mile coverage:** Postal services and

telecommunications have established merchant outlets which can cover the last mile in rural and small city locations, enabling banks to service customers at lower costs.

- **Innovative technology platforms:** Fintech

companies are able to offer innovative technologies more rapidly than banks owing to legacy costs. Banks can leverage existing platforms without building a new solution thanks to the fintech companies' lean, independent nature.

- **Payments:** Banks ought to also consider partnering

with government agencies, social media companies, fintech companies, and e-commerce providers to drive the cashless payments agenda in ASEAN.

Partnering for customer access

ASEAN banks are faced with low penetration due to a lack of reach, high cost-to-serve, and lack of KYC information. To combat these challenges, ASEAN banks could leverage partnerships with telecom companies, which have established customer bases with readily available KYC information. The largest telecommunications players in ASEAN typically have two or three times as many customers as the total bank customers. In Indonesia, for example, Telkom has 178 million subscribers, compared with a total banked population of approximately 93 million. By partnering with telecom players, ASEAN banks could quickly gain access to a large pool of customers.¹⁵⁰



Partnering for the last mile

In similar fashion to how ASEAN banks could partner with telecom players, they could also look to join forces with postal services to overcome the challenges of last mile coverage. Postal services in ASEAN have the widest reach globally — 99 percent of the population can be reached via home delivery service, providing strong last mile distribution. In other regions, such as Europe and Latin America, postal banking services have been very successful in reaching a wide customer pool.¹⁵¹

Partnering for platforms

Banks in ASEAN could also partner with fintech companies to gain alternative credit scoring methods and provide financing to SMEs without a traditional credit history.

There are two ways banks could collaborate with marketplace lending platforms. The first method is to partner with peer-to-peer platforms which can serve as a distribution channel for banks via referrals.

The second method is to buy loans from lending platforms by providing funding as institutional investors. Partnerships with alternative lending platforms enable marketplace lenders to access a larger customer base while leveraging platform technology. In the United States, a few leading banks are institutional investors of lending platforms. Banks purchase personal loans via the lending platform, utilising lending platforms' low operational costs and banks' strong balance sheet and large customer base.

Example:

Correios (Brazil's postal service) partnered with Bradesco, a national private bank, to drive financial inclusion¹⁵²

Background: In the early 2000s, banking access in more remote parts of Brazil was limited, with 75 percent of all bank branches being located in major cities in the southern and eastern parts of the country.

Value Proposition: In 2002, Bradesco, a national private bank in Brazil, entered into a 10 year partnership deal with Correios, Brazil's postal service provider, to drive financial inclusion. Bradesco linked each post office to the bank via satellite to provide real time banking transactions. The 6,021 post office branches enabled Bradesco to reach remote areas of Brazil to provide basic banking services such as new account opening, withdrawals, and deposit services. In 7 years this partnerships saw 700,000 loans being made and financial services being provided to 8.8 million previously unbanked residents. Based on the success of this partnership model, Correios allowed competitive bidding in 2011 to select a new banking partner, once tenure of the partnership with Bradesco had ended. Correios selected Banco do Brasil in January 2012 after twelve rounds of bidding and as of 2018, their partnership continues.

Partnering for payments

Partnerships with government agencies, social media companies, fintech companies, and e-commerce providers can be helpful to drive digital payments, but they also bring with them a number of key considerations and challenges. Government services can provide access to a vast customer pool and enhance the overall payment ecosystem. In India, the Aadhar enabled payment system, not only enables customers to perform basic banking transactions, but also facilitates the disbursements of entitlements such as pensions.

Social media partners can also provide a large user base and promote payments especially in the peer to peer sphere. E-commerce portals have existing customer bases and transaction ecosystems which would benefit from electronic payments. However, e-commerce players have already started to introduce their own payment systems, and so banks will have to act fast and create distinctive value propositions for customers to ensure they can bring enhanced value to such partnerships

These need to be carefully evaluated from a strategic fit, risk, and governance perspective on how such a partnership may be dissolved if it is no longer working.

Figure 3.11: Implementation Considerations for Partnership

| 1 Strategic Assessment | 2 Risk Management | 3 Partner Engagement | 4 Partnership Execution | 5 Partnership Governance | 6 Termination Considerations |
|--|---|---|---|---|---|
| <ul style="list-style-type: none"> Role of partnership in firm's long-term goals Assess whether the value of the partnership is unique or easily replicated Determine whether the partnership solves a pressing, existing problem | <ul style="list-style-type: none"> Define major regulatory and legislative concerns Identify system vulnerabilities from the partnership Perform necessary due diligence | <ul style="list-style-type: none"> Approach prospective partner Establish strategic and cultural compatibility Develop joint business plan | <ul style="list-style-type: none"> Negotiate and close partnership agreement Launch partnership | <ul style="list-style-type: none"> Ensure that governing structures are in place and that the partnership values are aligned to facilitate decision making | <ul style="list-style-type: none"> Identify when a partnership has failed Have an exit plan in place for rapid and orderly dissolution Learn from the lessons of the failure |

Key questions in managing risk with fintech partnerships

| Conflict of Interest | Regulatory Concerns | Privacy Protections | Outsourcing Risk |
|---|---|---|---|
| <ul style="list-style-type: none"> Does the fintech partner have existing banking clients? If so, are there controls to prevent service overlap? Does the partner need to access your bank's core systems? | <ul style="list-style-type: none"> Does the partner have the proper compliance staff? What is the partner's relationship with regulators? What's the compliance/litigation history of the partner? | <ul style="list-style-type: none"> What is the company's information security policy? Who is liable for breaches of customer data? Has the partner been independently audited for data security? | <ul style="list-style-type: none"> Does the partner use third party services to offer services? If so, what are the third party services' risk management/due diligence policies? |

Source: American Banking Association, CPA, PwC analysis

Benefits and Challenges

ASEAN banks make attractive partners given their capabilities and capital; however, there is a tendency for many banks in ASEAN to err on the side of caution and not enter partnerships, fearing they will dilute their propositions and brand. However, this is the time to act and be bold, albeit with the appropriate due diligence. To fully address the ASEAN potential, banks need to venture outside their comfort zone and trust that when partnerships are entered to and in the correct manner, they can be extremely successful as has been shown in parts of Africa.

Banks should keep these challenges in mind when entering into partnerships with non-banking partners:

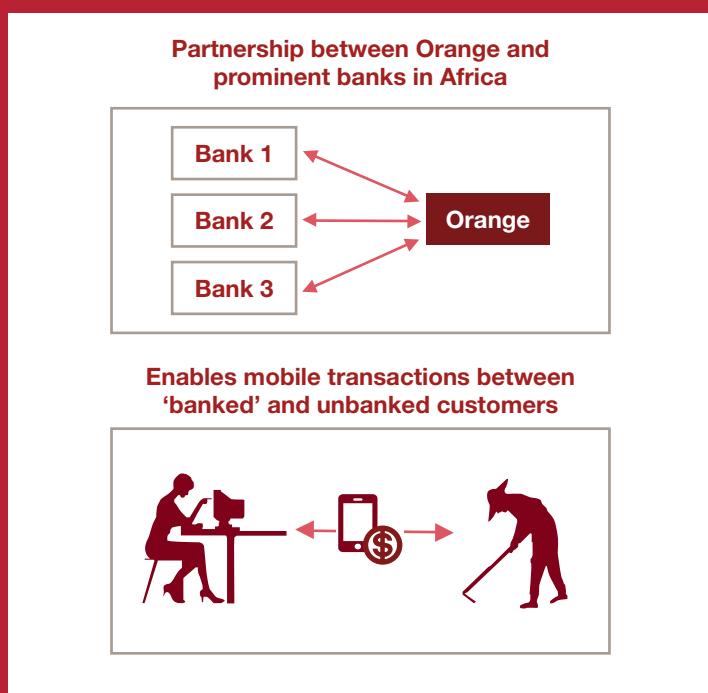
- Mismatched corporate cultures: Fintech companies, for example, have a start-up and innovation mind-set compared with the typical conservative, risk averse approach of most banks.
- Competition: A number of organisations, outside of the financial services sector, are already trying to serve the banking needs of new emerging consumers, therefore banks need to choose their partners quickly, carefully and then define unique and competitive value propositions.
- Allocation of resources post partnership: If the combined resources and capabilities are not allocated properly, the bank and its partner can end up destroying each other's inherent capabilities and advantages.



Case study: Partnership of Orange and Leading Banks of Africa¹⁵³

Africa is a region where only 10 percent of the population have access to bank accounts but 60 percent have access to mobile phones. In 2008, Orange one of Africa's largest telecom providers, launched a mobile money service called 'Orange Money' in the Cote d'Ivoire.

In order to increase distribution reach for the unbanked, Orange partnered with various African banks to drive Orange money (mobile money) transactions across Africa. Partnerships between various banks, including Bank of Africa, Eco Bank and others, and Orange's agent shops enabled people to withdraw cash at remote areas and allow transfers and payments.



Value Proposition: Facilitate transactions between unbanked and banked populations by enabling direct digital transactions between accounts.

Partnerships: Bank partnerships with Orange's e-wallet permits bank account holders and Orange Money users to seamlessly send and receive money between the two accounts – thus facilitating financial transactions between those with and without bank accounts.

Other features included linking bank account with orange account expanding financial services solutions to mobile customers.

Mobile money users and revenues have grown since Orange Money's partnerships with the various African banks and the expanded distribution network this partnership offered. In particular, Orange's partnership with Eco-Bank in Mali was a significant success enabling over US\$135 million worth of mobile money transactions between January 2015 and March 2016.¹⁵⁴ Synergies created by bank branches and an extensive network of thousands of licensed Orange Money vendors, considerably increased withdrawal points driving overall financial access and transaction volumes.

“

The ASEAN financial services industry is at an inflection point, poised to capture a new phase of growth enabled by the next generation of digital commerce business models and technologies for ASEAN's dynamic, mobile first customer base. The winning financial institutions will combine digital, analytics and AI technologies along with customer centric propositions and leveraging partnerships with other industries to drive growth and financial service access in the region. ”

Andrew Taggart

Partner, Financial Services Leader
South East Asia Consulting
PwC Singapore





Conclusion

The ASEAN financial services industry has the right ingredients for growth, including rising middle-class income, increasing smartphone and internet penetration, and ASEAN banking integration. However, key challenges remain, including limited financial access, a largely cash-based society and low usage of value-added services. These challenges are driven by weak infrastructure, financial literacy gaps and lack of a customer centric focus.

To bridge these gaps it will require national governments to standardise banking regulations and standards, especially in the area of financial inclusion and digital financial service. ASEAN governments can follow Singapore and Thailand in bringing national payment platforms to drive digital financial transactions.

Banks in ASEAN can also drive the change themselves and bridge these gaps by building capability in digital financial services specifically in digital on-boarding, driving financial inclusion, introducing QR scan capabilities to reduce merchant infrastructure gaps, developing automated financial advice applications such as Robo-advice to expand wealth management towards the emerging middle class and in developing alternative lending to bridge SME credit gaps.

Banks also need to develop customer-centric approaches and solutions by developing customised solutions and addressing customer pain points to drive overall financial usage. Finally, ASEAN banks can leverage partnerships with other industries to utilise synergies in bridging financial access and low usage in the region. Only then can they achieve the full growth potential of ASEAN.



Chapter 4: Consumer Goods

Consumer goods in ASEAN

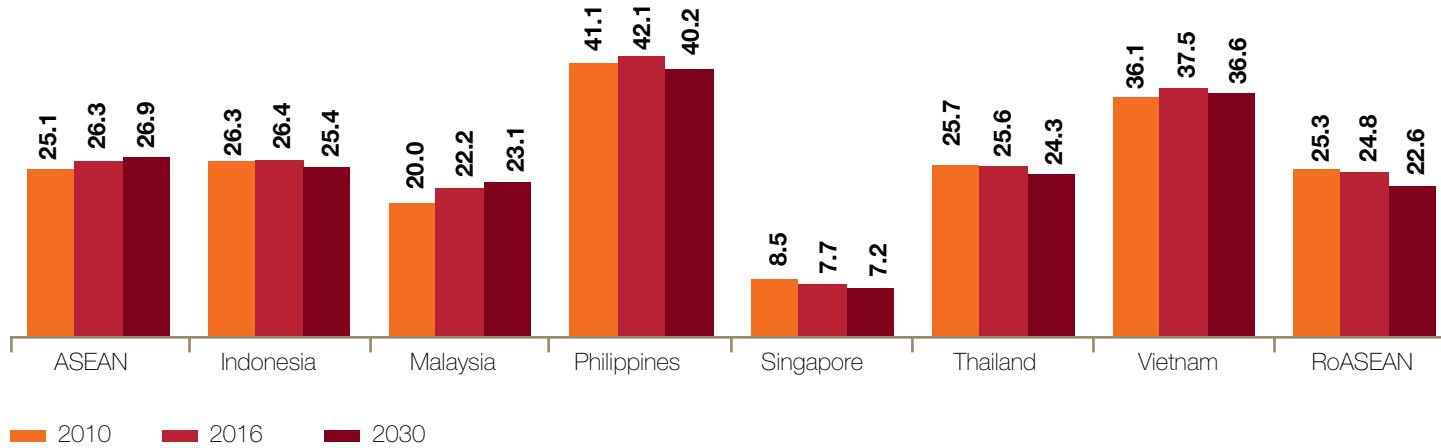
The consumer goods sector has been one of the early beneficiaries of ASEAN's growth and improving economic conditions, which have resulted in increased expenditure by the growing middle class on consumer goods. In fact, the rate of expenditure on consumer goods in ASEAN is now the third-largest globally, at 26.3 percent of GDP (after the Middle East and Africa region and Eastern Europe).¹⁵⁵ As seen in Figure 4.1, leading this trend toward 2030 are the Philippines (40.2 percent) and Vietnam (36.6 percent). Vietnam expects to have the largest growth in consumer expenditure on consumer goods over the 2016-2030 period (10.2 percent CAGR), followed by the Philippines (9.7 percent CAGR).

Across the rest of emerging ASEAN, frontier markets such as Myanmar and Cambodia will join Vietnam in leading the way in terms of GDP growth and growth in consumer spending. Indonesia is still expected to be the biggest market in terms of expenditure on consumer goods by 2030.¹⁵⁶ Consumer spending growth will also outstrip GDP growth in Malaysia, due to strong economic conditions and consumer confidence; however, rising housing prices in Thailand will impact consumers' disposable income.

Driving this growth is an increased propensity for ASEAN consumers to spend more due to their increased exposure to a wider variety of products. Disposable income rates are due to grow in all ASEAN markets until 2030, with the highest growth rate over 2016-2030 coming from Vietnam (9.6 percent CAGR), Indonesia (8.7 percent CAGR), and the Philippines (8.4 percent CAGR).¹⁵⁷

Figure 4.1: Philippines and Vietnam See the Largest Contribution of Expenditure on Consumer Goods to GDP

Consumer Expenditure as % of GDP, (2010 - 2030)



Note: Consumer expenditure refers to consumer expenditure on consumer goods only

Source: Euromonitor

Whilst Singapore will register the lowest growth rate (3.6 percent CAGR) in that same period, it will continue to enjoy the highest disposable income per capita within ASEAN (US\$45,000 in 2030).¹⁵⁸ Growth in disposable income implies a growth in consumer spending; for instance, Vietnam's total disposable income will grow at a 10.5 percent CAGR while its spending on consumer goods will grow at a 10.2 percent CAGR over the 2016-2030 period.¹⁵⁹ However, this increased expenditure will naturally impact savings, and this is reflected in the anticipated drop in savings from 8.4 percent of disposable income in 2010 to 6.6 percent in 2030.¹⁶⁰ According to the Hong Kong Trade Development Council, most of this increased spending in the near term (2017-2019)

will be on fashion (63 percent) and travel and leisure (54 percent), and more of the growth is occurring outside the metro cities. Middle-sized regions within ASEAN, that is, those with a population of more than 1 million but less than 5 million, benefitted from improved infrastructure and logistics, which led to a significant demand for products such as packaged noodles (60 percent share of ASEAN demand), soft drinks (56 percent), and cigarettes (55 percent) in 2016.¹⁶¹ Facilitating this increased desire to spend is easier access to financing and credit. Consumer credit is rising very fast in countries such as Thailand, where it increased by 16.8 percent between 2013 and 2015, growing to US\$97 million (THB3, 500 million) in 2015.¹⁶²

Figure 4.2: Strong Consumer Confidence Across ASEAN Will Drive Spending, with Discretionary Spending Rising in Most Markets

Market highlights



- **Improving consumer sentiments especially in smaller cities** e.g. Ambon and Semarang
- Increased government social spending to increase **size of middle class** and discretionary spending



- Consumer confidence increased in Q2 2017 due to **improvement in key economic indicators**
- Discretionary spending showing increase to 2030 impacting items like **new electronics in 2018**



- Consumers in the Philippines are the **most confident globally** with optimism increasing in 2017
- Consumers' willingness to **spend on new clothes** showed the greatest increase for consumer goods



- **Promise for increased consumption** after easing of concerns over economic growth
- Essential spending on food and housing is expected to **stabilise to 2030**



- **Optimism about the economy** and job opportunities improved the consumer confidence in 2017
- Increased affordability of food will **increase discretionary spending**



- Vietnam became **the fifth most optimistic country globally**, with record highs in 2017
- City dwellers intend to **increase consumption on consumer goods** by the greatest amount

Source: Euromonitor, Nielsen, Bank of Indonesia, The Nation, HKTDC

Thanks to the increase in ASEAN consumers' propensity to spend, the consumer goods sector across the ASEAN 6 countries namely, Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam will observe strong growth from 2016 to 2021, at a CAGR of 7.7 percent, behind only the Middle East and Africa region and Latin America.¹⁶³ This is likely to attract a large number of new entrants keen to establish an early foothold and benefit from its growth. This will in turn increase competition across most sectors in ASEAN 6, which will ultimately benefit consumers by providing them with greater choice at more affordable prices, with food and drink, apparel and footwear, and consumer electronics continuing to be the main subsectors of growth within the consumer goods industry.

Food and drink: The impacts of lifestyle changes and changing consumer preferences can be seen across the food and drink sector, with health and wellness being one example. Rising consumer awareness and an increase in government health and wellness programmes, such as BROWN4GOOD in the Philippines, are changing consumer preferences to products with health benefits across Singapore, Indonesia, and the Philippines. Cultural trends are also having an impact, as can be seen with the rising popularity of K-Pop and J-Pop in Thailand, which is leading to the introduction of new products by companies like CPRAM capitalising upon the related promotional events. However, growth in this subsector is not confined to products, but is also in packaging, as seen in Malaysia with the introduction of Nips in bags and pouches and the revamping of brands such as Gardenia, along with innovative marketing.

To address these opportunities as quickly and effectively as possible, companies are relying on partnerships as an expansion strategy. In the Philippines, for example, a new partnership is taking place between Monde Nissin and Nippon Indosari Corpindo to form Sarimonde Foods; Monde Nissin leveraged Nippon Indosari's significant presence in baked goods to enter the packaged bread category, which was dominated by Gardenia Bakeries (the Philippines) during 2016.¹⁶⁴ In addition to partnerships with local firms, ASEAN governments are also facilitating the local expansion of foreign companies with new legal frameworks which allow them to expand local production with imported products, as seen in Vietnam, where Schweppes Black Soda has been locally produced since 2016.

Apparel and footwear: Apparel and footwear retailers, particularly "fast fashion," continue to expand in the region, with manufacturing activity increasing most notably in Vietnam, especially for apparel and footwear. Its lower manufacturing costs and maturing capabilities and skills are attracting international brands such as Nike and Adidas, which relocated their factories at the end of 2015. Malaysia is also attracting international fast-fashion retailers such as SPAO, Shopen, and COS, leading to price competition and discounting strategies. In Singapore and Thailand, athleisure trends and sports-inspired apparel will continue to drive growth due to rising health awareness and the popularity of sports teams, respectively, whilst in the Philippines the refurbishment of shopping spaces and development of new ones such as the Outlets at Lipa in 2017 are encouraging the growth of brands through flagship stores, such as H&M in SM Mall of Asia in 2016.

Consumer electronics: The growing connectivity and rise of e-commerce across ASEAN underpins the rising demand for consumer electronics. This can be seen in Indonesia, where the growth of mobile payments through telecom services such as Lippo Group's OVO and Telkomsel's T-Cash and the rise of promotions by e-commerce companies such as Tokopedia and Bukalapak is expected to drive the demand for electronics, particularly via smartphones, up to 2021. In Malaysia, growth is being driven by the large, young population preference for products that offer convenience and serve multiple purposes, for example, convertible laptops, smartphones, and wearable technologies. ASEAN governments are playing their part, too, as in Singapore the preparation and roll-out of 5G networks in 2020 will drive up value sales of consumer products by creating a new value-added segment. Niche products including OLED televisions and premium portable media players also register growth, indicating a trend of premiumisation¹⁶⁵, and in the Philippines, the government's digital strategy for 2016-2022, which is aimed at providing free internet¹⁶⁶, will with luck lead to an increased demand for connected gadgets such as smartphones and tablets.

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Southeast Asia’s emerging economies, rapid urbanization and expanding middle class have been the main demand drivers for Electrolux products. This has made Southeast Asia the major contributor of growth for Electrolux in the Asia Pacific region and as such it will continue to represent a key focus area for our company. **”**

Enrique Patrickson
Chief Financial Officer-APAC Major Appliances
Electrolux

Key opportunities

Against this backdrop of increased consumer spending, a number of opportunities arise for consumer goods companies, both in addressing the increased local demand and in how they can best source and manufacture goods to meet it. Consumer goods companies ought to begin, if they have not already, to review their sourcing and manufacturing operating model to be more localised and take advantage of the improving capabilities across ASEAN to support their business needs. Furthermore, given the startling growth of smartphone usage across the region, consumer goods companies can now look to extend their traditional B2B model to include direct-to-consumer marketing and sales through digital platforms such as e-commerce and mobile.

Sourcing in ASEAN

Sourcing in developing markets is a familiar model, especially for the textiles, apparel, and footwear sectors where China has dominated for years. However, rising costs in China and new emissions regulations have forced companies to consider alternative sourcing and manufacturing locations, such as markets in ASEAN. Wages (which represent approximately 60 percent of total production costs)¹⁶⁷ remain the key consideration for apparel and footwear manufacturers, and with the sharp rise in China's manufacturing wages between 2010 and 2016, many apparel and footwear manufacturers have sought to source from lower-cost ASEAN countries. Vietnam was one key beneficiary; its annual manufacturing wages per capita were only one-third of China's, as of 2016.¹⁶⁸

Textiles, apparel, and footwear manufacturing is a key segment within ASEAN, accounting for more than 9 million jobs, or three out of 10 wage employees, and is particularly concentrated in Cambodia (three out of four employees) and Vietnam (two out of five).¹⁶⁹ This is a young workforce (with an average age of about 31 years), with more than 70 percent of these employees being women.¹⁷⁰ However, whilst this does provide

employment for millions of people, it is an industry characterised by labour-intensive production (i.e. low productivity) and low education levels, placing employees at high risk of displacement with the uptake of automation, especially over the next decade.

Since 2001, when it established a number of trading relationship with Western countries, and in particular following its inclusion within the WTO in 2007, Vietnam has rapidly risen through the ranks to become the second-largest apparel and footwear exporter globally.¹⁷¹ These agreements allowed it to capitalise on its competitive manufacturing costs, clean safety record, and stable political environment to draw international apparel and attract footwear manufacturers from around the world. For instance, Spectre, a Danish sportswear manufacturer, invested US\$5 million in a new factory at Hoa Xa Industrial Zone in 2017. Now instead of “China + Many,” the expected apparel and footwear sourcing model from 2017 onward is “China + Vietnam + Many”.¹⁷² China is expected to take up 30 to 50 percent of total value/volume, Vietnam 11 to 30 percent, and each of the “many” countries less than 10 percent.¹⁷³ Vietnam is now the largest apparel and footwear exporter in ASEAN¹⁷⁴ and is expected to remain so through 2030, with the U.S., the E.U., and Japan its top three export markets.¹⁷⁵ Cambodia is benefiting from Vietnam’s rise, by picking up demand when Vietnam has insufficient capacity or cannot meet demand due to trade relations.

However, ASEAN apparel and footwear manufacturers will face stronger challenges from rapid technological advancements, including China’s eagerness to move up the value chain in manufacturing, and will eventually lose out if they compete solely on low cost.

Digital in ASEAN

The fundamental growth drivers for the consumer sector in ASEAN are the increasing levels of urbanisation, a younger and wealthier consumer base, and higher levels of consumer spending. Nonetheless, the sector’s expected exponential growth will be led by the adoption of digital technologies for consumption. The use of technology is adding another dimension to how ASEAN consumers shop. Whether searching for what they want, comparing prices, finding the best deals, deciding when and where to buy and how products should be delivered, or sharing their feedback, their decision-making journey will become more complex and less predictable. It is already having a significant effect, as ASEAN now has 200 million digital consumers (those who have purchased products or services online), up 50 percent in a year, and 230 million online-engaged consumers (consumers who have only researched products or services online).¹⁷⁶ These new digital channels, such as e-commerce, m-commerce, and social media, provide consumer packaged goods companies a unique opportunity to turn millions of ASEAN consumers into loyal customers by enabling them to connect and by selling directly to them.

Rapid adoption of e-commerce

This opportunity for consumer goods companies results from the fact that ASEAN is now the fastest-growing internet-using region in the world, with 3.8 million users coming online every month. This is fuelling a rapid e-commerce boom; the market is expected to grow by a 31 percent CAGR until 2025. According to a Google-Temasek study, the total e-commerce market in Southeast Asia is estimated to reach around US\$88 billion by 2025 (a CAGR of 31 percent). However, the region's e-commerce market is highly fragmented, and most of this expected future growth will be led by Indonesia, the largest and fastest-growing online retail market in ASEAN, accounting for most of the region's retail e-commerce growth (52 percent) by 2025.¹⁷⁷ To facilitate the growth of e-commerce and address consumer demands, the Indonesian government recently altered regulations in order to allow more foreign investment in e-commerce. Now, 100 percent foreign ownership is allowed for companies approved under the Investment Coordinating Board (BKPM). The caveat is that the e-commerce business in Indonesia needs to have a value of at least US\$7.3 million.¹⁷⁸

In line with “Thailand 4.0,” the country’s digital initiative, Thailand’s e-commerce market is expected to grow strongly. Currently e-commerce sales in Thailand are growing more than 100 percent, outpacing purchases made in store, where sales are increasing at a 10 percent rate.¹⁷⁹ Malaysia also has a robust internet user penetration; however, only about one-third of digital consumers made purchases online in the first half of 2016.¹⁸⁰ Vietnam and the Philippines are rapidly developing online retail markets, but e-commerce is still relatively nascent. In developed ASEAN, Singapore is the region’s most advanced e-commerce market, with the highest internet penetration and speed rates; however, because it is the most well-established and mature e-commerce market, growth is expected to be relatively minor going forward.¹⁸¹

Despite the quick recent adoption of e-commerce, ASEAN still lags behind other global e-commerce markets such as China, the U.S., the U.K., Japan, and Germany by a significant amount. In most ASEAN countries, e-commerce still accounts for a very small percentage of overall retail sales (around 4 percent, whilst in China it is around 16 percent).¹⁸² Although this is partly due to the challenges and complexities associated with the region, such as major infrastructure bottlenecks which limit the growth of e-commerce, the relatively low value and growth rate of e-commerce indicates that there is still a lot of potential for further growth. Increasing broadband and mobile connectivity combined with consumer openness to online retail means that exponential growth in e-commerce is inevitable.

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The fast pace of digital adoption in ASEAN is fundamentally disrupting consumer perceptions, preferences and behaviours, and steering them towards an increasingly wider range of influences and options. It is now up to consumer goods players to develop winning strategies to better engage with their consumers, both in the physical and digital world. Going digital is a new norm for Consumer companies and clinging on to just brick-and-mortar business model is no longer an option! ”

Charles Loh
Partner
Consumer and Industrial Products Leader
South East Asia Consulting
PwC Singapore

M-commerce in ASEAN

Mobile commerce (m-commerce) has increased significantly in ASEAN thanks to the region's high rate of mobile connectivity. In 2017, mobile subscriptions in ASEAN grew well above the global average, and the number of connections already exceeds the number of people living in the region, with users having more than one active SIM.¹⁸³ A total of 130 million people are now using smartphones out of a total population of around 630 million, and 89 percent of internet users in ASEAN use a smartphone as their primary device. The growth of m-commerce has been driven by the expansion of 3G and 4G networks across the region as well as the increased affordability of smartphones. Over the past year, 62 percent of the smartphones shipped in Southeast Asia were priced at US\$150 or less.¹⁸⁴

Thanks to the easy access of smartphones and stronger networks, ASEAN consumers are now amongst the world's strongest adopters of social media for complementing their shopping. Facebook has been the key growth driver here, with at least two-thirds of internet users in each of the countries regularly logging on to the platform. Indonesia was ranked fourth in the world in number of Facebook users (78 million).¹⁸⁵ ASEAN shoppers use social media to complement their shopping through reading reviews, accessing promotional offerings, and generally associating with brands. In fact, around 80 percent of ASEAN consumers currently use social media and over-the-top content to conduct research on products or connect with retailers.¹⁸⁶ Southeast Asian consumers' adoption of social media applications to complement their shopping is even more advanced than their adoption of mobile technologies. It is estimated that 30 percent of digital sales in the region took place via a social network in 2016 (in Thailand, up to 50 percent of total e-commerce gross merchandise volume is transacted via social media, such as Instagram, Facebook, and LINE, as compared with only 16 percent globally).¹⁸⁷

Consumer goods companies can benefit from this digital phenomenon as it opens new opportunities for them to reach their market by creating digital channels direct to consumers. These channels can inform consumers about companies' latest products, offer them promotions, and direct them to preferred outlets, but it will also enable these companies to learn more about consumer preferences and needs, so as to then be able to tailor offerings more effectively and build up stronger brand loyalty.

Consumer packaged goods (CPG) companies need to recognise that consumer loyalty is shifting from brands to solutions (i.e. products that meet consumers' specific requirements at a specific point in time) and must act now to avoid missing out on the next generation of digital shoppers. Companies that are able to provide these personalised and relevant solutions in an intuitive and seamless way are likely to grasp consumers' attention. Evolving digital technologies (connected devices, wearables, virtual/augmented reality, AI, and so on) will further empower consumers in their purchase path. CPG companies have an unprecedented opportunity to harness the power of digital technology to influence purchase decisions and change consumer behaviour to their advantage. Those who succeed in doing so will be able to lock in demand, build consumer loyalty, and capture a greater share of the consumer goods market.

Key challenges

Whilst the rewards related to these new opportunities are undoubtedly attractive, capitalising on them will not be straightforward in ASEAN. CPG companies face a number of challenges in adapting their existing business models to enable them to source and manufacture more from the region and to embrace the digital age, both within their organisations and in how they engage with consumers. These challenges fall into two categories:

- External factors, those which are less in control of consumer goods companies, such as infrastructure, geography, and local competitors
- Internal factors, those which a company has more influence over, such as worker skills and the adoption of technology, for example, Industry 4.0 technology.

External — business environment challenges

Geography and infrastructure

The complexity of ASEAN's geography poses a serious challenge for the consumer goods industry, as it significantly limits connectivity in the region. From a marine perspective, Indonesia and the Philippines, two of ASEAN's major markets, are archipelagos consisting of thousands of islands. Other ASEAN markets, such as Thailand, offer better access to neighbouring countries such as Cambodia, Vietnam, and Lao PDR; however, poor logistics infrastructure between them limits connectivity. For those operating across ASEAN, this poor connectivity has significant implications on costs; in fact, the World Bank has stated that it is cheaper to ship essential goods from China to Singapore than to send goods from Jakarta to Papua, both in Indonesia.¹⁸⁸ Indonesia spends 26 percent of its GDP on logistics, one of the highest rates of spending on logistics in the world. However, the cost of shipping a 20-foot container from Jakarta to Hamburg (11,000 kilometres) is less than shipping it from Jakarta to Padang (1,000 kilometres) due to the complexity of the territory.¹⁸⁹

On land, access routes to rural areas within most ASEAN countries are underdeveloped and restricted, making it costly and time-consuming to reach consumers residing outside the key metro cities. The medium-sized regions cannot be ignored, given the emerging middle-class population and rapid urbanisation in emerging ASEAN countries such as Thailand; however, it is expensive to serve these medium-sized regions given the infrastructure challenges and dominance of independent traditional retailers (75 percent of grocery sales in ASEAN are made through the 5 million "mom-and-pop" stores in the region).¹⁹⁰

Poor connectivity and transport makes integrated supply chain management very difficult, as transport is the main determinant of the efficiency of the flow of products to meet customers' requirements. This inhibits consumer goods companies' ability to adopt a just-in-time delivery model, which is detrimental to the sector overall. As consumption across the region increases, especially with the increased adoption of digital technologies, effective supply chain and logistics will become imperative for sustained growth in the consumer goods sector.

Logistics fragmentation and severe infrastructure bottlenecks are common across ASEAN, with uneven levels of port and road infrastructure across the member countries. Land transport currently takes up more time than processing at ports, and rail and air cargo networks are inadequate in many ASEAN nations. Therefore it is not surprising that the biggest challenge for companies operating in ASEAN is the total cost of getting products from the point of manufacture to their consumers. Weak last-mile delivery options dominate across all markets outside Singapore.

ASEAN's projected growth will require the development of world-class supply chain and logistics networks, and this development will depend on the effectiveness of policies such as the ASEAN Framework Agreement on the Facilitation of Goods in Transit (AFAFGIT).¹⁹¹ Better logistics connectivity is needed, not just within states but between countries in ASEAN, to boost the region's value chain and economy.

Increasingly competitive environment

A rapid increase in the number of connected consumers in ASEAN is expected to result in 200 million digital consumers in 2017 (representing 50 percent growth from 2016), which will continue to attract the creation of a large ecosystem of consumer goods companies, suppliers, e-commerce players, brick-and-mortar retailers, and other players. This will lead to the landscape being more competitive as more foreign e-commerce players such as Amazon enter and expand their presence in the market; regional players, meanwhile, such as Tokopedia and RedMart, will be strengthening their foothold. One can thus expect M&A activity to increase as consumer goods companies and retailers attempt to expand market share or gain market entry in the region. Competition is even coming from overseas, as cross-border e-commerce experiences rapid growth amidst consumers' eagerness to access unique brands not physically present in their own country or cheaper locally made products.

Internal — corporate challenges

Skilled workforce and Industry 4.0 challenges

Despite ASEAN hosting a large and young workforce, many of ASEAN's employees are low skilled. This threatens ASEAN's position in consumer goods sourcing, especially with the rise of automation within Industry 4.0. According to an International Labour Organisation (ILO) survey,¹⁹² 12.5 percent of ASEAN enterprises named the lack of highly skilled labour as the key barrier to adoption of new technology in their ASEAN operations. As companies increasingly seek to enhance their operations with technology, the lack of skilled labour — employees who possess sound technical and digital skills and can operate, upgrade, and maintain automation technologies — poses a high threat of labour displacement in key ASEAN manufacturing countries. This is especially the case with consumer goods manufacturers, which are

increasingly reshoring their manufacturing activities given the rapidly falling costs of automation in developed markets and the access to skilled employees there. Therefore, ASEAN needs to invest heavily, including in higher education, to develop a skilled workforce. Ensuring easy access to this skilled labour force is also critical, as manufacturers are expected to incline toward a combination of countries (for example, "China+Vietnam+Many" for consumer goods sourcing through to 2030).

Apparel and footwear manufacturing shows the highest amount of automation risk, more than electrical and electronics and food and drink manufacturing in ASEAN, as it primarily consists of repetitive and mundane jobs that are replaceable by programmed machinery and engineering advancements, such as in sewing, which provides the bulk of employment in the sector. Despite the expected rapid decline in the costs of automation technologies such as "sewbots," companies in ASEAN are unlikely to adopt them en masse within the next five years because there is a huge cost gap between the high investment costs and the still low human labour costs. But the automation trend in clothing manufacturing could still indirectly harm ASEAN countries. This is because as such technologies become prevalent in developed countries, foreign manufacturers will find it more cost-effective to reshore to their home country or nearby developed countries; they could realise substantial savings from the replacement of labour-intensive processes and not have to bear the high risks and transportation costs of getting the products shipped from their offshore locations within ASEAN. The eagerness to react faster to consumers' needs, including catering to their demands for customisation, further supports this possibility.

As part of ASEAN's economic growth journey, the majority of countries will look to mature their less labour-intensive production sectors, especially with businesses seeking higher productivity. We have seen this happen in China in recent years. Although there are signs that local, ASEAN-owned small and medium-sized enterprises (SMEs) are taking advantage of the rapidly declining price point of some technologies, such as computer-aided design (CAD), the adoption of advanced technologies still lags in ASEAN. This becomes a worrying trend, as these firms provide substantial employment throughout the region. In Cambodia and Vietnam, for example, 447,000 and 769,000 sewing operators, respectively, are at high risk of automation.¹⁹³ However, Indonesia, the Philippines, and Thailand are less susceptible given their more developed landscapes for apparel and footwear manufacturing.

To compound the threat from automation technologies, the demand for sustainable manufacturing also creates rising pressure for ASEAN countries to adopt high "green" standards, including adoption of green technologies and equipment in manufacturing as well as improvement of working conditions in a way that will reduce environmental waste.

As we can see, there are challenges for consumer goods companies to resolve across the entire value chain if they are to remain relevant in ASEAN's rapidly evolving landscape. Starting and ending with ASEAN consumers, consumer goods companies essentially need to begin with rethinking their sourcing strategies. They must find ways to react faster to consumers' demands as well as to deal with the double-edged sword that e-commerce represents if they are to win in ASEAN consumer goods over the long term.



Strategies for consumer goods in ASEAN

A digital operating model

We have seen that consumer goods companies operating across ASEAN face a number of business environment and corporate challenges. To address these effectively, companies need to consider pursuing alternative business models and enhancing their capabilities to be more suitable for the region. In this regard, companies are looking to digitise parts of their operating model not only to improve existing operations, but also to be able to expand their business model to develop more direct relationships with ASEAN consumers.

In order to achieve the additional potential growth provided through digital transformation, CPG companies ought to focus on developing a digital supply chain (DSC), which incorporates a fully integrated supply chain with seamlessly connected suppliers, manufacturing, logistics, warehousing, and customers and which is driven through a central cloud-based command centre.¹⁹⁴ CPG companies can look to achieve this through adopting new and innovative technologies which will enable them to capitalise on big data and increase the productivity of their supply chain, from the supply side to the demand side, where they will be able to have a more direct relationship with consumers. Companies will need to develop and/or hire new skills and promote a more agile and innovative mind-set in order to execute these new digital processes successfully.

Digital Supply Chains (DSCs)

For the vision of Industry 4.0 to be realised, operational processes must evolve towards more digitised models, and supply chains will need to operate as connected, smart, and highly efficient ecosystems, replacing the traditional set of discrete, siloed steps wherein the flow of information is linear and the lack of transparency leads to inefficiency and delays. Digitisation will effectively bring down those silo walls to create a DSC.

A DSC depends on a number of key components, including integrated planning and execution systems, logistics visibility, autonomous logistics, smart procurement and warehousing, and advanced analytics. Underpinning it are new digital technologies such as cloud computing, big data analytics, the Internet of Things (IoT), 3D printing, advanced robotics, augmented reality, and wearables, amongst others.¹⁹⁵

In a complex consumer market such as ASEAN, characterised by demanding consumer requirements, supply-side challenges, and operational inefficiencies, a DSC will allow the right product to be delivered to customers quickly, responsibly, and reliably, while increasing efficiency and cutting costs through automation. The implementation of a DSC will allow companies operating in ASEAN to be much more resilient and responsive and to thus gain competitive advantage.

Benefits of a digital supply chain

By digitising their operating model, consumer goods companies in ASEAN will be able to realise benefits spanning the full value chain. Primarily, process improvement led by the automation of physical and planning activities, e.g. advanced analytics for demand planning and smart warehousing, will lead to greater productivity, higher operational efficiency, and significant reductions in operating costs.

The end-to-end visibility of the DSC provides a complete view of all aspects of the supply chain, and joint platforms allow for greater transparency and collaboration amongst all partners. When information is rapidly available to all members simultaneously, decision making can occur faster and the supply chain can operate with greater flexibility. Ad hoc real-time planning, characteristic of a DSC, enables companies to rapidly respond to changes in the environment or in demand and supply.

Agile DSCs can dramatically boost customer experience. Companies will be better equipped to establish a direct relationship with their consumers and customise products which will more closely match their requirements. Digitally enhanced planning activities will reduce lead times and out-of-stock scenarios, and improved service levels will lead to greater customer satisfaction and ultimately stronger customer loyalty.

A digital strategy for suppliers

For CPG companies, managing and integrating suppliers of raw materials in ASEAN today is challenging given the level of cross-border trading both within and outside the region, the level of supplier fragmentation, and the use of paper-based or legacy systems in supplier management. Companies tend to engage with their Tier One suppliers and not properly control the approach taken with Tier Two suppliers. This lack of integration and transparency exposes CPG companies to a myriad of risks. Any issue such as allegations of unethical labour practices may have a knock-on effect that can be significantly detrimental to the brand's reputation and image.

Although organisations are making progress in the sustainable sourcing of direct materials, indirect procurement is more challenging given its complexity. The auditing required to ensure that practices are sustainable, including both Tier One and Tier Two suppliers, tends to be labour-intensive and time-consuming.

In addition, international consumer goods manufacturers are increasingly in the spotlight with respect to the safety of their products, especially when it comes to food. Food safety in ASEAN is a growing concern; the region still lacks a fully harmonised set of food safety standards.

In such developing markets, the traceability of raw materials along the supply chain is critical, especially for food companies. However, track-and-trace mechanisms are not easy to implement in such a fragmented territory with suppliers that often operate using old-fashioned, paper-based systems. Traceability is essential in combatting issues such as pilferage of products whilst in transit and storage, ensuring food safety, and providing a more accurate view of sustainability practices within the food chain.

Given this situation, a DSC enabled by advanced data technology would enhance collaboration between a CPG player and its suppliers by providing greater transparency thereby helping to minimise supplier risk. Greater transparency would in itself improve the traceability of products upstream within the supply chain and also provide a clearer view of the supply chain's overall sustainability. Given the increasing importance that ASEAN consumers place on the provenance and sustainability of the products they consume, such transparency would provide CPG companies with significant competitive advantage.

Data technology such as an electronic data interchange (EDI), which is the exchange of business documents in a standard electronic format between supply chain partners and, more recently, IoT/blockchain, will improve companies' ability to track and trace products as they travel through their supply chain, increasing transparency. Blockchain is a shared ledger, or digital record, of all activity related to a product that is distributed across all relevant parties, showing a "single

source of truth." All parties can access the information, but no single company has control of it, making it very reliable. Through the use of blockchain, all parties would be able to trace a product's journey. For example, consumers would be able to trace the seafood they eat from the fisherman's boat all the way to their plate.¹⁹⁶

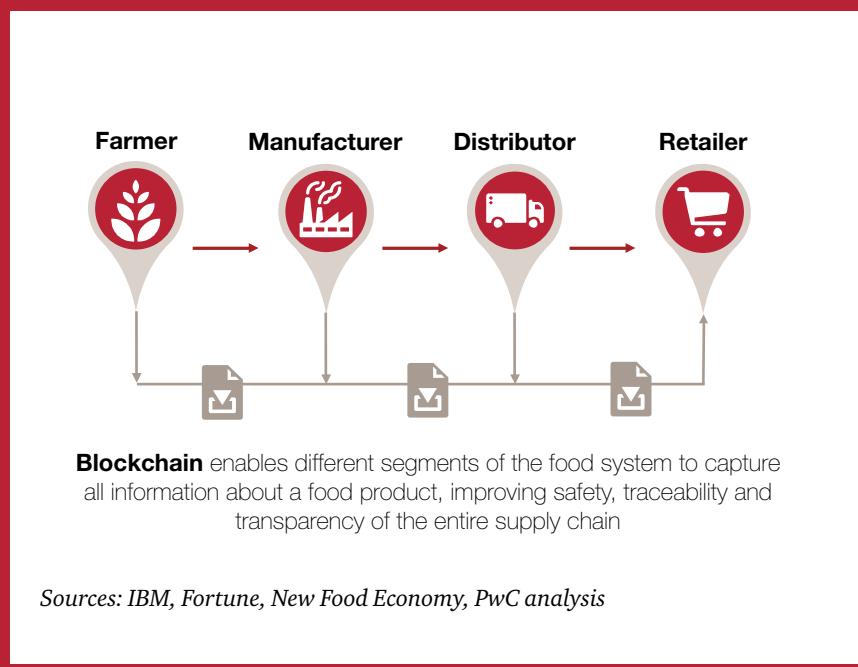
Whilst blockchain is at a nascent stage of adoption in consumer goods, it does represent a big opportunity for the sector to provide increased precision and granularity of product visibility compared with current track-and-trace technologies such as RFID, which provides visibility within a much more restricted range. Blockchain also affords a stricter auditability, resulting in higher standards of quality in production and distribution, and it reduces the risk for retailers and consumers of sourcing products that are unsafe or that are manufactured using unsustainable practices. Furthermore, the solution drives consensus between parties and thereby encourages greater collaboration and trust within the supply chain.¹⁹⁷



Case study: Walmart and IBM — Blockchain shows potential for revolutionising food safety

Background

Walmart has 11,695 stores across 28 countries and works with over 100,000 suppliers around the world.¹⁹⁸ Although its scale provides it with key competitive advantage, it also exposes the retailer to significant safety, reputation and financial risks if any food contamination issues arise. If an issue arises, Walmart will pull all products from shelves until they identify the implicated product before they can bring it back into their stores. They must act fast and with complete accuracy as their reputation is at stake, even if the issue is outside of their control. Walmart has long searched for the “Holy Grail of food traceability” to create accountability and detection across their complex supply chain.¹⁹⁹ In 2016 the company identified blockchain as a potential solution to bring efficiency, authenticity and full transparency to its food supply chain, and has been working with IBM and other partners in piloting this initiative.



Approach:

- 1. 2016:** Walmart and IBM first experiment with blockchain to track pork from China and mangoes from Mexico to the US.
- 2. Aug 2017:** Walmart and IBM launch a global food industry consortium with 9 leading global food companies including Unilever, to identify new areas where the global supply chain can benefit from the use of blockchain.
- 3. Dec 2017:** Walmart and IBM, with Tsinghua University National Engineering Laboratory for E-Commerce Technologies, set up a Blockchain Food Safety Alliance to improve food tracking and safety in China.

Impact

When Walmart’s Food Safety team was tasked with tracing a package of sliced mangoes back to their original source using traditional methods it took them over six days. Subsequently, the team used IBM’s blockchain software for the same exercise and it took 2.2 seconds. Such results demonstrate that in a market like the U.S., with over 500 food recalls annually and \$10-15 billion annual spend on food safety incidents, this offers large financial and operational implications for all participants in the ecosystem.²⁰⁰

Blockchain will allow Walmart and other companies to save money on product recalls due to foodborne diseases, as details of the product origin can be specifically tracked and controlled, in a quick and cost-efficient way. It will also instill collaboration and transparency across the food system.

A digital strategy for CPG companies

CPG companies are constantly trying to navigate the additional pressures brought on by savvier consumers who shop in a variety of channels and seek consistency in service and experience, competition from pure-play e-commerce retailers, and the continued surge of direct-to-consumer CPG providers. Providing the right product, at the right place and time, at the right price, safely and conveniently can be a challenge for most traditional CPG companies. In addition, further individualisation and customisation are driving constant changes in companies' SKU portfolios. Category management and inventory management have therefore become much more complex.

For CPG companies operating in emerging ASEAN countries, especially the medium-sized regions, the dominance of independent traditional retailers added to infrastructure and logistical difficulties in reaching them makes inventory management a challenge. Stock-outs are commonplace. In addition, the rise of digital commerce and the wide variety of retail formats in ASEAN countries means category management is considerably more intricate and requires a lot more consideration and planning than is the case in more established consumer markets.

Given this scenario, CPG companies can greatly improve their planning and forecasting accuracy by leveraging advanced supply chain analytics. This would give companies a much more granular understanding of demand so they can optimise their product portfolios and inventory levels accordingly, thus reducing costs, improving efficiency, and enhancing the customer experience.²⁰¹

Predictive analytics in DSCs analyse numerous internal and external demand-influencing variables (e.g. weather, social network trends, sensor data) to derive an accurate demand plan and forecast for products. When automated and integrated into the DSC, planning happens as a flexible, continuous process that is able to react dynamically to changing requirements or constraints.

Combining real-time and historical data enables business leaders to identify and respond to customer and market changes quickly, improving the speed and accuracy of their decision making.

In addition, the next phase in the development of supply chain analytics is focused on prescriptive analytics, which allows companies to optimise for a number of factors across the supply chain, depending on circumstances, and then modify decisions accordingly. Self-learning algorithms help supply chain managers with the decision-making process.²⁰²

Advanced supply chain analytics would enable demand through the chain to be better anticipated thanks to more sophisticated market signals, which translates to demand for production capacity, storage and logistics needs, and changes in raw material requirements. Improved forecasting accuracy will contribute to higher order fulfilment and fewer out-of-stock scenarios.

Predictive analytics also serve to strengthen CPG companies' relations with partner retailers or e-tailers. The combined visibility of demand data will not only streamline forecasting and stock levels, but also enable joint decision making on ways to optimise product portfolio and promotion planning for the benefit of both parties.

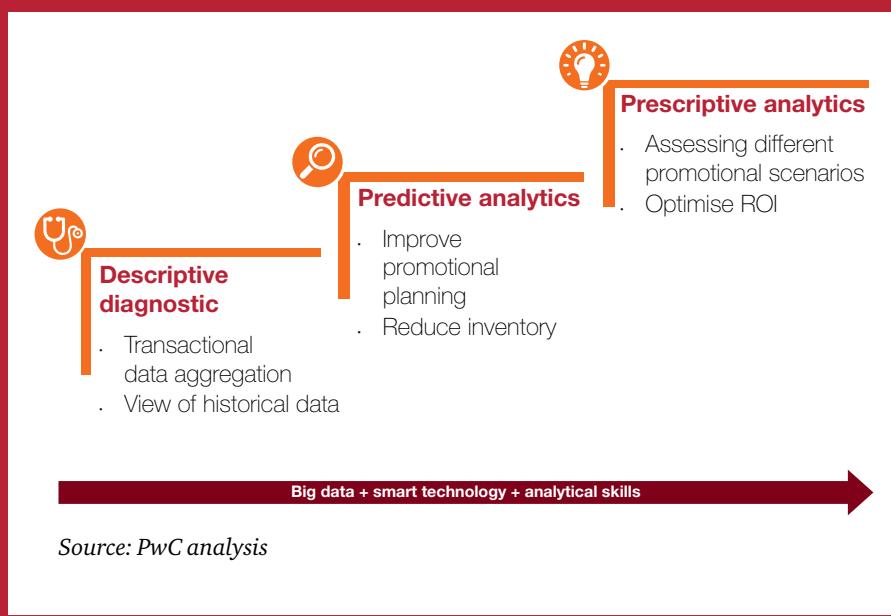
Prescriptive analytics go a step beyond by embedding analytics into the decision-making process. They prescribe how the supply chain should operate, through providing specific actions to resolve or capitalise on opportunities highlighted in data gathered from consumer insights.

All these benefits will lead to a better ROI, as companies will be able to optimise their product supply and operate with much lower inventories. Enhanced customer experience would subsequently lead to repeat purchasing, thereby increasing profitability.

Case study: Leading food company implements predictive analytics for accurate demand planning and forecasting

Background

In 2016 a leading food company embarked on a journey to improve consumer promotions through predictive analytics. The company was facing challenges related to growing demand volatility and competition. A growing portion of sales were made on promotions, which are difficult to predict, and figures showed that a vast majority of promotions were not actually profitable. In addition, its traditional processes were not accurately sensing demand patterns and this was leading to unwanted goods and unmet demand. With data becoming more available and accessible, the company realized that using consumption data was critical to gauge the true demand at the point of sale and this would help them manage their supply to retailers more accurately. The company therefore decided to invest in advanced analytical solutions to improve their demand planning processes by fundamentally changing the way they capture and utilise data, analyse historical demand patterns, accurately forecast future demand and optimise promotional effectiveness.



Approach:

1. Implementation of advanced data analytics using a demand signal repository as a hub to consolidate and feed data from/to all business functions.
2. Leveraging Big Data, smart technology and analytical skills, the company applied predictive analytics to improve promotional planning, and prescriptive analytics to optimize scenarios which provide the highest ROI.
3. The company is deploying its forecasting tool worldwide to deliver multi-layer business benefits and is developing analytical expertise in all its business units globally.

Impact

Overall the company's investment in advanced analytics and optimized use of data has resulted in greater promotional accuracy and a higher ROI in 2016. It has also led to an increase of 400 bps in terms of order fulfilment and a reduction in inventory of 500 bps in 2016 compared to 2013. High value insights have also allowed the company to consider different scenarios when running promotions, such as changing prices or store displays, engaging in sponsorship or running loyalty programs. The impact of this investment was felt across the company's operations worldwide. For example, in one of its US divisions, the implementation of demand planning tools reduced safety stock by 15 percent. In a Brazilian business unit, the sales precision increased by 9 percent, creating direct impact in the level of customer service, inventory reduction and product freshness.

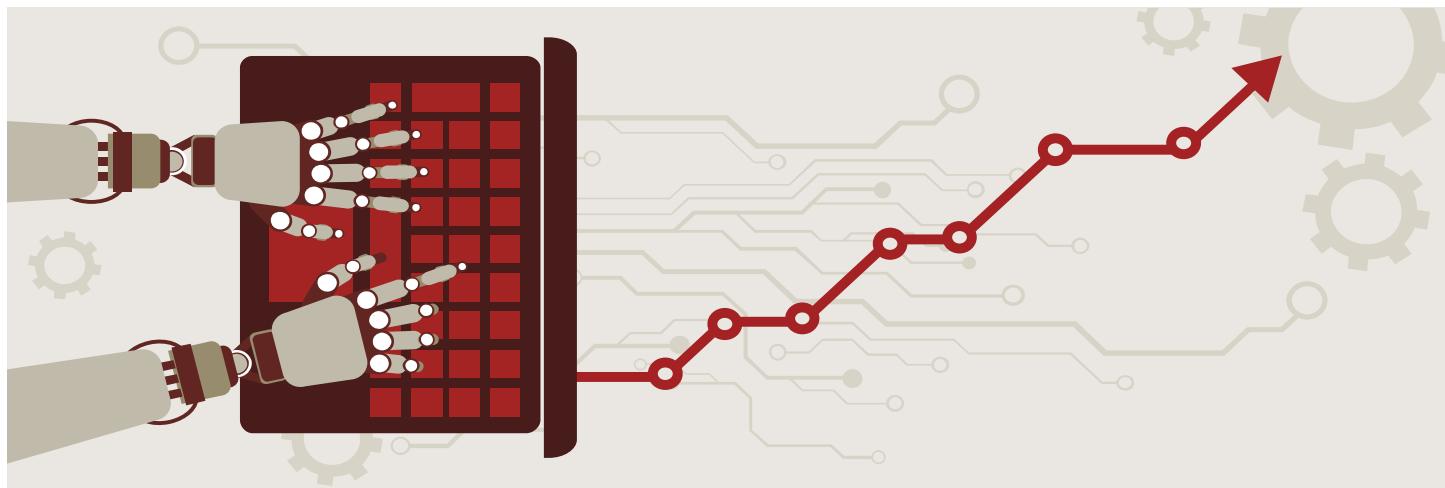
A digital strategy for wholesale and distribution

Conventional warehousing models are being challenged by the changing expectations of customers in the digital age, who are increasingly demanding and expect a high level of service. Their demands require warehousing to become far more flexible, transparent, responsive and scalable, and the conventional warehousing model — wherein warehouses are fragmented and not close to the point of consumption — will struggle to accommodate these future needs.

Within ASEAN, the biggest challenges lie in warehouse location, operation, and logistics. The physical location of inventory is often far removed from customers' delivery points to enable agile handling. Warehouses tend to operate via highly labour-intensive, often paper-based processes which are subject to human error, resulting in lower productivity and time delays. ASEAN's infrastructure challenges also limit logistical and transportation efficiency, leading to inaccurate or delayed order fulfilment and ultimately affecting customer satisfaction. Increasingly, CPG companies are choosing to partner with warehousing and logistics operators to optimise their wholesale and distribution capabilities by increasing their reach and efficiency and to save on costs.

For CPG companies developing these capabilities organically, smart warehousing is proving to be the way forward. Smart warehousing relates to how companies can increase the productivity, efficiency, and speed of their supply chain through the automation of all warehouse/distribution centre activities.²⁰³ Warehousing within a DSC promises to become a strategic tool in how companies operate and generate value for their customers. The aim is to improve efficiency and safety through the automation of virtually every ordinary warehousing activity, from inbound logistics, to the internal warehouse operations, and outbound shipping. Warehouse automation also increases visibility within the supply chain by allowing efficient inventory tracking procedures, especially useful for companies which operate reverse logistics involved when consumers return products.

A smart warehouse incorporates innovative digital technologies such as IoT, augmented reality (AR), wearables such as smart glasses, sensors, connected automated guided vehicles (AGVs), and robotics, which are transforming labour-intensive processes (such as picking goods), often expensive, slow, and prone to human error. Cloud-based inventory management systems will allow CPG companies to have greater visibility of their inventory levels across different warehouses within a network.²⁰⁴



New technologies are emerging, such as the Smart Warehousing Cloud (SWC), which is a real-time online platform that allocates warehouse space by matching storage needs with available capacity within the warehouse network. It combines a cloud solution with predictive analytics, allowing for continuous optimisation of the network and space utilisation.²⁰⁵

Smart warehousing is increasingly being adopted by CPG companies, e-tailers, and third-party logistics companies which serve consumer goods manufacturers.

One can see that CPGs in ASEAN would benefit from such a solution. It would allow companies to maximise the utilisation of labour, space, capacity, and assets whilst minimising down times, stock levels, and delays, hence improving the efficiency and reducing the overall cost of the warehousing and distribution element of the value chain, and put CPG companies in a position to better serve their customers. However, there is the consideration, as with all these solutions, that adopting automation will incur an overwhelming initial capital outlay and result in job losses.



“

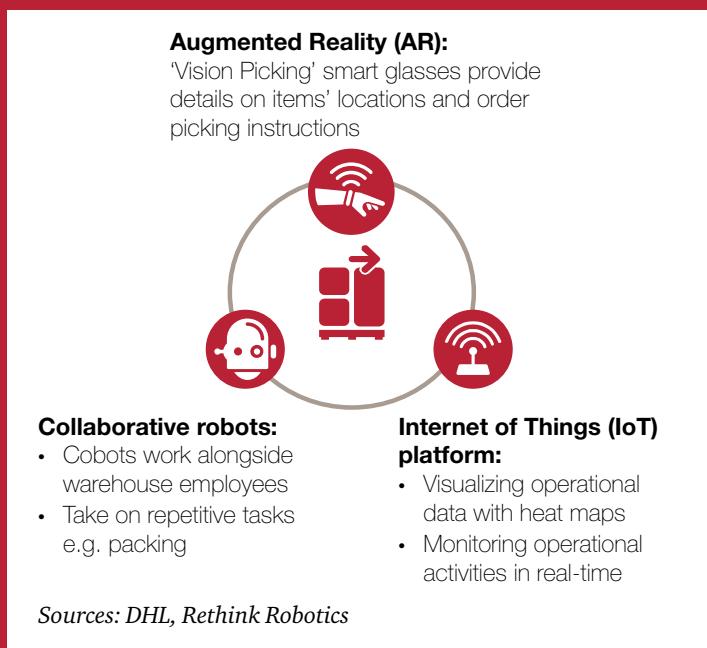
Leveraging on the latest innovations and Internet of Things (IoT), we have access to data and information that did not exist in the past and now it can be used to increase efficiency in the warehouse environment and the potential end to end value chain. The key is how to define and translate these data into solutions that provide meaningful insights delivering business values and impact to the industry. ”

Philip Chu
Managing Director
Global Centre of Excellence
DHL

Case study: DHL implements smart solutions for its warehouses

Background

The effects of digitalisation and increased customer expectations forced leading German logistics leader, DHL, to revise existing warehousing operating models. As one of the main providers of warehousing and logistics services for leading CPG companies worldwide, DHL worked on exploring smarter solutions that could drive greater efficiency, flexibility and transparency, and ensure higher service levels for clients in this and other industries. Between 2016 and 2017 the company trialled and implemented different solutions such as IoT (in Germany, the Netherlands and Poland), Augmented Reality (AR) 'smart glasses' (piloted in U.S., mainland Europe and U.K. and implemented globally following successful trials), and are starting to look at other emerging technologies such as cobots and AGVs (automated guided vehicles).



Approach:

1. Implemented **'Vision Picking' program**, where Augmented Reality 'smart glasses' provide visual displays of order picking instructions along with information on where items are located and where they need to be placed.
2. Launched **Internet of Things (IoT)** cockpits to monitor operational activities in real-time through a responsive graphical visualization of operational data aggregated from sensors and DHL's warehouse management system.
3. Pilot testing collaborative, autonomous robotics solutions. **Collaborative robots**, or 'cobots' work as picker companions for piece picking order fulfillment in the warehouse.

Impact

DHL's incorporation of 'smart-glasses' led to a 15 percent improvement in productivity as well as higher accuracy rates and approval ratings by users. The user-friendly and intuitive solution technology reduced onboarding and training times by 50 percent. In addition, removing paper instructions allowed workers to carry out tasks more efficiently and comfortably. Driven by the positive outcome, DHL has expanded the use of smart glasses to more warehouses around the world, establishing a new standard in order picking for the industry.²⁰⁶ Implementing IoT technology into warehousing has allowed DHL to optimize operational efficiency and instil safer work practices. The solution enables DHL to visualize and monitor operational activities in real-time, rather than retrospectively, with heat maps, allowing warehouse managers to interpret data more meaningfully, immediately re-engineer processes or warehouse layouts to boost operational efficiency and address potential safety blind spots in a warehouse.²⁰⁷ Despite still being tested, collaborative robots are expected to significantly improve productivity in DHL's warehouses, which are currently 80 percent manual. Their flexibility and value-add to existing labour intensive processes make this solution highly attractive in terms of ROI for DHL.²⁰⁸

A digital strategy for consumers

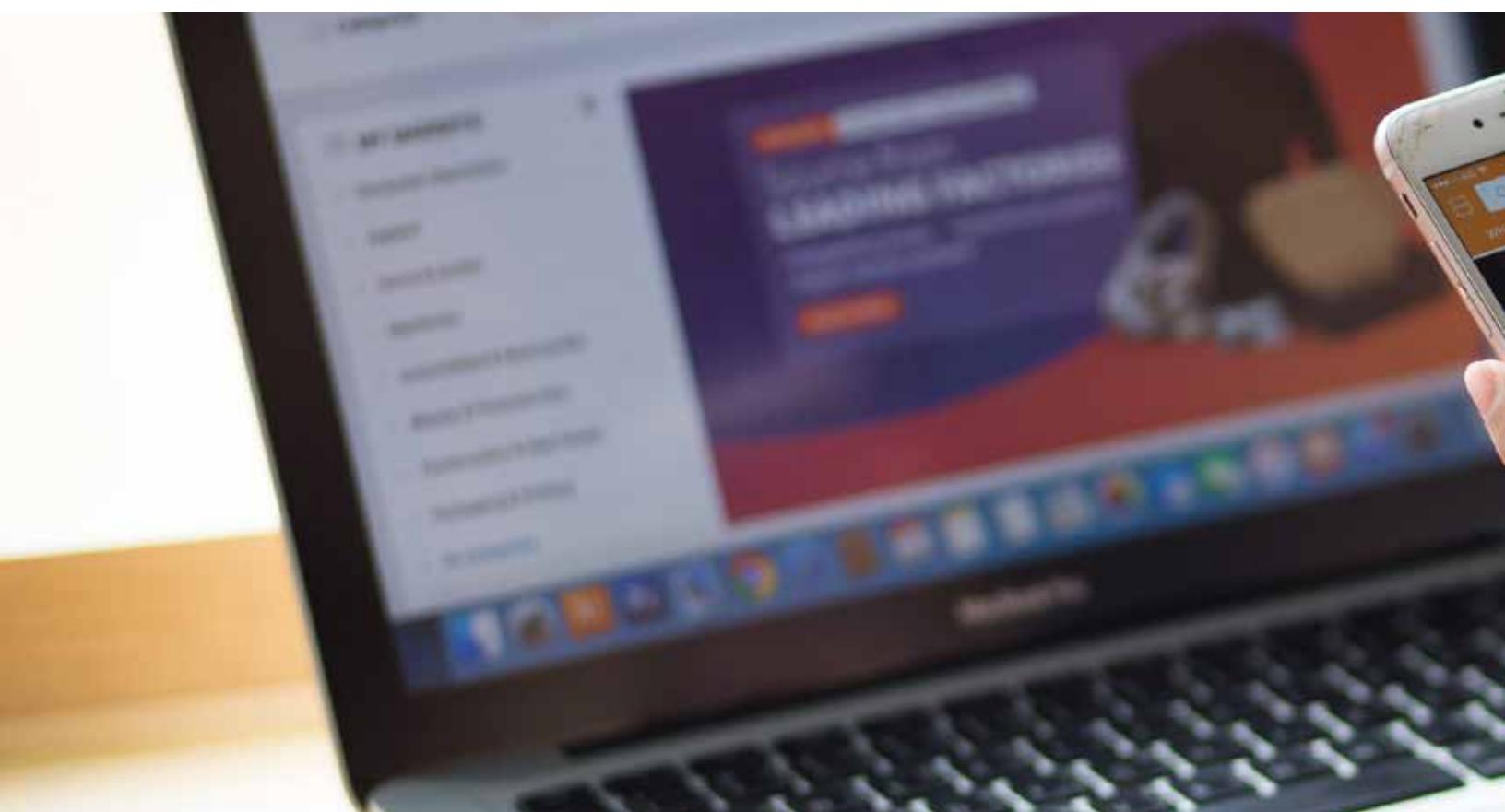
The growth of digital channels is making the consumer goods marketplace increasingly crowded, with the entrance of more cash-rich companies, digital natives, and innovative startups, raising competition for traditional CPG manufacturers which must fight to adapt if they want to remain competitive. In addition, the blurring boundaries between online and offline channels provide an incentive for CPG companies to expand their channel offering beyond traditional brick-and-mortar retailers and third-party e-tailers, and reach out to consumers directly.

ASEAN's digital commerce boom means CPG companies have a unique opportunity to lock in demand and earn the loyalty of millions of consumers. The emergence of digital channels is providing new revenue streams for CPG companies. Companies that can offer the most relevant product at the right time are likely to gain a competitive edge.

However, a deep understanding of consumer needs and a flexible and agile operation are needed to turn these insights into action. CPG companies operating traditional business models depend on retailers for selling their products and providing data and consumer insights on their shoppers; this dependency can be an obstacle in their mission to win over these consumers.

By venturing into new business models such as direct-to-consumer (D2C), which bypasses retailers, CPG companies can better understand their customers' needs, as well as test, market, and sell new products directly, gaining greater loyalty.

D2C brands are designed, produced, marketed, distributed, and sold by the same company. They bypass retailers or distributors. CPG companies that develop D2C brands are taking ownership of the full consumer journey from beginning to end, including the buying experience.



Selling D2C represents a major departure from CPG companies' existing business models. Many large, established CPG companies offer products solely through retailers or other traditional distribution channels, and it can be difficult to transition from a business model that sells products to retailers, dealing primarily in B2B transactions, to a business model that sells directly to consumers. Having a highly flexible, streamlined, efficient operating model which incorporates a DSC will enable CPG companies to reinvent traditional value propositions and establish that direct relationship with consumers. In addition, companies should be mindful that capabilities which were previously provided by retailers and distributors, such as consumer payment technologies, will be required. These can be developed organically or obtained via partnerships with solutions providers.

The D2C model provides manufacturers with the advantage of being able to engage in direct conversation with consumers, to inform them not only of specific products but also of the values which differentiate them from competitors. Few retailers and distributors will convey these messages with the same motivation and passion as the CPG companies themselves. This is especially valuable in the ASEAN consumer goods market, where creating brand awareness and locking in future demand requires engaging the new consumer early on.

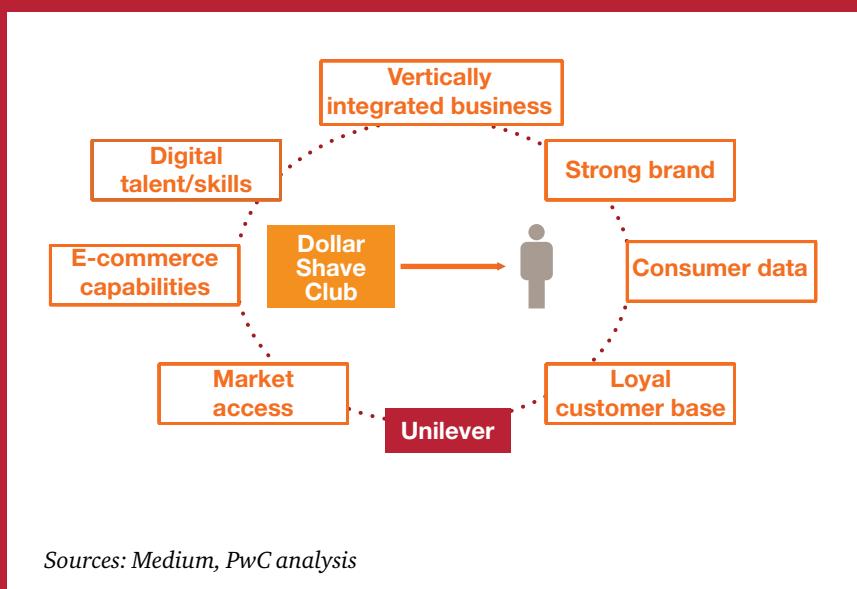
Aside from strengthening their brands' position, D2C models allow companies to collect unfiltered consumer data and insights, and perform sophisticated analytics to better understand consumers and improve marketing efforts, which they can then disseminate via mobile advertising direct to pre-selected customers. All this will allow CPG companies to increase revenues and margins, and build their market share in ASEAN.²⁰⁹



Case study: Unilever invests in direct-to-consumers via subscription model

Background

Dollar Shave Club (est. 2011) is a US-born subscription based direct-to-consumer delivery service company which provides customers with low-cost and reasonable quality male shaving products. Within five years of its launch, the company had grown to US\$200 million in sales, boasted 3 million subscribers had nearly 7 percent of the US shaving market.²¹⁰ Dollar Shave Club caused significant disruption in the market – in 2010 P&G-owned Gillette had 70 percent share of the American razor market and gross margins as high as 60 percent. Following Dollar Shave Club and Harry's (a competing razor subscription service) entry in the market, Gillette's market share fell to 54 percent.²¹¹ In 2016, CPG giant Unilever acquired Dollar Shave Club for US\$1 billion and officially made a foray into the direct-to-consumer channel and mens grooming market.²¹²



Approach:

1. Acquisition of Dollar Shave Club by Unilever acts as a strategic move by the CPG company to enter into the direct-to-consumer channel.
2. Unilever capitalising on Dollar Shave Club's capabilities: a vertically-integrated business, with solid e-commerce and digital expertise, and a strong brand.
3. Dollar Shave Club's large and loyal customer base a huge asset for Unilever as it enters male grooming market.
4. Acquisition provides Unilever with cross-selling opportunities within Personal Care category.
5. Unilever will seek to extend Dollar Shave Club's first-mover advantage in the US and expand it into new markets.

Impact

The Dollar Shave Club acquisition was the primary factor behind a 47 percent jump in Unilever's direct-to-consumer razor blade market. As of February 2017, the Dollar Shave Club had grown to 47.3 percent of the online market, more than double its main competitor Gillette's 23.1 percent, establishing market leadership in the US D2C consumer razor blade market.²¹³

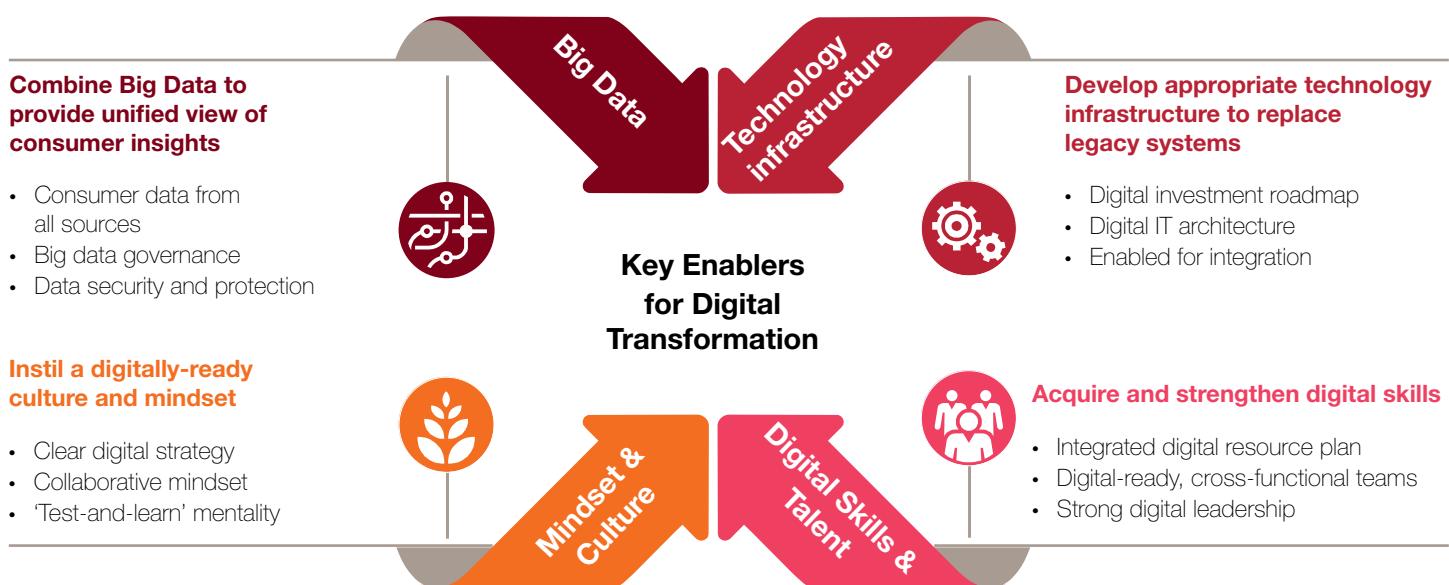
The acquisition helped Unilever to understand the direct-to-consumer channel and gave the business the ability to build on a new and powerful digitally-enabled business model. In fact, Unilever has already used this to launch two new brands: Verve, a fabric care product, in the U.K., and Skinsei, a personalized, subscription-based skincare regimen sold directly to consumers in the US.²¹⁴

Digital supply chain enablers

Each component of the Digital Supply Chain that we have mentioned is dependent on a company adopting and embracing a number of key enablers, without which digital transformation cannot be fully successful. Clearly investment in technological infrastructure is required, but this needs to be synchronised with the collection of clean “big data” on consumers, suppliers,

and internal processes. Infrastructure and data can be procured, but mindsets and skills are harder to develop and acquire, particularly across ASEAN. Therefore, these capabilities ought to be considered and planned first to ensure the right people and culture are in place to operate the new digitised operating model.

Figure 4.3: Key Enablers for Digital Transformation

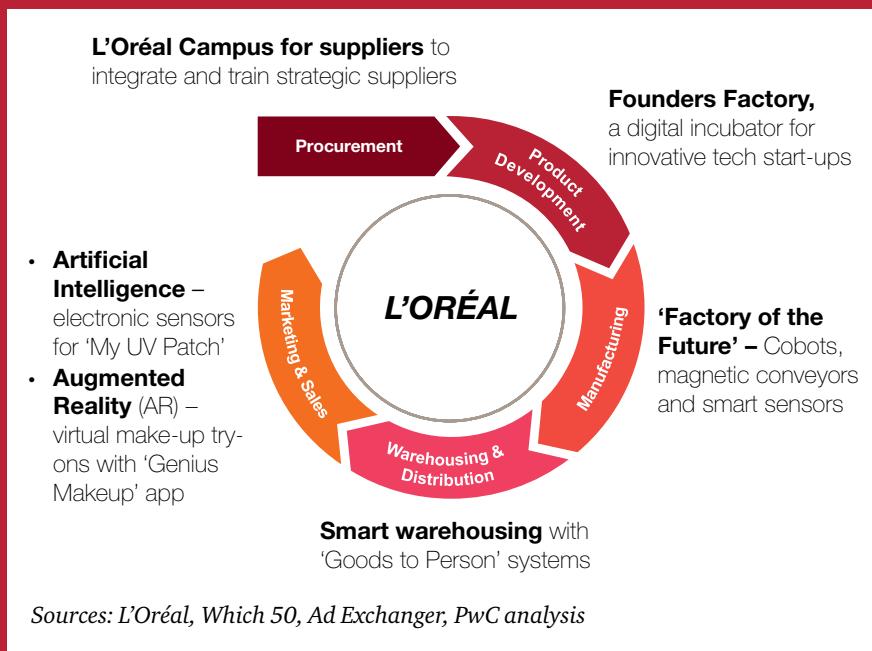


Source: PwC analysis

Case study: L'Oréal at the forefront of digital transformation

Background

From circa 2010, L'Oréal embarked on a process of digital transformation which is still ongoing and central to the company. Over the years, the cosmetic giant has committed to digitally upskilling its workforce and hiring more than 1,400 digital specialists across their 32 brands, with over 5000 of its employees having completed basic digital marketing training modules.²¹⁵ Today, digital constitutes more than 35 percent of L'Oréal's overall media spend and L'Oréal sites and social webpages received more than 1 billion visits each year.²¹⁶ L'Oréal's Chief Digital Officer has worked to put digital at the heart of everything the company does and this digitally-minded business model is what enables them to innovate quickly and be a leading company in their industry.²¹⁷



Approach:

1. Integration of strategic suppliers into supply chain with training and joint product development
2. Constant innovation through L'Oréal's Founders Factory
3. Smart sensors, connected magnetic conveyors and collaborative robots (cobots) controlled by workers via touch tablets in factories
4. "Goods-to-person" smart machines allow for products to be delivered directly to warehouse operators
5. AI and AR technologies used to engage with digital consumers.

Impact:

All aspects of L'Oréal's operations benefitted from the company's digital transformation. Within 2 months of the L'Oréal Campus for suppliers' release in 2016, 150 suppliers had been connected, and completed 100+ hours of online training.²¹⁸ Its Founders Factory initiative allowed for the creation of innovative beauty products such as 'My UV Patch' (La Roche-Posay). In manufacturing, L'Oréal's 450-staff Lassigny plant has seen improved information sharing, reduction in manual tasks and time savings, as well as a more agile production line, capable of switching between runs within 20 mins.²¹⁹ The reliable and flexible 'goods-to-person' systems, implemented in North America and Western Europe, have greatly improved distribution centre performance levels.²²⁰ The digitalisation of operations has furthermore allowed the company to get much closer to its consumers – the Augmented Reality (AR) app Makeup Genius was a great success, having recorded over 65 million trials following its launch in 2016.²²¹ Overall, L'Oréal's 2016 financial reports reported e-commerce sales of US\$1.7 billion.²²² E-commerce now accounts for 10 percent of total revenues and enjoys a growth rate of 34 percent year-on-year.²²³

Partnerships

As we have seen, there are opportunities and challenges for consumer goods companies across the entire value chain; however, given the complexities and diverse nature of ASEAN, coupled with the increasingly competitive environment and fast-changing consumer needs, these companies will need to adopt more agile and innovative business models. Continual improvement and innovation of capabilities, including digitising of supply chain as illustrated previously, is even more critical if the consumer goods company wants to tap into the region's potential and the strategic importance of e-commerce in reaching and selling to consumers directly and then fulfilling demand in a quick yet profitable manner. Given that the creation of new capabilities usually requires significant investment in effort, partnerships with disruptors or local companies to outsource the vital processes for success could be a more efficient and effective way to acquire valuable consumer insights and facilitate best practices across the business. With this in mind, consumer goods companies can consider partnerships across the value chain in:

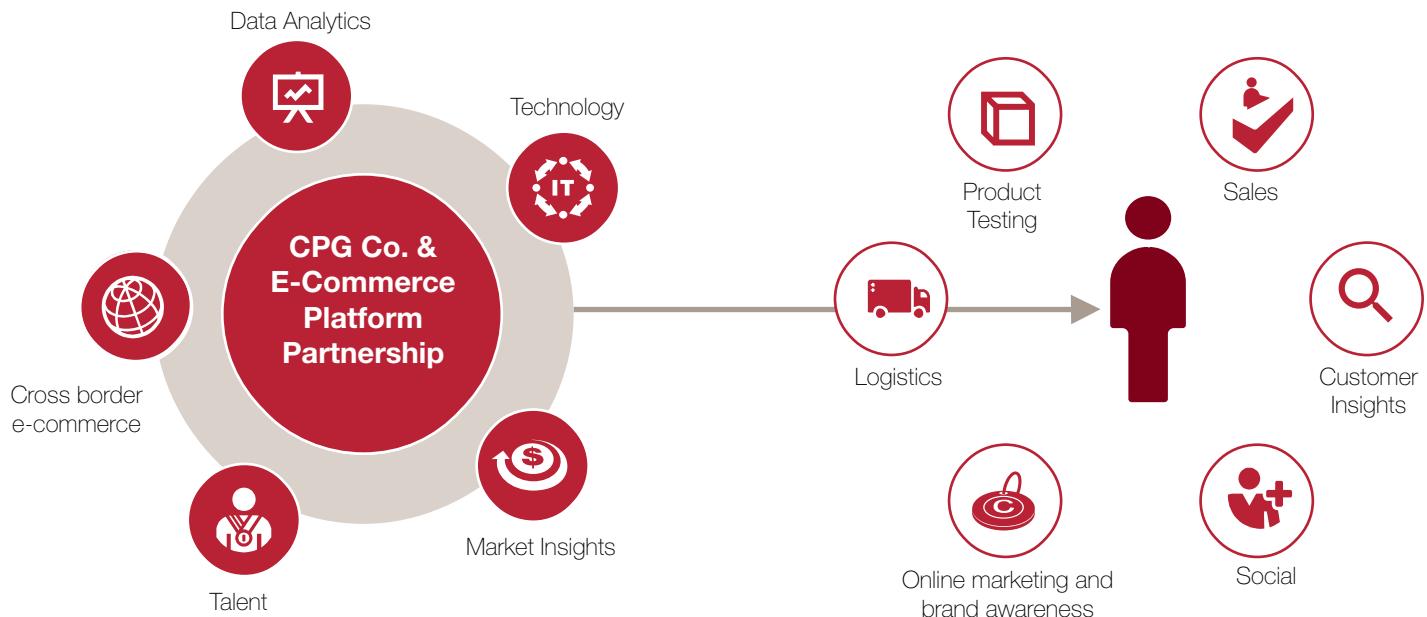
1. E-commerce platforms
2. E-payments
3. Logistics
4. Horizontal collaboration

Partnerships with e-commerce platforms

Although the e-commerce opportunity in ASEAN is exciting, consumer goods companies are finding it challenging to enter and expand within the channel by themselves, be it due to a lack of understanding of the channel or the high investment costs involved. Seeking partnerships with e-commerce platforms that operate either as a marketplace or a direct B2C business can thus ease entry into ASEAN e-commerce for consumer goods companies, as these players are able to offer essential knowledge and a ready customer base.

Partnering with an e-commerce player provides a number of cross-functional benefits to a consumer goods company (aside from purely sales benefits), which will enable it to combat increased competition and differentiate itself to consumers. Such a partnership will enable a consumer goods company to reach more consumers through the e-commerce platform, thereby enabling it to connect with a consumer base in secondary cities and rural areas, where consumer goods distributors and brick-and-mortar retailers may not be present. This e-connection to a wider consumer base from across different segments will provide the company with direct access to a vast amount of data and insights about the new ASEAN consumer across a much wider catchment area, which it can use to understand the needs and preferences of ASEAN consumers and thereby develop more tailored marketing campaigns, as well as future expansion to its D2C platform. This data will also enable companies to test a new product, its positioning, and its price via a soft launch on the e-commerce platform and target it to a set of "pilot consumers" whose feedback can then be used to fine-tune the product for a regional or countrywide launch strategy.

Figure 4.4: Benefits of Partnership Between Consumer Goods Company and E-commerce Platform



Source: PwC analysis

In addition to expanding a company's reach and consumer insight, a partnership with an e-commerce platform enables a CPG company to promote its products directly to consumers in a cost-effective manner, which will not only provide greater exposure for the company but also enhance consumers' awareness of the company's "presence" behind the brand and thereby help it differentiate itself from competitors. Often, consumers are focused on the brand and the retailer, from which they purchase a product, but not the manufacturer. If the consumer has direct visibility to the manufacturer, however, the company has an opportunity to enhance a consumer's opinion of it and foster trust and loyalty to the company, rather than only the brand. Having established this trust, it will be easier to sell other products to the same consumers and via other channels.

E-commerce partnerships also provide consumer goods companies' cross-border opportunities, especially given the eagerness of ASEAN consumers to access new products at competitive prices. Many of the e-commerce platforms, such as Amazon, are open to global or regional purchases with shipping and payment solutions in place. The consumer goods company can thus conveniently access a global customer base through listings on these websites.

The benefits to partnering with an e-commerce platform go beyond leveraging its consumer insight capabilities, extending to the platform's distribution capabilities. Consumer goods companies are able to leverage the logistics capabilities of e-commerce platforms to tackle last-mile delivery challenges.

Partnerships for e-payments

ASEAN is still a predominantly cash-based society. Therefore, cash-on-delivery (COD) remains the preferred payment mode for consumers who purchase online (approximately 75 percent of payments for e-commerce are made this way).²²⁴ COD is also dominant as a method of payment collection from traditional retailers, which are largely independent small businesses. COD impedes e-commerce development, because consumer goods companies and e-commerce platforms need to develop alternative payment modes for ASEAN consumers, and collection of cash payments from traditional retailers and consumers requires the consumer goods companies to undertake additional processes such as manual cash calculation and reconciliation and to purchase insurance, which eats into their bottom line.

Though e-payment platforms continue to emerge across ASEAN, as businesses tap into the e-commerce opportunity, there is still no true solution to the fundamental payment collection issue. The majority of platforms rely on the existing credit card infrastructure, which is still in its early stages, given the large unbanked population in many emerging ASEAN countries.

As consumer goods companies shift toward digitising their supply chain and operating model, they should not be attempting to solve the unbanked issue in ASEAN given the scale of the issue. Rather, consumer goods companies should seek partnerships with e-payment platforms to reach out to the ASEAN population. E-payment platforms chosen as partners should also be customer-centric (that is, provide value and convenience). For example, Go-Pay allows users to send payments peer-to-peer (P2P) and top up by giving cash to Go-Jek drivers who act as mobile ATMs. Such partnerships will help to reduce consumer goods companies' reliance on COD while improving the returns handling process.²²⁵

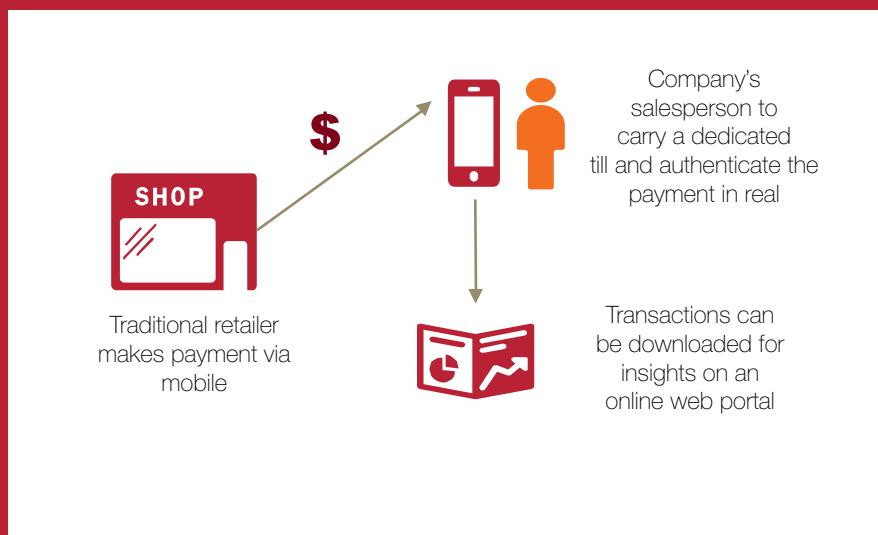
This is also an attractive option for the e-payments platforms, as they can gain an increased number of registered and active customers while also extending their portfolio to include new products.



Case study: African drinks company partners with mobile money transfer service provider for payment collection from small independent retailers

Background

A leading alcoholic drinks player in Africa had an extensive distribution network including small independent retailers, which largely operated on a cash basis. Collection of payments from these independent retailers was highly subject to risk of robbery, with about 30 percent of reported losses for a typical collection of US\$33,000, and to counterfeit currency. This is in addition to the tedious process of having the collected funds transported to a central location for counting and reconciliation before being moved to the bank. To resolve this, in 2013, the company partnered with a mobile phone-based money transfer service.



Approach:

1. The company's sales team carry a dedicated till — a phone or another terminal containing a SIM card specific to the mobile-money transfer provider that can be used to buy stock, receive payments from retailers, bars or restaurants and to deposit the takings into the bank
2. Small independent retailer makes payment to the company's salesperson via the mobile money transfer service on his/her phone rather than using cash
3. A real-time SMS is sent to the salesperson's dedicated till so he/she can authorise and authenticate the transaction

Impact

The company witnessed a significant reduction in operating costs as the reduction in the risk of robbery lowered the need for security and insurance in cash transportation. Its salespeople also gained confidence to sell in areas which previously were high risk areas. Furthermore, the company's productivity improved with the faster processing of payments. Previously, distributors/salespersons were required to return to the depots to securely deposit the cash between 3 and 4pm, which affected ability to do more sales. The electronic collection of payments also allowed downloadable electronic reports for distributors for the reconciliation and audit process, as well as data insights for tailored promotions to the retailers.

Partnerships for logistics

Logistics remains the biggest bottleneck for retailers and consumer goods companies in ASEAN. These challenges are not confined to the last-mile delivery, but are spread across the entire value chain, including sourcing from suppliers, delivering to retailers, and the warehousing and handling of returns from customers. However, the ASEAN e-commerce boom has had a positive effect on the development of the logistics infrastructure as logistics providers (including SMEs) began to invest strongly to build logistics infrastructure such as fleets and regional distribution hubs to overcome logistical barriers as part of their expansion plans for the region. For example, JNE, the largest logistics company in Indonesia, which witnessed 30 to 40 percent growth in total revenue annually, had about 90 percent of its revenue contributed by retail, particularly e-commerce. Given the lack of logistics infrastructure in Indonesia, the company invested US\$105 million over 2016-2017 to develop infrastructure related to e-commerce deliveries so as to sustain its revenue growth. The investment was used to build more warehouses across Indonesia, enlarge its vehicle fleets, and train its labour force, as well as improve the IT systems, just to better serve Indonesia's wide geographic area.²²⁶

Companies across the value chain have acknowledged these challenges and taken action in different ways. Large third-party logistics companies such as DHL have established logistics hubs either to facilitate distribution in the ASEAN region or within the country as well as explored alternative collection methods, such as lockers. Local companies have also seized the opportunity to be entrepreneurial and launched unique solutions such as Go-Jek, which has a fleet of motorcycles for on-demand delivery services and same-day delivery in traffic-congested Jakarta, Indonesia. At the same time, the increasing volume of cross-border transactions in ASEAN prompted an increase in cross-border package forwarding services such as vPost (for goods shipped from U.S., Europe, Japan and China to Singapore), Shipping Cart and POBox.ph (for goods shipped from the U.S. to the Philippines).

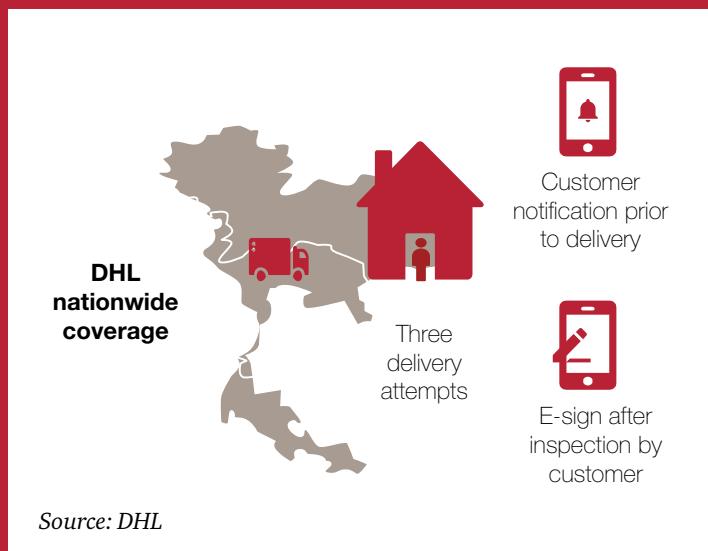
In this context, consumer goods companies in ASEAN need to evolve their servicing models for multiple channels, including hypermarkets/supermarkets, convenience stores, and e-commerce, so as to ensure maximum sales effectiveness and customer satisfaction. The huge contribution of traditional retailers to retail sales in ASEAN also calls for consumer goods companies to address how they can best distribute to them and not be solely concerned about optimising efficiency at modern grocery retailers. For instance, the lack of space at traditional retailers requires consumer goods companies to help these retailers rationalise their product range and manage inventory. Traditional retailers need to adopt an open mind in terms of gaining help from these larger organisations as well as adopting new technologies.

Our digital operating model strategy highlighted the importance of digitising the supply chain and the heavy investments required to scale logistics operations, not to mention the hefty contribution to operating costs. Many CPG companies will see partnerships as being a more cost-effective strategy, especially those consumer goods companies that are new to ASEAN, implementing D2C across ASEAN, or seeking to expand into rural areas. For instance, aCommerce, a Thai company, provides end-to-end logistics solutions for consumer goods companies, including storage, fulfilment, delivery, channel management services, and online tracking of order and delivery. The company's offerings attracted big consumer goods companies such as L'Oréal and Samsung to partner with it to tackle logistics issues in Thailand as well as the Philippines and Indonesia.²²⁷

Case study: A global cosmetics player partners with DHL eCommerce to resolve its last-mile challenges in Thailand

Background

A leading cosmetics player was one of the early entrants in ASEAN for e-commerce of cosmetics. In the company's recent expansion into Thailand, one of the largest ASEAN cosmetics market, it met with multiple last-mile delivery problems. These included limited visibility of its last-mile delivery, high numbers of lost and damaged goods claims, and late deliveries. Unhappiness among its customers grew, and given the criticality of Thailand, the company was eager to seek a new partnership for its last-mile delivery. It partnered with DHL eCommerce, a dedicated e-commerce division, which had 100 percent nationwide coverage and a central hub in Thailand while also covering cross-border delivery and fulfilment.



Approach:

1. The company partnered with DHL eCommerce and attained nationwide delivery
2. DHL eCommerce adopted a basic proof-of-delivery system — each customer to inspect the order and e-sign, allowing minimal late deliveries and complaints of damaged goods
3. Three-attempt delivery by DHL eCommerce
4. Customer to receive notification prior to the delivery — ensuring that they would be available during attempted delivery
5. Customers were also allowed to pick time and delivery locations to ensure they are able to receive products

Impact

The company managed to gain visibility into its last-mile delivery with the e-signing and status summary provided by DHL eCommerce, addressing the issues typically faced by e-commerce players around when orders arrive at customer's doorstep and the product quality upon arrival. There was also a significant reduction in customer complaints, especially with regards to missed deliveries, and furthermore this new partnership arrangement also improved the quality of service, as 24 hours delivery was guaranteed within Bangkok and within 3 days for upcountry locations. The delivery options provided to the customer, notifications and three attempts, gave the customer more control over their purchase journey and created a more positive door-step experience. The electronic proof of delivery reduced the occurrence of fraudulent complaints and ensured that genuine issues were highlighted and could be resolved more promptly to reduce effort for the company and minimise friction for its customers.

Horizontal collaboration

As we noted earlier, improved supply chain efficiency levels are required for consumer goods companies to remain profitable in ASEAN, especially considering the rising contribution of logistics costs to total operating costs. Warehouses and inventory stores are prized and valuable assets, particularly as commercial real estate prices rise across ASEAN. Housing inventory is a considerable cost for consumer goods companies, so they need to consider methods to maximise capacity, either with improved logistics planning with the adoption of smart warehousing or through developing relationships with competitors or partners to improve their asset utilisation.

Horizontal supply chain collaboration among consumer goods companies can take the form of sharing warehouses (to gain flexibility to configure space according to demand fluctuations) or consolidating shipments going to the same retailer/distribution centre into one full truckload as this helps to reduce

transportation costs and decrease stock transfers. For instance, Mars and United Biscuits share warehouse space as well as delivery vehicles to retailer distribution centres. Similar collaboration can be seen in the shipping industry, where alliances have been formed among shipping companies, to enable them to maximise capacity on certain routes.

This partnership is more cost-efficient for consumer goods companies, especially those serving rural areas with infrastructure challenges and low population numbers. At the same time, this collaboration can help to reduce carbon emissions and attain economies of scale required to procure flexible storage, packaging, and transportation solutions.

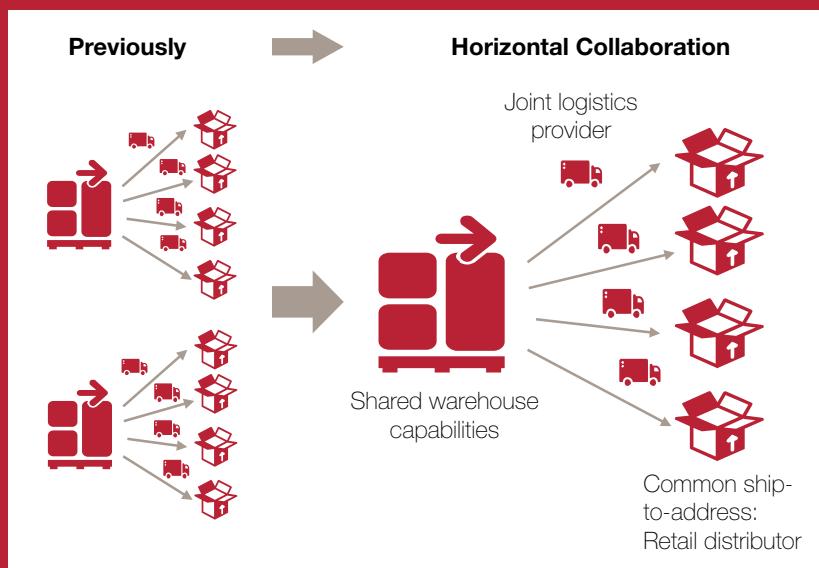


Case study: Two large CPG companies share warehouse capabilities for fresh and chilled food product distribution in Europe

Background

Consumer goods companies typically deliver less than full truckloads to their key customers — in fact the retailers' distribution centres average truck capacity utilisation is about 50 percent. As most consumer goods companies have common ship-to addresses (i.e. the same retailer's distribution centre), this offers a significant opportunity for better asset utilisation and savings as well as CO₂ reduction.

Horizontal collaboration between consumer goods companies seems the rational way to move forward, but the lack of a standard legal framework and fear of anti-trust laws impede such approaches. A Belgian industry association was the initiator regarding this approach, bringing about the partnership of these two large FMCG players, along with the appointment of an independent trustee for oversight.



Approach:

1. Shared warehouse capabilities — storage, packing operations, and distribution of fresh and chilled food products for retail customers in Belgium and Luxembourg
2. Joint logistics provider: handling 220 SKUs and 21,000 tonnes for this collaboration that were delivered to 112 customers, with 20 percent being common ship-to addresses (90 percent of total delivery volume)
3. Logistics cost is split between the two companies based on utilisation level
4. Independent trustee appointed to ensure anti-trust compliance in collaboration involving two competing companies

Impact

Shared warehouse agreements like this one are able to bring about 12 to 15 percent savings from logistics costs. Savings emerge from an increase in the number of trips with full truck loads, higher fill rate for transport and warehousing as well as optimised working shifts. Customer service to high volume customers is also improved as both companies are able to make more frequent deliveries, therefore fresher products. Savings from the synergies are also shared based on an equitable formula. The success of this partnership prompted the Belgian industry association to transfer it into an open access cluster to attract compatible shippers and eventually create a snowball effect.

Challenges

Although both the digital and partnership strategies have their own benefits, consumer goods companies should prepare for potential challenges while balancing the implementation of both to ensure they are successful in the rapidly evolving ASEAN CPG landscape. Despite the obvious financial appeal of partnering, companies still need to protect their brand, as the typical inclination is to focus on successfully selling the product rather than building the brand's positioning and image, and most importantly, building an ecosystem consisting of its suppliers, retailers, and logistics partners. The lack of direct interaction with the end customer is also a challenge when partnering with an e-commerce platform as it can make it difficult for consumer goods companies to build strong customer relationships and loyalty. Conversely, a D2C model which allows CPG companies to build closer relationships with customers could also lead to friction with their retail partners.

Both digitisation of the operating model and partnering with different players along the value chain require consumer goods companies to be aware of the difficulties involved in integrating independent systems. For instance, last-mile delivery companies would need to have systems which can correspond or be integrated with the manufacturers' systems for accurate order tracking and fulfilment. Failure to do so will lead to delayed or missed shipments, which can severely impact customer experience. The same challenge arises when consumer goods companies work toward digitising supply chains where integrating horizontal and vertical partners' own independent digital systems — for example, logistics visibility platforms — can be a complex operation.

Systems integration will also bring about challenges relating to the treatment of data. Data security is a common stumbling block for those companies seeking to partner, as information is still treated as "confidential" by retailers and consumer goods companies in ASEAN, hindering the ease of data sharing. The same applies within organisations; an Economist Intelligence Unit study found that 63 percent of respondents in Singapore and Malaysia (twice the regional average) said that departments are typically working in silos and not effectively sharing data, thus hindering innovation.²²⁸ Collaboration and communication are vitally important, including the need to establish a common gateway to facilitate data sharing within a partnership. As consumer goods companies look to digitise their operations, they must also find ways to maintain data security.

Significant investments and motivation for change are required for the consumer goods company to successfully implement partnerships and digitise operations. The complexity involved in the digital transformation of operating models can be discouraging, as can the struggle to allocate resources across digital opportunities. Companies need to carefully consider the long-term benefits and savings of investing in collaboration exercises against the erosion of short-term profit margins, and of investing in digital transformation against the high initial capital outlay and digital complexity involved.





Conclusion

Demographic and economic shifts, as well as the digital revolution, are transforming the profile of consumption in ASEAN and creating a very different consumer goods landscape across the region. Although there are significant challenges and investment requirements, this new scenario presents a unique opportunity for consumer goods companies to tap into ASEAN's potential to win the loyalty of consumers and establish a strong foothold in the region. Players that are willing to move fast in terms of transforming their operating models, seeking partnerships to leverage different capabilities, and changing their mindsets, will be in a strong position to win a large slice of the prize.





Chapter 5: Medical Devices

Medical devices in ASEAN

The medical devices, or medtech, industry designs and manufactures a wide variety of medical products that diagnose, monitor, and treat diseases and conditions. These products range from inexpensive tools and consumables to complex, multimillion-dollar systems. Medtech encompasses scalpels, medical laboratory diagnostic instruments, test kits, magnetic resonance imaging (MRI) systems, pacemakers, replacement joints, implants, and miniature robots that perform complex surgeries.²²⁹

The demand for healthcare is growing in ASEAN and development of the medical device industry is crucial if countries are to meet this growing healthcare demand. Average per capita sales of medical devices in ASEAN are low compared with those of other emerging markets, indicating significant scope for growth. The medical device industry is a priority growth sector for governments in many ASEAN countries, which are offering incentives to attract companies in this sector. Global medtech companies, for their part, have an increased interest in the ASEAN region due to its strong growth and considerable market size. Companies and governments should seize this growth opportunity.

The growth of the ASEAN medical device sector has been driven primarily by greater government expenditure on universal healthcare and

reimbursement schemes. However, private players have also been investing in the modernisation of hospitals and infrastructure owing to increasing healthcare demand across ASEAN and the rise of medical tourism^a in the region. Mature economies such as Singapore, Malaysia, and Thailand have led this growth, but in recent years higher growth has come from markets such as Indonesia and the Philippines. For example, Singapore's medical device sales grew at 14.8 percent per year from 2010 to 2013 and at 1.7 percent from 2013 to 2016. In the same time period, medical device sales in the Philippines grew at 9.5 percent annually from 2010 to 2013 and at 19.4 percent from 2013 to 2016.²³⁰

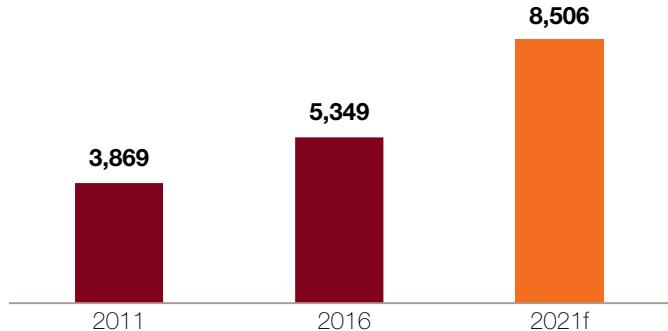
The ASEAN medical device sector is set to outpace other markets thanks to a growing and ageing population, rising levels of chronic disease, and a more educated and increasingly affluent middle class which is demanding quality healthcare.

These factors will enable the ASEAN medical device market to expand into a US\$8.5 billion market by 2020, with a CAGR of nearly 10 percent (see Figure 5.1). Acknowledging this growth potential, a significant number of global medical device companies have started to expand their footprint in ASEAN, actively engaging local healthcare institutions and other key stakeholders.

^a The Centers for Disease Control and Prevention (CDC) says "Medical tourism refers to traveling to another country for medical care."

Figure 5.1: Medical Device Market in ASEAN

Medical device sales in ASEAN (US\$ million)



| ASEAN | 2011-16 CAGR | 2016-21 CAGR |
|-----------|--------------|--------------|
| China | 10.6% | 12.5% |
| India | 6.2% | 8.7% |
| U.S. | 4.7% | 5.0% |
| U.K. | 1.7% | 4.1% |
| Australia | 1.6% | 3.8% |
| Japan | -1.6% | 1.6% |

Note: ASEAN data is for 6 countries – Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam

Source: BMI Database, 2018

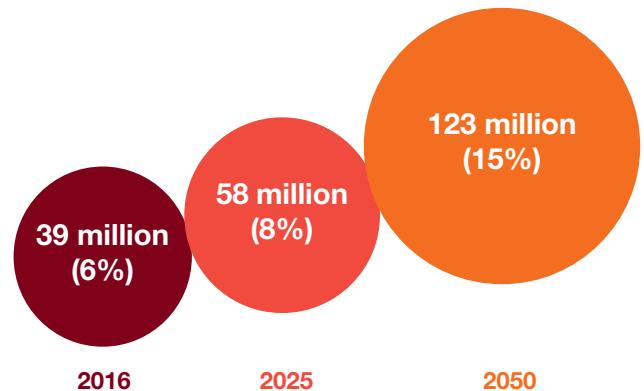
Demand drivers

Ageing populations

The rapidly ageing populations of the ASEAN countries will increase the burden on healthcare systems and grow demand for eldercare services. In ASEAN, the percentage of people over the age of 65 is predicted to more than triple by 2050 (see Figure 5.2), and this rapid growth in the elderly population will change the leading cause of death from infections to chronic non-communicable diseases, such as diabetes, dementia, cardiovascular disease, and cancer. Managing these chronic conditions will increase the financial demands on the healthcare systems and generate a strong demand for eldercare facilities and services.

Figure 5.2: Ageing Population in ASEAN

Number and percentage of population above 65 years



Note: Data for all 10 ASEAN countries

Source: BMI Database, 2018

Rising incomes and middle class

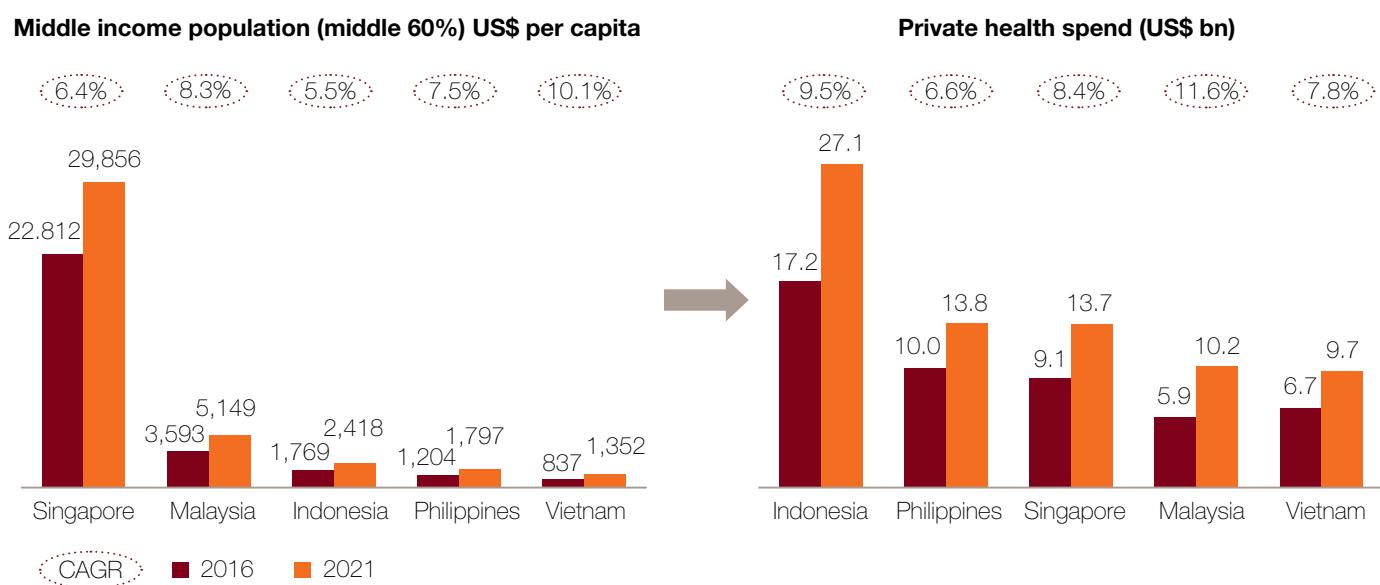
As ASEAN's middle class grows and disposable incomes rise across all segments of the population, greater spending power is spurring a demand for services and higher value-add products.

Urbanisation and consumer growth move in tandem, and ASEAN's cities are booming. At present 309 million or 48 percent of the ASEAN population live in urban areas.^b An additional 63 million people are expected to move to cities by 2025.²³¹ This will further drive private consumption. Against this backdrop of increasing urbanisation, the size of the consumer spending pie in the region is expected to hit US\$2.3 trillion by 2020.²³² Already, some 86 million households in ASEAN nations are part of the middle class, with incomes exceeding the level at which they can begin to make significant

discretionary purchases. That number could reach 120 million households by 2025, making ASEAN a pivotal consumer market of the future.²³³ The per capita spending by the middle 60 percent of the population is expected to grow by between 6 and 10 percent from 2016 to 2021 across the major ASEAN markets, with Vietnam and Malaysia leading the growth (see Figure 5.3).

These new consumers are now demanding higher-quality healthcare services and treatment. Private healthcare spending is expected to rise by between 6 and 12 percent from 2016 to 2021 across the major ASEAN markets, in line with the growth in the middle-income population. For example, in Malaysia, the private health spend will grow from US\$5.9 billion to US\$10.2 billion from 2016 to 2021 — a growth rate of 11.6 percent per year.²³⁴

Figure 5.3: Middle Income Population and Private Health Spend in ASEAN



Source: BMI Database, 2018

^b

Data for all 10 ASEAN countries

Rising chronic diseases

This new affluence of the middle class brings with it changing lifestyles and the adoption of Western habits, which has resulted in an epidemiological transition of the disease burden shifting from communicable diseases to non-communicable diseases (NCDs) such as cardiovascular disease and cancer.

Cardiovascular disease is the leading cause of death in ASEAN, accounting for 32.7 percent of total deaths. The annual mortality rate per 100,000 people from cardiovascular diseases in Indonesia has increased by 55 percent since 1990 (from 142.6 to 221.6 deaths per 100,000 people from 1990 to 2013), an average of 1.9 percent a year.²³⁵

Similarly, the annual mortality rate per 100,000 people from cancer in Southeast Asia has increased by 30 percent since 1990 (from 65.3 to 85.0 deaths per 100,000 people from 1990 to 2013), an average of 1.2 percent a year. The top three cancers in women are breast, lung, and cervical cancers, whilst the top three cancers in men are lung, stomach, and liver cancers. Oral cancers are common in many ASEAN countries due to the use of smokeless tobacco products.²³⁶

The annual mortality rate per 100,000 people from diabetes mellitus in Southeast Asia has increased by 79 percent since 1990 (from 15.1 to 27.0 deaths per 100,000 people from 1990 to 2013), an average of 2.6 percent a year. Indonesia is among the 10 nations with the most diabetics. Vietnam, Malaysia, and the Philippines are forecast to have increasingly high levels of new diabetes diagnoses over the next two decades.²³⁷

Governments seeking relief from these additional healthcare burdens are looking for alternative care delivery models (including home care) as well as encouraging healthy lifestyles and focusing on prevention and adherence to medication and prescribed treatment.

The ASEAN medical device sector is expected to expand along the entire continuum of care, from screening and diagnosis to treatment and monitoring.

Key medical device segments

Screening and diagnosis

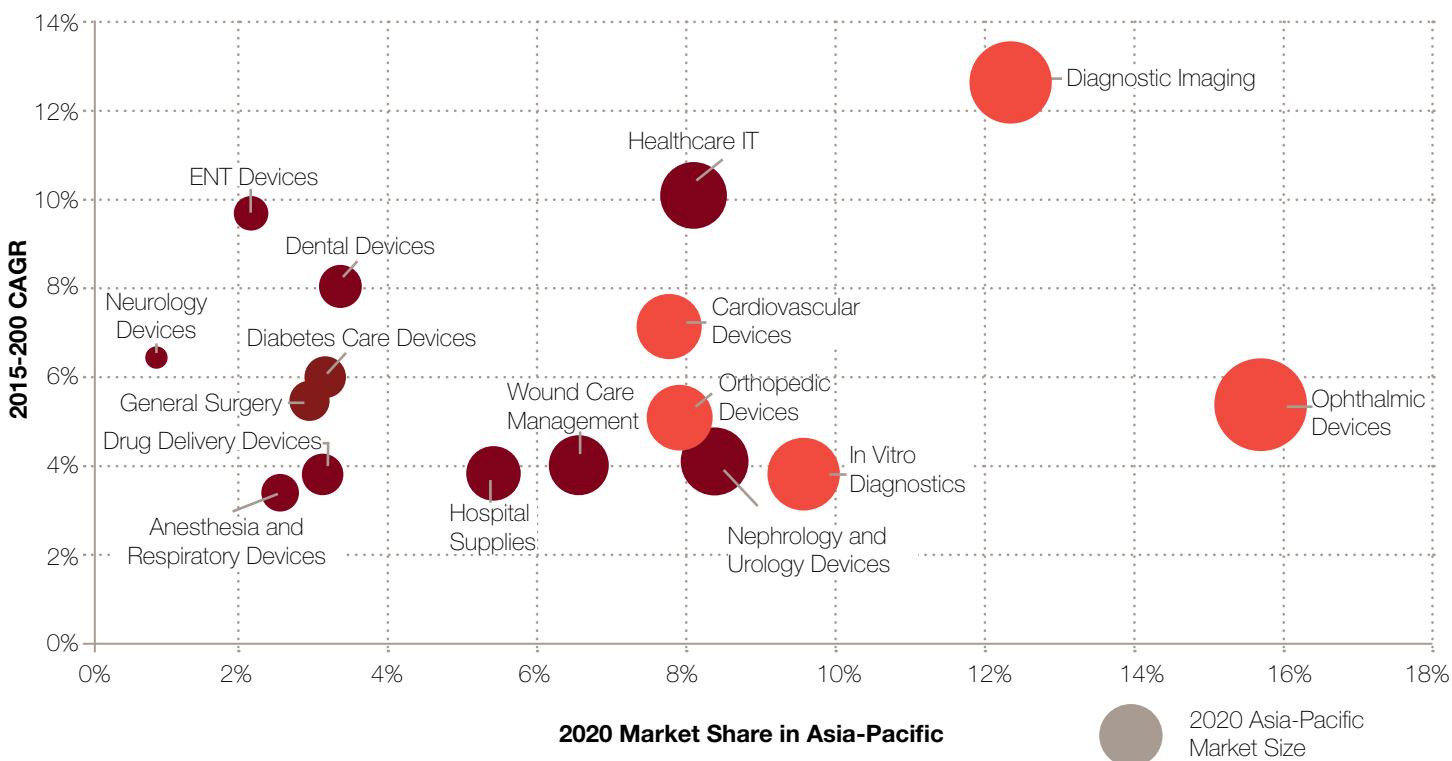
As the rising middle class improves its understanding of the causes and effects of NCDs, there is an increasing demand for health checkups as well as more effective diagnoses of health issues. This has led to an increase in spending by governments, which are now implementing reimbursement schemes for annual major disease screening. Basic tests are being covered by universal health coverage plans where available. For example, the Thai government schemes include free HIV testing twice a year at all public hospitals, reimbursement for cervical cancer tests under all national health schemes, free annual blood sugar tests, and X-rays for patients with a high risk of contracting tuberculosis.²³⁸ We are now witnessing point-of-care/ portable diagnostic devices enabling care at home, resulting in improved outcomes, improved patient satisfaction, and increased access to care in under-penetrated and remote regions.²³⁹

Treatment

Advanced surgical equipment is not only enabling doctors to treat highly critical and complex cases but is also reducing the length of hospital stays. It is increasingly allowing elective yet complex surgeries such as knee replacement, bariatric, and pain management surgeries to be shifted to outpatient/short stay surgery centres. We see cardiovascular, cancer, orthopaedics, and ophthalmology treatments as key growth areas in ASEAN.

Cardiovascular. Cardiovascular disease is the leading cause of death in several ASEAN countries. An increasing focus on preventing, diagnosing, and treating cardiovascular issues has resulted in an increased demand for cardiac devices. Some foreign cardiovascular firms are also developing cardiac technology centres, manufacturing sites, and R&D facilities in the region.²⁴⁰ Cardiovascular devices are expected to be one of the fastest-growing segments in Asia-Pacific, with an annual growth rate of 7.1 percent and a market share of 7.8 percent by 2020 (see Figure 5.4).

Figure 5.4: Key Medical Device Segments



Source: Global Data, 2018

Cancer. The ASEAN nations are also experiencing increasingly high cancer rates. The most common cancers in Southeast Asia are lung, breast, liver, and colorectal. The causes include high rates of hepatitis B, smoking, alcohol use, red meat consumption, air pollution, and genetic factors. Nasopharyngeal (nose) cancer, relatively rare in the West, is increasingly common in Asia. As a result, many Western device firms are expected to increase their sales of cancer diagnostic and treatment products in ASEAN nations.²⁴¹

Ophthalmology. Companies with products in the field of ophthalmology can tap into the high occurrence of eye diseases in the region, including cataracts, glaucoma, and myopia. Singapore and Thailand are renowned for ophthalmology. This is expected to become the biggest segment in Asia-Pacific, with a market share of 15.7 percent in 2020 and an annual growth rate of 5.7 percent per annum (see Figure 5.4).

Orthopaedics. As people age, they have significantly more orthopaedic problems. A December 2013 report by the International Osteoporosis Foundation indicated that the number of people at high risk for osteoporosis in the Philippines will reach 4 million by 2020 and 10.2 million by 2050. Also by 2050, more than 7 million Vietnamese women will be at risk of developing osteoporosis. This segment is expected to grow at 5.1 percent per year from 2015 to 2020.

Monitoring

Health screening devices are enabling patients to take charge of their health at home and regularly monitor certain health indicators. Further, devices are being used to monitor patients remotely for early diagnosis, thus minimising hospital visits and reducing pressure on a country's overburdened medical resources.

Opportunities across ASEAN

Across ASEAN, we have seen the medical device market grow by a 6.7 percent CAGR between 2011 and 2016, to become a US\$5.3 billion market, and this growth is expected to accelerate with a 9.7 percent CAGR to become a US\$8.5 billion market by 2021.²⁴² In this context, Singapore, Indonesia, and Thailand are currently the most attractive markets, with consistent growth. Singapore is also emerging as a hub for medical devices.

Singapore's medical device sales grew at 6.2 percent per year from 2011 to 2016, and sales are expected to grow at 12.3 percent annually from 2016 to 2021. Singapore benefits from strong research infrastructure, intellectual property protection, an educated workforce, and government support in the form of tax relief and training grants. As a result, numerous large global medtech companies have established their operations and R&D facilities in the country — more than 30 medical technology companies and seven of the world's top 10 biopharmaceutical companies.²⁴³ The biomedical manufacturing industry is the second-biggest contributor to Singapore's manufacturing sector, contributing approximately 20 percent. Additionally, government supports the growth of startups in medtech with a series of incentive schemes. SPRING Singapore, a Ministry of Trade and Industry agency, has supported

more than 50 medtech startups. The Agency for Science, Technology and Research (A*STAR) – led US\$46 million^c Diagnostics Development Hub that aims to fast-track diagnostic innovations by combining and aligning a multitude of expertise from clinicians, researchers, innovators, and entrepreneurs with the industrial process of productisation. As a result, startup MiRXES, for instance, has shortened the process of bringing its blood-based cancer diagnostic test kits to the market by half.²⁴⁴

Malaysia has identified the medical device industry as a major area of national economic focus with growing government support, promotion, and development. In fact, the country is now the world's leading producer and exporter of catheters and surgical and examination gloves and is aspiring to move up the value chain in medical device manufacturing. It is fast becoming a hub for medical device contract manufacturing. Although growth was slow in recent years due to poor economic conditions (2.5 percent per year from 2011 to 2016), sales are expected to increase to 9.7 percent annually from 2016 to 2021.²⁴⁵

Thailand, although known for its production of such low-tech devices as syringes, test kits, and surgical gloves, has become a popular medical tourist destination and therefore has developed a strong demand for medical devices. Acknowledging the potential of this sector, the government has made efforts to attract foreign manufacturers by promising corporate tax exemptions for a number of years. Thailand medical device sales grew at 6.1 percent per year from 2011 to 2016 and sales are expected to grow at 9.2 percent per year from 2016 to 2021.²⁴⁶

^c SGD 60 million

Indonesia, a large market owing to its large population base, currently has a low penetration of medical devices. However, Indonesian upper-middle class and up have a high rate of medical "tourism" to Singapore to access quality healthcare. Unlike in other ASEAN markets, independent third parties in Indonesia are not allowed to hold a license on behalf of a foreign device manufacturer. Hence, nearly all medical device licenses are held in the name of the Indonesian distributor, making it difficult and expensive for foreign device companies to part ways with their Indonesian distributors. Indonesia's medical device sales grew at 9.9 percent per year from 2011 to 2016, and sales are expected to grow at 9.6 percent per year from 2016 to 2021.²⁴⁷

The Philippines have public hospitals with significant autonomy in procurement but are hampered by a severe lack of funds; the private hospitals however are much better funded and able to buy high-end devices. A recent government reform has mandated that all new foreign medical devices in the Philippines must be registered.²⁴⁸

Vietnam is increasingly becoming a hub for low-cost manufacturing. Although it is required that domestically manufactured devices be registered with the Department of Medical Equipment and Health Works, imported devices do not need product registrations, only an import license. Vietnam medical device sales grew at 8.4 percent per year from 2011 to 2016, and sales are expected to grow at 9.4 percent per year from 2016 to 2021.²⁴⁹

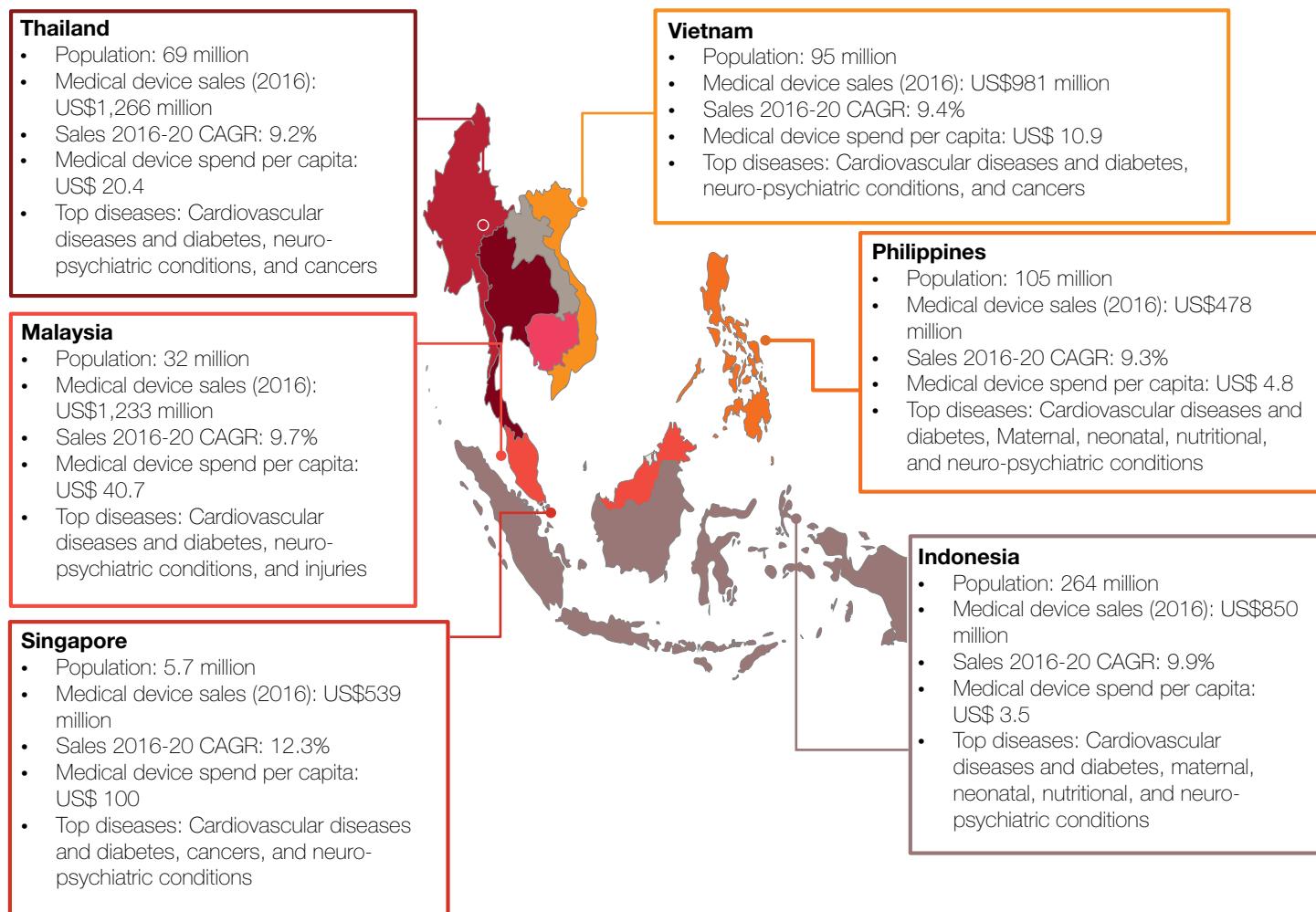


A diverse region

ASEAN is made up of a diverse mix of nations—different in development, legislative environment, and healthcare issues and priorities. To be successful, companies have to understand the differences in each country and deploy the right strategy and resources to support different regions. Although Singapore may have a yearly medical device spend per capita

of US\$100 and Indonesia one of only US\$3.50, Singapore's population is a fraction of the size of Indonesia's (with a population of 5.7 million versus 264 million) (see Figure 5.5). However, the increase in NCDs across ASEAN is a common element, which drives companies to develop multifaceted strategies in order to address the needs and opportunities of each specific market.

Figure 5.5: ASEAN - A Diverse Region



Note: Top diseases are based on leading cause of Disability-adjusted life years (DALYs), years of life lost (YLL) and Years Lived with Disability (YLD)

Source: BMI Database, 2018; World Health Organization (WHO) Country Health Profiles

The ASEAN Medical Device Directive

ASEAN's unpredictable regulatory situation has been one of the biggest hurdles for foreign medical device companies, as each country can have different regulations for post-market surveillance, quality control, and product registration. The ASEAN Medical Device Directive (AMDD) looks to address this inconsistency and develop a harmonised regulatory model for ASEAN countries by identifying basic requirements for assessing conformity as well as creating a single classification system based on risk. These measures would be enhanced by regulations on device safety and performance, and a Common Submission Dossier Template (CSDT).²⁵⁰

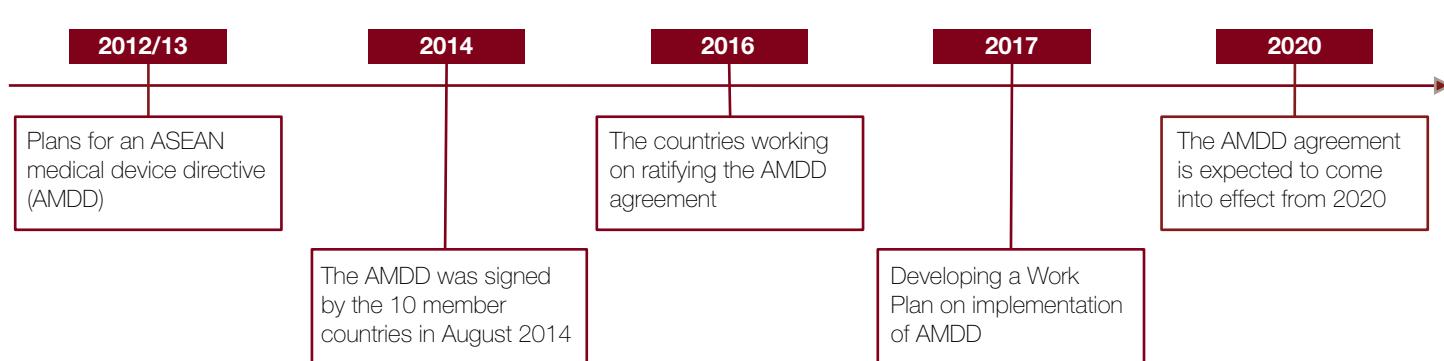
Although the AMDD would not create a single, 10-member market à la Europe, where a medical device certified for sale in one member state may be sold in all others, it would make it significantly easier

for a manufacturer that registers a device for sale in one country, such as Singapore, to then apply for registration in another ASEAN member country, such as Malaysia or Indonesia.²⁵¹

Having been signed in 2014 by all 10 member states, the AMDD was ratified in 2017 with a view that it would come into effect in 2020. If the directive is successfully implemented, it should remove technical barriers and facilitate the integration of medical devices within ASEAN member economies (see Figure 5.6).²⁵²

This integration effort can lead to speedier market access, lower costs, regulatory efficiency improvement, and, most importantly, enhancement of public healthcare systems. Medical device companies will be able to more easily access a common medical device market with a size of more than 600 million people.

Figure 5.6: ASEAN Medical Device Directive – Timeline



Source: ASEAN Economic Community (AEC), Emergo

Key challenges

The potential of the ASEAN medical device industry has been hampered by a lack of local innovation, low affordability, and poor access and quality of healthcare service.

Lack of innovation

At present there is a lack of local innovation with medical devices across ASEAN due to challenges such as a lack of robust IP protection, limited availability of funding in the industry, and the risk-averse nature of the private players and government. As a result, more than 90 percent of ASEAN's medical devices are imported from the U.S., Japan, Germany, and the Netherlands. For example, Thailand imports 97 percent of its medical devices and Indonesia, more than 94 percent. These products are designed for global or developed markets, and many of them are too expensive for customers in the ASEAN region. As a result, the penetration of medical devices in ASEAN is still relatively low compared with penetration rates in other markets in Asia and rest of the world. The per capita yearly spending on medical devices in ASEAN is US\$10; this compares with US\$14 in China, US\$20 in Brazil, US\$37 in Mexico, US\$102 in the UAE, and US\$106 in South Korea (see Figure 5.7).²⁵³

Low affordability

Governments in ASEAN countries are rolling out universal healthcare; however, it offers limited coverage. Private medical insurance penetration in ASEAN is very low. Therefore private out-of-pocket^d spending still dominates the healthcare spending in most countries (see Figure 5.8), making affordability low. For this reason, smaller hospitals, particularly those in Tier II and III cities and rural areas,

opt for cheaper products. Many of them cannot afford to use high-end products. For example, in Indonesia, the government is rolling out universal health coverage and is looking to expand its national insurance programme to all its citizens by 2019. It has also increased its national budget allocation to healthcare. Despite all these efforts, public expenditure accounts for just 38 percent of total healthcare expenditure. Private insurance accounts for another 2 percent. And 47 percent is still out-of-pocket expenditure.^e Due to this high out-of-pocket component, people are extremely price sensitive; hence, spending on medical devices remains low.²⁵⁴

Poor access and quality

Southeast Asia has relatively few physicians and nurses. Indonesia, Thailand and Vietnam have 0.36, 0.44, and 0.80 physicians for every 1,000 people, respectively, compared with the OECD average of 3.30.²⁵⁵ Furthermore, hospitals and qualified healthcare personnel across ASEAN are unevenly concentrated in urban areas. For example, in Indonesia, 76 percent of all hospital beds are located in Java and Sumatra and 50 percent of healthcare professionals are located in Java and Bali (~55% of Indonesia's population lives in urban areas).²⁵⁶ In the Philippines, 38 percent of doctors and 27 percent of nurses are based in Metropolitan Manila and hospitals are concentrated in National Capital Region (NCR), Calabarzon, and Central Luzon. Patients flock to urban hospitals for access to qualified physicians and better diagnostic capabilities.²⁵⁷

The bed density (number of beds per 1,000 people) is also very low — 1.05 in the Philippines and 1.16 in Indonesia — compared with the OECD average of 4.70. Hence hospitals have long wait times and occupancy rates of more than 100 percent.²⁵⁸

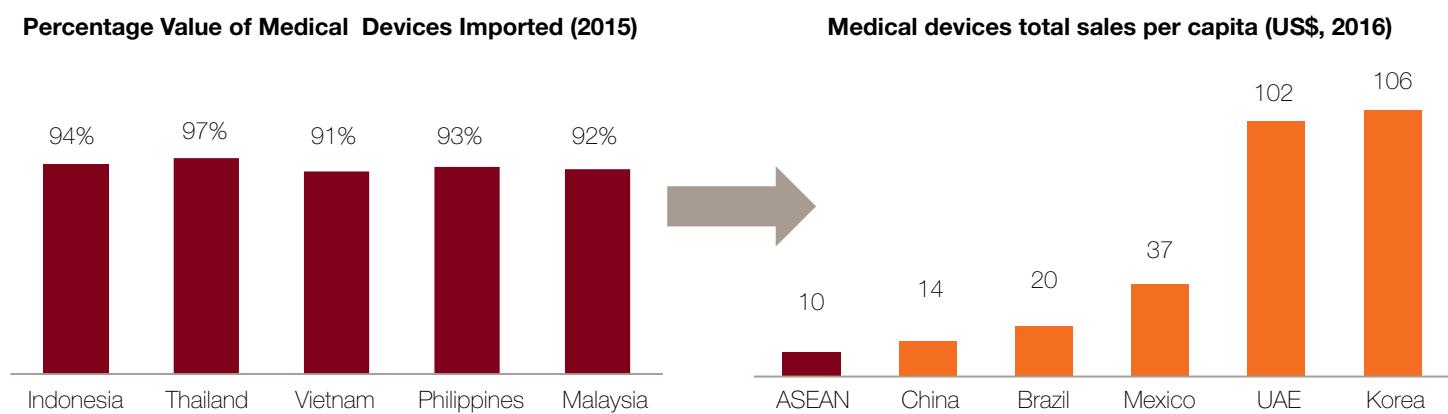
^d According to HealthCare.gov "Out-of-Pocket Costs are expenses for medical care that aren't reimbursed by insurance. Out-of-pocket costs include deductibles, coinsurance, and copayments for covered services plus all costs for services that aren't covered."

^e The other 13 percent of healthcare expenditure is from non-profit institutions serving households (NPISHs), which are not predominantly financed and controlled by government, that provide goods or services to households free or at prices that are not economically significant

Further, the quality of care is often poor, especially with public healthcare providers. Hospitals in the provinces are underequipped with the modern technology necessary to carry out treatment. From the perspective of medical device companies, there is a lack of skilled workers to perform and interpret tests, a

lack of technicians or biomedical engineers to operate devices, and a lack of maintenance service providers for medical equipment. The entire healthcare system is overburdened. With ageing populations and rising rates of chronic disease, the issue will only be exacerbated.²⁵⁹

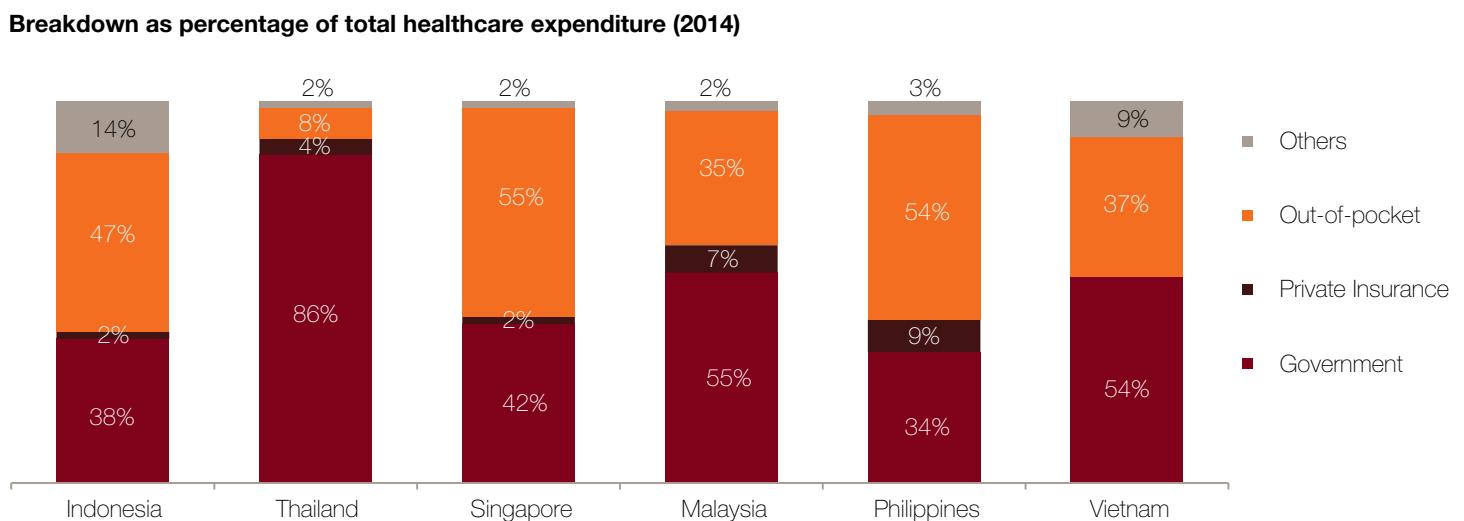
Figure 5.7: ASEAN Medical Device Imports and Spending per capita on Medical Devices



Note: Percentage of medical devices imported is calculated from BMI using domestic medical devices sales and total import of medical devices by the country

Source: Global Data, 2018; BMI Database, 2018

Figure 5.8: Public, Private Insurance and Out-of-Pocket Healthcare Expenditure in ASEAN



Source: BMI Database, 2018

Strategies for medical devices in ASEAN

On the basis of the potential across the ASEAN medical device market and the current challenges, we have considered three key avenues to achieving sustainable growth (see Figure 5.9). These are “local innovation,” developing products that are cost-effective and that

meet the needs of ASEAN customers at a price they can afford; “alternative care models,” enabling products and services to be delivered at home or outside the hospital premises; and “digital solutions,” using mobile and artificial intelligence to improve health outcomes as well as improve healthcare access in remote areas.

Figure 5.9: Strategies for Medical Devices in ASEAN



Source: PwC analysis

“Typical service/product offers of many vendors focus on the bottom line only, an area which many companies are already pretty good. I believe that anything that drives top-line growth is better value proposition and a real opportunity of growth for Medical devices companies. Here in ASEAN there are opportunities for both: to increase penetration in the current segments as well as expand into new higher margin segments which however need to consider the local situation carefully.”

Dr. Tobias Seyfarth
MD and President
Siemens Healthineers ASEAN



Local innovation

The typical medtech product which has been designed from and for a developed market is often too expensive and complex to operate for ASEAN users. Many such products have features that are not necessary for the ASEAN market.

A. Local innovation — closer end-user links

Medical device companies seeking to grow in ASEAN should look to create closer end-users links. This will enable companies to gain clearer insights into the needs of their target market and allow for appropriate customisation of their product portfolio.²⁶⁰

In creating these closer links, multinationals need to develop more sophisticated customer insight capabilities. They should facilitate data gathering, data analysis, and knowledge sharing between their R&D, business development, and marketing teams. These insights can be gathered through a business model which has closer links to end-users as opposed to the traditional model, which leans very heavily on a tiered distribution system, resulting in a dilution of information and insights. Organisations need to ensure that they provide sufficient autonomy to senior management in the ASEAN region and adopt a long-term orientation in decision making and resource allocation.

ASEAN countries are very diverse in terms of patient beliefs, cultures, language, disease profile, and healthcare demands. For example, Muslim-dominant countries such as Malaysia and Indonesia are increasingly looking for halal labels even on medical devices such as sutures. The healthcare infrastructure also varies by country; for instance, in Singapore, public hospitals dominate healthcare delivery whereas in the Philippines, it is private hospitals. As a result of these differences, the needs and procurements processes will vary by country and it is critical for companies to have a deep understanding of their local market. Companies should look to work closely with local hospitals, local employees and community workers to leverage their insights.

B. Local innovation — customised devices

Having gained deeper insights into local ASEAN needs, companies are well positioned to develop innovative devices that are customised and more affordable to local customers whilst still meeting high quality requirements. Companies with “hand-me-down” approaches from global markets have not been able to penetrate emerging markets because they lack adequate value-for-money propositions and have operational challenges. These challenges include a lack of skilled workers to use and maintain devices, a power supply too unstable to operate devices, and language barriers that interfere with workers learning to operate equipment. Customised, easy-to-use, cost-effective devices produced locally can help overcome some of these challenges.²⁶¹

Companies should drive frugal innovation — as opposed to producing premium products — in order to create more value-based devices which are manufactured in ASEAN markets and suited to the local and regional economy, infrastructure, and environmental conditions. There is significant potential for “reverse innovation,” that is, developing an innovative product in an emerging market and then distributing/marketing that product in developed markets.²⁶²

Example:

GE Healthcare's reverse innovation in China

GE Healthcare found that its premium-priced ultrasound scanners were not successful in China as 90 percent of hospitals could not afford them. Through local R&D, sales, and marketing, GE Healthcare's China team developed a handheld ultrasound scanner at 15 percent of the original cost. This product is now being used globally, including in developed countries, which use the portable scanners in ambulances and operating rooms.²⁶³

C. Local innovation — localised business model

In order to gain more in-depth local insights to develop, sell, and service localised products, companies need to alter their business model and go-to market approach.

As previously mentioned, ASEAN is not a homogeneous region and needs differ from country to country. The needs of a public healthcare system are different from those of a private healthcare system. The needs of a hospital in a major city are different from those in lower-tier cities.

In Singapore, for example, where the public healthcare system dominates, the public hospitals look to “do more with less” so as to lower healthcare costs. This also sets a market-driven price benchmark for private hospitals. In such cases medical devices should look to show greater value to the healthcare system.

In the private sector, for large hospitals across ASEAN, companies can look to have a direct sales team, whilst in lower-tier cities, companies can incentivise sales representatives by allowing them to sell multiple product lines. In addition to these channels, companies ought to consider the benefits of having a direct channel for low-cost products.

Some medical equipment cannot be localised; consider high-tech, complex products such as the latest diagnostic equipment (PET-CT scanners, gamma knives). This medical equipment is highly expensive, and the cost burden is made heavier when coupled with installation and maintenance charges, making them unaffordable for many hospitals and diagnostic centres.

To support local hospitals, companies and vendors can offer financing alternatives such as leasing and contracting of medical equipment supplemented with a regular program of upgrading and maintaining the equipment. For example, Zeiss has developed financing options to cover traditional means of paying for medical equipment with leasing contracts as well as customised full-service contracts. Some financing options include “pay as you use” the equipment; full-service leasing; rent with insurance, repairs, and consumables covered; and free use with agreed purchase of specific consumables.²⁶⁴

Companies can help overcome the challenge of getting skilled personnel to run and maintain the medical equipment by developing comprehensive staff training programmes. This training can also be incorporated as part of the maintenance contract.

Local innovation — benefits

As we have seen, local innovation can help businesses make a greater impact in complex emerging markets such as in ASEAN. By altering product portfolios and localising their business models, medical device companies can improve access to healthcare in lower-tier cities and rural areas and also make the provision and servicing of their products more affordable.

This helps add new revenue streams for the medtech companies and makes them more competitive in the ASEAN market as well as globally. Local innovation does not only benefit the medtech companies, hospitals, and patients, but also benefits ASEAN governments looking for sustainable and affordable solutions to provide enhanced healthcare to their growing, ageing populations.

Alternative care models

With ASEAN's ageing population and rising NCDs, the burden on the region's healthcare systems is increasing. Governments are therefore looking to deliver health services through alternative models such as home care. Elderly consumers and professional caregivers are looking to medical technologies to be provided in home settings; these include ventilators, infusion pumps, and dialysis machines. However, awareness of these products and services is low.

Value-based reimbursement is designed to improve medical outcomes for patients and reduce healthcare costs. Under this system, a medical device company gets reimbursed not for selling the device but for demonstrating a successful outcome. It is another reason for medical device companies to focus on alternative care models. By monitoring patients outside a hospital setting, medical device companies can take timely actions that help improve the outcomes for the entire system.

This presents opportunities for new, market-grabbing devices that offer both superior therapeutic results and competitive advantage.

A. Alternative care models — portable devices

Given the lack of capacity and availability of care in ASEAN's traditional healthcare settings, such as hospitals and clinics, it is expected that portable eldercare devices will be in high demand as home healthcare services and nursing home facilities expand. Therefore, companies looking for further expansion in ASEAN ought to consider developing portable, easy-to-use, cost-effective products, such as home dialysis systems, portable respiratory equipment, and wirelessly connected pacemakers.

The declining cost of microprocessors, the growing number of connected devices, and the rapidly expanding volumes of data streaming from them are creating opportunities for home care solutions that can help improve quality as well as reduce the cost of care.²⁶⁵

As the majority of these costs are covered by government or are out-of-pocket, the products need to be cost-effective and companies should look at alternative financing such as the renting out of equipment.

B. Alternative care models — direct to consumer

The growing demand for home care products presents a large retail opportunity for personal healthcare products. Medical device companies should look to develop strong direct business-to-consumer (B2C) channels which will also drive greater awareness of their products.

Recent data from Google states that 43 percent of consumers say the internet is their first point of reference for health-related info, whereas only 14 percent regularly seek out the advice of their physician. The B2C medical device market is growing, and digital direct-to-patient campaigns have also grown in importance. This will also allow medical device players to have more control over their own distribution channels via strategies that bring them closer to their customers.²⁶⁶

Some of the attractive areas for forward interaction are:

1. in vitro diagnostics; manufacturers can consolidate and acquire clinical labs and save on marketing and sales costs, boost pricing power, and drive best practices
2. hearing aids and corrective lenses; manufacturers can take control of their supply chains and sell directly to customers
3. dialysis; companies can sell directly to consumers.²⁶⁷

Companies should also offer sales and service support online for consumers. In spite of all these advances, awareness of home care solutions and their benefits is generally low and medtech companies would gain from more actively marketing their products to end-users.

Case study: Philips in India home healthcare market

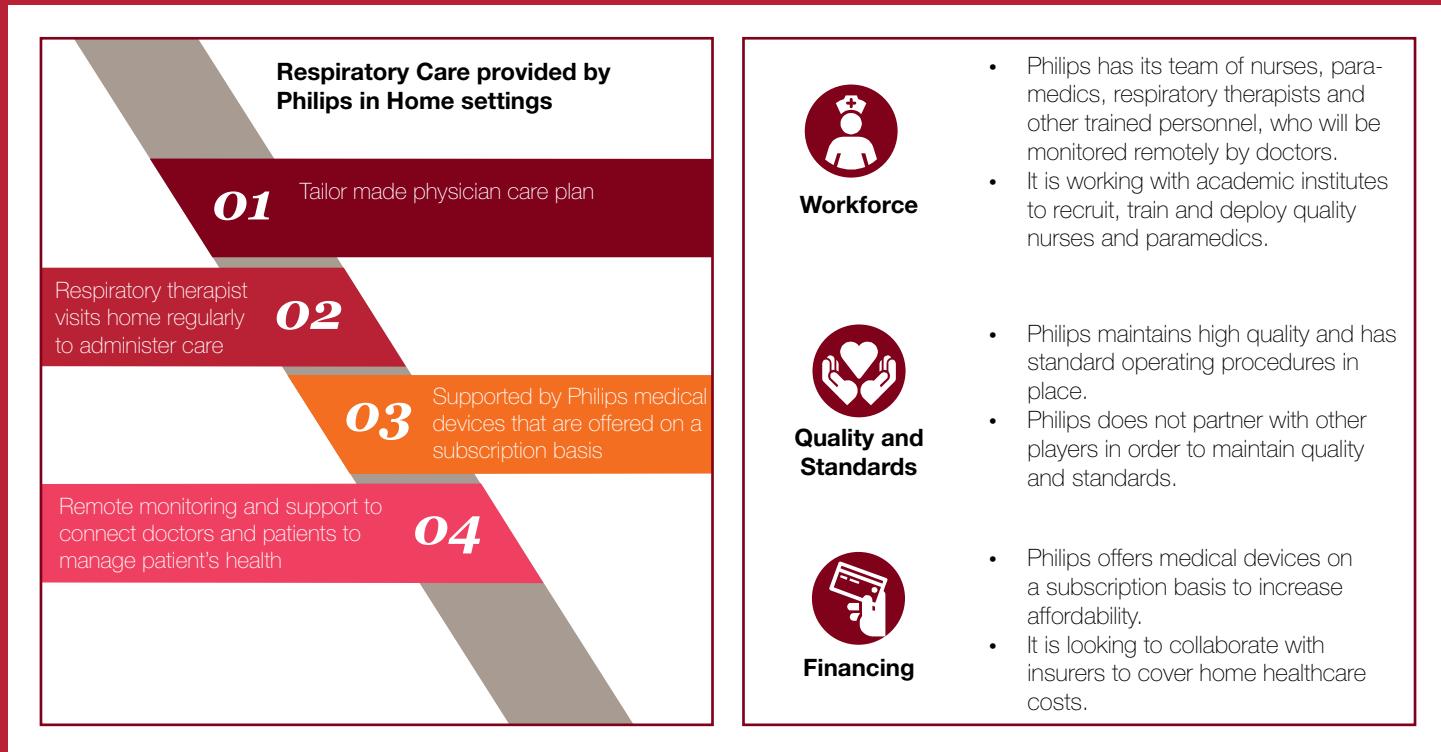
Background and context

There is an increasing burden on healthcare infrastructure in India with an acute shortage of hospital beds and long waiting times. As a result, providers are increasingly looking to deliver care such as chemotherapy in a home setting. According to CyberMedia Research, home healthcare in India is projected to reach US\$6.2 billion by 2020, growing at a CAGR of 18 percent from US\$3.2 billion in 2016. Philips is looking to capture this home healthcare business.

Strategy/Solution

Philips has expanded into the home healthcare business in India by creating a new entity called Philips Home Care Services, that focuses on delivery of both devices and home healthcare services to the consumers' household. Philips provides home healthcare treatment, diagnosis and care for ailments such as heart failure, respiratory disease, post-surgical treatment, sleep disorder, kidney and cancer care.²⁶⁸ Below is the flow of care process for a patient seeking respiratory care at home using Philips services and devices. It also highlights key strategies that Philips has adopted for its home healthcare business in India.

Philips Home Healthcare Solution and Strategy in India



Source: Philips India Website

Impact and Benefits

These devices and services help reduce the total cost of care by reducing the hospitalisation costs, avoiding hospital-acquired infections, and minimising relapse or post-surgical complications.

The cost of home healthcare is estimated to be US\$70-92 (INR 5,000-6,000) per day as compared with US\$231 -308 (INR 15,000-20,000) in a hospital.²⁶⁹ The ICU services provided by Philips are also cost effective, coming in at 30-40 percent lower than that at hospitals.²⁷⁰

More than 200 doctors are currently working with Philips as a part of care, and Philips works directly with doctors in more than 200 hospitals across cities. Philips has provided home care services to more than 2500 patients and is expected to reach more than 100,000 people by 2020.²⁷¹



C. Alternative care models partnership and collaboration

ASEAN is grappling with underdeveloped public-sector healthcare infrastructure and rising demand due to its ageing population and increase in chronic diseases. Governments are looking for solutions to reduce this burden and more effectively serve their citizens. At the same time, the private sector is looking to modernise its facilities to capture the growth from higher incomes and the surge in medical tourism.

These trends create opportunities for medical device companies to partner with governments and private players across ASEAN to help them realise their goals. Medical device companies can partner with government to enable care to be delivered through alternative points such as nursing homes, retirement homes, and residences. They can also work with private players to develop state-of-the-art technology and processes in the new hospitals or help upgrade the existing technology and processes.

Medical device companies should look to work with hospital providers and developers to incorporate the devices in retirement homes and other facilities for eldercare. By partnering with them at early stages, medtech companies can ensure that home and eldercare devices can be built into the projects at the time of construction.

Currently, public awareness regarding home care products is low. The current system also doesn't incentivise moving to home care. Medical device companies need to drive shifts in the mind-sets and behaviours that will result in the adoption of changes in technology and delivery models.

Government, insurers, medtech companies, and hospital providers must come together to successfully penetrate this opportunity area.

Example: GE's Partnership with Hospitals in Saudi Arabia

Saudi Arabia is seeking to transform its healthcare system, in order to offer advanced medical services and increased research capabilities.

GE is working with various hospitals across the country to conduct pilots and proof-of-concept tests. GE Healthcare has signed a US\$30 million agreement to support Anfas Medical Care's new 120-bed specialty facility, which will cater to chronic pulmonary patients requiring long-term rehabilitation and intensive care. Through this partnership, GE is providing comprehensive, long-term support (technological and advisory) in building a robust and sustainable healthcare infrastructure for Saudi Arabia. As part of this, it is looking to implement the latest clinical workflows and operational processes, which will deliver increased capacity and patient throughput, high-quality care, and reduced hospital stays.

The partnership has helped enhance the GE brand and allowed it to gain significant market share. According to GE, about 90 percent of Saudi hospitals deploy GE technology.²⁷²

Alternative care models — benefits

Reduced costs: The alternative care delivery model can help reduce the number of hospital visits, reduce the length of stay in hospitals, and reduce overall costs. For example, a pilot study was conducted by Philips and Banner Health in the United States on using technology as a means of providing remote care for patients. The findings from the study indicated a 27 percent reduction in the cost of care, a 32 percent reduction in acute and long-term care costs, and a 45 percent reduction in hospitalisations.²⁷³

Improved health outcomes: The home care devices can provide real-time monitoring of physical activity, vital signs, and other metrics. This data can be used to better manage chronic illnesses and predict if and when an intervention will be necessary. This can improve the overall health outcomes and reduce the number of hospitalisations and emergency room visits.



Digital solutions for medtech

With increasing mobile penetration and rapid technological advancements, digital solutions for medical devices can be used to address healthcare challenges in ASEAN.

Technology trends such as mobility, advanced analytics, big data, robotics, and connectivity are affecting medical technology with increasing speed. For example, large rural communities across ASEAN have limited access to health services, which creates a niche market for mobile-based healthcare services and telemedicine, making use of wearable devices, app-based diagnostics, and remote consultations.

ASEAN is well positioned to adopt digital solutions such as these thanks to widespread internet and mobile connectivity and the increasing penetration of cheaper smartphones. However, countries in ASEAN are at different stages of digital adoption in healthcare. At one end is Singapore, whose National Electronic Health Record (NEHR) system was rolled out in 2011. This allows patient healthcare records to be shared across the entire healthcare system. As of December 2017, healthcare professionals from over 1,200 healthcare providers across all care settings have access to the National Electronic Health Record (NEHR). This includes all the public healthcare institutions, all community hospitals, slightly more than half of GP clinics, clinical laboratories, and approximately 70 percent of nursing homes.²⁷⁴ Singapore intends to take the next major step for the NEHR, mandating data contribution by all licensees, such as healthcare providers and laboratories, so as to improve data comprehensiveness for better patient care.²⁷⁵ It is looking to increasingly move health information to the cloud. Future developments will also include the use of data analytics to support both decision making at the point of care and national planning for the Ministry of Health. Singapore is also starting to use robotics, artificial intelligence, and chatbots in nursing homes and acute care facilities.

At the other end of the scale are countries like Indonesia, the Philippines, and Vietnam, whose infrastructure is underdeveloped and impedes the adoption of digital healthcare. However, startups and low-cost solutions are emerging that can help in digitising healthcare in these countries. Two examples are ConnectedHealth and Lifetrack Medical Systems.

ConnectedHealth (headquartered in Singapore) offers a platform that is compatible with medical devices, allowing for remote monitoring of patients from healthcare, nursing, and fitness providers. ConnectedHealth's eHealth platform product is the first to provide an end-to-end connected solution for remote health management. ConnectedHealth sells its eHealth platform to healthcare providers that seek to reduce the cost of patient care by keeping patients who can be cared for remotely out of hospitals.²⁷⁶

The Philippines' Lifetrack Medical Systems provides a digital radiology platform by leveraging cloud services. The technology enables doctors in emerging markets to send X-rays and scans to senior radiologists overseas in order to obtain accurate diagnoses on a patient's condition.²⁷⁷

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New medical device technologies are being developed and coming onto the market at an exponential pace. Companies and regulators need to keep pace with the latest technology, changing regulatory landscape and threats around patient safety. ”

Dr. Zubin J Daruwalla
Director, Healthcare Lead
South East Asia Consulting
PwC Singapore

A. Digital solutions — telemedicine and m-health

Telemedicine leverages telecom devices and technology to fundamentally change the way value can be created in the healthcare industry, either by improving healthcare access and driving efficiencies, or through containing costs and addressing physician needs and patient pain points.

ASEAN countries are seeing the rise of chronic diseases such as diabetes and cardiovascular diseases. Governments are looking to encourage healthy lifestyles and promote wellness. Wearable devices are gaining prominence in ASEAN owing to these efforts. For example, Singapore's Health Promotion Board (HPB) distributed wearable step trackers and a 'sure-win' chance to earn small cash incentives by clocking 5,000 to 10,000 steps a day. Participants synced their step counts through a mobile app called Healthy 365 that allowed HPB to gain insights about Singaporeans and refined its programmes and policies to empower citizens to lead a healthier lifestyle.²⁷⁸

Digital solutions are of particular value in reducing emergency room visits and hospitalisations. They are also valuable in rural areas where access to healthcare is limited. In both cases, enabling collaboration and optimising resources will advance the quality and access of care for patients. Large medical device companies are working with ASEAN governments to improve healthcare access and quality in rural areas.

Startups are also gaining considerable market share in the telemedicine sector by offering innovative means

of connecting stakeholders and sharing data. Ospicon (headquartered in Singapore) created the world's first alkaline battery-powered fibre-optic sensor that can detect breath count accurately, for both infant and adult use. Irregularities in data can then be communicated to a physician with the accompanying app. The company's products include a slumbering mat capable of monitoring a baby's breathing sequence via installed fibre-optic sensors. This information is communicated through supporting smart apps, giving parents real-time situation awareness and alerting them to instances of irregular breathing. The adult bed sensors monitoring a patient's respiratory signs can improve the care experience for patients, while support from a host of smart technologies can ease the pressure on healthcare workers and lead to efficiencies in workflow.²⁷⁹

Digitally enabled medical devices can also facilitate access to information. This enables patients to manage their health in a less intrusive manner, by tracking chronic diseases and disseminating information to manage them on a day-by-day basis. Healint is a digital healthcare analytics startup (headquartered in Singapore) with the tag line "Intelligence for a better life." Its mobile app is called Migraine Buddy, and its apps purportedly predict migraines with an accuracy of 90 percent. It recognises triggers and identifies patterns that help patients cope with migraine. The reports can be shared with the doctor. The platform has recorded terabytes of data to help patients, doctors, and researchers better understand the real-world causes and effects of neurological disorders.²⁸⁰



Case study: Philips telemedicine solution to improve maternal and child health in Indonesia²⁸¹

Background and context

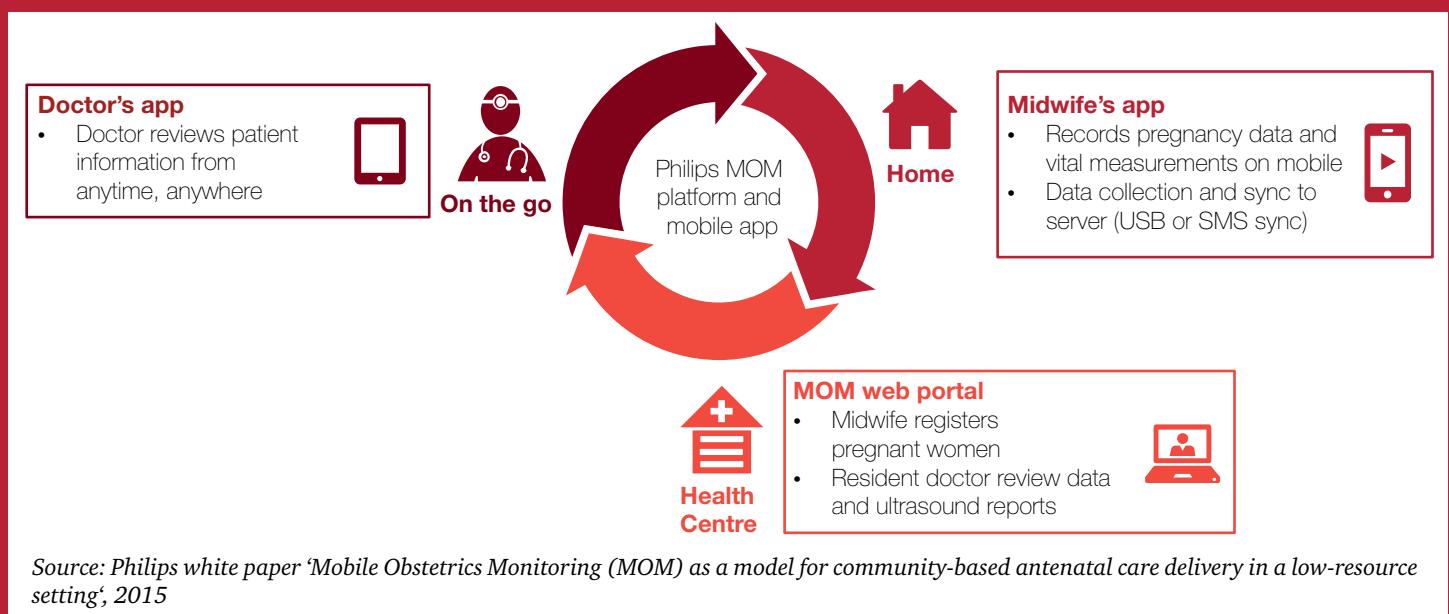
The maternal mortality rate in Indonesia remains among the highest in Southeast Asia, with 190 maternal deaths per 100,000 live births. This problem is largely attributed to a continuing lack of access to quality healthcare for expectant mothers. Deaths occur with births handled by traditional birth attendants rather than by medically trained healthcare professionals, according to the World Health Organization.

Indonesia has large mobile penetration rates and an increasing usage of mobile apps. Philips developed a pilot program that leveraged this huge mobile penetration to improve maternal health.

Solution

Philips worked with the Indonesian government to improve maternal and child health. The initiative Mobile Obstetrics Monitoring (MOM) was piloted with the Indonesian Reproductive Science Institute (IRSI), providing expectant mothers with enhanced care to help address maternal mortality. It is a scalable telehealth platform that can be adapted to suit specific rural and urban needs, using a mobile phone application. The app enables midwives to build a relevant health profile of pregnant women by collecting data from physical examinations and tests and local nursing clinics, or even at the soon to-be mother's home. Data is uploaded from the app onto the central Mobile Obstetrical Monitoring server, allowing obstetricians and gynaecologists to remotely monitor patients from hospitals or home. The doctors can review the data collected from the antenatal visits and determine if a pregnancy might be high risk, in which case immediate care can be provided.

Philips Telemedicine Solution to Improve Maternal Health in Indonesia



Source: Philips white paper 'Mobile Obstetrics Monitoring (MOM) as a model for community-based antenatal care delivery in a low-resource setting', 2015

Impact and Benefits

MOM empowers community caregivers to capture vital information during home visits, enabling antenatal risk stratification, diagnostic assistance, and progress assessment through mobile applications.

A pilot study of 656 pregnant women in Padang assessed the use of MOM to facilitate a public-private partnership of midwives and obstetricians and

gynaecologists. Based on the study, detection of very high-risk pregnancies increased by three times during the 2014 pilot study and zero maternal deaths were recorded thanks to identification, timely referral and management using the MOM solution. There was also a 99 percent reduction in anaemia from the first to the third trimester through enhanced patient management.



B. Digital solutions — artificial intelligence

In ASEAN, physicians and specialists are scarce, especially in rural areas. In these cases, artificial intelligence (AI) can be embedded in medical devices at local clinics and community centres to provide valuable advice and improve healthcare access and decision making.

AI is able to enhance the access and provision of care through clinical decision support systems, predictive modelling, and cognitive analytics. It can also help improve healthcare access and quality by filling gap where there is limited availability of skilled resources.

Chatbots are another application of AI. A chatbot asks users a series of questions and helps determine the potential causes of their symptoms. It can help decide if the person should travel to a larger hospital in the city to consult a specialist or undergo treatment.

Example:

VoxelCloud using AI and Cloud Computing to Improve Healthcare Access and Quality in China²⁸²

Doctors in China are extremely overworked, sometimes seeing more than 100 patients a day, and some earn less than US\$500 a month. That means boosting doctors' efficiency is crucial to managing caseloads, especially in places where hospitals are shorthanded.

VoxelCloud uses AI and cloud-computing technologies to provide automated medical image analysis and clinical decision support for medical practitioners. VoxelCloud's goal is to use AI in healthcare to improve the current clinical workflow. Diseases covered include coronary heart disease, lung cancer and retinal diseases. It not only frees up physician's time spent poring over medical images but it can also help fill the gap in hospitals in smaller cities and rural villages where there is lack of specialist doctors.

C. Digital solutions — partnering with ICT

Information and Communications Technology (ICT) presents an opportunity for universal access to medical technology at very low cost, and it should be used in creative new ways to support innovation in medical technology. For Example, recently a leading diagnostic imaging and robotic-assisted surgery focused medical technology company partnered with a telecom provider. The partnership sought to leverage telecom provider's capability in emerging network technologies to increase mobile uplink connectivity and data compression in order to transfer images and perform remote analysis. It will also enable the medical device company to deploy technologies to emerging markets across the world.²⁸³

Companies should also look to build relationships with community workers, NGOs, and schools and provide them with training to develop necessary skills.

Digital solutions — benefits

Enabling digital solutions will give medical devices companies the ability to gather data from users and access continuous insights around disease profiles, habits and needs. This will allow companies to respond in a highly focused way.

Digital solutions will also drive value for the healthcare systems by improving access and quality. It will potentially reduce the burden on healthcare infrastructure and doctors by improving productivity and efficiency.²⁸⁴

Case study: Singapore-developed AI to improve efficiency and accuracy in diagnosis of Diabetic Retinopathy (DR) and related eye diseases²⁸⁵

Background and context

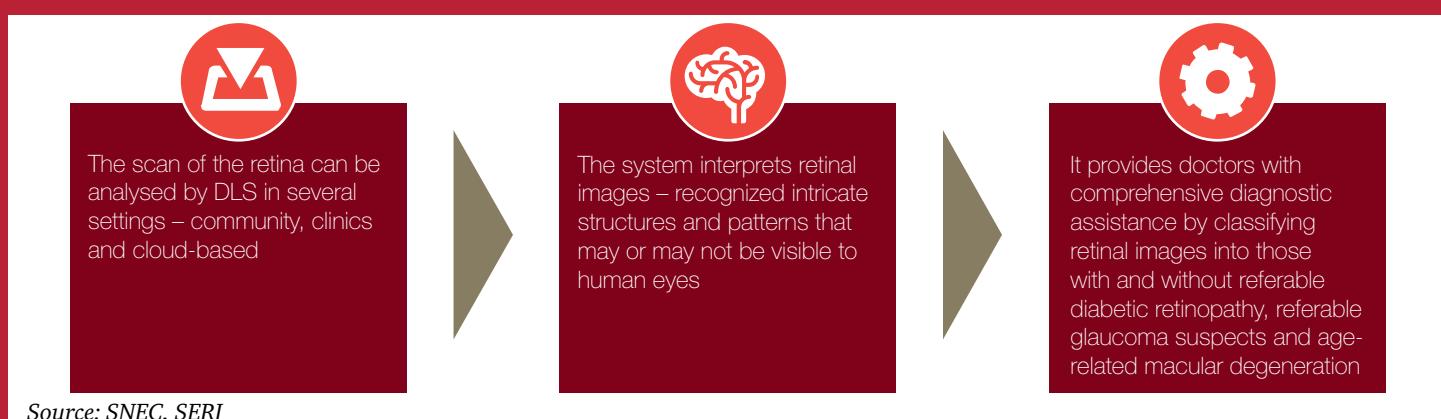
Asia is home to 60% of the world's total population with diabetes. China, India and Indonesia together with the United States of America are ranked the top 4 most populated countries in the world. The prevalence of diabetes in ASEAN, China and India range from 3% to 13.7%, with close to 300M people with diabetes. Diabetic retinopathy (DR), a diabetes-related microvascular complication, is the most common acquired visual loss amongst working adults. Currently, annual screening for DR is a universally accepted practice and recommended by the American Diabetes Association and International Council of Ophthalmology (ICO) to prevent vision loss. However, implementation of DR screening programs across the world require human assessors (ophthalmologists, optometrists or professional technicians trained to read retinal photographs). Such screening programs are thus challenged by issues related to the need for significant human resources and long-term financial sustainability.

Solution

Singapore National Eye Centre (SNEC) and SERI partnered with the National University of Singapore (NUS) School of Computing to build an AI system to screen for diabetic eye diseases, in collaboration with several leading eye centres globally (Australia, China, USA, Mexico and Hong Kong). This AI system uses a deep learning system (DLS) that thinks and makes decision like human intelligence in differentiating those with and without these conditions. It provides clinical practitioners with automated medical image analysis services and diagnosis assistance using AI and cloud computing technologies as shown below.

Other than diabetic retinopathy, the AI technology can also screen for glaucoma and age-related macular degeneration – the first system in the world to do so according to the SNEC.

Singapore's AI Solution to Diagnose Diabetic Retinopathy



Source: SNEC, SERI

Impact and Benefits

This DLS can potentially save tremendous cost, manpower and improve efficiency of healthcare systems by allowing ophthalmologists and optometrists to concentrate on treating only DR cases that require treatment. For countries with no existing screening programs, this DLS can also be utilized as a standalone software to automatically analyse retinal images to detect any diabetes eye-related conditions from the retina.



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Induced collaboration among stakeholders (MOH, regulators, academics, healthcare providers, industry executives, and patient groups) and “solution-wrapped med tech innovation” could help remove some of the structural barriers. This will not only benefit patients with improved healthcare outcomes but will also benefit health care providers by providing access to the latest medical technologies, and optimal utilisation and work-life balance of its staff. ”

Bidur Dhaul

Senior Director

Business Head of Monitoring Analytics and Therapeutic Care Solutions, Health Systems
Philips ASEAN Pacific

Conclusion

ASEAN is an attractive market for medical devices. Healthcare demand is increasing due to rising incomes, ageing populations, and growing incidences of chronic disease. However, many healthcare systems are underdeveloped and suffers from poor access, poor affordability, and poor quality. The penetration of medical devices is low, especially outside the main cities. Most of the medical devices are imported, and are not well suited for the needs of the people in ASEAN.

Medical device companies can play an important role in ASEAN to improve the access, affordability, and quality of healthcare and at the same time increase penetration of their devices in this market of 600 million-plus people.

Instead of using a “hand-me-down” approach to medical devices in ASEAN, medical device companies should look to build customised and affordable devices for the market. They should get closer to the customer to understand customer needs, have a local presence, and encourage local innovation.

The current systems of healthcare in ASEAN bear an ever-greater burden. Medical device companies should work with the public and private sector to provide care through alternative models in lower-cost settings such as home care.

Medical devices are also being disrupted by digital. Companies should embrace technology such as mobility, big data, and artificial intelligence in their current product portfolio and use this technology to provide healthcare in remote areas at lower costs.

To make the alternative care models and digital solutions successful, companies need to work to improve awareness of these solutions. They should look to drive shifts in the mind-sets and behaviours that result in slow adoption of changes in technology and delivery models.

One of the hurdles that medical device companies face in implementation of these strategies is the availability of skills and talent. Companies should play an active role in skill development. They should engage with the government and academia to develop relevant courses that will develop the skill base required for the industry. They should look to develop training institutes in partnership with healthcare providers, government, and academia to provide training for operating and maintaining the medical devices. They should also collaborate with healthcare providers to promote training and education of physicians and other technical personnel in the area of medical technology. They should encourage the use of technology to accelerate and enhance medical education.

Governments in the region, too, need to support the industry and provide a favourable environment to companies playing a leading role in improving healthcare services in the region.

Governments should look to improve the regulatory landscape. There is a need for greater regional and although the AMDD is a step in the right direction, a tighter enforcement of these common regulations is needed. The establishment of a single body for the ASEAN medical device industry could be an innovative idea. Such a body could formulate and drive the regulations required for sustainable growth across the industry.

Government should nurture a crop of innovators, including building incubators and improving funding access for medtech startups, especially in the early research phase. Considering the long timeframe it takes to get returns from medtech innovations, governments should play a lead role in providing infrastructure, funding, and access to business networks.

There is also a need for industry stakeholders and governments to encourage collaboration between regulators, academics, healthcare providers, industry executives, trade groups, patient groups, and insurance companies.



Chapter 6: Refined Fuels

Refined Fuels in ASEAN

As mentioned in chapter 1 of this report, ASEAN continues to record strong economic growth, with factors such as policy reforms and infrastructure investments pushing economic improvements, especially in the region's emerging markets. Aligned with this economic performance, energy requirements in the ASEAN region have also witnessed a sharp rise — energy is needed to support the expanding industrial base, as well as the household and transport sectors. However, there is still significant room for growth in overall energy consumption. Figures released by the International Energy Agency indicate that although average per capita energy demand in ASEAN has increased by 20 percent over the past decade, it still remains at around half of the world average, indicating significant scope for future growth.²⁸⁶

Oil continues to be the dominant source of primary energy in the region, representing a 34 percent share in 2016, and consumption of refined fuels has grown at a tremendous pace over the past 15 years — rising by 67 percent between 2000 and 2016. As shown in Figure 6.1, fuel consumption in ASEAN has risen dramatically over this period, overtaking regional production capacity since a one-off dip in demand witnessed in 2008. During this period, capacity addition in ASEAN has continued to lag behind consumption; the consumption–capacity gap reached its widest point in 2016. Given the region's limited production capacity to meet its domestic fuel requirements, its reliance on imports has also grown significantly over the past decade, raising concerns over energy security while increasing the cost burden on regional economies.²⁸⁷

Going forward, strong economic growth in the region is expected to sustain a steady demand for fuels, maintaining ASEAN's position as the third-largest fuel consumer worldwide by 2021, behind only the U.S. and China. This growth in fuel consumption will be driven mainly by the rising demand for mobility in the transport sector, for cleaner cooking fuels (such as liquefied petroleum gas [LPG] rather than solid biomass) in the household sector, and for petrochemical feedstocks in the industrial sector.²⁸⁸

Considering these trends, one can see a greater focus among national governments on building additional production capacity in order to reduce their domestic fuel deficits and counter growing import costs. However, as shown in Figure 6.1, even with the announced capacity addition plans, a large gap will continue to exist between consumption and capacity by 2021 (Gap A), indicating significant scope for additional investments in expanding production.

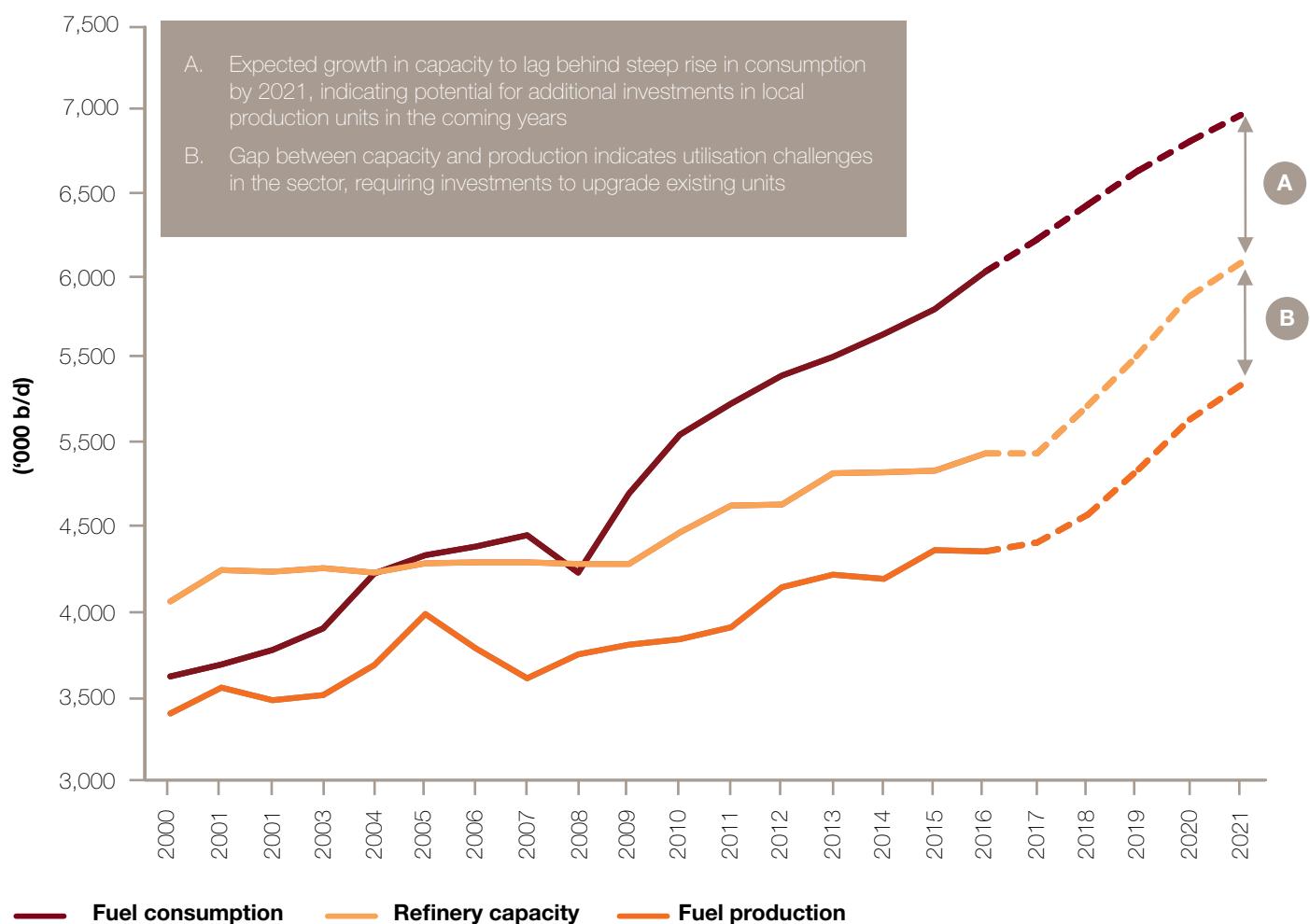
- **Gap A:** Fuel production capacity in ASEAN is projected to rise from 4,950 (in thousand barrels per day) in 2016 to 6,087 (000 b/d) by 2021; however, this planned addition will still not be sufficient to meet regional demand for fuels, projected to reach a peak of 6,969 (000 b/d) by 2021, growing at 3 percent per year over the between 2016 and 2021.²⁸⁹

Besides this, investments will be required to upgrade ageing downstream infrastructure to improve current utilisation rates, lowering the gap between capacity and actual production (Gap B). Plant upgrades to, for example, improve crude processing flexibility and meet stricter fuel emission standards will also require investments from industry players.

- **Gap B:** Projections based on the current environment indicate that fuel production will continue to remain below overall capacity, reaching only 5,357 (000 b/d) by 2021. This will require additional investments in improving operational efficiency in production plants, to help improve utilisation and refining margins for companies in the region.²⁹⁰

These overall regional numbers, although informative, hide the disparities and growth trends within ASEAN's individual markets. It is therefore important to move beyond these and examine country-level variations. The production of refined fuels is a highly localised industry, regulated by national governments to push for greater energy security in their individual markets. Country-specific factors such as demand trends, plans to build additional capacity, and regulations will all play an important part for companies seeking to invest in ASEAN opportunities.

Figure 6.1: Demand–Supply Gap for Refined Fuels in ASEAN



Note: ASEAN figures exclude Lao PDR

Source: BMI database, January 2018

Vietnam has the second-largest consumption–capacity gap in ASEAN at present (behind Indonesia). Its government is increasingly focusing on that gap, with the result that the country's capacity addition plans through to 2021 are leading the region. These plans include two new refineries designed to meet Vietnam's growing domestic demand, collectively creating an additional 361,000 b/d in capacity by 2020. This is followed by Malaysia's mega-project known as the Refinery and Petrochemical Integrated Development

(or RAPID) project, which is being undertaken in Southern Johor. RAPID represents an additional 300,000 b/d of capacity and is expected to begin production by 2020. It is the largest individual refining project being undertaken at present in the ASEAN region. Malaysia plans to add this new capacity mainly to target rising demand for high-specification fuels (Euro 4 and Euro 5 compliant)^a and petrochemicals in the larger Asia-Pacific region, as it already has enough capacity to meet domestic fuel requirements.²⁹¹

Figure 6.2: Major Planned/Current Development Projects in ASEAN

| ASEAN markets | Project name | Project type | Location | Refining capacity (b/d) | Expected completion | Key stakeholders |
|---|--------------|--------------|--------------------|-------------------------|----------------------|---|
|  Malaysia | RAPID | New refinery | Johor | 300,000 | 2019-20 | Petronas (Malaysia), Saudi Aramco (Saudi Arabia) |
|  Vietnam | Nghi Son | New refinery | Thanh Hoa | 200,000 | 2018-19 | PetroVietnam (Vietnam), Kuwait Petroleum International (Kuwait), Idemitsu Kosan (Japan), Mitsui Chemicals (Japan) |
|  Vietnam | Vung Ro | New refinery | Phu Yen | 161,000 | 2019-20 ^b | Vung Ro Petroleum Company (JV between Technostar Management, U.K. and Telloil Company, Russia) |
|  Brunei Darussalam | PMB | New refinery | Pulau Muara Besar | 160,000 | 2019 | Zhejiang Hengyi Group (China) |
|  Thailand | Sriracha | Expansion | Sriracha, Chonburi | 135,000 (additional) | 2021 | Thai Oil (Thailand) |
|  Philippines | Bataan | Expansion | Limay, Bataan | 80,000 (additional) | 2019 | Petron Corporation (Philippines) |
|  Indonesia | Cilacap | Expansion | Central Java | 52,000 (additional) | 2021 | Pertamina (Indonesia), Saudi Aramco (Saudi Arabia) |
|  Cambodia | Kampong Som | New refinery | Kampong Som | 40,000 | 2019 | China Perfect Machinery Industry Corporation (China), Cambodian Petrochemical Company (Cambodia) |

Source: BMI database, January 2018; “Emerging among Giants,” S&P Global Platts, September 2017

As shown in Figure 6.2, international oil firms are playing a major role in developing the refining sector in ASEAN and will be key to bridging the consumption–capacity gap going forward. Besides bringing in investments and global expertise, these firms are signing feedstock contracts with ASEAN refineries to safeguard their supply in the coming years. These global companies are in turn looking for greater demand security and are keen to invest in fast-growing markets such as ASEAN. For example, Kuwait Petroleum International will meet almost all of Nghi Son Refinery’s crude oil needs in Vietnam, and Saudi

Aramco will be supplying up to 70 percent of the RAPID Refinery’s needs in Malaysia. These capacity-build-up plans in ASEAN will also be supported by global trends that promise improved stability in industry margins, such as recent plant shutdowns in Europe and the US Gulf Coast, and expected capacity cuts in major global markets such as Japan, UK, Italy and France over the next five years. However, factors such as a complex regulatory environment (in terms of foreign ownership and environmental obligations), bureaucratic delays, and populist policy measures such as price subsidies remain areas of concern for many foreign investors.²⁹²

^a Developed by the European Union, Euro 4 and Euro 5 emission standards focus mainly on reducing emissions from diesel cars, especially particulate matter (PM) and oxides of nitrogen (NOx). These standards prescribe stricter emission controls than Euro 1, Euro 2 and Euro 3 standards released earlier.

^b Vung Ro project developers were issued a warning in March 2018, to have their investment certificate revoked due to implementation delays. Completion date for the project could thus be delayed if the current allocation is cancelled and re-opened for other interested parties.

Figure 6.3: Refined Fuels Landscape in ASEAN by Country

| ASEAN markets | Share in capacity (2016) | Share in consumption (2021) | Consumption growth (CAGR, 2016-21) | Capacity growth (000 b/d, 2016-21) | Share in capacity growth (2016-21) | Consumption – Capacity Gap (000 b/d, 2021) |
|-------------------|--------------------------|-----------------------------|------------------------------------|------------------------------------|------------------------------------|--|
| Brunei Darussalam | 0.2% | 0.3% | 5.4% | 160.0 | 14.1% | -151 |
| Cambodia | 0.0% | 0.7% | 3.8% | 40.0 | 3.5% | 10 |
| Indonesia | 21.2% | 27.6% | 2.8% | 52.0 | 4.6% | 823 |
| Malaysia | 13.4% | 9.1% | 1.2% | 300.0 | 26.4% | -327 |
| Myanmar | 1.2% | 7.1% | 17.9% | 0.0 | 0.0 | 439 |
| Philippines | 5.9% | 7.6% | 6.5% | 80.0 | 7.0% | 160 |
| Singapore | 29.9% | 19.5% | 0.3% | 0.0 | 0.0 | -124 |
| Thailand | 25.3% | 20.1% | 1.2% | 135.0 | 12.7% | 3 |
| Vietnam | 3.0% | 8.0% | 4.7% | 361.0 | 31.7% | 49 |
| ASEAN | 100% | 100% | 2.9% | 1,128 | 100% | 881 |

Note: ASEAN figures exclude Lao PDR

Source: BMI database, January 2018

Besides Vietnam, we see strong potential in other select ASEAN markets offering significant growth and investment opportunities for interested players — mainly driven by the consumption–capacity gap that will continue to exist in these markets, despite planned additions by 2021. The markets with these largest projected gaps by 2021 are Indonesia, Myanmar, and the Philippines, as highlighted in Figure 6.3.

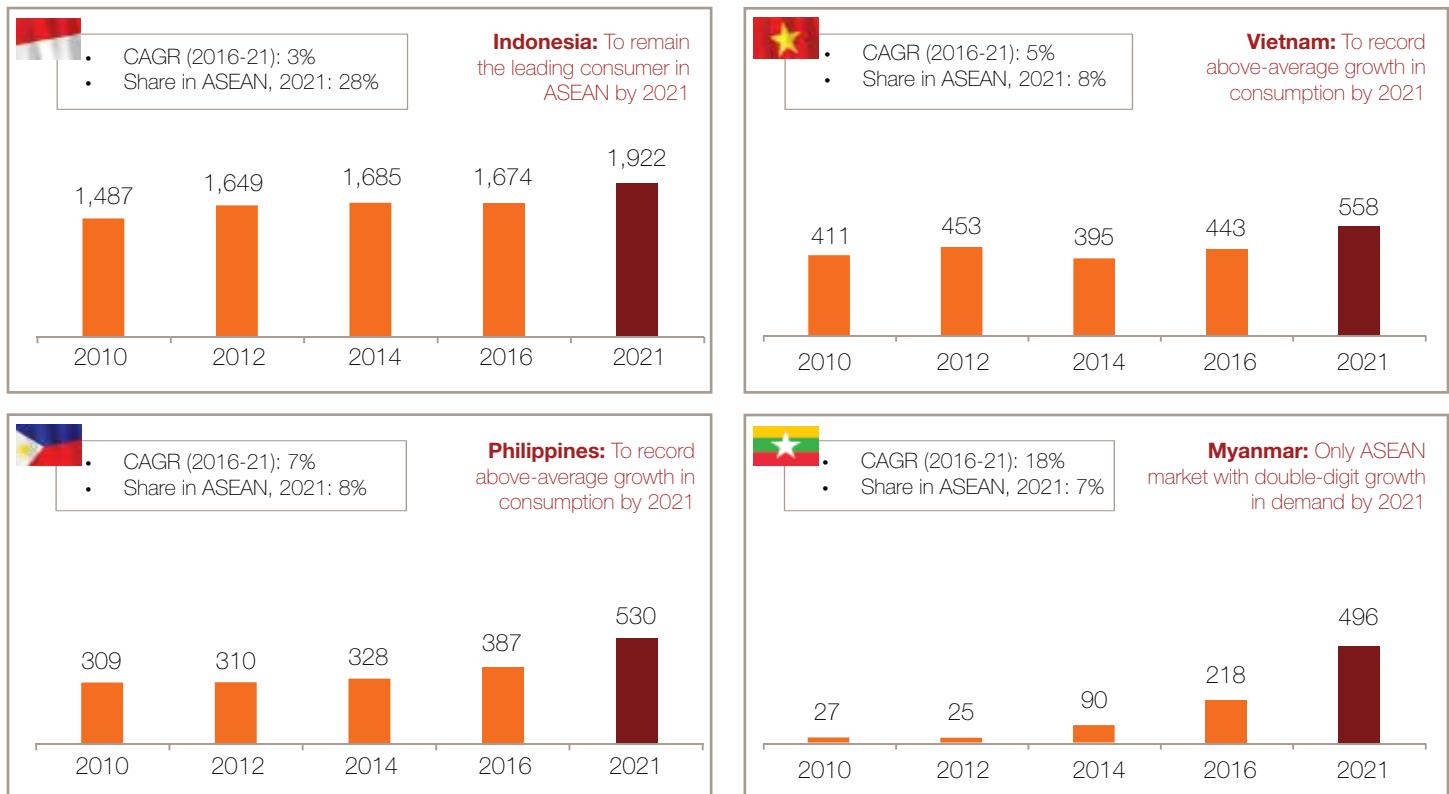
Indonesia will continue to be the largest consumer of fuels in ASEAN (with a 27.6 percent share by 2021), but it has limited production capacity at present (21 percent of overall ASEAN capacity in 2016). The expected capacity addition by 2021 of only 52,000 b/d will not be enough to cover the expected sharp rise in consumption, leaving Indonesia with the largest consumption–capacity gap of any ASEAN nation, an estimated 823,000 b/d. Singapore and Thailand are other key consumers (with an approximate 20 percent

share each by 2021); however, they have sufficient capacity or projects under execution to meet their expected growth. Myanmar stands out in the ASEAN region, representing its fastest-growing demand centre over 2016-2021 (~18 percent CAGR), followed by the Philippines (6.5 percent CAGR). No major capacity build-up is expected to materialise in Myanmar by 2021, leaving scope for fresh investments to reduce the growing burden of its fuel imports.²⁹³

Demand-side trends

Economic expansion will increase demand for fuels across leading markets; the transport and household sectors primarily will drive consumption. Highlighted in Figure 6.4 are key demand-side trends in the four priority markets in ASEAN.

Figure 6.4: Market Opportunity—Consumption of Refined Fuel Products (000 b/d)



Note: ASEAN figures exclude Lao PDR

Source: BMI database, January 2018

Indonesia

Fuel demand in Indonesia is anticipated to grow from 1,674 (000 b/d) in 2016 to 1,922 (000 b/d) by 2021, at a 3 percent CAGR. The country's favourable market conditions, such as being the fourth-largest population globally and the largest ASEAN economy with more than 5 percent annual GDP growth by 2021, will drive demand for refined fuels. The transport sector leads demand in Indonesia at present, with a 52 percent share. Passenger car sales are projected to experience 11 percent annual growth between 2017 and 2021, so the demand for gasoline is expected to rise significantly, pushing the share of gasoline from 31 percent to 37 percent of fuel consumption by 2021. LPG demand will also be on the rise, with state-owned Pertamina planning to build new inland storage terminals to ease distribution.²⁹⁴

Vietnam

Fuel demand in Vietnam is expected to grow from 443 (000 b/d) in 2016 to 558 (000 b/d) by 2021 at a 5 percent CAGR. Consumption is projected to rise with the growth in vehicle sales, steady LPG demand, and prospects of foreign investments in the downstream sector. Vietnam is keen to open its downstream market to foreign investors, starting with plans to sell a stake in its only major refinery (Dung Quat). Although this is expected to boost investments in distribution infrastructure, government control on fuel prices remains a concern. Demand for fuels such as gasoline and diesel will be driven by the automotive sector; vehicle sales are projected to register growth of 14 percent per year between 2017 and 2021. LPG represents another major product, as 70 percent of households use it as the main cooking fuel, which will help maintain steady demand.²⁹⁵

The Philippines

Demand for fuels in the Philippines is projected to grow at a robust rate, from 387 (000 b/d) in 2016 to 530 (000 b/d) by 2021, along with the country's economic performance — the economy is projected to expand at a CAGR of 6.7 percent through until 2021. The government also plans to implement a new fuel marking and monitoring system by the end of 2018 to limit smuggling. This will help reduce tax evasion, lower distortions in price and demand, minimise financial losses, and improve sector transparency and profitability. Automotive fuels will lead demand; vehicle sales are projected to grow by 18 percent per year between 2017 and 2021, and in addition to this, an expected rise in construction amidst the government's infrastructure plans will further push demand for diesel fuel.²⁹⁶

Myanmar

Strong economic growth, facilitated by market reforms, will push fuel demand from 218 (000 b/d) in 2016 to 496 (000 b/d) by 2021, rising at an 18 percent CAGR. Ongoing reforms are aimed at improving business conditions and facilitating foreign investments in energy-intensive sectors such as manufacturing, infrastructure, and agriculture. The government has also removed the requirement for foreign investors to partner with the concerned ministry to participate in fuel distribution and retail. Fuel demand is expected to be driven by the transport and industrial applications required to support Myanmar's fast-growing economy. The transport sector will be a key growth driver, as vehicle sales are projected to grow by 14 percent per year between 2017 and 2021.²⁹⁷



“

The ASEAN region is facing a period of growing oil import dependence, due to fuel consumption growing strongly while domestic output is struggling to keep up. This rising dependence on crude oil imports is unavoidable, but further development of downstream capacity can at least stem the flow of product imports in what will be a robust market for regional refining going forward. ”

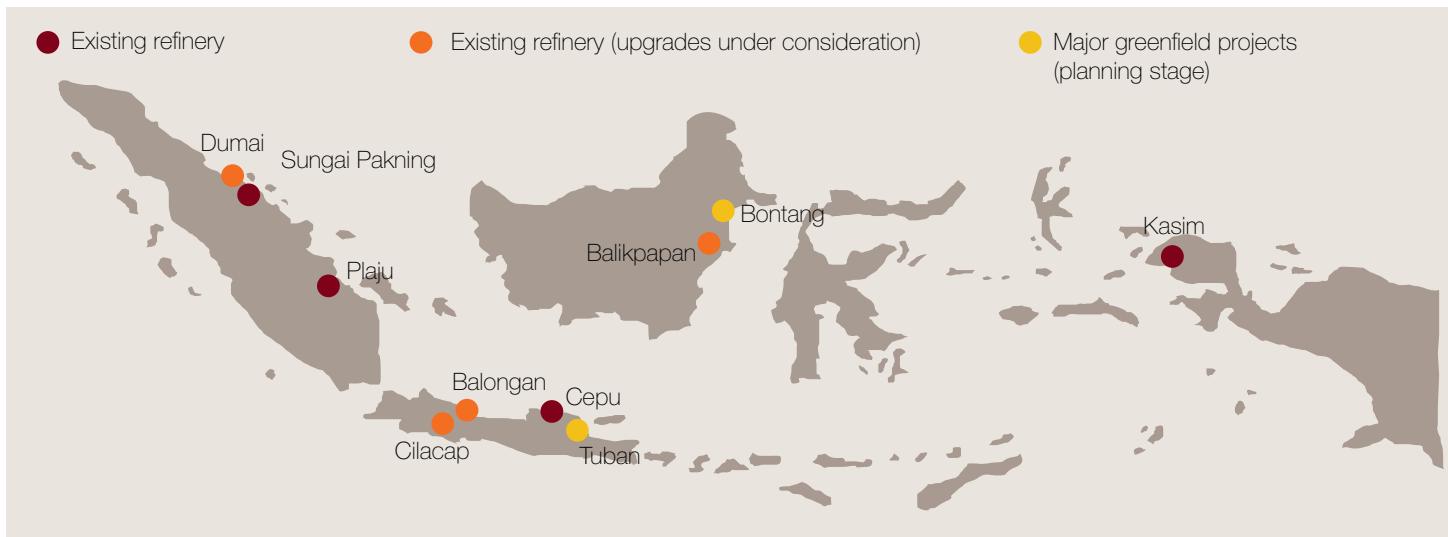
Peter Kiernan
Lead Analyst, Energy
The Economist Intelligence Unit

Supply-side trends

Figure 6.5: Refining Industry in Indonesia

Indonesia

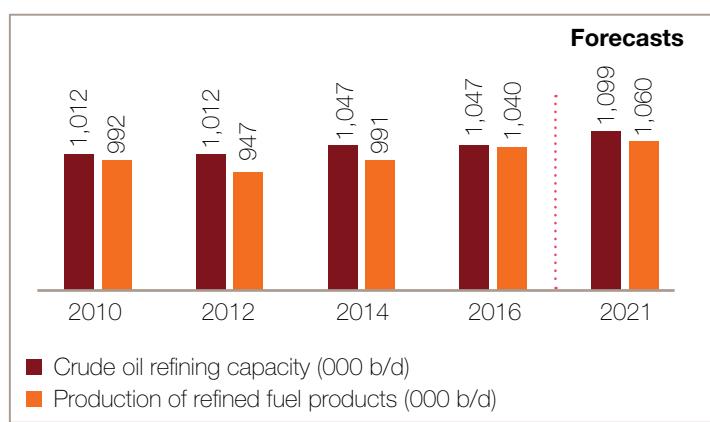
Indonesia has plans to significantly boost its domestic refining capacity by 2025, and is seeking investments and expertise from global oil companies.



Indonesia has insufficient capacity to meet rising fuel demand, and limited additional capacity is expected by 2021 owing to execution delays. The refining sector in Indonesia has lagged behind growth in demand for fuel products; the last major new refinery was built in 1994. At present, the sector is dominated by state-owned Pertamina, which operates eight refineries across the country. Although the sector was recently opened to private investments, only a few small-scale private plants have been set up so far. A lack of regulatory clarity has deterred growth in private investments.²⁹⁸

Despite regulatory concerns, foreign investors have shown strong interest in targeting the market's large consumer base. Saudi Aramco is participating in an expansion project in Cilacap, and Rosneft (Russia) is considering setting up a new refinery in Tuban. Indonesia is also looking for a strategic partner in setting up another refinery at Bontang. Financing issues remain a major concern for state-owned Pertamina, creating an opportunity for global firms to target the market.²⁹⁹

Pertamina has announced major expansion plans by 2025, with the launch of the Refinery Development Master Plan (RDMP) and the Grass Root Refinery (GRR) plan in 2014 to double refinery capacity by 2025. However, execution has been a challenge. Only a few projects have actually been initiated so far — leaving significant scope for new players to enter the market for both new projects and refinery upgrades.³⁰⁰



Source: BMI database, January 2018

Vietnam

Refining capacity in Vietnam is expected to more than triple by 2021 as two new units come online, though production will continue to lag local demand.

Figure 6.6: Refining Industry in Vietnam



Binh Son Refining and Petrochemical Company (BSR), owned by PetroVietnam, operates the country's only major refinery at Dung Quat in Quang Ngai (it has a capacity of 148,000 b/d). BSR has announced the decision to sell a 49 percent ownership stake in the refinery to private and foreign companies by the end of 2018, starting with a 7.8 percent stake on offer as part of an IPO in January 2018. Many global players, such as Kuwait National Petroleum Corporation, PTT, SK Group, Rosneft and Repsol have expressed interest in exploring the opportunity.³⁰¹

So far, refining sector growth has been hampered by the availability of cheap imports from Asian markets, with which Vietnam has existing free trade agreements. However, rising demand is bound to increase import costs going forward, prompting the industry to invest in improving local refining capacity. Two new units are expected to start production in the near future, namely the Nghi Son (200,000 b/d) and Vung Ro (160,720 b/d) refineries.³⁰²

Production of refined fuels is accordingly expected to grow substantially between 2016 and 2021, especially for automotive fuels such as gasoline and diesel. However, the anticipated growth in production will not suffice to meet local demand, which will reach 558,000 b/d by 2021. Thus, the government has approved another two refineries (Long Son and Nam Van Phong) with a combined capacity of 400,000 b/d, but these are still in the planning stage, and progress will be determined by evolving global supply and demand trends. Construction at these units has yet to start. Among the interested players evaluating feasibility is JX Nippon.³⁰³

Source: BMI database, January 2018

The Philippines

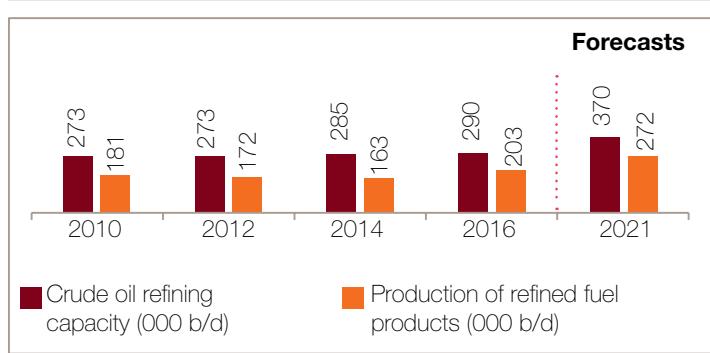
By 2021, refining capacity will rise moderately through upgrades; discussions are under way to build new capacity to meet growing fuel demand.

Figure 6.7: Refining Industry in the Philippines



The refining sector in the Philippines is restricted to two major units: the Bataan refinery operated by Petron Corporation, which has a capacity of 180,000 b/d, and the Leyte refinery operated by a global oil and gas firm, which has a capacity of 110,000 b/d. Going forward, the sector is expected to see limited expansion. The only major project currently under way is the expansion of the Bataan refinery by 80,000 b/d. This will leave a major gap between installed capacity and consumption (which will reach 530,000 b/d by 2021), creating scope for further expansion in local fuel production.³⁰⁴

Foreign players are showing interest. For example, China's Handi Group is discussing the construction of a refining and petrochemical manufacturing facility in the Mindanao region with the Department of Trade and Industry. Petron Corporation, the leading fuel refining and marketing player in the Philippines, is discussing another greenfield project in the southern Philippines with two unnamed foreign entities. The project is expected to require investments of US\$15 billion to \$20 billion to build an integrated refinery and petrochemical complex with a processing capacity of 250,000 b/d.³⁰⁵



Source: BMI database, January 2018

Myanmar

Fast-rising local consumption with no major capacity announcements will create an opportunity for new players.

Figure 6.8: Refining Industry in Myanmar



Myanmar has three small refineries at present: the Thanlyin (26,000 b/d), Chauk (6,000 b/d) and the Mann Thanpayarkan Petrochemical Complex (25,000 b/d), with a combined capacity of 57,000 b/d, as of 2016 — all operated by the state-owned Myanma Petrochemical Enterprise (MPE). Despite having some existing capacity, actual production remains significantly low, as the refinery sector faces major challenges in the form of limited downstream investments, low operational efficiencies, and ageing infrastructure, all of which push the economy to rely heavily on imports.³⁰⁶

Given the financial strain of the domestic market, foreign capital will be essential for Myanmar's growth. The government had earlier approved the construction of a new refinery (100,000 b/d) by China's Guangdong Zhenrong Energy Company in the city of Dawei, as part of a US\$3 billion project, which also included setting up an oil terminal and other storage and distribution facilities. The Chinese company was to hold a majority 70 percent share in the refinery. However, the project has seen major construction delays over the past two years due to financial constraints being faced by the Chinese developer, raising the likelihood of it being cancelled by the government. Beyond this Dawei project, companies from Japan, China, and South Korea have expressed interest in upgrading the Thanlyin refinery; meanwhile, players from India are exploring potential opportunities on the marketing and retail side.³⁰⁷

There is a significant gap between consumption and capacity at present, and because Myanmar is projected to record the fastest growth in fuel demand in ASEAN by 2021 – coupled with no major capacity additions – this gap will expand to almost three times the current figure by 2021, indicating significant scope for market entrants.³⁰⁸

Source: BMI database, January 2018

Industry challenges

While ASEAN markets offer significant opportunities, the refining industry in ASEAN will need to address a mix of supply, profitability, and investment-related challenges, to enable future growth.

Supply-side issues

Falling domestic crude production and growing variability in global feedstock are increasing supply-side risks for ASEAN refiners, which are increasingly having to rely on crude oil imports. Investment in exploration activities has dropped sharply, creating concerns over the discovery of new reserves to counter any potential decline in production from maturing fields. According to industry estimates, these elements could combine to shrink domestic oil production in ASEAN by as much as 20 percent over the next 10 years. Worse, an almost 30 percent reduction is expected in larger markets such as Indonesia and Malaysia, threatening the supply of cheaper local crude oil to the domestic refining industry.³⁰⁹

Growing variability in global oil supply is further challenging the industry, creating a need to upgrade infrastructure in order to process oil variants from new source markets such as the U.S. and Latin America. Competitive refiners in China, India, and South Korea have taken the lead in making such upgrades in recent years, in order to reduce their dependence on oil from the Middle East and thus strengthen their bargaining position. Demand for heavier crude from Latin American markets such as Brazil, Mexico, Colombia, Ecuador, and Bolivia has also risen in recent times due to its lower costs. With this, ASEAN players are under additional pressure to improve processing flexibility in order to remain competitive.³¹⁰

Profitability concerns

Margin pressures are on the rise amidst stringent regulations, pricing controls, and growing regional competitiveness. Stricter environmental standards — intended to control air emissions, lower toxicity in effluents, and reduce sulphur concentration in fuels — are being adopted worldwide, including in many ASEAN markets. For example, the International Maritime Organization (IMO) has mandated capping of the sulphur content of marine fuels sold worldwide at 0.5 percent from 2020 onward. Singapore moved to Euro 6^c emission standard in 2017, and Malaysia plans to adopt the Euro 5 standard by 2020. Vietnam has also mandated that only two types of better-quality transport fuels (the RON 95 gasoline and the E5 biofuel) can be sold in the country from 2018 onward.³¹¹

However, most existing refineries in ASEAN have relatively limited desulphurisation capacity, currently estimated at around 40 percent of the primary distillation capacity, much lower than the global average of 51 percent. Production meeting these new fuel standards will require costly adjustments to the refining process and thus increase margin pressures on refining firms — at a time when continuing government control on fuel pricing in many ASEAN markets is reducing companies' appetite for making fresh investments. For example, Indonesia has imposed a single-price fuel program across 54 remote areas, which restricts the ability of companies to recover additional operational expenses involved in distributing fuels to these regions.³¹²

Finally, competitive pressures on ASEAN refineries are also on the rise from other regional refiners such as those in China and India, which plan on making significant investments in fresh capacity and upgrades in the coming years. For example, India intends to expand its refining capacity by 77 percent by 2030; leading industry players such as Reliance Industries Ltd. to invest in building larger integrated plants to achieve stronger margins.³¹³

^c Developed by the European Union, the Euro 6 standard imposes greater reduction in exhaust emissions from motor vehicles over previous standards. For example, for diesel engines, it requires 67% reduction in NOx emissions over the Euro 5 standard.

Investment gaps

The downstream sector in ASEAN remains relatively underdeveloped in terms of meeting domestic demand in most regional markets (exceptions being Singapore and Malaysia, where capacity exceeds consumption at present). The sector is dominated by state-owned oil companies that are facing a greater need to invest in more expensive upstream exploration and extraction methods to mitigate falling oil production levels, which leaves limited capacity to invest in the downstream sector. For example, Indonesia built its last major refinery about 25 years ago, and ageing infrastructure has led to a plant utilisation rate of only 25 percent in Myanmar.³¹⁴

According to industry estimates, almost one-third of overall investments in oil infrastructure required in ASEAN over the next two decades will need to be directed toward capacity addition in the refining sector — a much higher allocation than the mere 10 percent share required globally — reflecting a stronger need to bolster capacity in ASEAN as compared with other parts of the world. As discussed earlier, besides the capital required to build new units, investments will be needed to upgrade existing units in order to utilise cheaper feedstock and to produce the higher-quality fuels being pushed by many national governments, such as in Singapore, Malaysia, Vietnam, and Thailand. As an example, Thai Oil, the largest refiner in Thailand, recently announced investment requirements of US\$4 billion to upgrade infrastructure intended to increase production of cleaner low-sulphur fuels, while improving its ability to process a wider range of crude oil variants by 2022.

Finally, refiners may also be required to increase investments in support infrastructure to lower industry risks, such as by building oil storage tanks to reduce supply distortions. Already three of the 10 largest tank farms being planned worldwide are in Malaysia, with other projects being planned in Indonesia, Singapore, and Vietnam.³¹⁵

Strategies for refined fuels in ASEAN

In order to address the opportunities across the ASEAN market, companies need to explore a number of growth strategies. These are:

Vertical integration

Explore synergies offered by integrated refining and petrochemical plants while improving revenue sustainability through diversification. This strategy will help companies in addressing challenges related to profitability and investment gaps.

Improving feedstock flexibility

Invest in capabilities to process cheaper feedstock variants from new market sources (for both refining and petrochemical operations), to lower supply-side risks, and to boost operating margins.

Building new alliances

Companies can look to address supply-side difficulties and investment gaps by fostering partnerships with global oil companies to garner the investments and expertise required to build capacity and adopt new technologies.

Vertical integration

The oil and gas industry worldwide, and in ASEAN, has faced challenging conditions in recent years. These challenges have included falling commodity prices, reduced investment appetite, and a growing acceptance of non-conventional energy sources amidst rising policy pressures. The need to improve competitiveness in such a challenging market landscape is driving many downstream firms to consider new ways of improving profitability and lowering growth risks. Integrated refining and petrochemical facilities are increasingly being considered by companies worldwide; they could enhance operational efficiencies and achieve a higher return on assets through greater synergy and flexibility in operations, resulting in much stronger margins. Moreover, the expansion of refining operations into a fast-growing segment such as petrochemicals will offer greater sustainability in revenues to ASEAN companies, which are operating in a highly dynamic and competitive market environment impacted by global supply and demand trends. Diversification into multiple segments (refined fuels and petrochemicals) will help companies in reducing pricing and revenue sustainability risks emanating from possible oversupply (availability of cheaper imports) or changing regulatory norms that could impact particular products.³¹⁶

From an operational standpoint, vertical integration of refining with petrochemicals offers the advantage of maintaining a reliable feedstock supply for the petrochemical facility, while also giving companies the flexibility to change feedstock quality to vary the production of basic chemicals, aligned to any changing demand patterns for petrochemical products. For example, integrated complexes can more easily use a different quality of feedstock, such as light, heavy, or full-range naphtha, to vary ethylene production per demand projections. Integration also benefits the refinery by providing it with a consistent supply of hydrogen and other petrochemical plant by-products. At an overall level, integration reduces the burden of managing by-products for the sector, thus also lowering costs associated with meeting environmental obligations, which are getting stricter by the day. Finally, integration also helps lower transport and logistics costs (due to the proximity of feedstock

sources) while enabling cost synergies through shared facilities, such as utilities, and support functions such as maintenance or HR. Industry estimates indicate that just enabling shared infrastructure could reduce a company's capital costs of building utilities and off-sites by up to 40 percent. Reduction in logistics costs is also particularly significant for the refining industry: A 10 percent reduction in logistics costs can improve overall profitability by 6 to 8 percent.³¹⁷

In terms of the market potential, expansion into petrochemicals has a significant upside for the ASEAN region. This makes vertical integration a highly relevant strategy for the region at this point in time – considering its potential to substantially impact both the revenue and cost side of profitability improvement, as shown in Figure 6.9. Besides the fast rising demand for fuels discussed earlier, diversification into petrochemicals (especially polyolefins) has significant growth upside. The ASEAN region is already the world's third-largest consumer of polyolefins (behind only the U.S. and China); annual demand is greater than 11.5 million metric tons at present. Demand for polyolefins in ASEAN is further expected to grow at a strong rate of 6.5 percent per year over the coming decade. Among the key markets, Thailand is projected to rise from being ranked 11th in global polyolefin demand in 2017 to sixth by 2027; Indonesia, Vietnam, and Malaysia are also expected to enter the worldwide top 15 polyolefin demand centres by then. Growing regional integration will enable ASEAN players to compete more effectively with imports from East Asia and the Middle East that help meet most of the supply gap at present. Besides catering to the intra-regional demand, ASEAN has the potential to become a major export hub in the larger Asia-Pacific region, supplying to large regional markets such as China and India, which are facing a production deficit in polymers. Considering its geographic proximity to these markets, products from ASEAN will also be more competitive for consumers than exports from the Americas.

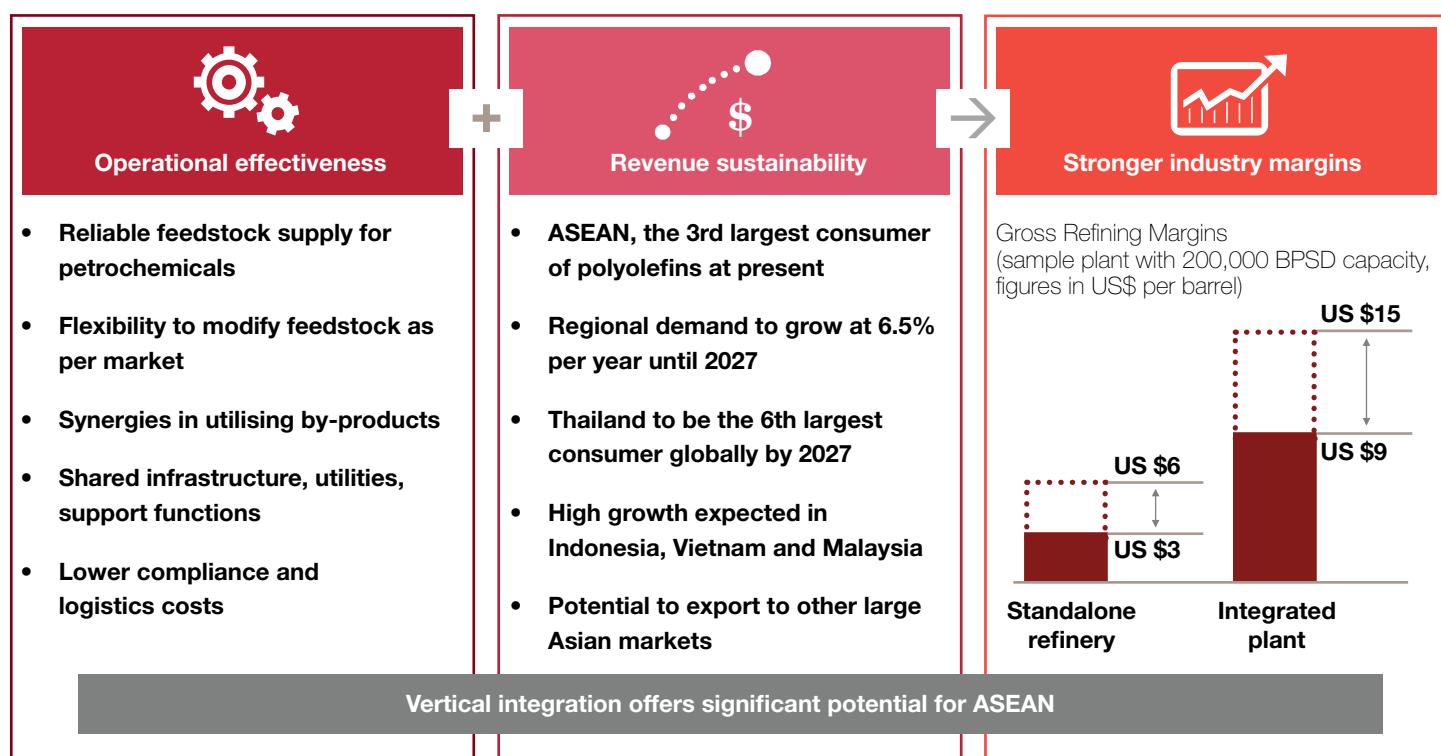
Seeing the growth potential in this market, a global chemical manufacturer, operating one of its largest integrated plants in Singapore, has announced multiple plans to further expand production capacity for key products such as aromatics and specialty

polymers – targeting exports to the larger regional market. The company expects global demand to rise by more than 40 percent over the next 10 years, with almost three-fourths of the additional demand originating from the Asia-Pacific region. Going forward, vertical integration will be particularly relevant for a market such as Indonesia — pushed by a mix of factors such as fast-rising consumption of both refined fuels and petrochemicals, existence of a large deficit in production capacity, and the need to spread out risks associated with funding and regulatory complications.³¹⁸

Analysing the impact on industry margins will be key to understanding the benefits achievable through vertical integration. Industry estimates based on a study conducted in Western Europe highlight the significant improvement in profitability possible

through integration, which is highly important for sustaining growth in today's volatile and competitive business environment. According to the study, an integrated complex with crude processing capacity of around 200,000 BPSD (barrels per stream day)^d could generate gross margins of approximately US\$9 to \$15 per barrel, depending on market conditions and operational factors, as compared with only US\$3 to \$6 per barrel for a stand-alone refinery. Another example in the Asia-Pacific region is that of the refinery off-gas cracker (ROGC) complex built by Reliance Industries Ltd. in India. The company has been able to consistently achieve double-digit margins in recent times, much higher than its industry peers, by building large-scale integrated production facilities, supported by specific capabilities helping it stay ahead of the competition.³¹⁹ This is discussed in more detail in the case study at the end of the chapter.

Figure 6.9: Vertical Integration – Refining Sector in ASEAN



Source: PwC analysis

^d The maximum number of barrels of input that a facility can process within a 24 hour period, while working at full capacity under optimal conditions, without downtime. It differs from barrels per day of capacity, which indicates the amount of input that a facility can process under usual operating conditions marked by multiple operational constraints.

Feedstock flexibility

Companies can also look to lower supply-side risks and boost operating margins by investing in capabilities to process cheaper feedstock from new market sources. As discussed earlier, crude reserves and oil production in ASEAN are expected to fall in the coming years, increasing the reliance on imports. The global crude industry is also witnessing the emergence of new and cheaper supply sources. However, most refineries in ASEAN (except in Singapore) are mainly designed to process lighter Middle East crude than heavier oil variants from the Americas, thus increasing the reliance of ASEAN on specific suppliers such as Kuwait and Saudi Arabia. On the other hand, competitive Asian markets such as China and India have already started making investments to upgrade refineries to handle more flexible inputs. Even for petrochemicals, production units in ASEAN have heavy dependence on naphtha as a primary feedstock, inhibiting the use of other inputs that can help improve margins, such as cheaper LPG and condensates. As per industry estimates, monthly flows of naphtha to the region reduced to almost one-third over the past one year period, due to rising naphtha prices, driven by strong demand in Western markets. Other regional competitors such as in North Asia have accordingly been focusing on building propane dehydrogenation capacity that allows the use of less expensive alternatives in their petrochemical plants.³²⁰

Investing in the operational infrastructure and capabilities required to process different feedstock variants will be important in improving operating margins, as they allow the use of cheaper fuel sources and provide a stronger bargaining position with oil suppliers. This infrastructure will include investments in new equipment (such as pumps, compressors, and heat exchangers), and in next-generation technologies to better detect instances of fouling and corrosion due to the blending of different crude oil variants. Companies will also need to strengthen their crude

blending capabilities, developing deeper knowledge of feedstock properties in order to create suitable “mixed feeds” at cheaper costs that will meet a particular plant’s operational requirements and avoid large-scale infrastructure investments. A few ASEAN markets have already started planning in this direction. For example, Indonesia’s Pertamina is looking to upgrade three refineries to process cheaper and more easily available “sour” oil with higher sulphur content of 2 percent (the “sweet” crude being used at present has a sulphur content of around 0.2 percent). Singapore has also invested in making its petrochemical units more flexible in being able to process cheaper condensates to produce aromatics, and reduce the reliance on more expensive naphtha as a feedstock.³²¹

New alliances

The oil and gas sector in ASEAN has been facing an investment crunch in recent years. Domestic oil reserves and production are on the decline, and new field developments will require more expensive and advanced extraction methods, such as deep-water drilling and enhanced oil recovery (EOR) techniques from mature fields. Factors such as falling oil prices, regulatory uncertainties with respect to foreign participation, and a slowdown in global economic growth have driven a sharp decline in upstream investments in Indonesia, for example, which recorded its lowest levels—US\$9.3 billion in 2017—prompting regulatory changes to boost investments in the coming years. Dominated by such upstream concerns, the oil and gas sector in ASEAN has neglected downstream refining, in turn creating the need for capacity expansion and infrastructure upgrades in the future. As an example, compared to the upstream sector, Indonesia invested only US\$846 million in the downstream sector in 2017, despite a major lag in capacity over consumption.³²²

Facing an investment deficit, ASEAN refineries could look to target partnerships with global oil firms — which are on the lookout for greater demand security — to address falling domestic supply and to garner much-needed investments and technical expertise in the sector. Many ASEAN markets have started taking steps in this direction. For example, Saudi Aramco will supply up to 70 percent of the RAPID refinery's needs in Malaysia and invest US\$7 billion to acquire a 50 percent stake in the plant. Aramco has also acquired a 45 percent stake in Indonesia's Cilacap refinery, to boost its expansion plans by making an investment worth US\$5.5 billion. Besides capacity addition, investments will be required to upgrade infrastructure and adopt new technology solutions that will help improve equipment reliability, reduce downtime, and meet stricter environmental regulations. These potential solutions include new system monitoring tools based on predictive analytics, advanced contaminant detection and treatment techniques, and new crude oil compatibility testing solutions.³²³

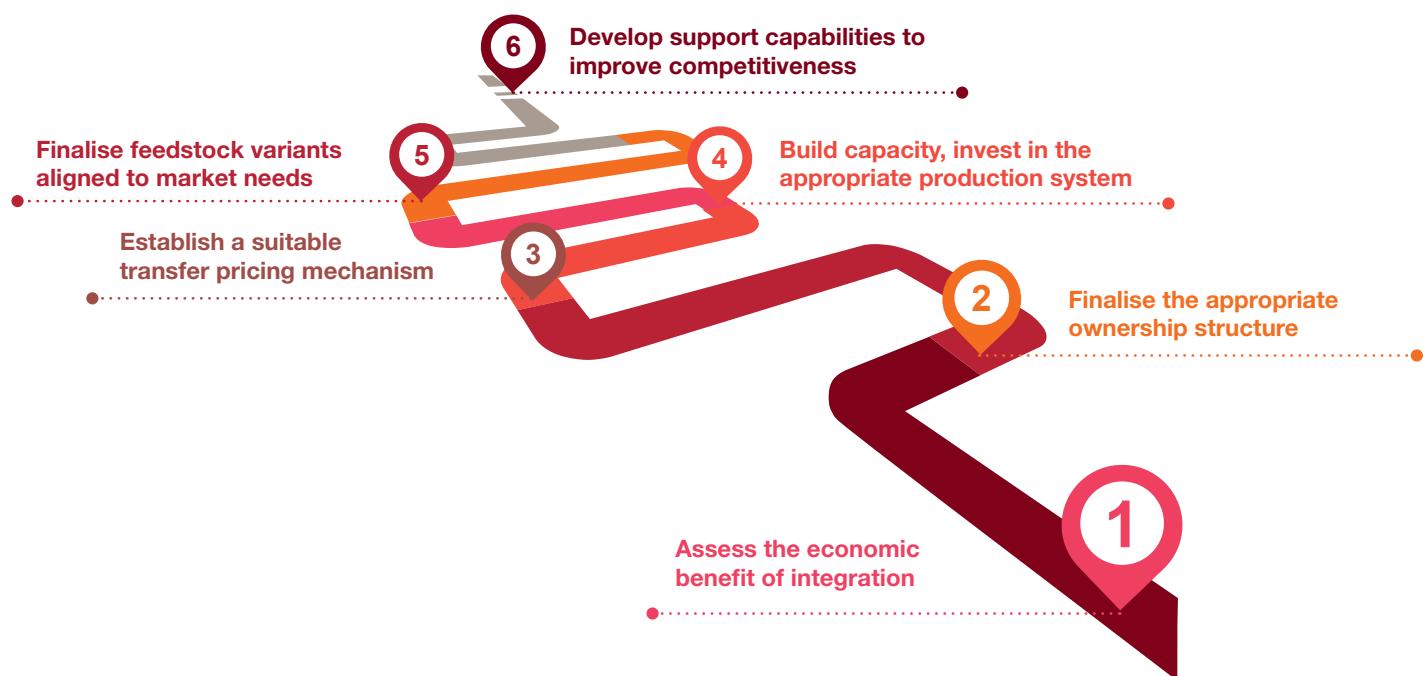
Vertical integration implementation road map

Companies must develop an implementation road map to navigate through the adoption of the new technologies, processes, and skills required to put strategies into action. Mentioned below, as an example, is a six-step roadmap to help execute effective vertical integration of refining and petrochemical plants.³²⁴

Step 1: Assess the economic benefit of integration

Understanding the economics of an integrated refinery over a stand-alone refinery will require detailed analyses of factors such as demand and pricing trends for fuel and chemical products; feedstock type and availability; and expected savings from synergies based on the scale of operations, location, and capital costs.

Figure 6.10: Vertical Integration Implementation Roadmap



Source: PwC analysis

Step 2: Finalise the appropriate ownership structure

The two business lines could operate as separate entities or be combined under a common structure (with unified profit and loss accounting). The decision will depend on factors such as the ease of decision making and execution based on the need for a single unified leadership or separate market focus, impact on existing financial statements, efficient tax structuring, and ease of securing funding.

Step 3: Establish a suitable transfer pricing mechanism

Determine and discuss commercial terms for each product stream that flows across the refining and petrochemical unit. The two units could negotiate upper and lower pricing limits at an early stage, to improve transparency and facilitate agreement among key stakeholders. These limits will be based on factors such as value derived from integration for each unit, existence of an alternative market for each stream and its value in this market, the cost to produce or dispose of the product stream, and overall demand and supply trends.

Step 4: Build capacity, invest in the appropriate production system

Companies need to finalise the level of integration required (petrochemicals as a percentage of crude throughput) based on market considerations and operational strengths, and choose the overall configuration from the following production systems:

Option 1—Refinery integrated with steam cracker: mainly for light olefin production with co-products such as hydrogen and pygas being used back in the refinery for fuel production.

Option 2—Refinery integrated with aromatics complex: Heavy naphtha from the refinery produces a reformate that includes aromatics and other by-products.

Option 3—Refinery integrated with steam cracker and aromatics complex: a more complex system incorporating the two systems above, adopted if the market for both aromatics and olefins justifies the additional investments.

Step 5: Finalise feedstock variants aligned to market needs

Determine the quality of feedstock and blending required to achieve the desired product yields. For example, variations in the use of light, heavy, or full-range naphtha could change ethylene yields, and advanced catalysts could be used to increase aromatic yields. Competitive considerations will also have a major role to play in making investments in feedstock flexibility for both the refining and petrochemical operations, as noted earlier.

Step 6: Develop support capabilities to improve competitiveness

These broad capability areas can maximise the impact of growth strategies

1. Marketing: Develop marketing expertise to remain agile and enter new partnerships
2. Technology: Deploy new technology tools to reduce downtime and safety issues
3. Human capital: Strengthen skills to optimise technology adoption and minimise shocks
4. Risk management: Build robust frameworks, reducing dependence on external operators

Vertical integration execution challenges

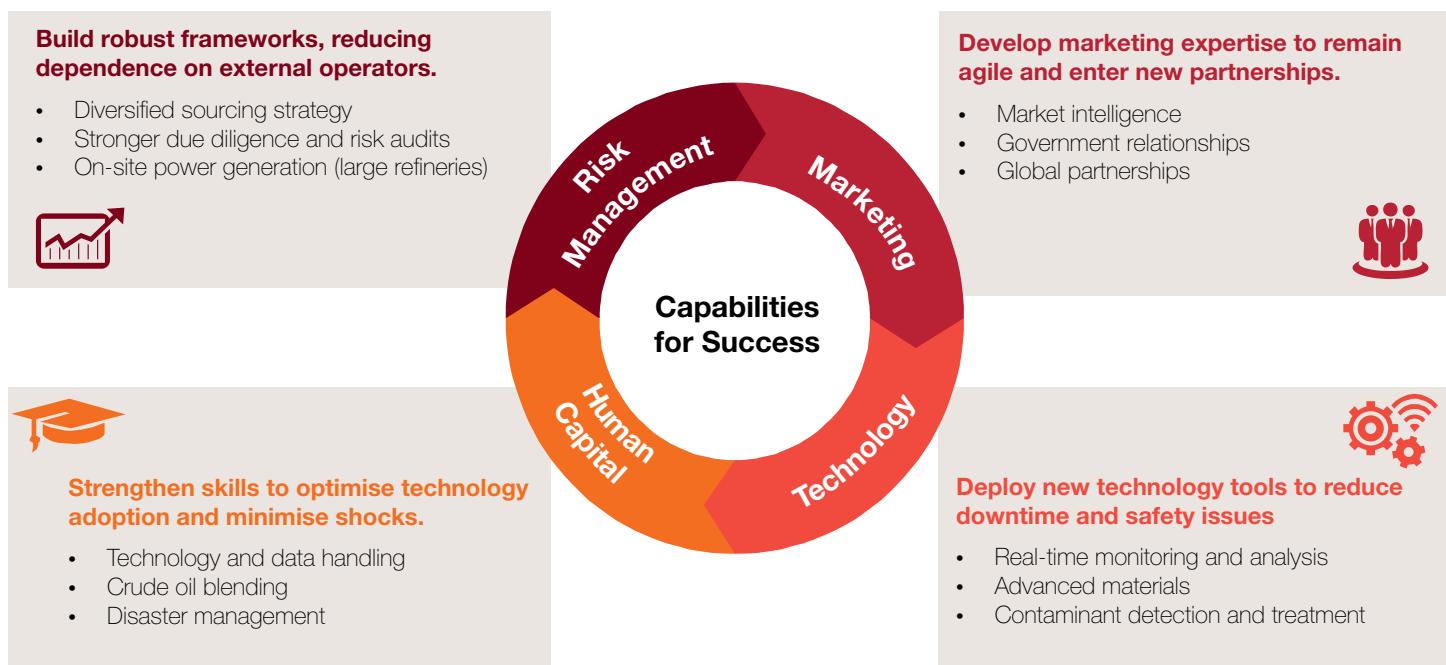
Achieving effective vertical integration between a refinery and a petrochemical plant will not be without its challenges. Most important will be the parties' ability to manage the additional technical complexity that integration will bring — especially in monitoring multiple product streams and in the need to modify the end product mix (and hence inputs) in response to changing market consumption patterns — if it is to remain profitable in a highly competitive environment. Lack of expertise in building and operating such large-scale integrated units in less developed ASEAN markets further necessitates international involvement to understand best practices. However, considering the strategic importance of the energy sector, regulatory restrictions in certain markets could play a major role

in undermining the potential to build new alliances with global oil firms, while bureaucratic barriers could make sourcing crude oil from multiple markets more difficult. Hence, understanding the regulatory landscape, including its impact on the overall business case through environmental obligations or pricing controls, will also be essential before devising any entry or growth strategy for a particular ASEAN market.³²⁵

Enabling capabilities

As highlighted in the roadmap for vertical integration, there are four broad capability areas that ASEAN companies will need to focus upon to maximise the impact of growth strategies and address key CEO concerns in the refining sector.

Figure 6.11: Enabling Capabilities – Refining Sector in ASEAN



Source: PwC analysis

Marketing: Develop marketing expertise to remain agile and enter new partnerships.

A stronger marketing focus will be required to remain agile in a highly dynamic industry. This will include building market intelligence capabilities to acquire timely inputs and better anticipate the impact of factors such as changing regulatory norms, emerging industry standards, or changes in global supply and demand patterns on feedstock and end-product choices for the refiner. Companies operating in ASEAN will also have to engage more proactively with government stakeholders to push for reforms that incentivise private-sector participation, especially from foreign investors capable of bringing in growth capital. Aligned with this will be the expertise required to effectively manage relationships with global investors and partners in the coming years. They will need expertise in identifying the right partners, deciding suitable contractual terms, and building stronger dispute resolution mechanisms.³²⁶

Technology: Deploy new technology tools to reduce downtime and safety issues.

Adoption of new technologies such as wireless sensing, data management, and predictive analytics solutions that enable real-time monitoring, analysis, and response will be essential in the coming years, to reduce unplanned downtime and to minimise safety-related risks to, in turn, minimise disruptions and improve profitability in a hypercompetitive business environment. Companies could also utilise advances in materials science (such as materials with higher alloy content) and advanced contaminant detection and treatment techniques, to reduce instances of pipe leakages from corrosion, which remains among the leading causes of accidents within refineries. Collectively, these new solutions could help reduce financial, health and safety, and environmental risks (and therefore costs) for the refining company.³²⁷

Human capital: Strengthen skills to optimise technology adoption and minimise shocks.

Detailed skill development plans, outlining hiring and training requirements, will need to be incorporated as part of strategy implementation. Companies will need to hire experienced personnel and train existing employees to effectively deploy advanced technology solutions, identify weak spots, and respond appropriately to the large quantum of data generated by new data-driven tools. Stronger technical expertise will be required to understand the potential for blending different crude variants at cheaper costs, to benefit from feedstock flexibility. Companies also need to focus on strengthening their disaster management skills by developing expertise in new engineering designs and configurations that help minimise the impact of external shocks, and be able to respond appropriately to any safety incidents in a high-risk work environment.³²⁸

Risk management: Build robust frameworks, reducing dependence on external operators.

Refining companies will need to adopt stronger risk management frameworks spanning across multiple aspects including strategic, safety, compliance, and financial risks. Key elements of such a framework will include adopting a diversified crude sourcing strategy (from multiple geographies, under a mix of short-term and long-term arrangements), building stronger due diligence skills (technical, financial, legal) to better estimate the viability of new projects, and making periodic risk assessments and contractor audits. To reduce power outages and incidents of electrical equipment failure, large-scale refineries could also consider building on-site power generation units (renewable energy, cogeneration, or microgrids). This reduces the dependence on external operators and improves the reliability of power supply.³²⁹

Case study: Reliance Industries Ltd., India

Reliance Industries Ltd. (RIL) is the largest private player in India's refining sector, with a 26 percent share in domestic production capacity, as of 2016–17. The company recently commissioned one of the world's largest integrated refinery–petrochemical plants in Jamnagar, India (called the refinery off-gas cracker, or ROGC complex), allowing RIL to double its ethylene production capacity and feature among the top five petrochemical producers worldwide. It has also focused on a mix of growth strategies and capabilities to strengthen its performance over industry peers in recent years.³³⁰

Growth strategies

RIL's operational strategies have helped it achieve much stronger industry performance than its global counterparts.³³¹ These include:

1. Building large-scale integrated production capacity (such as the ROGC at Jamnagar), combined with 100 percent captive utility and power production to lower risks.
2. Improving plant flexibility to process different crude variants. Industry experts state that RIL can currently process up to 65 different grades of crude oil.
3. Building stronger capabilities to understand changing demand and supply trends. RIL has improved market outreach by expanding its global presence. The company has established trading offices in Houston, London, Singapore and Mumbai, and tankages at Rotterdam, Ashkelon and Singapore to improve market responsiveness and reduce sourcing risks.



RIL's Refining Operations and Growth Strategies – Highlights

Overview

Largest private sector refiner in India. Operates among the world's largest integrated complexes in Jamnagar, India.

Key growth strategies

1 Build large-scale integrated production capacity



2 Improve plant flexibility to process multiple feedstocks



3 Global outreach to lower supply risks and improve responsiveness



Impact

Much stronger refining margins than global peers – 12 consecutive quarters of double-digit margins.

Key players by refining capacity in India (2016-17)

| Company | Type | Capacity share |
|------------------------------------|-----------------------|----------------|
| IOCL | Public sector | 30% |
| BPCL | Public sector | 10% |
| HPCL | Public sector | 7% |
| MRPL | Public sector | 6% |
| CPCL | Public sector | 5% |
| Reliance Industries Limited | Private sector | 26% |
| Essar Oil | Private sector | 8% |

Characteristics of RIL's Jamnagar refinery, 2018

| | |
|---|------------------|
| Crude processing capacity (000 b/d) | 1,380 |
| Complexity Index (indicates ability to handle cheaper, lower quality feedstock, >10 considered complex) | 12.7 |
| % Captive utilities and power | 100% |
| Integration level - Petrochemicals (as % of crude) | 14.5% |
| Gross Refining Margin (GRM), FY'17 (US\$/bbl) | |
| RIL's Jamnagar refinery | US\$ 11.0 |
| US Gulf Coast/WTI | US\$ 8.7 |
| Singapore/Dubai | US\$ 5.8 |
| Rotterdam/Brent | US\$ 5.3 |

Source: Company website, media releases and project documents; Indian Petroleum & Natural Gas Statistics, Government of India, September 2017; Press articles

Strategy impact

Synergies resulting from the integrated plant (such as by using off-gases from RIL's two refineries as feedstock) enabled the company to supply products at costs competitive with those of players in the Middle East and North America, with bulk crude purchases for large-scale operations enabling stronger discounts. The benefits of integration combined with suitable design changes also allowed RIL to build the ROGC plant at approximately 40 percent lower capital costs compared with projects of a similar scale worldwide. Overall, RIL has been able to record stronger refining margins, consistently reporting a significant premium per barrel over global and regional benchmarks. As of January 2018, the refining business of RIL had recorded 12 consecutive quarters of double-digit margins.³³²



“

Continued growth in demand for petroleum products in ASEAN countries, particularly petrol and diesel in the emerging economies, rationalisation in the global refining industry and the relatively stable outlook for refining margins are factors supporting planned increases in ASEAN refining capacity. Combined with opportunities for vertical integration into the growing petrochemicals sector in ASEAN, this provides a platform for the future growth of the industry. ”

Paul Cornelius

Partner, Energy, Mining and Utilities Leader
PwC Singapore



Conclusion

ASEAN is at an important juncture in its growth journey, wherein the demand for energy is expected to grow tremendously with economic expansion going forward. However, by failing to build a strong domestic refining sector, the region risks squandering this opportunity, as a rising burden of imports further limits the region's abilities to make growth investments in other sectors. The refining sector remains underdeveloped in most markets in ASEAN, and limited production capacity and utilisation challenges are pushing the need for additional investments for new construction and plant upgrades. With national governments being concerned over energy security and the falling investment potential of domestic public-sector enterprises, the opportunities for private sector involvement are on the rise.

However, the refining industry itself is also facing challenging conditions, notably supply-side risks and profitability pressures, which will require interested players to adopt new growth strategies if they are to remain competitive. Integration of refining units with

petrochemical plants is a key strategy that promises significant revenue and cost upside in the ASEAN region. Companies will also need to improve feedstock flexibility and enter into global partnerships to address industry challenges. These strategies will require stronger support capabilities in terms of marketing focus, technology adoption, employee skills, and risk management, in order to maximise their potential – while being governed by a more robust implementation roadmap to effectively put strategy into execution.

The refining industry in ASEAN is in a state of flux, witnessing the introduction of new crude variants, adoption of stricter regulations and the emergence of new regional and global competitors. This high level of dynamism in the industry further necessitates the need to push for greater involvement of the private sector in the coming years. Undeterred by bureaucratic hurdles that could slow down execution in public-sector enterprises, these firms are better positioned to learn from best practices developed by international companies, and to leverage new technologies and strategies to maximise ASEAN's growth going forward.



A young man with dark hair and glasses is wearing white headphones and a dark hoodie. He is looking down at a red smartphone he is holding in his hands. The background is blurred, showing what appears to be a city street.

Chapter 7: *Telecommunications*

Telecommunications in ASEAN

The ASEAN telecom industry is a significant contributor to the growth of the region's economy. As the sector is an enabler for industry and consumer services, the knock-on effect that telecommunications has on wider industries is significant, and without telecom services, digital services as a whole would not exist.³³³ The World Bank has found that a 10 percent increase in mobile penetration is associated with a 1.35 percent increase in GDP for developing countries.³³⁴

The fixed internet has been available in the ASEAN region since 1992, not long after the World Wide Web was made available to the public (1991). The first commercial fixed internet service provider first appeared in Malaysia in 1992, Singapore, and Indonesia in 1994 and Thailand in 1995.³³⁵ Southeast Asia still had a fixed internet penetration rate of only 25 percent in 2014, due to the under-investment in fixed internet infrastructure.³³⁶ At this time the market was already at the tail end of the Web 2.0 wave and gearing up toward Web 3.0, resulting in consumers and businesses in the less mature markets demanding the same level of connectivity. ASEAN invested heavily in mobile infrastructure during this phase. Therefore, growth was driven by mobile internet and online computing, instead of fixed internet connectivity. ASEAN's mobile connectivity now ranks third globally, with a young population very focused on mobile content. Although mobile-only subscribers continue to dominate the market, wireline voice subscriptions will have a CAGR of -2.8 percent to reach 306 million subscriptions by the end of 2021.³³⁷

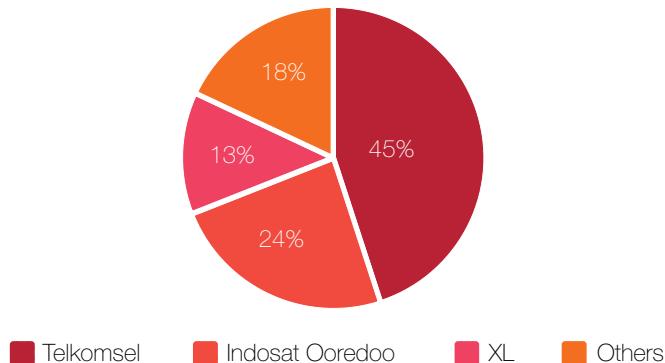
The growth of the telecom sector has been extraordinary across ASEAN. According to the 'We Are Social' Global Digital Report 2018, the average mobile connectivity in Southeast Asia was 141 percent as of January 2018, facilitating 81 percent mobile broadband penetration. These figures are higher than global averages (connectivity 112 percent, mobile broadband 63 percent).³³⁸ BMI reported that ASEAN mobile subscriptions grew by 2.2 percent in 2017, reaching 4 billion. The preference for multi-SIM ownership is fuelling further organic growth. The growth opportunity wave will benefit all the players in the ecosystem, including wireless and wireline/broadband carriers, network equipment/infrastructure companies, and device manufacturers.

Nevertheless, whilst mobile subscriber penetration is high in several ASEAN countries, regional disparities in internet penetration and internet speed still exist, caused by the strength of a country's infrastructure. For example, the average internet speed in Singapore is 20 Mbps, compared with 5.5 Mbps in the Philippines. This disparity is expected to be even more pronounced when comparing a highly digital city landscape with a rural area.

Consumer segment

Telecom operators in ASEAN have always had a “right to play”, given the protectionist policies of the regulators, however, with increasing competition their “right to win” in the market is being challenged. For example, in Indonesia, three operators — Telkomsel, Indosat Ooredoo, and XL Axiata — account for about 80 percent of the market share³³⁹ (see Figure 7.1), but they are under constant competitive pressure. This competition within the industry is affecting the profitability of operators across ASEAN; traditional business strategies aimed at securing growth through aggressive price competition ultimately benefit no one. Players in ASEAN must be wary of what has transpired in India, where telecom operators are in a race to the bottom and are fighting for survival. In the more advanced markets, such as Singapore, Singtel is facing competition from over-the-top (OTT) players such as WhatsApp and Netflix that are eating into its market share. WhatsApp’s launch of new services such as e-finance within its platform could further increase its stickiness factor, pulling business away from classic telecom services.

Figure 7.1: Indonesia Mobile Subscription Market Shares (%), Q2 2017



Source: BMI Indonesia Q1 2018 telecommunications report

Enterprise segment

ASEAN telecom providers face numerous challenges in the competitive consumer landscape. The enterprise segment presents its own complexities.

The ASEAN small and medium-sized enterprise (SME) sector is fragmented across the region, so the demand for enterprise telecom services is not at a large scale yet; however, there is significant potential for this segment as SMEs seek to increase their productivity dividend. With this in mind, telecom providers are evaluating the value of developing enterprise capabilities, such as managed IT, managed data centres, and cloud platforms, before demand picks up. Telecom operators in ASEAN need to invest in this segment. They hold the key to wider economic growth for ASEAN markets because they have the capability to create the ecosystems through which enterprise customers can connect and transact with consumers in a flexible and secure manner. At present, the enterprise product offerings in these areas are at nascent stages and the segment has yet to find a footing in the ASEAN market.



Government support

Given the importance of the sector, governments in ASEAN countries are taking measures to make more spectrum available and increase fairness and competitiveness. With the increased uptake of 3G and 4G within the region, governments are closing down legacy 2G spectrums. Thailand and Singapore, for example, are withdrawing their 2G networks in order to help increase the spectrum space for 3G and 4G. In the Philippines, regulators have demanded a new third operator, in what is currently a two-player market, as they hope to improve competition, although the new entrant will struggle against the dominance of the major two operators. In Vietnam in 2016, the government approved a national project to improve the fixed broadband infrastructure in order to accommodate 40 percent of the country's households with a minimum internet download speed of 25 Mbps by 2020. The long-term goal of this project is to increase e-commerce and e-governance, but it is also good news for providers, as it allows them much higher penetration rates for fixed broadband subscriptions.³⁴⁰

Foreign direct investment (FDI)

Governments' telecom-related FDI policies can be interpreted as harming their own interests to some extent. Malaysia and the Philippines do not allow foreign investors to own more than 49 percent and 40 percent, respectively, of companies offering both fixed and mobile telecom services. Indonesia also has restrictions on its foreign investment: no more than 49 percent for fixed telecom services and 65 percent for mobile telecom services. This is causing foreign investors to look elsewhere in the region, toward countries that are more flexible on ownership and investment, which is needed to boost telecommunications innovation in all markets to keep up with demand. The other adverse effect of these FDI policies is that the investing stakeholders, by not having a controlling stake in the company, have limited or no control over the business direction or board visibility. If governments become more flexible, it could increase the investment in the sector and have a knock-on effect on technology growth in areas such as e-commerce (Figure 7.2).³⁴¹

Figure 7.2: Foreign Ownership Allowed in Acquisition of a Local Company

| Selected Sectors | IDN | KHM | LAO | MMR | MYS | PHL | SGP | THA | VNM |
|--------------------------|-----|-----|-----|-----|-----------------|-----------------|-----|-----|-----|
| Banking | 99 | 100 | 100 | 100 | 30 ^b | 60 ^a | 100 | 49 | 30 |
| Insurance auto | 80 | 100 | 49 | 0 | 70 ^b | 100 | 100 | 49 | 100 |
| Insurance life | 80 | 100 | 49 | 0 | 70 ^b | 100 | 100 | 49 | 100 |
| Fixed telecom | 49 | 100 | 100 | 100 | 49 | 40 | 100 | 100 | 70 |
| Mobile telecom | 65 | 100 | 100 | 100 | 49 | 40 | 100 | 100 | 70 |
| Retailing | 0 | 100 | 0 | 100 | 100 | 100 | 100 | 100 | 100 |
| Air transport | 49 | 49 | 49 | 49 | 49 | 40 | 100 | 49 | 49 |
| Maritime shipping | 49 | 49 | NA | 0 | 100 | 40 | 100 | 49 | 49 |
| Maritime aux. | 49 | 100 | NA | 0 | | 40 | 100 | 49 | 51 |
| Road freight | 49 | 100 | 49 | 0 | 49 | 40 | 100 | 49 | 51 |
| Rail freight | 0 | 100 | NA | 0 | 0 | 0 | NA | 49 | 49 |

Note:

a. In the Philippines, under the Republic Act (R.A) No. 10641, enacted in 2014, after the policy survey was conducted, foreign banks can now apply to operate in the Philippines either as a branch or as a wholly owned subsidiary. In addition, the new law allows foreign banks to acquire up to 100 percent of the voting stock of an existing domestic bank.

b. Following the enactment of the Financial Services Act 2013 and Islamic Financial Services Act 2013 in June 2013, the acquisition of a significant foreign equity interest in Malaysian banks and insurance companies in both the conventional and Islamic finance sectors could be up to 100 percent, subject to meeting the prudential and "best interest of Malaysia" criteria.

Source: ASEAN services integration report ASEAN-World Bank Group 2015

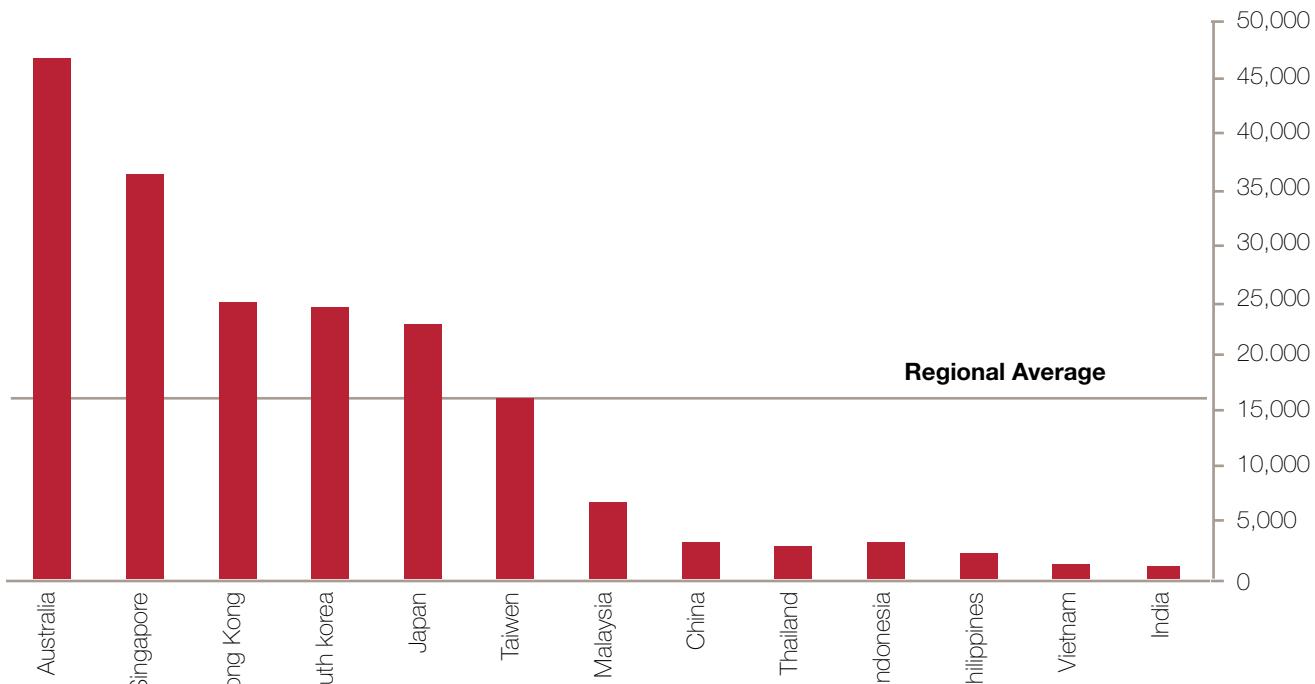
Favourable demographics

Against this backdrop, a number of forces are driving the potential growth of the ASEAN telecom market in both the consumer and enterprise segments.

At present, approximately 60 percent of the ASEAN population is under 40 years old, and many of these young workers (62 percent) will be residing in cities by 2020. As wages rise and technology becomes more available, the consumption of online goods and services

will increase. Growing urban development will make it easier for mobile providers to reach urban consumers in higher-density areas. ASEANZ also has an average net income per capita of more than US\$15,000 (see Figure 7.3) and the disposable income is likely to rise.

Figure 7.3: Disposable Income Per Capita, USD (2017f)



f = BMI forecast

Source: BMI

Changing consumer preferences

People across ASEAN are spending more time online, either shopping, consuming digital content, or utilising services. Mobile messaging is growing as consumers are hungry for the multiple modes of communication offered by messaging apps and the growing number of features offered, including peer-to-peer payments and m-commerce. In fact, social media penetration in ASEAN has already surpassed that in the developed markets.³⁴²

The global average of social media penetration stands at 31 percent, while the penetration in Southeast Asia stands at 53 percent.

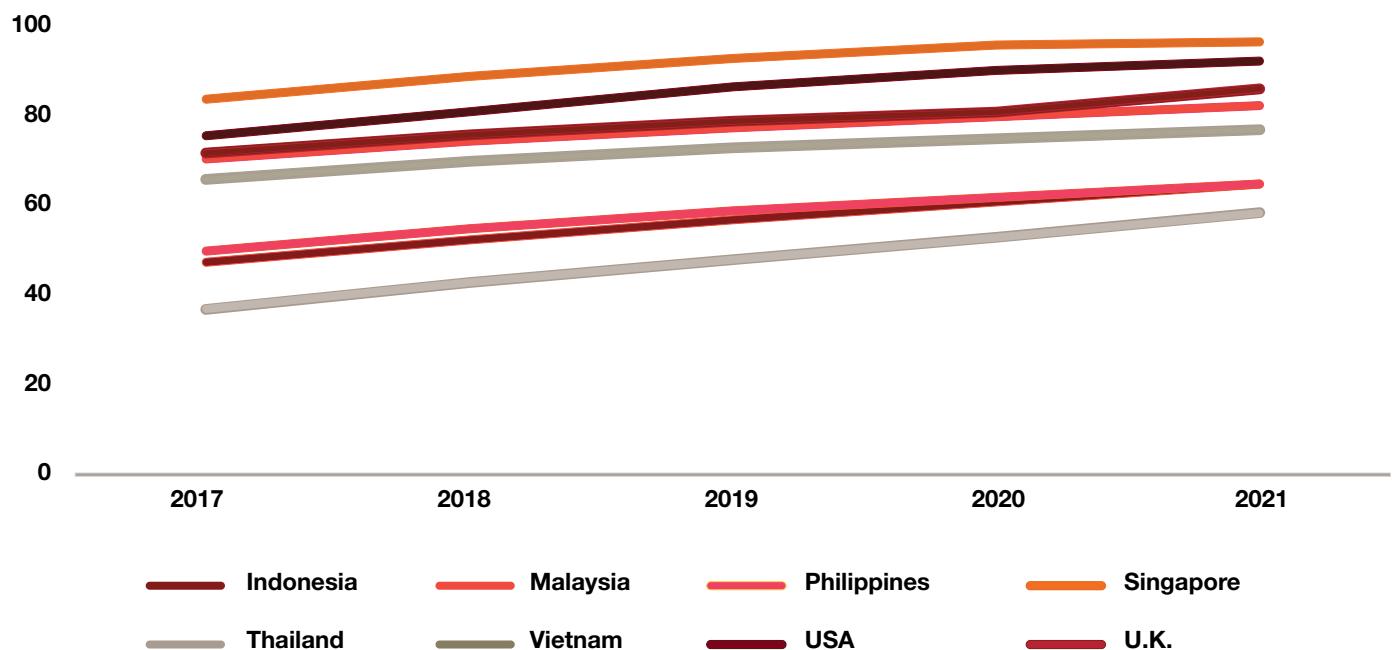
It is forecasted that smartphone ownership will skyrocket to a penetration rate of over 80 percent in the region in key markets such as Singapore and Malaysia by 2021 (see Figure 7.4).³⁴³

“

The rising penetration of smartphones, together with the high popularity of social media and digital commerce all go to show the potential for more growth in the ASEAN digital economy. But the needs of the next-generation digital consumer are constantly evolving, and to be successful companies must find new ways to understand customers better and target their market propositions accordingly. ,

Mohammad Chowdhury
Partner, Technology, Media and
Telecommunications Leader,
Australia, New Zealand and South East Asia
PwC Australia

Figure 7.4: Smartphone Penetration Rates, %



Source: Global entertainment and media outlook 2017-2021

Rise of Over the Top (OTT)

OTT video on demand revenue is projected to increase by approximately 80 to 90 percent between 2016 and 2021. It is estimated that the penetration rate for OTT in 2016 was 36 percent in South East Asia. This is set to grow to 64 percent by 2020. Advertising will remain the main source of revenue, contributing 47 percent of the total.³⁴⁴

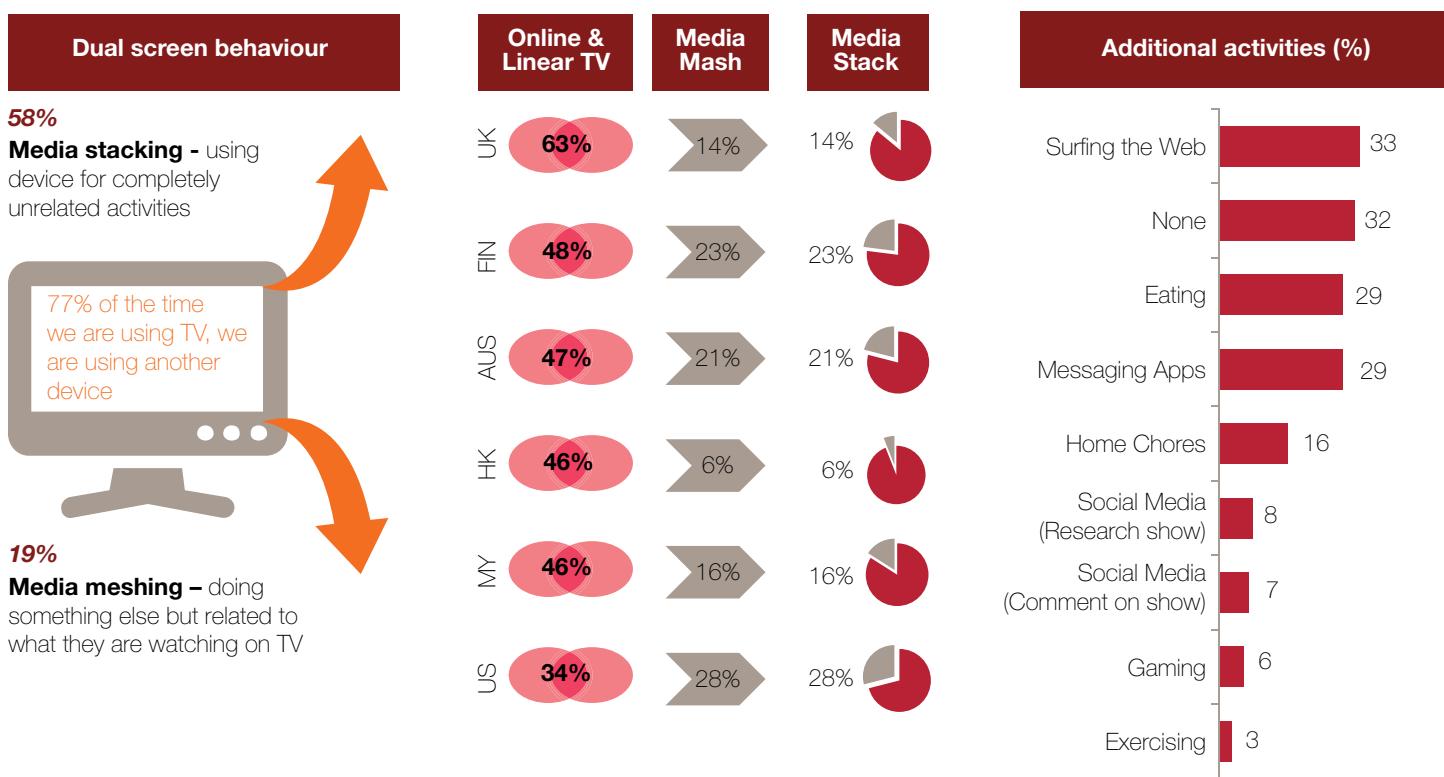
In developed nations such as the United States, video streaming services provided by Netflix and Amazon grew rapidly thanks to robust internet speeds, high fixed-line broadband connectivity, and more transient credit card payment. The same model will not work in a volatile market like ASEAN. Lack of premium content and deficient law enforcement have encouraged many Southeast Asians to turn to content piracy in the form of buying counterfeit DVDs and torrents.

Whereas network operators' business model are determined by regulatory requirements, the OTT players are usually free of such limitations; they have no licencing fees, no quality requirements, and little or no enforcement power. If countries in ASEAN wish to capitalise on the OTT trend, lobbying is needed to push governments to recognise and understand this new technology, how it impacts people's media usage, and the growth that will occur within this service.³⁴⁵

Advent of multi-screen

The “second screen” phenomenon is growing not only in ASEAN but also globally. Around the world, 77 percent of people are using another device while watching TV. There are a few terms for different types of multiscreen usage. *Media stacking* is a term for using a second device for a completely unrelated activity, for example, watching a film on TV while also reading

Figure 7.5: Consumer Multi-screen Behaviour



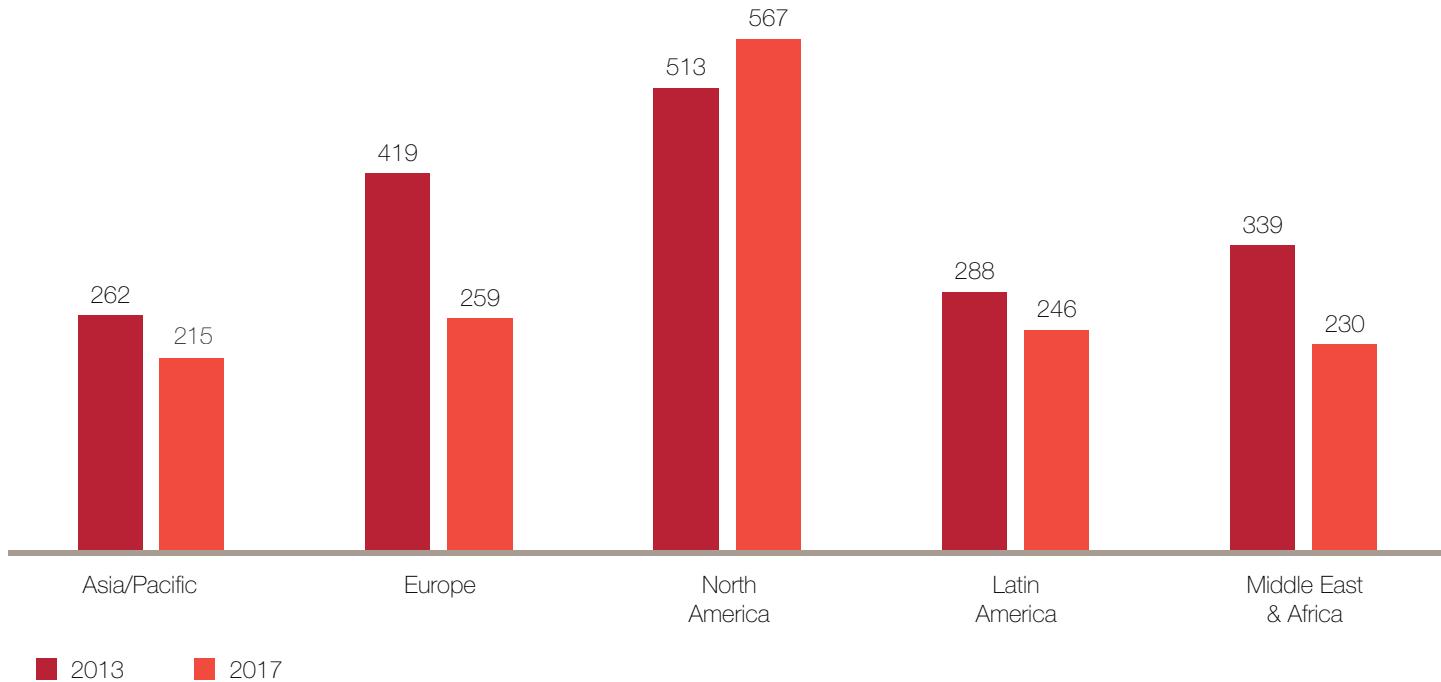
Source: AdReaction Report, Google Consumer Barometer, PwC Consumer Survey, Strategy& analysis

news online; media stacking usage is currently at 58 percent globally. *Media meshing* is a term for using another device related to what the user is watching on TV, such as researching something about a TV series or film while watching it or researching a word or a term that comes up on TV. This occurs 19 percent of the time. The types of digital activities people usually perform while stacking or meshing are surfing the Web, using messaging apps, using social media, and gaming (see Figure 7.5).³⁴⁶

Availability of affordable smartphones

Asia-Pacific smartphone prices fell by 18 percent between 2013 and 2017, a trend seen on a global scale, with production of budget smartphones being made available to consumers and enterprises across the region. Worldwide, smartphone shipments have seen their biggest increase in the last two years, and smartphones below US\$99 are estimated to approach 500 million units shipped in 2018. As these devices are increasingly adopted, 3G/4G growth will be fuelled further by cheaper data prices, which have already been shrinking over the past few years. In 2014, Indonesia, on average, charged US\$4 per gigabyte of data. That was reduced to just under US\$2.50 in 2015, and in 2016 was around the US\$2 mark. The same trend can be seen in Singapore, where the charge per gigabyte is much higher; it was more than US\$12 in 2014 and 2015 but dropped to around US\$7 in 2016 (see Figure 7.6).³⁴⁷

Figure 7.6: Average Selling Price of Smartphones Worldwide, US\$



Source: Statista

Increasing enterprise bandwidth demand

Managed data centres

Data centre services demand is increasing, driven by data growth and the need for business continuity services. Globally, the data centre market is expected to grow 25 percent by 2019, with the majority of data centre traffic flowing through the cloud. It is projected that Asia-Pacific data services spend will increase at a 14 percent CAGR from US\$16.3 million to US\$31.9 million between 2017 and 2022. Disaster recovery and business continuity will be the top priority, followed by network reliability. Among businesses, operating with a reduced risk of data loss and disruption to operations is considered a high priority; telecom companies can build their services around these requirements.³⁴⁸

The opportunity for enterprises to outsource their data centre services gives them the chance to reduce the cost of hardware and human resources. The value of these elements varies by size and scope of the company using the services of the telecom provider, but it can amount to significant savings.

Managed cloud services

Telecom companies are carving out a role in the cloud ecosystem. Globally, the importance of cloud services is expected to increase; predictions are for a 27 percent increase in deployment between 2014 and 2019 to PaaS, IaaS, and SaaS (platform-, infrastructure-, software as a service). To capitalise on this opportunity, telecom companies are taking strategic steps such as forming partnerships to optimise the delivery of solutions.³⁴⁹

Managed mobility and communications

Managed mobility will grow in importance in line with “bring your own device” initiatives and a more connected and mobile workforce. Workforces are becoming increasingly connected and mobile. The global devices per employee in 2010 was five; in 2020, this is expected to reach six devices per employee. Meanwhile, the number of desks per 10 knowledge workers is expected to drop to seven by 2020 from eight in 2010.

Advantages of managed services:

- Reduce operating costs by outsourcing data centre services.
- Reduce capital costs by provisioning cloud infrastructure on a pay-as-you-go basis.
- Support existing legacy applications with fully managed support of operating systems.
- Enhance security and networking with a tried-and-true architecture.
- Improve performance with guaranteed service levels and greater business agility.
- Customise solutions for complex IT environments.

Future potential — Consumer

Whilst average revenue per user (ARPU) from voice calls is declining, there are still tremendous opportunities for subscriber/revenue growth across ASEAN due to the sheer size of the underserved population, coupled with the increase in affluence in the growing middle-class households and assisted by the affordability of mobile platforms. Increased data usage will also help ease the decline in revenues for telecom operators; this can be achieved through a variety of mediums, including video streaming and increased usage of digital services.

Video on demand

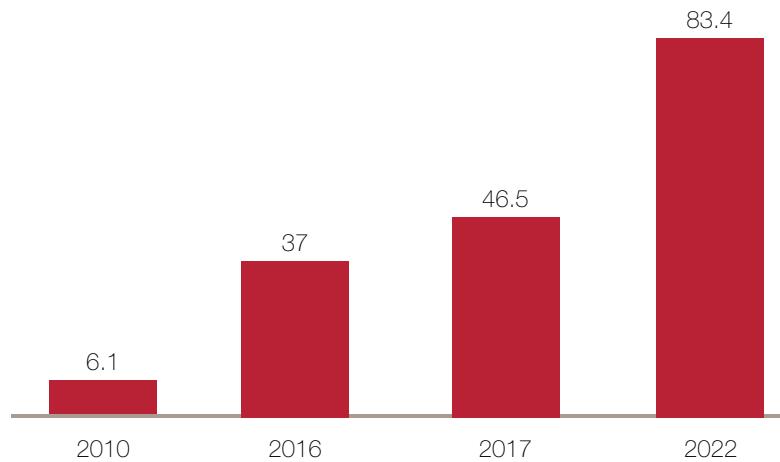
In the consumer segment, a younger population (more than 50 percent of the population is below 45) and the emerging middle class are contributing to the digital growth. The trend and opportunity within this group is in the decline of subscription-based fixed cable TV and the growth of online and OTT services, as well as the competitive online gaming industry that requires a large amount of bandwidth, predominantly mobile,

but also fixed household broadband. This provides an opportunity for service providers to partner with these OTT services to provide specific services. According to Digital TV Research, OTT services in Asia-Pacific generated US\$8.27 billion in 2016, and this is set to triple to US\$24 billion by 2022.³⁵⁰

One such example is the partnership between Telekom Malaysia and iflix that offers consumers the ability to get access without using their data plan. As iflix is a local home-grown OTT provider with more local content than Netflix, this encourages the Gen X and Gen Y users to go onto post-paid subscriptions, feeding back into the telecom monetisation infrastructure.³⁵¹

The two highest video viewing shares in ASEAN are live TV and smartphone. It is expected that the smartphone share will increase at a fast pace as the younger population drives consumption demand, giving telecom players a respite in revenue decline (see Figure 7.7).

Figure 7.7: Over-the-top (OTT) Revenue Worldwide from 2010 to 2022 (in billion U.S. Dollars)



Source: Statista

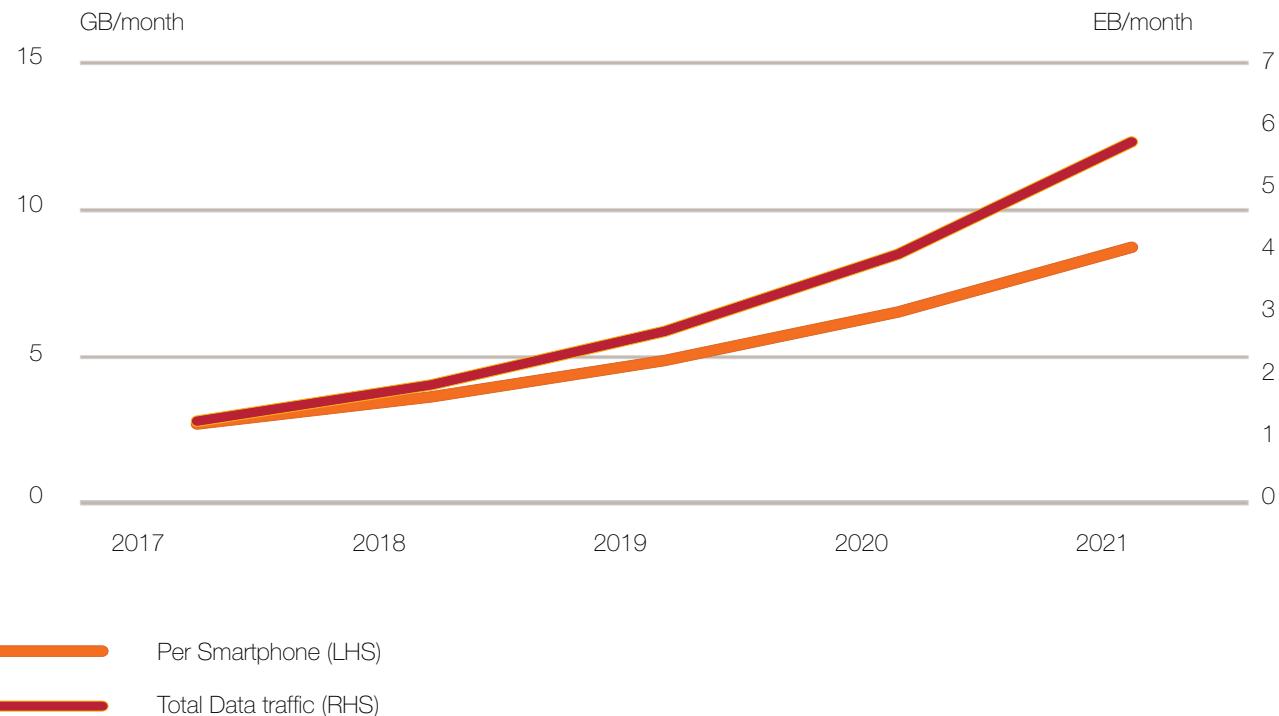
Digital services

Digital connectivity is increasingly shaping the behaviours of Southeast Asians and driving their usage of mobile data. This can be seen in the rapid rise of data-based call apps such as Skype and WhatsApp, as well as data-based messaging and social media. ASEAN has a 55 percent social media penetration, which surpasses the global average of 42 percent. This need for data is set to be on an exponential incline, as more than half of Southeast Asians will soon have access to the internet. Telecom players can still aspire to maintain revenues, despite declining ARPU from voice, thanks to the increasing data requirements of their subscriber base. The need for data is also growing rapidly on a global basis; the Asia-Pacific region is expected to grow by 73 percent CAGR between 2016 and 2021 (Figure 7.8).³⁵²

Emergence of eSIM

The launch of Apple Watch Series 3 and the adoption by most tier one mobile network operators (MNOs) of subscription manager (eSIM) platforms should lead to the aggressive introduction of new eSIM-enabled devices in the ASEAN market in the next 12–24 months, culminating with the launch of an Apple iPhone supporting eSIM in the next 24 months. This will lead to a sea change in the way MNOs interact with their consumer customers. They will no longer have the physical SIM as the manifestation of their MNO-to-consumer relationship. Owing to the change in distribution and the reduction in need for shelf space and the resulting competitiveness in the retail environment, a more level playing field for smaller MNOs and mobile virtual network operators (MVNOs) will develop.

Figure 7.8: Mobile Data Traffic Southeast Asia (including Oceania)



Direct SIM distribution methods will begin to take a back seat to direct marketing and demographic awareness. This links strongly to potential MNO advantages in their ability to directly appeal to targeted demographic groups with highly localised offers and packages. The introduction of eSIM and support for the technology platform by GSMA should also result in an influx of MVNOs targeting even more specialised demographic groups.

Electronic Know Your Customer (eKYC) regulations

Most countries in ASEAN are introducing stringent eKYC regulations, typically because of increased concerns about security and terrorism. Most of these regulations involve capture of key biometric data at

the point of customer registration, but in some cases (Malaysia, for example) also at the point of each account top-up. This is mostly being perceived as a cost to the operator, but could also be turned into a revenue stream if this collected and verified biometric data can be used by other service providers such as banks as a form of secure verification. This data could further be used in a cross-border scenario, giving regional alliances an advantage.



Future potential — Enterprise

As the consumer segment across Asia-Pacific matures, telecom players need to consider alternative avenues for growth through portfolio diversification. ASEAN telecom players are looking at the B2B/enterprise segment for the next wave of growth. However, there are a number of gaps within telecom operators' current enterprise offerings. The opportunity is dependent on the operators' ability to commit to and invest in multiple capabilities that are easy to maintain and scalable to SMEs and large businesses. Currently, within Asia-Pacific, the majority of the enterprise revenue comes from dedicated connections, but that is estimated to shrink by 2022 (see Figure 7.9).

Traditional business services offered to large enterprises include Unified Communications (UC), enterprise mobility, security, and desktop management. Although telecom companies have traditionally provided a subset of these services, a new paradigm is emerging. Telecom companies are strategically positioned to expand their portfolio and provide co-

location and hosting, SaaS, PaaS, and IaaS (either private or public cloud-based) services as well. Many of these markets are dominated by global IT companies. In the Asia-Pacific region alone, telecoms' revenue is expected to increase from US\$5 billion in 2017 to US\$9 billion in 2022.³⁵³

The conflict comes when the discussion turns to the physical location of the data centres. This is unsurprising considering the policies and regulations in place in some of the ASEAN countries. In Indonesia, for example, companies must get regulatory approval if they want to store financial data outside the country.

Singapore, the most mature market in the ASEAN region, requires that the owner of the overseas servers comply with local regulations on data security. The Trans-Pacific Partnership stipulates that countries cannot dictate data sovereignty provisions, so there is also a conflict of policy across the region. This gives local telecom companies the ability to offer services within their jurisdiction that comply with local regulations.³⁵⁴



Figure 7.9A: Telecoms operators' retail revenue from large enterprise by service type, emerging Asia-Pacific, 2017-2022

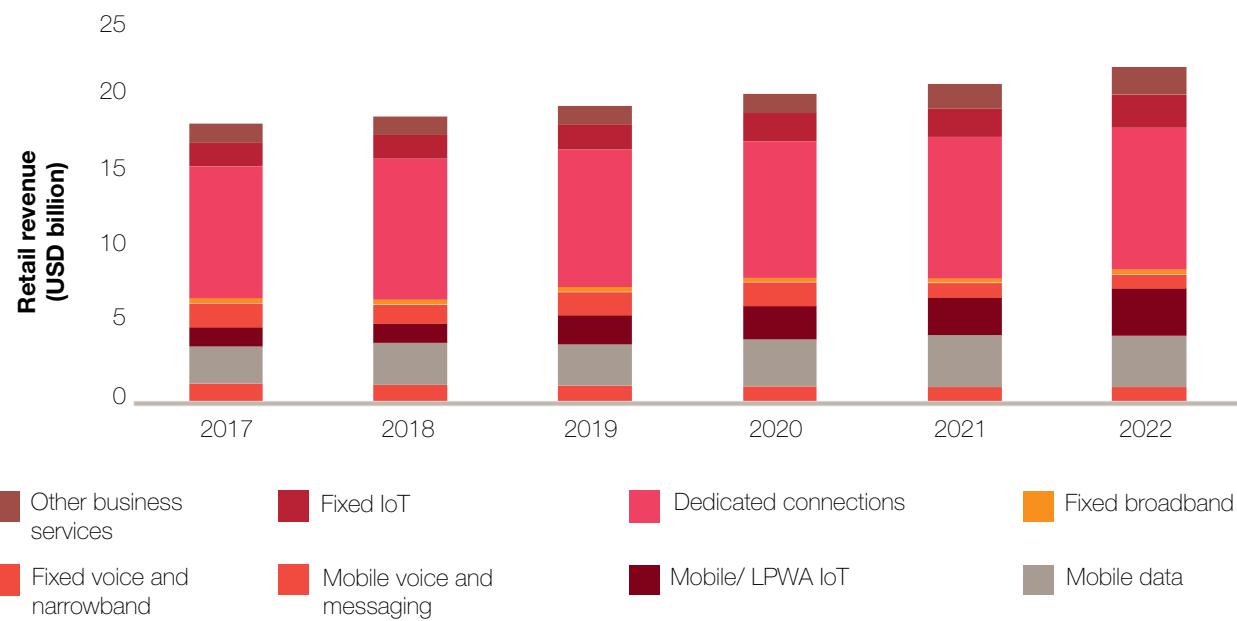
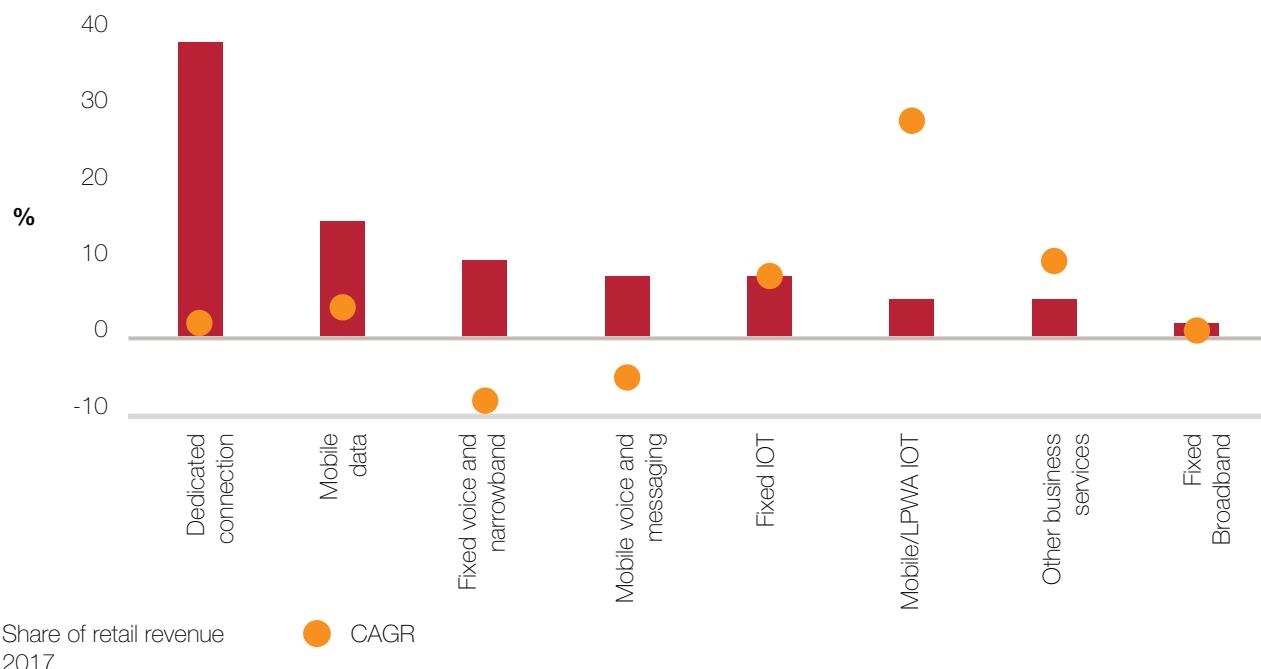


Figure 7.9B: Emerging Asia Pacific Enterprise revenue 2017 and CAGR's 2017-2022 by service, %



Source: Analysys Mason

Key industry challenges

Despite these seemingly robust drivers of growth for telecom providers across ASEAN, there are a number of challenges which players have to overcome in order to capitalise on ASEAN's potential.

Hypercompetitive environment

Although the number of mobile subscribers is growing across ASEAN, the ARPU is declining in key markets, which is due to the highly competitive environment driving lower prices and thereby impacting profitability. Trends in other markets, such as India, show that traditional business strategies aimed at securing growth through aggressive pricing ultimately benefit no one. ASEAN operators will need to embrace new service-oriented business models that will deliver the most attractive returns on investment in highly prized resources such as spectrum.

Capturing consumer attention

As mentioned earlier, consumer preferences and content consumption habits across ASEAN are ever evolving, making it harder to lock in customers and achieve long-term loyalty. All customers are important; however, certain segments are more valuable than others. ASEAN telecom companies need to –first determine what attributes their high-value customers have and then identify these clients specifically. The next step is to determine who, among this group, is most likely to churn (for example, clients approaching the end of their contract) and then target them appropriately. Not only can organisations make sure these segments are routed to higher-tier agents who can provide a better experience, but they should put structures into place to proactively reach out to these customers with relevant offers and information.

Diversifying revenue streams

Acknowledging the increasingly competitive and less profitable B2C business in ASEAN, some companies are considering opportunities within the B2B2C model. However, moving into a B2B model requires the development of new capabilities, which can bring significant risks. IT services come with growth opportunities attractive to a mature telecom industry,

but they also come with reduced margins (EBITDA of 5 to 25 percent for IT services, versus 35 to 40 percent for typical telecom services). For example, one operator in ASEAN acquired an IT player with a broad offering including systems integration, but found that benefitting from becoming an integrated IT and telecom player was tougher than expected, as the majority of the IT and telecom services were too different to enable commercial or operational synergies to be realised.

Stringent regulations

The current weak regulatory environment across the different ASEAN markets presents a deterrent to potential investors. In Thailand, for example, regulation continues to play catch-up, as political activity diverts attention away from enforcing policies to encourage mobile growth. In Vietnam, the telecommunications market is heavily regulated with the state having ownership in almost all operators. The Singapore telecommunications market is a bright spot in ASEAN, and is one of Asia's finest in terms of regulatory model and governance. The IDA (Info-communications Development Authority of Singapore) is an active regulator in terms of rulemaking and market governance, and enjoys a healthy distance from political forces in the country.

In short, there is little harmonisation of policies within Southeast Asia owing to a weak ASEAN framework that has limited definitive actions, resulting in a region whose countries do not operate effectively together. Consumer protection is also relatively weak in the region; only three countries (Malaysia, Singapore, and the Philippines) offer consumer policy laws at present. The industry structure is not clearly defined, resulting in few regulations in the OTT service industry. Foreign investments in some areas are also capped at a certain percentage, making it unattractive to investors as they have limited control and visibility.

Policymakers can take several steps to ensure harmonisation of policies in ASEAN, for example:

- Encourage innovation in digital industries through education, policies, and schemes (e.g. Malaysia Digital Economy Corporation)
- Build trust in consumers, enterprises, and operators
- Invest in the local digital economy
- Push internet penetration to borders
- Focus on e-commerce and fintech to get better transparency for taxes, digital services, and a cashless society

The telecom sector in ASEAN continues to be a critical force for growth, innovation, and disruption across multiple technology industries. With many of the fundamentals already in place, such as the robust and growing economy of the region, a young and literate population, and rapidly growing smartphone penetration, and as home to many of the world's largest companies, ASEAN has an opportunity to move to the forefront of the fast-growing global digital economy. Maintaining the current growth trajectory and addressing the challenges will require CEOs to look ahead and place some strategic bets in both the consumer and enterprise segments of the business. These bets may potentially divide the winners from the rest.

“

The digital economy is a critical driver for long term growth in ASEAN, and telecom players have the opportunity to play a major role in enabling digital transformation across the region. However, achieving this goal will require partnerships and collaboration between various stakeholders, including the industry and government, to deliver innovative, value-added and cost effective digital services to new age consumers and enterprises. ”

Rudiantara

Minister of Communication and Information Technology of the Republic of Indonesia



Strategies for telecommunications

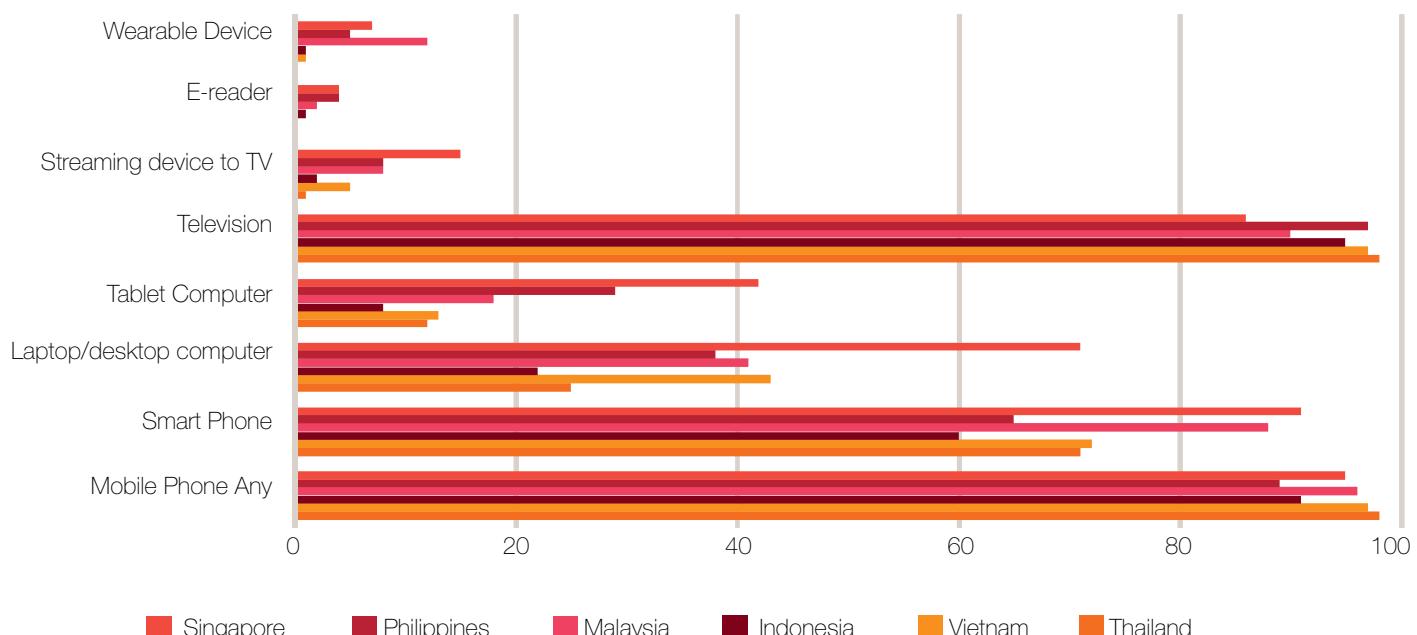
ASEAN has a broad mix of developed and emerging telecom markets, which are at very different stages of development. As we have seen, the consumer telecom market is a competitive landscape, and whilst not ignoring the remaining core opportunities (e.g. connectivity), operators are now more likely to evaluate opportunities in adjacent verticals, such as enterprise, where they can leverage their existing assets and address the growing needs of SMEs and large businesses in particular. Whilst the ROI for each opportunity will be different given the regional dynamics, telecom operators that take a portfolio investment mind-set and tap into true cross-sector opportunities are more likely to succeed. With this in mind, and from looking at the broad trends in ASEAN, there emerge a few key strategic options within both the consumer and enterprise segments.

Consumer

From a consumer perspective, digital/mobile advertising is one area which looks ripe for investment at this point. In 2017, global digital ad spending increased by 19.1 percent, to US\$228.4 billion, and mobile advertising investments accounted for 62.5 percent of digital advertising revenues. Telecom operators have a unique opportunity in this space to leverage the wealth of subscriber data that they have available.

Another opportunity area lies in consumer wearables. Gartner estimates that the global wearables market grew by 17 percent in 2017, with 310 million devices sold and US\$30.5 billion in revenue generated. Furthermore, IDC predicts that the wearables market will double by 2021.³⁵⁵ Malaysia is leading the wearables market in the region; 12 percent of participants in a study by 'We Are Social' say they own a wearable device. This is followed by Singapore with 7 percent (see Figure 7.10).³⁵⁶

Figure 7.10: Percentage of Adult Population Device Split 2018, %



Sources: *We Are Social 2018*

A third opportunity is in the area of Mobile Virtual Network Operator (MVNO) brands, launching a low-cost focused digital MVNO. Untapped niche segments are the primary driver for MVNO emergence. In saturated markets, reaching niche segments is a powerful way of growing the subscriber base. Existing MNOs may not have sufficient “brand permission” or focus to target untapped niche markets (e.g. minority groups) effectively. Moreover, MVNOs are better able to do this with targeted offers (e.g. Lycamobile, Boost). A secondary driver for the emergence of MVNO is spectrum scarcity/excess capacity.

Digital advertising

Market potential

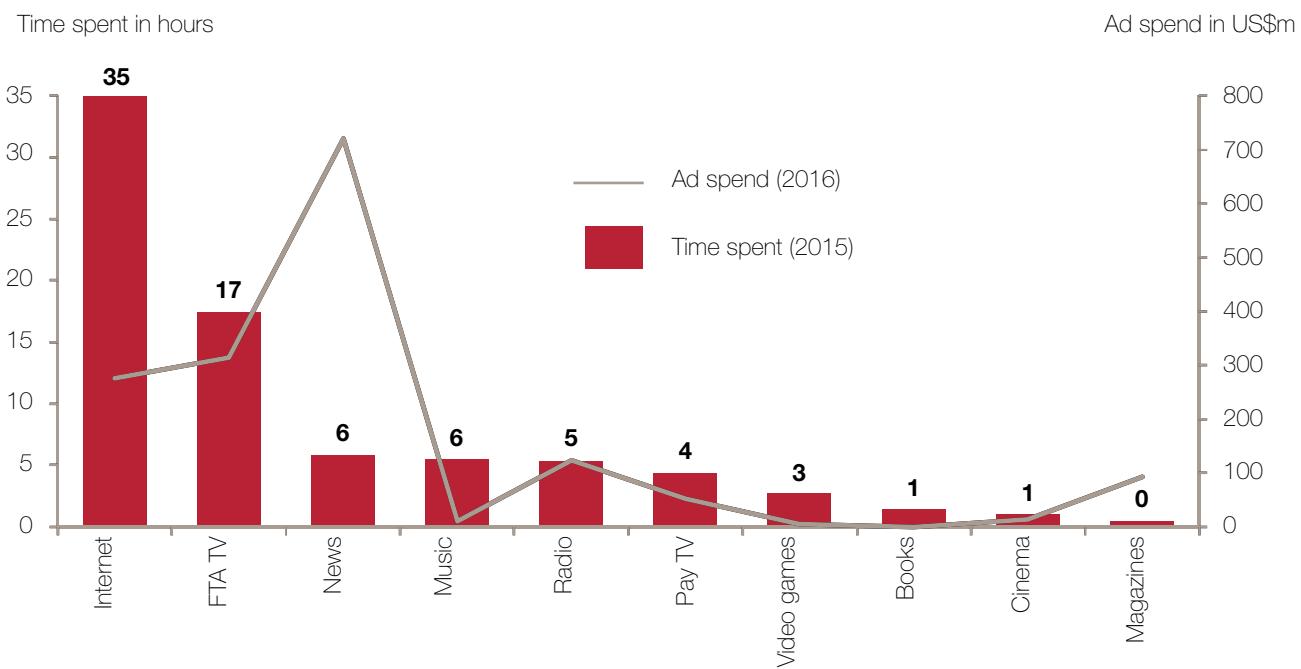
Pressures on advertising budgets across both traditional media (news, magazines, etc.) and non-traditional media (online via internet, video games, etc.) are leading to increased scrutiny of media audits and

greater ROI expectations. The focus is shifting to “outcomes-based” ROI decisions. However, currently companies are unable to draw strong correlations between “eyeballs” and ad spend, which will likely result in drastic adjustments in the coming years. As seen in Figure 7.11, ad spend has a limited correlation to the number of hours spent viewing the media source. This shows that there is an opportunity for advertisers to further optimise where they spend their limited marketing/advertising budget to target their audiences.

The developing economies of ASEAN are well placed to become Asia’s next top-ranking digital advertising growth markets. These economies will reap the gains of a development catch-up with their favourable demographics, rapid smartphone adoption, expanding internet access, and declining data prices. Furthermore, ASEAN customers are more open to receiving digital adverts which more developed market consumers may consider intrusive.

Figure 7.11: Advertising Spend (in US\$ million) and Time (in hours) Across Media

Currently there is a limited correlation between eyeballs and ad spend



Source: IMDA, PwC E&M outlook

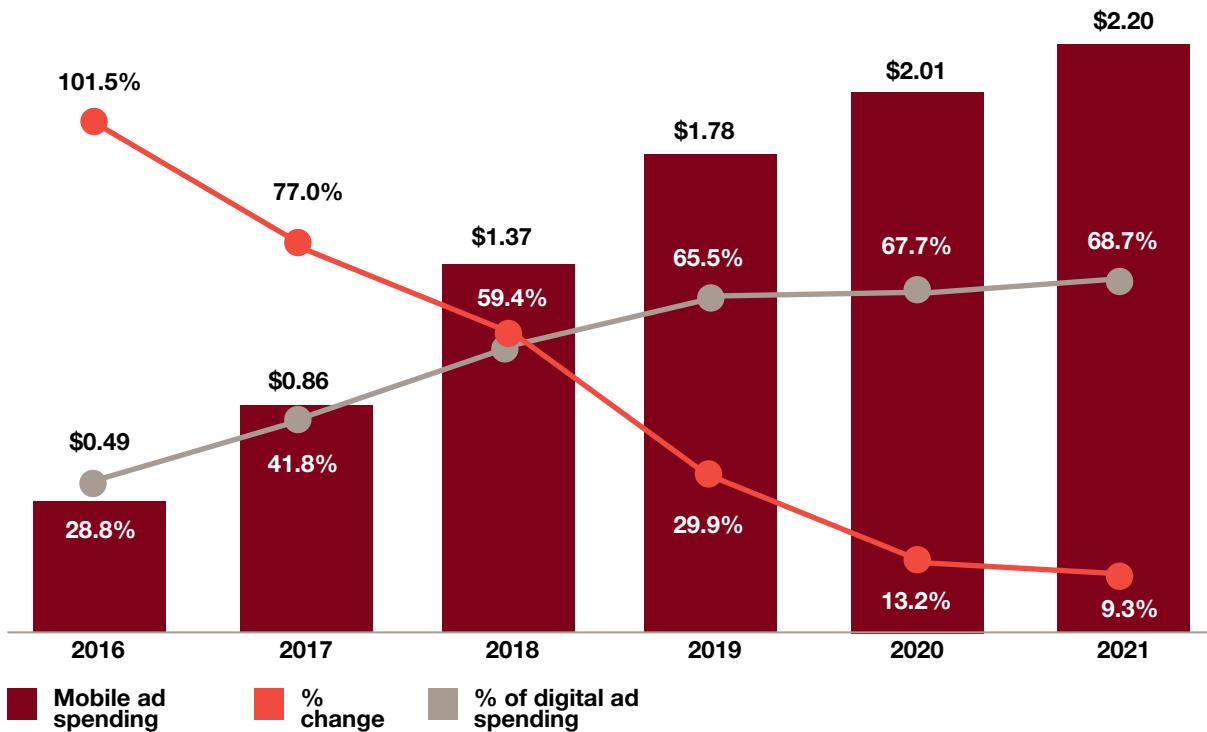
According to eMarketer, Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam will see digital ad expenditures increase by double digits in 2017 and 2018. Mobile ad spending in these markets will more than double during the forecast period, surpassing US\$2.2 billion and accounting for nearly 69 percent of digital ad expenditures by 2021 (see Figure 7.12).

In both the Philippines and Vietnam, the mobile advert expenditures were predicted to double in 2017, whilst in Indonesian outlays were anticipated to grow by 80 percent, thanks to heavy smartphone adoption. This growth is complemented across the region, with digital advertising accounting for 18.5 percent of all media ad

spend in Thailand in 2017, and this share is expected to rise to 28.7 percent by 2021. By 2021, digital advertising expenditures in Singapore will total roughly US\$520 million, with mobile accounting for 81.7 percent of all digital spend. This anticipated increase in digital advertising spend is primarily driven by brands' strong perception that ASEAN holds long-term growth potential thanks to its growing young population with a strengthening consumer appetite and increasing disposable spend.³⁵⁷

Figure 7.12: Mobile Ad Spending in Southeast Asia, 2016-2021

In billions, % change and % of digital ad spending



Note: includes display (banners, video and rich media and search); excludes SMS, MMS and P2P messaging-based advertising; includes ad spending on tablets

Source: eMarketer, Sep 2017

Challenges with the traditional ad sales process

Several process inefficiencies exist in the ad sales process.

1. Traditional advertising has limited reach:

Without broad reach, many potential consumers are liable to never hear of the brand, message, or proposition. For example, a radio ad might play in just one city or region. Or mailbox flyers will go to households in only a selected number of suburbs.

2. Traditional advertising is opaque to marketers and advertisers:

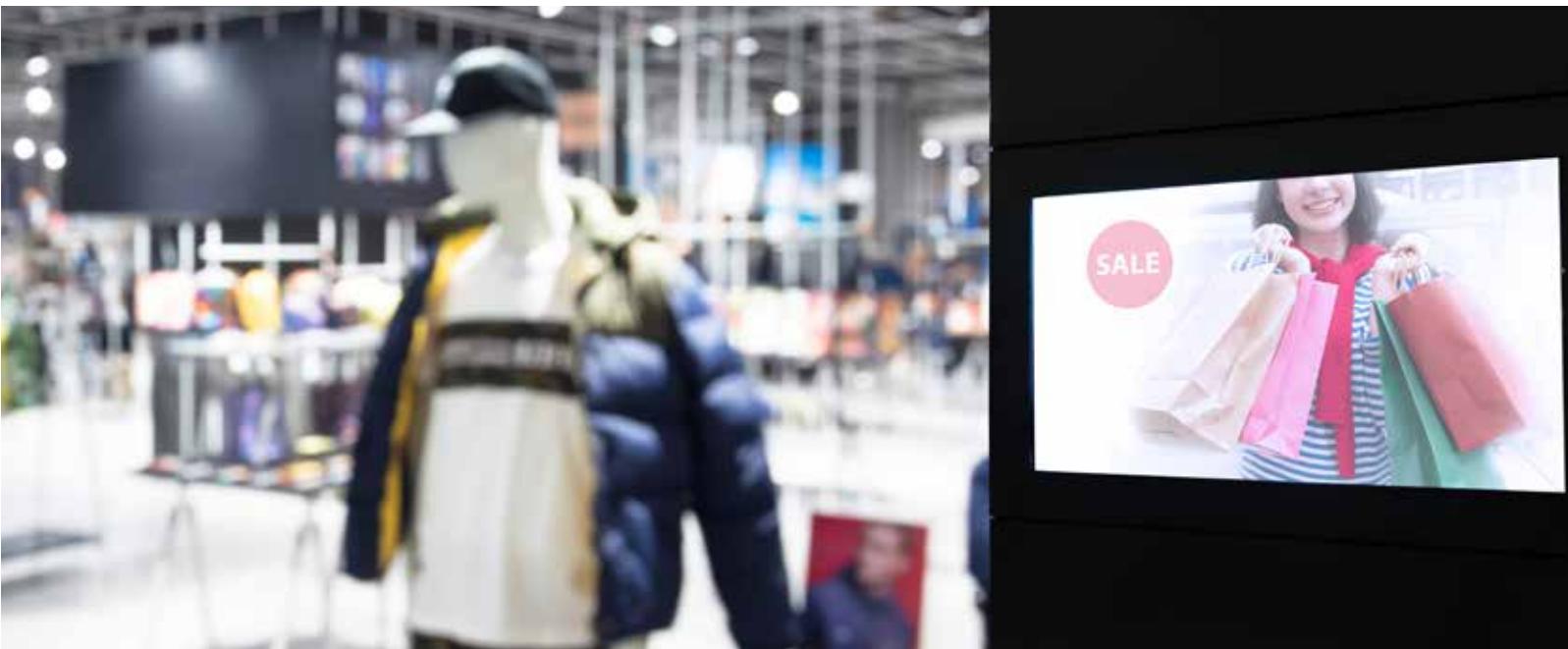
It's very difficult for companies to see exactly what sites their advertisements are reaching, the type of customer looking at their ad, and any costs associated with the advertisement.

3. No real-time reporting and data measurement:

Advertisers cannot measure exactly how their creative, campaign, and overall targeting is running as soon as it is launched. With traditional advertising (billboards, print advertisements, digital advertising through a publisher, etc.) companies have to wait until the end of the campaign to learn the results.

4. Traditional advertising is non-targeted:

Targeting allows marketers and advertisers to directly reach those customers most likely to complete the goal conversion, aka the ideal customers. In traditional advertising, it is difficult to segment the audience into marketing lists, making it harder to target the right audience, in the right context, at the right time. With programmatic advertising, on the other hand, marketers and advertisers can reach these ideal customers through IP targeting (zoning in on a specific IP address — usually good for targeting a business), geolocation targeting (East/West coast, state, city, postal code), or category and site targeting. Additionally, programmatic advertising allows marketers and advertisers to retarget customers after they have visited their site. Initially, only 2 percent of consumers convert on the first visit to a website. With retargeting, marketers and advertisers are able to continue to reach out to those ideal customers and get the other 98 percent to participate in a conversion.

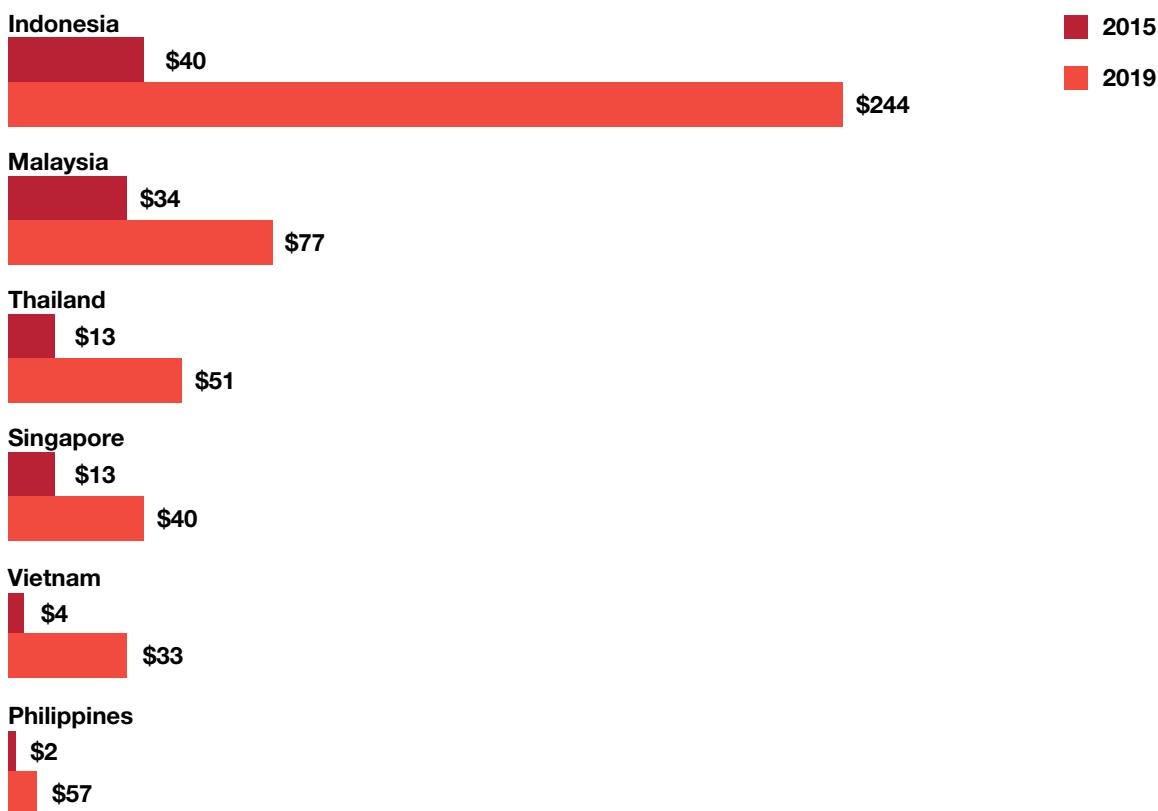


Programmatic advertising platform

Programmatic advertising is the automated process of allocating advertisements to video content, using software and algorithms to match adverts to content based on subject matter and other criteria. This digital marketplace enables advertisers and publishers to buy and sell advertising space, often through real-time auctions, thereby replacing the inefficient processes of buying and selling space and content. In other words, the human element of buying and selling is replaced with a machine-based solution to deliver real-time advertising. By working in collaboration with publishers, providers can offer scale and avoid being marginalised by global programmatic platforms such as Facebook.

Traditionally, advertising relied on a publisher and brand agreeing on the content of the advert and on the target audience, and then scheduling the appearance of that advert to coincide with the targeted audience watching/reading/listening/browsing. That process combined creative and data science. In a digital world, the audience fragmentation increases exponentially — there are more online destinations than newspapers — but the opportunity to deeply target those smaller, more relevant audiences introduces inefficiency unless there is an automated approach. Programmatic advertising is predominantly auction driven, that is, audience segments are sold to brands within nanoseconds, and the advert is served there and then.

Figure 7.13: Programmatic Ad Spending in select countries in Southeast Asia, 2015 & 2019 millions



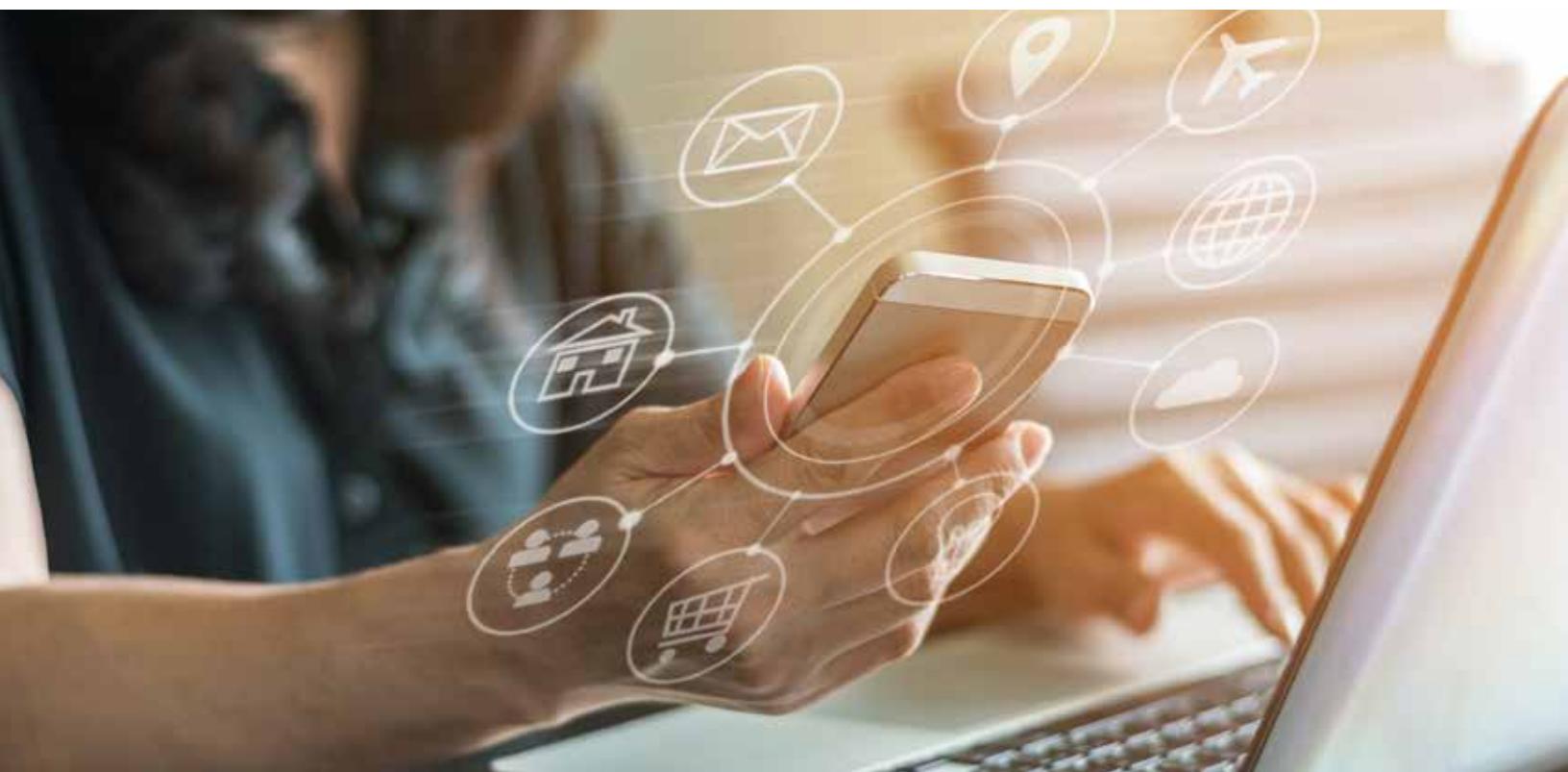
Source: Magna Global as cited by Vserv, Aug 23, 2016

Programmatic ad spending has grown globally, and whilst it is still in its early days in ASEAN, investment is starting to increase. The region is ripe for expansion thanks to accelerating adoption rates and growing familiarity with the technology among advertisers there. As seen in Figure 7.13, Indonesia is the region's spending leader and is on course to record outlays rising to US\$244 million in 2019 — a fivefold increase from 2015.³⁵⁸ Likewise, spending is expected to more than double in Malaysia, Thailand, Singapore, the Philippines, and Vietnam during the same period. In support of these growth expectations, a study by Forrester showed that 60 percent of interviewed marketing and media buying decision makers in Singapore and nearly 50 percent in Malaysia and 40 percent in Indonesia said that they had either adopted programmatic ad buying or planned to do so within a year.³⁵⁹

Telecom providers have troves of subscriber data. Carrier data is very valuable for marketers because cellular companies not only have validated information about their subscribers, but also can see exactly

how people use their phones for mobile apps, Web browsing, chat, and email. Despite this wealth of information, carriers have struggled to gain a foothold in mobile advertising. Mobile carriers want to monetise subscriber information, especially because revenues from voice and SMS have declined as messaging apps have become more popular. However, they need to be especially careful about following privacy laws and preventing data breaches. The anonymised data can either be broken down into audience segments for targeting or used as a reference to help publishers and advertisers verify the quality of their own data.

Operators can create a programmatic ad platform that gives them a way to monetise this subscriber data once the profiles are anonymised. All personal data that can identify an individual is stripped out before it reaches the programmatic ad platform, and the remaining data is catalogued using mobile ad IDs. The programmatic ad platform will help regional cellular companies attain a bigger scale so they can better compete with global players who currently dominate digital advertising.



Programmatic capabilities required

In an increasingly “noisy,” fragmented, and programmatic world, advertisers demand greater sophistication in acquiring digital advertising space. Advertisers are looking for partners that can support them in identifying a targeted audience at scale, to which they can deliver hypertargeted, brand-safe campaigns and connect with customers through (first-party) data-enriched inventory. Brands are seeking to pursue these targeted campaigns by using the most technically advanced and engaging advertising formats to create meaningful relationships with customers and achieving all this through a one-stop advertising shop, which can provide a uniform and media-rich experience for their customers across many publishers and platforms (see Figure 7.14).

Strategic options for telecom providers

A few options are available to providers seeking to develop the types of programmatic capabilities that brands and advertisers are looking for.

Option A: Offer a central platform for operator-enriched advertising inventory.

Today, telecom data is too fragmented for advertisers to take advantage of in any meaningful way. However, a telecom's subscriber data can be anonymised and aggregated through a programmatic trading platform to enable the platform to deliver improved ad relevancy and performance for its advertiser and publisher customers. This allows customers who access a particular platform to see clean, specific data that the operator owns through its own customers' data.

Option B: Own and power a mobile ad exchange platform.

By owning the mobile exchange platform, telecom companies are able to control what clients and what content they have in their inventories. This is important if they wish to address a specific vertical or horizontal to cater to their clients' needs in a more direct manner.

Figure 7.14: Key Programmatic Capabilities Required by Brands

In an increasingly ‘noisy’, fragmented and programmatic world, advertisers demand greater sophistication in acquiring digital advertising space



Targeted Audience at Scale

No longer is wide mass-market reach desirable; brands want to reach sizable and targeted micro-audiences at scale

Quality & Context-Rich Inventory

Brands want to deliver hyper-targeted brand-safe campaigns and connect with customers through (first-party) data enriched inventory

Creative Ad Formats

Brands want to advertise using the most technically advanced and engaging advertising formats to create meaningful relationships with customers

One-Stop Advertising Shop

Brands want to create a uniform and media-rich experience for its customers across many publishers and platforms in one simple programmatic buy

Source: IMDA, PwC E&M outlook

The fastest go-to-market strategy with either Option A or Option B is to acquire capabilities. By acquiring platforms inorganically, telecom companies can jump into the market with a product that they can monetise very quickly. With minimal additional investment, telecom companies can combine their current operations with the new acquisition to provide “best of breed” capabilities.

Acquiring companies that already provide services or that have the technology but not the partnerships, connections, and network, allows telecom companies to move into the market at a faster pace. This can also give them the capability to change the product, or to use it as a blueprint to supply different services and products faster. Acquiring companies also gives telecom companies access to the existing customer base of the platform, adding to their reach. Telecom companies have become the new ad tech strategies over the last two or three years. Verizon's purchases of AOL and Yahoo are the most high-profile examples. Others include players such as Singtel acquiring ad tech, beginning with Amobee in 2012 and continuing with Adconion and Kontera in 2014.

“
The status quo of digital advertising is simply untenable; the massive fragmentation of inventory, is at best frustrating for brands, as they seek scaled access to their audience. For sub-scale publishers it means losing nearly all bargaining power. For ‘enablers’, like telecom players, it’s an opportunity. Can they harness sufficient scale and relevant data to be a compelling alternative to global players? ”

Michael Graham
Partner

Telecoms and Media Consulting Leader
South East Asia Consulting
PwC Malaysia

Challenges in becoming an integrated media platform

Regardless of which option a telecom provider decides to take, it faces three challenges in becoming the best integrated media platform.

Challenge 1: Incoherent strategy

The branding might be strong but short on deep insights. Agencies and advertisers therefore have fewer options when it comes to live bidding. The telecom player might also have a recognised lack of genre expertise, which is important in mapping what is appropriate for what audience (for example, showing football advertisements during evening romantic drama programs might not yield the best profitability results). Finally, pricing principles may be in place, but not matured in areas of value-based pricing and discount structures. This is an important issue when advertisers are looking for the best deal and competition between advertising platforms is high.

Challenge 2: Lack of genre and creative services expertise

Telecom companies might have neither a formal interactive media digital function to support digital advertising nor the creative services expertise to develop user experiences that make platforms attractive to advertisers.

Challenge 3: Gaps in technology capabilities

Having a platform that is vertical specific but also capable of being integrated on a horizontal level with minimal renovation is important. This capability would give telecom companies quick access to other verticals that can use the platform just with a new skin. However, whilst data and analytics technology and capability are mature they are currently not being applied to their potential in advertising.

Case study: Singtel has made a series of acquisitions in the mobile digital advertising solutions space to increase its share of the consumer wallet and to shape the digital ecosystem

In the face of declining revenues from voice, Singtel wanted to expand its presence into the fast-growing mobile advertising and marketing industry. At the same time, Singtel wanted to help brands better reach their target audience and deliver relevant offers, rewards and promotions to customers that can help them deepen their one-on-one engagement with different audiences.

Recognising the opportunity, Singtel has made a series of acquisitions in the last few years. It started with acquiring Amobee, which provides mobile advertising solutions to operators, publishers and advertisers

globally, complements Singtel's capabilities with a technical platform that serves ads, banner as well as video ads. Through the acquisition of RingRing Media, AdJitsu, Gradient X, Adconian Media Group, and Kontera – it has further strengthened its data analytics capabilities and understanding of consumers that provides a strong foundation for future growth. The latest acquisition of Turn expands Amobee's existing programmatic and data management capabilities, and enables Singtel to offer marketers an independent end-to-end advertising and data management platform across all channels.

Consumer Segment: Digital Advertising

Singtel moved into the digital advertising industry with the acquisition of Amobee, and continues to build its capability inorganically

RingRing Media

- Announced: 2010
- Acquisition Price: \$20M
- Mobile advertising agency managing campaigns for clients

Adconian Media group

- Announced: 2014
- Acquisition Price: \$235M
- Innovative products delivered across multiple screens on a single platform

Declaraciones ISLR Venezuela

- Announced: 2014
- Acquisition Price: \$150M
- Kontera content activation platform

2010

2011

2012

2013

2014

2015

2016

2017

2018

Adjitsu

- Announced: 2012
- Acquisition Price: Undisclosed
- 3D technology based advertising company

Gradient X

- Announced: 2013
- Acquisition Price: Undisclosed
- Advanced programmatic marketing platform for mobile

Adeonion Direct

- Announced: 2014
- Acquisition Price: Undisclosed
- Marketing agency focused on brand intelligence

Turn

- Announced: 2017
- Acquisition Price: \$310M
- Data and media management platform technology

Benefits

As a result of the acquisitions, Singtel subsidiary Amobee is one of the largest independent buy-side marketing technology providers globally today. With Singtel's unified platform, leading brands and agencies can plan and buy media for specific audiences in a more integrated way to maximise their investments across desktop, mobile, video and social media. The capabilities give Singtel new monetisation opportunities- it is now positioned to target a consumer with a specific ad, or offer customers an ad-subsidised service plan.

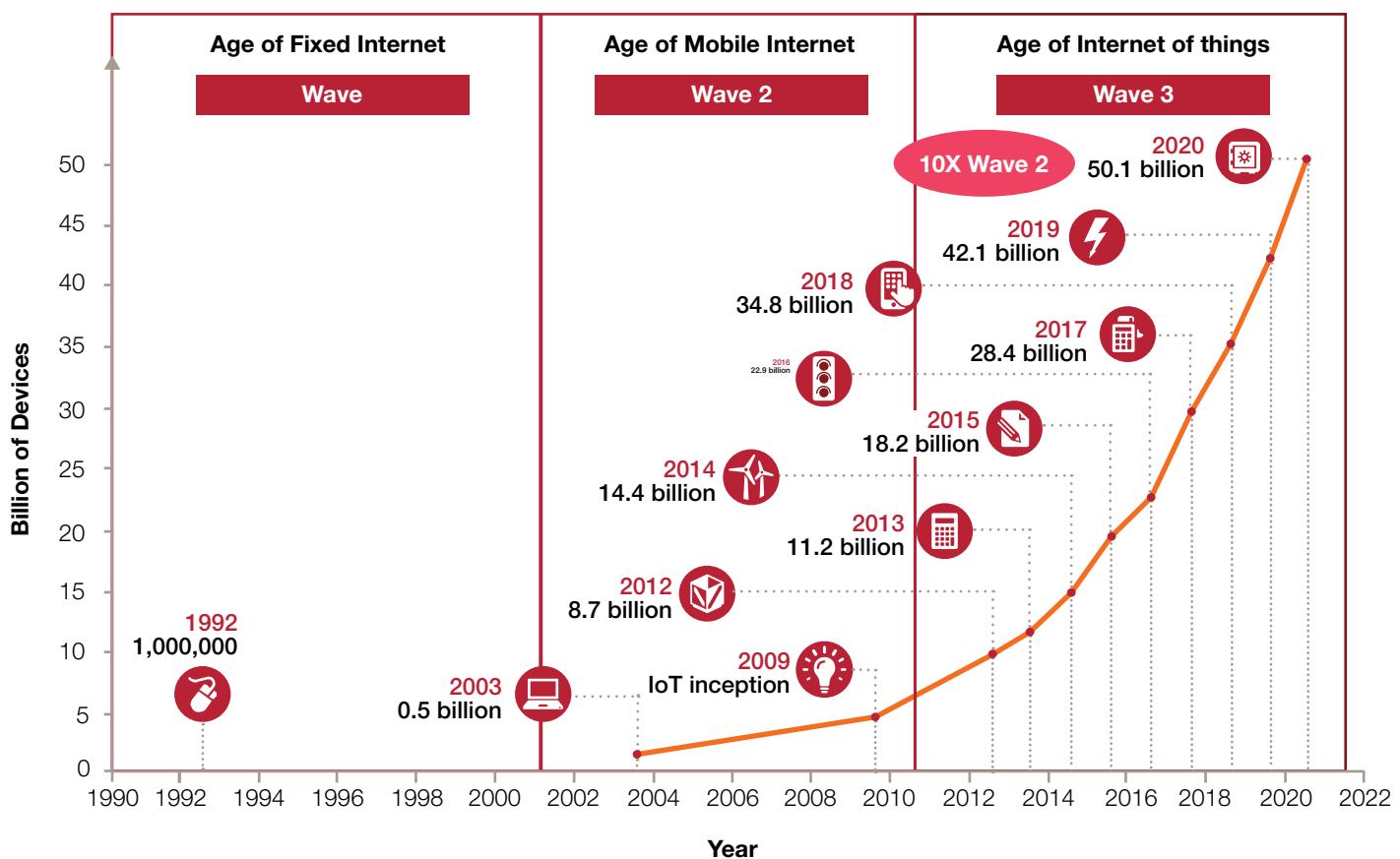
Enterprise

In the enterprise segment, the first major opportunity is in line with the growth of machine to machine (M2M) technology and the Internet of Things (IoT). It is anticipated that 50 billion “things” will be connected by 2020. This represents a 23 percent CAGR between 2014 and 2020, of which 40 percent is expected to come from the Asia-Pacific region. This will be a sevenfold increase over this period.³⁶⁰

Telecom operators are key players in creating and maintaining the ecosystems that connect businesses and connect them with consumers too (B2B2C). In this vein, enterprises are now migrating more of their business functions to the cloud at a rapid pace, to facilitate these new B2B2C ecosystems.

Given that Southeast Asians are spending more time making transactions online, mobile payments make up a third key area. ASEAN telecom companies should play a crucial role in developing strong payment infrastructures to enable enterprises to engage more effectively with consumers.

Figure 7.15: Growth in Device Connectivity between 1990 and 2022



Enterprise segment—M2M and IoT

Market potential

We are in the age of the Internet of Things, with billions of digital endpoints proliferating at the network's edge. Since the IoT inception in 2009, the number of devices is forecasted to rise 10-fold, from 5 billion to 50 billion by 2020.³⁶¹ The use of devices is evolving from passive monitoring of surrounding environments to optimising of daily decisions (Figure 7.16). Progress has been enabled by the IoT service functionality evolution, starting with connecting devices for capturing, monitoring, and reporting information and continuing all the way to creating self-healing/self-configuring networks of connected devices to optimise performance.

ASEAN holds significant potential for enterprise IoT projects; the IoT market is estimated to be valued at US\$1.7 billion in 2016, and it is expected to grow 35 percent per year for the next 5 years. Singapore, Indonesia, Malaysia, Thailand, and the Philippines lead the region's IoT spending, with a strong focus on key areas such as smart cities, manufacturing, automotive, transport and logistics, and agriculture. Singapore serves as the centre of IoT technology in ASEAN, and leads in discussions driving enterprise digital transformation.

Figure 7.16: Potential Applications for IoT Across Key Sectors

| |  Healthcare |  Transportation & Logistics |  Retail |  Financial Services |  Energy & Utility |  Industrial Manufacturing ¹⁾ |  Government |
|---|---|--|---|---|--|--|---|
| Some Applications Demanded | | | | | | | |
| Tracking and monitoring of systems | <ul style="list-style-type: none">Asset TrackingPatient SurveillanceMedical Equipment Tracking | <ul style="list-style-type: none">Asset TrackingFleet Tracking | <ul style="list-style-type: none">Asset TrackingInventory trackingSmart Self-checkout | <ul style="list-style-type: none">ATM Management(Asset Tracking)Card trackingStaff-less retail banks | <ul style="list-style-type: none">Asset TrackingSolar Farms ManagementWindmill Monitoring | <ul style="list-style-type: none">Asset trackingInventory Tracking | <ul style="list-style-type: none">Asset TrackingStreamlining of Surveillance & Other Security services |
| Controlling of devices | <ul style="list-style-type: none">Biomedical Devices Automation | <ul style="list-style-type: none">Connected vehicle guidanceTraffic light management | <ul style="list-style-type: none">Smart Shopping CartsSmart Shopping suggestions | <ul style="list-style-type: none">Smart ATMs | <ul style="list-style-type: none">Remote site managementAutomated manufacturing chainSmart Grids | <ul style="list-style-type: none">Remote site managementAutomated industry-specific processes | <ul style="list-style-type: none">Water & Electricity Regulation |
| Processes optimization | <ul style="list-style-type: none">Hospital bed managementPatient filing systemPatient care management | <ul style="list-style-type: none">Traffic ControlSmart ParkingVehicle PerformanceInventory management | <ul style="list-style-type: none">Supply Chain managementDemand management | <ul style="list-style-type: none">NFC paymentsSeamless Trading Operations | <ul style="list-style-type: none">Supply Chain OptimizationUtilities process management | <ul style="list-style-type: none">Smart automationStreamlining of processes | <ul style="list-style-type: none">Smart cityFacilitation of E-government services |

¹⁾ Industrial Manufacturing includes construction, heavy industry and large discrete manufacturing plants

Sources: IDC Market analysis; Strategy& analysis

Demand and supply

Dominating the IoT narrative in ASEAN are the associated issues of productivity and efficiency. This is unsurprising, as it is important for ASEAN nations to improve their productivity and efficiency to catalyse and sustain the region's growth. To this end, different countries in the region are aggressively capitalising on IoT technology in different verticals and sectors. On the demand side, various solutions will be needed within each industry, whereas on the supply side, many

telecom companies have initiated efforts in the IoT space, especially in developed markets. IoT applications are now used across most industries. In the industrial manufacturing sector, for example, IoT devices are used for asset and inventory tracking. Oil and gas companies that use IoT devices to monitor their pipelines are now able to detect and view damage on a pipeline through a video camera using 4G connectivity. The evolution of 3G to 4G data services has created more opportunities for telecom providers in the M2M and IoT space (Figure 7.17).

Figure 7.17: Opportunities for Telecom Providers in the M2M and IoT Space

| Corporate IoT Strategy | Product and Services Strategy | Technical Design | Functional Design & Implementation | Operating Model Design & Implementation | IoT Build/ Deploy | IoT Run/ Manage |
|--|--|---|---|--|--|--|
| Corporate/BU IoT strategy to establish Vision, Ways to Play, Capabilities, Competitive Positioning, and Value Propositions | Strategic to monetize, differentiate, and build value through connected products and services. The capability to translate data and analytics into services. | Global IoT Platform Strategies; Define and Deploy the required Capabilities, Infrastructure, and Process to support Corporate and BU IoT Services and IoT Operating Strategies. | Embedding the IoT into End-to-end Operations; Define and Deploy enterprise-wide Governance, Organization, processes and Enablement required to leverage the IoT | Corporate and BU Operating Model Design and Go-To-Market Strategies to support the shift to Outcome-based, Software/ Service-Driven Value Propositions. | Build/deploy offerings consist of pre-integrated solutions as well as technical capabilities to develop, integrate, test and deploy IoT Implementations | Run/Manage offerings will provide multi-year management of end to end IoT solutions. |
| <ul style="list-style-type: none"> Corporate Strategy Business Outcome framework/ Financial Model Business Unit Assessment IoT Market Assessment Market Entry and Growth M&A and Diligence Workshop/ Accelerators | <ul style="list-style-type: none"> Use Cases Products & Services Strategy Service Monetization Predictive Analytics Data Monetization COE & Innovation MVP products Ecosystem Strategy | <ul style="list-style-type: none"> Technical requirements Platform Strategy Technical Architecture Enterprise Enablement Data & Analytics Design Data Strategy and Management Security Framework Capability Roadmap | <ul style="list-style-type: none"> Functional Requirements Process Enablement Digital Fit for Growth Operations Asset & Productivity Management Digital Factory Digital Supply Chain | <ul style="list-style-type: none"> Operating Model Design Operations Process and Run Books Service Operations Center design Digital Transformation Solution Selling Digital Hub Strategy Ecosystem Strategy | <ul style="list-style-type: none"> Proof of Concepts Command center Agile development Pre-integrated solutions Deployment accelerators Test Strategy The Deployment | <ul style="list-style-type: none"> Application management & outsourcing Analytics and business intelligence Monitoring & management Tier I & II operations support Device management Vendor management Billing & Security |
| Enterprise Enablement | | | | | | |
| Digital Culture Organizational Change | | | | | | |
| Cyber Security | | | | | | |

In the field of transportation and logistics, for example, many ride-hailing companies use IoT-revolutionised fleets to operate their on-demand services. This has made it possible for people to simply tap their smartphone and have a cab arrive at their location in the minimum possible time. Connected vehicles can be tracked and monitored using integrated broadband communication such as cellular networks to deliver real-time information. There are many other ways in which IoT can be integrated into fleet management, for example, smart vehicle application (deploying IoT to enhance existing vehicle on-board technology, improve collision prevention, help with auto-parking and enabling driverless vehicle services) and vehicle security and recovery solutions (the use of RFID, sensors, and transmitting technologies to prevent vehicle theft or recover stolen vehicles).

Government involvement in the IoT revolution is also increasing. The Malaysia Digital Economy Corporation (MDEC), a government agency, plays a major role in advocating the adoption of IoT across industries. In 2016, it joined the LoRa Alliance together with Telekom Malaysia to promote national IoT adoption. By building a local IoT ecosystem, it allows local startups and tech companies to tap into the vast potential of IoT globally, which is estimated to be valued from US\$1.9 trillion to US\$7.1 trillion by 2020.

“

The prospect of IoT for telecoms players is mouth-watering. The size of the future market appears extraordinary, and for winners, the spoils of annuity style income streams, very much worth it, in terms of immediate term losses. However, there are health-warnings aplenty – above all, playing beyond connectivity is fundamental to survival. ”

Michael Graham

Partner

Telecoms and Media Consulting Leader

South East Asia Consulting

PwC Malaysia



IoT does present security difficulties for telecom operators. The rapid growth of IoT is introducing many new devices to the market, and along with them come numerous security challenges. Many companies are increasingly concerned about cybersecurity. As new IoT manufacturers reach out to the telecom industry with their product lines, they may fail to understand the telecom industry and its security needs. Unfortunately, the burden of IoT security falls on telecom operators, which need to understand the problems that IoT devices face because consumers have come to rely upon them for secure service.

IoT end-to-end integration is the most complex and involved link of the value chain. Integration in the IoT domain encompasses sensors, actuators, devices, middleware, gateways, the cloud, analytics, user applications, and so on. Integration often requires solution providers to be flexible on the hardware, software, and domain knowledge level. The biggest challenges of IoT integration projects for telecom companies will be complexity and risk. Telecom companies that decide to take on such projects, however, are expected to have great returns.

M2M/IoT Enterprise Strategy

Given that there are many ways and many industries in which telecom companies can implement services and products to create value for the enterprise segment, they have to look at their own individual capabilities and see how they can develop what they currently have, or how they can innovate, to provide value to enterprises.

Telecom companies do have some competitive advantages in the IoT realm. First, only telecom companies have the necessary experience to deliver scale connectivity solutions at the centre of the IoT. Second, telecom companies are the only players with experience in managing extensive directories and the life cycles of millions of devices. Third, they have a strong position in developing and managing analytics at the edge of the network across a range of industries and uses. These strengths leave telecom companies uniquely qualified to facilitate the delivery of IoT solutions.

Together, these advantages provide telecom companies with the opportunity to develop industry-specific solutions that deliver value to enterprises and consumers, beyond basic connectivity and device life-cycle management. A pragmatic approach is to focus on a particular vertical, select three to five specific use cases within that vertical, and develop targeted solutions with a longer-term plan to expand focus. Telecom companies may choose to participate directly or facilitate vertical solutions that others provide.

Of course, not all opportunities in IoT are equal. Telecom companies should prioritise investments in those opportunities that are most attractive to customers, in terms of their willingness and ability to adopt them. Automotive, healthcare, and manufacturing verticals might be a good place to start, because vendors and customers are mostly aligned on the features and requirements of the products and services.

Figure 7.18: Key Capabilities for Deploying and Managing IoT Solutions

| | Key Capabilities for Deploying and Managing IoT Solutions | | | | |
|--|---|---|--|---|--|
| | Solution Design & Development | Selling & Distribution | Service Delivery | Analytics | Service Monitoring & Management |
| Typical Consumer Telecom Company Strengths | Connectivity Plans Multiplay Offerings Value added services | Care and Experience Mgmt. Indirect Channel Management Branding & Marketing | Network Management CRM, OSS & BSS | Business Performance Reporting Network & IT Reporting | Regulatory Driven Service Levels Systems Redundancy Planning |
| Telecom Company Enterprise Business Capabilities | Vertical Specific Solutions Development Multiple Services Portfolio Management | Account Planning Reseller Network with Wide Reach Partnership Driven Sales Networks | Service Platforms Configuration of devices and modules Installation and Testing Multi-environment Implementations | Client Level Reporting Basic Analytics Multiple data sources and vertical specific analytic | Maintenance & Fault Resolution Service Level Agreements Mgmt. Effective Complaint Management |
| IoT Capabilities- Significant Departure | Partnership led Apps/Solutions Development | Consultative Sales | Multiple solutions, connectivity & devices integration | Big data driven solutions and monetization models | Customer Centric IoT NoC & Care |

Source: Strategy& analysis

Overall, an IoT proposition must be initiated and scaled with a comprehensive effort (see Figure 7.18), all the way from defining an IoT strategy at the corporate level to deploying and managing IoT solutions in the field. The following structured approach can be used for developing and scaling capabilities in this domain.

Define an IoT strategy at the corporate level.

The corporate strategy must include the vision, ways to play, capabilities, competitive positioning, and value proposition. Subsequently, a business model must be developed for the addressable IoT market.

Establish products and services strategy.

Telecom companies must strategise on how to monetise, differentiate, and build value through connected products and services. This depends on the telecom player's ability to translate data and analytics into services.

Design the technical solution. After defining the corporate vision and product and services strategy, the telecom player must look at its technical capabilities in order to deliver the product to market. By utilising global cloud platforms, payment systems, and security systems, telecom companies need to develop and design the blueprint of the IoT offering to support corporate IoT operating strategies.

Implement the functional design. Establish and deploy enterprise-wide governance and organisational frameworks to leverage the IoT opportunity. These should take into account functional requirements, process enablement, digital fit for growth, operations readiness and capabilities, asset and productivity management, digital factory, and digital supply chains.

Operationalise the operating model. Develop corporate and business unit operating model design and go-to-market strategies to drive outcome-based, software-/service-driven value propositions.

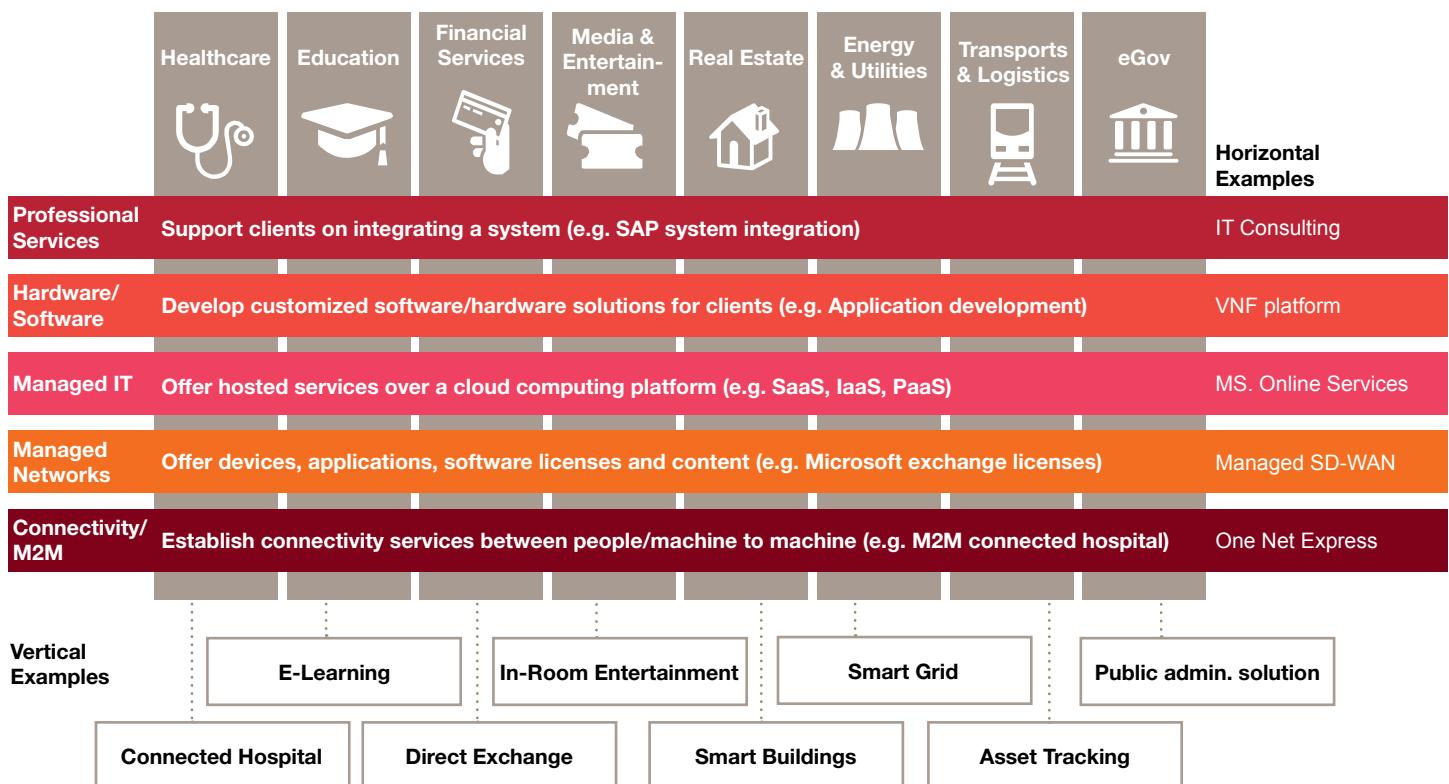
Build/deploy IoT solutions. Build/deploy offerings which consist of pre-integrated solutions as well as technical capabilities to develop, integrate, test, and deploy IoT implementations. These include proof of concept, command centre implementation and governance, agile development of the product, full solution development, deployment accelerators, test strategy, and test deployment. The goal is to build a product that not only provides a user experience that is simple and ticks all the boxes, but also provides companies with the right monetisation tools to give sufficient ROI to the telecom operators.

Run/manage IoT solutions. Post-deployment, telecom companies need to run/manage their deployments and provide multiyear management of end-to-end IoT solutions. These include application management and outsourcing, analytics and business intelligence, monitoring and management, Tier One and Two operations support, device management, vendor management, and billing and security.

Capabilities needed to develop M2M/IoT strategies

For B2C focused telecom companies, many of the capabilities required are a significant departure from what exists today (Figure 7.19). For example, most telecom companies do not have the core capabilities in solution design and development they will need to pursue partnerships in this domain. Similarly, the selling and distribution model will morph from direct sales to consultative sales that require a lens on selling solutions rather than products. Finally, telecom companies will need to establish a dedicated customer-centric network operations centre, or NOC, for IoT applications.

Figure 7.19: Example of ICT Vertical and Horizontal Propositions



Challenges and key considerations

Both engineering and business hurdles and challenges exist in pursuing this strategy. From an engineering standpoint, the existence of multiple industry standards prevents scaling; examples include Zigbee, IEEE 802.15.4, and Sigfox, and although some telecom companies are aligning through commercial platforms, others are pursuing open standard routes. Furthermore, no one party controls the connectivity and user relationship on IoT, and the connectivity is distributed. For example, free WiFi hot spots and Bluetooth are extensively used for many IoT devices (cameras, wearables, etc.). Compounding these challenges is the fact that engineering a solution in the field is not easy. Partnership-driven, multiple technology-led solutions create engineering challenges involving interoperability.

From a business perspective, multiple challenges to mainstream adoption remain. End users of IoT technology still view IoT services as complex and expensive. Meanwhile, competition is increasing as multiple players in the IoT market are emerging,

including startups, large tech players, and device players. As the ecosystem evolves, players typically need to strike partnerships with many value chain players to create an offering (a device, a platform, applications), resulting in lower value extraction from offerings. Specifically for device-led plays, inventory/investment risks are higher as devices might have a short shelf life before the new wave of sensors is developed. Finally, alternative monetisation models are not matured yet. Digital advertising, big data-driven solutions, and advanced bundling-driven packages are some of the current models, but these might apply only to certain verticals, and don't translate well to different horizontals.

Benefits

Carriers globally have realised that the IoT ecosystem is too complex for them to tackle it alone. Telecom companies need to provide an end-to-end portfolio of IoT services to businesses – from connecting solutions to analysing data. In many cases, it's becoming clear that strategic partnerships are the vehicle to help move them forward, quickly.

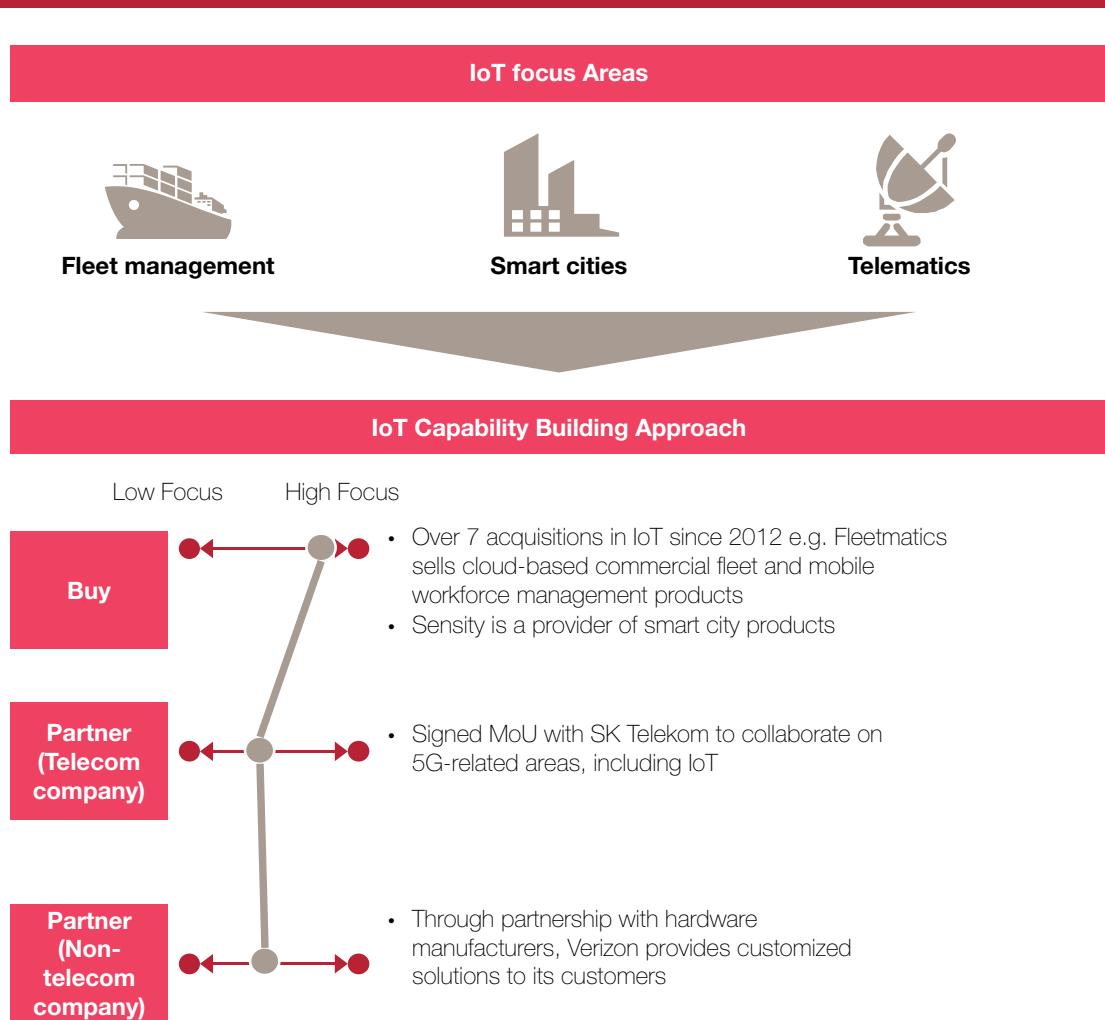


Case study: Verizon focused on partnerships to grow IoT across industry verticals³⁶²

In the future where cars, factories, and appliances in the home are connected to the internet, success will be about selling applications not mere cellular connections.

In the United States, Verizon is a great example of a telecom player that is well positioned to be among the earliest providers of a full-service IoT platform.

Verizon are looking to not only focus on connectivity but also on IoT applications which are expected to provide significant opportunities for revenue increase. Therefore, to ensure continuous growth in this space, Verizon is pursuing a holistic strategy that involves partners, a cloud product, cheaper modems, and new data plans.



Source: Operator's website, Strategy& analysis

Enterprise segment: IT-as-a-Service

Market potential

Enterprises are migrating more of their business functions to the cloud. Cloud computing in Asia-Pacific is expected to grow at a rate of 28.4 percent CAGR between 2016 and 2022.³⁶³ Within managed IT, telecom companies can choose to focus on:

- Managed data centre — co-location, managed hosting, legacy shared Web hosting, storage
- Managed security — client premises-hosted security, cloud-hosted security
- Managed cloud services — IaaS, PaaS, SaaS, on-demand High Power Computing (HPC), dedicated HPC

Currently there is a gap in the market for IT-as-a-Service solutions (SaaS, PaaS, IaaS) in ASEAN, providing a window of opportunity for the first mover.

The global managed IT services market was valued at US\$155.9 billion in 2017, and is expected to reach US\$296.4 billion by 2023, witnessing a CAGR of 11.32 percent during the forecast period, 2018–23.³⁶⁴ The Asia-Pacific managed IT services market is anticipated to reach US\$70.0 billion in 2018.

A case in point is the Indonesian market. In Indonesia there is a strong demand in the data communications market, which is valued close to US\$3 billion.

Indonesia's data centre services market expects a 35 percent CAGR over the next five years. In order to tap into this market, the government is planning a US\$450 billion infrastructure project with telecommunications as the focus to attract significant FDI. The Indonesian IT-as-a-Service market is nascent, but is expected to develop rapidly, supported by strong economic

growth and increasingly sophisticated corporate ICT (information and communications technology) requirements.

Some emerging cloud providers in Indonesia are listed below.

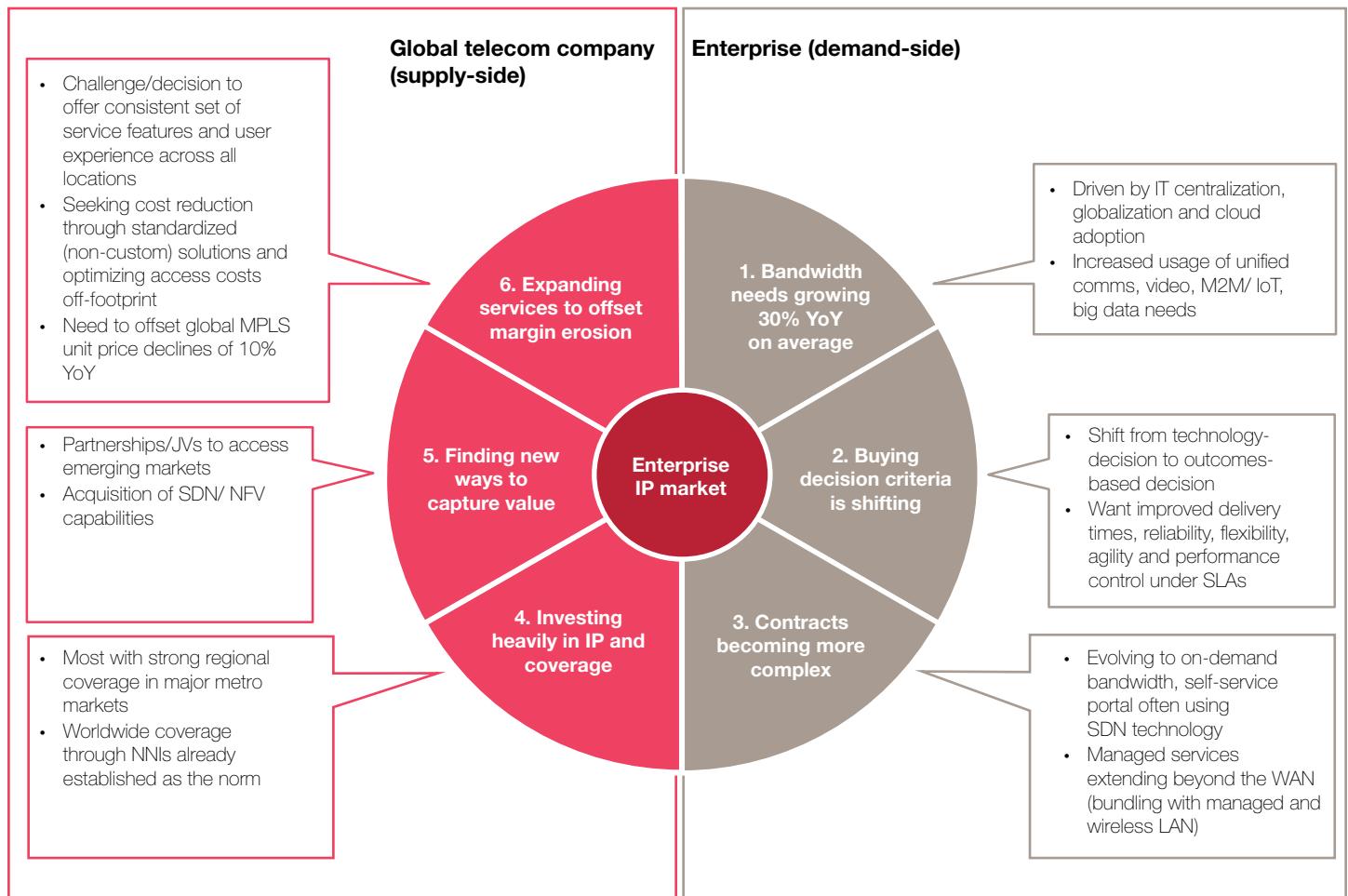
- Indosat has the largest fibre network, connecting 44 cities with a sophisticated cloud product offering. It has experienced double-digit growth in the large enterprise segment and has 2,000 corporate customers.
- Biznet operates its own data centres in Indonesia. It has 17,000 kilometres of fibre optics network that is 100G ready. It is focused on (Metropolitan –WAN) MWAN/LAN and co-located hosting.

Demand and supply

Demand-side and supply-side factors are forcing global service providers to reconsider their business models (see Figure 7.20).

Figure 7.20: Global enterprise network services key trends and challenges

Demand-side and supply-side factors are forcing global service providers to reconsider their business models



Source : PwC analysis, Gartner, IDC, Company announcements

On the demand side, bandwidth needs are growing on average 30 percent year-over-year, driven by IT centralisation, globalisation, cloud adoption, and increased usage of unified communications, video, M2M/IoT, and big data needs. At the same time, buying decision criteria are shifting. Contracts are becoming more complex as they evolve to on-demand bandwidth and self-service portals (often using software-defined networking [SDN] technology), and customers want improved delivery times, reliability, flexibility, agility, and performance control under service-level agreements.

Similarly, on the supply side, telecom companies are expanding services to offset margin erosion from legacy voice offerings and to offset global Multi-Protocol Label Switching (MPLS) unit price declines of 10 percent year-over-year. Telecom companies are also looking for new ways to capture value in the ecosystem either through partnerships/joint ventures or by outright acquiring Software Defined Networking/Network Function Virtualisation capabilities.

The enterprise market spans multiple horizontal services and industry verticals, and there are numerous ways that inventive telecom companies can capitalise on such opportunities. By choosing to focus on providing service to a specific industry vertical, telecom companies can focus on the specific needs of that vertical and deliver a higher level of expert service.

Managed IT services for the financial services industry: Banks, hedge funds, and proprietary trading groups need IT-as-a-Service providers to help provide services for ultra-low-latency trading, market data, hosting, and infrastructure connectivity and risk management solutions. Financial services companies need their data encrypted and backed up securely, and must have a full range of backup and disaster recovery (BDR) solutions to meet compliance regulations. Managed IT service providers that specialise in BDR for financial services help these businesses protect sensitive information, mitigate downtime, and promote overall business continuity.

Managed IT services for the energy industry:

In the rapidly changing energy industry, providers who turn to managed IT gain a competitive edge. Whether addressing compliance and supply chain challenges or collecting and interpreting field and customer data, energy companies are finding greater efficiency through managed IT services.

IT as a Service Strategy

In growing the B2B share, telecom companies start with fixing the core and then build new capabilities to ensure continued success. Telecom companies need to develop different capabilities when targeting varying customer segments. For example, dedicated project management resources and turnkey partnerships are required to provide and deploy customised solutions on a large scale for government clients. Large business customers require telecom operators with telecom/IT knowledge specific to their industry to ensure that holistic vertical solutions can be offered. Vendor/partner management is a key requirement for SMEs to ensure that increased communications capabilities can be converted from an investment to a service for the customer. At the same time, innovation and distribution capabilities are key imperatives given the large number of customers and their close relationship to consumer-based offerings.

Before selecting the optimal way to play, telecom companies need to answer some key questions.

- 1. Operator aspirations:** Which ways to play are aligned with the operator's strategic direction and guidelines?
- 2. Market dynamics:** Who are the competitors and what is their value proposition?
- 3. Financial returns:** What is the addressable market for each way to play, what are the revenues and share the operator is able to grab, and what is the capital investment required for each way to play?

4. Internal capabilities: Which way-to-play capabilities systems offer synergies with the current internal capabilities?

Typically, mobile challengers first target SMEs and evolve from a connectivity/mobility play; transitioning to a fully converged ICT solutions play is where many challengers fail. The value proposition becomes more complex through this journey. SMEs are easier to penetrate. The large enterprises (LE) are harder, and typically require building new relationships. Doing so takes time. Typically LEs have established relationships with incumbents, and quite often they have a negative perception of challengers. Similarly, mobile players face challenges in transitioning to a fully converged play. However, mobile challengers have a limited fixed footprint, but that can be addressed via alternative technologies or inorganic moves.

As a connectivity provider, a telecom company typically invests in leading-edge technology, offering standard mobile and M2M connectivity solutions, and with limited fixed solutions, mainly leveraging mobile. The potential benefit for connectivity providers is relatively low — likely less than a 10 percent B2B revenue share.

From a mobile champion, a telecom company would typically move to become an emerging converged provider with partnership-led “business in a box” solutions. In this state, the telecom company provides off-the-shelf traditional or cloud IT services, often through targeted fixed infrastructure such as fibre, microwave, and satellite.

As it continues to bulk up its capabilities, the telecom company then moves to becoming a fully converged provider focusing on network-centric ICT plays and providing end-to-end managed services for mobile, fixed, and cloud.

Finally, on the other end of the spectrum, an ICT vertical solutions provider typically provides an integrated IT/network/digital solution play, with tailored solutions, typically through in-house system integration, and offers a comprehensive set of industry solutions. A fully integrated ICT solution provider typically captures greater than 20 percent B2B revenue share.

Building capabilities in-house, acquiring capabilities inorganically, and partnering with capable providers — all of these are viable strategic options for building the capabilities for this opportunity.

Build capabilities in house

- Pros
 - No sharing of returns
 - Telecom company maintains full control of service development and go-to-market strategy
 - Opportunity for strong customer development
- Cons
 - Lengthy time needed to build capabilities
 - High investment with potentially compromised short-term returns
 - Usually requires mass hiring and re-skilling

Acquire capabilities

- Pros
 - Control over providers
 - Fast speed-to-market
 - Ability to manage effectively as a portfolio of businesses with differentiated returns
 - Access to existing account base
- Cons
 - Usually high investment required
 - Post-acquisition integration and governance ineffectiveness issues

Partner with capable providers

- Pros
 - Fast speed-to-market
 - Limited initial investment required
 - Combination of best-of-breed capabilities
 - Access to existing account base
- Cons
 - Revenue share/dilution
 - Potential loss of customer ownership
 - Difficult to manage and control partner behaviour

Efforts to build in-house capabilities at telecom companies require significant investment and time, in order to develop people, processes, and systems. Given the substantial build-up effort required, many telecom companies leverage/invest in system integrators for go-to-market acceleration. A number of viable inorganic acceleration mechanisms exist, such as making strategic acquisitions, entering into long-term partnerships, or establishing a frame agreement to:

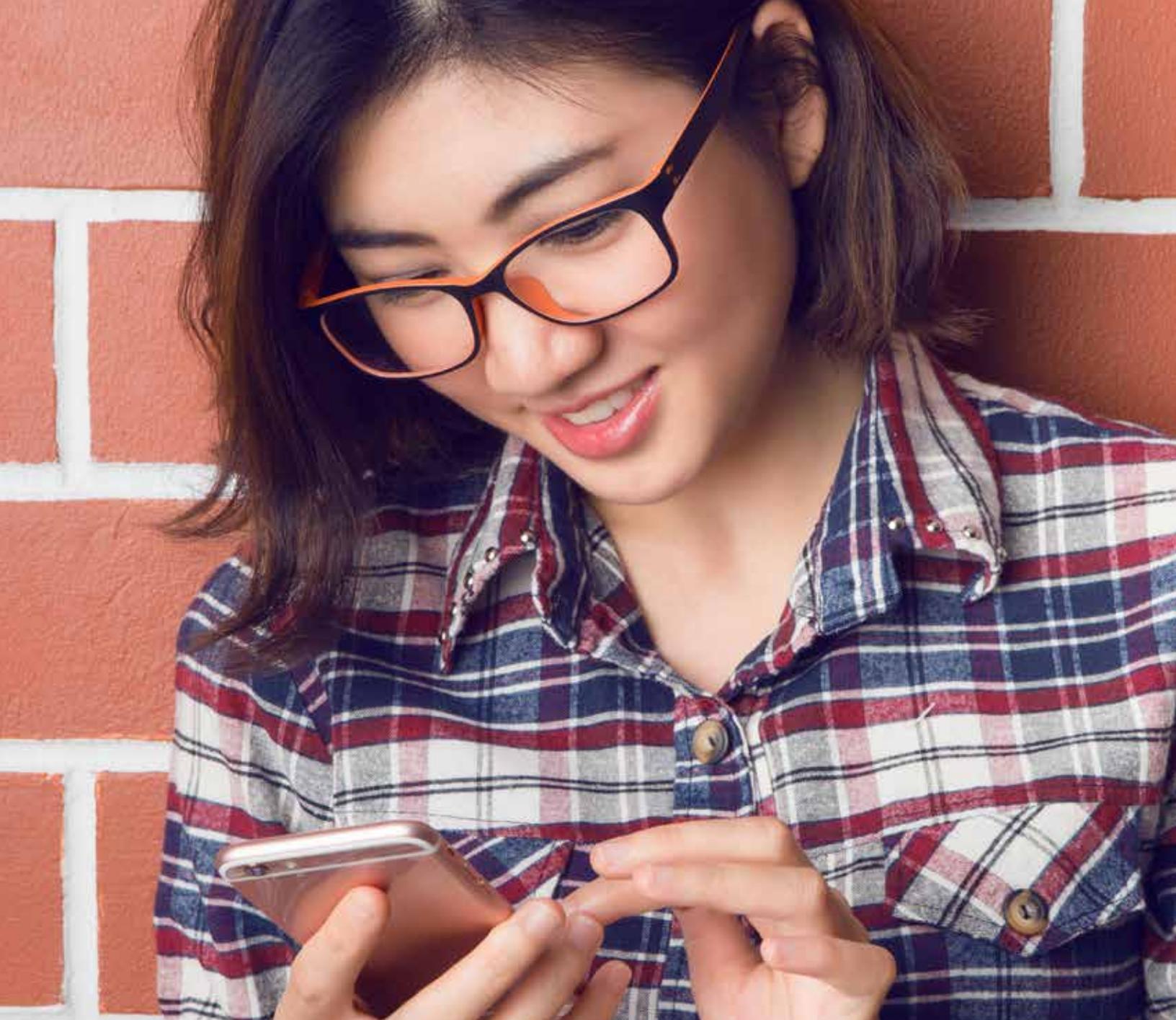
- Augment the telecom company value proposition
- Strengthen existing capabilities in solution designing, sales and marketing, service provisioning, post-service support

Many advanced telecom companies have made acquisitions in the areas of service offering creation and solution design. In the region, Singtel has made several big acquisitions (Trustwave, Alphawest, and NCS) over the years to strengthen its managed services infrastructure.

On the other hand, challenger telecom companies have relied mostly on partnerships in service offering creation and provisioning. For example, Optus partners with leading tech security firms to increase its security offerings for enterprises and from a regional perspective, M1 has partnered with specific industry (health and traffic) tech companies to provide end-to-end M2M enterprise solutions.

Challenges and key considerations

As telecom companies seek to expand their services and offset margin erosion, the first challenge is to find suitable acquisition targets/partnership opportunities with the right capabilities at the right price. That will determine and influence the ROI from placing the bet. Second, telecom companies face a challenging decision to offer a consistent set of service features and user experience across all locations in ASEAN. Disparity in fibre availability only amplifies this challenge. Finally, the regulatory regime in the different countries causes additional uncertainty in realising this opportunity. For example, the licensing framework (for managed network services) is not supported by clear legislation, and regulation favours incumbents. Moreover, there are data sovereignty issues relating to information hosted — in particular, the ability for the government to access personal or confidential information in countries such as Indonesia.



Conclusion

The time to sit back and relax is over. Judging from several trends during the past couple of years and observing the state of the industry in both the consumer and enterprise segments, senior executives at ASEAN telecommunications companies must now pick the growth opportunities where they have a competitive edge and focus their strategy on them. In the consumer segment, telecom players can monetise the flood of data running through their networks by building advertising platforms, whereas in the enterprise segment, telecom players have the opportunity to address the gap in the IT-as-a-Service market and build IoT capabilities. The future of both the consumer and the enterprise segment in telecommunications is definitely data-centric, and digital-savvy telecom companies will dominate the next decade of growth.



Chapter 8: Transportation



Transportation in ASEAN

Trading activities are set to grow across ASEAN, and the development of transportation infrastructure and services will be a critical enabler of this promise. Trade in ASEAN has grown by US\$200 billion, from US\$2 trillion in 2010 to US\$2.2 trillion in 2016, mainly driven by the external trade.

Trade with China has dominated this period, thanks in part to the ASEAN–China Free Trade Area and the development of regional value chains across China and Southeast Asia, which have propelled a CAGR of 9.3 percent in trade from 2010 to 2016. It is estimated that ASEAN–China trade will double between 2017 and 2025, riding on a further deepening of trade ties and the establishment of manufacturing centres in Southeast Asia.

In contrast, intra-ASEAN trade has grown only modestly over the last five years, by a CAGR of just 0.5 percent.³⁶⁵ Nevertheless, as ASEAN co-operation and integration gains pace through vehicles such as the ASEAN Economic Community (AEC), we can realistically anticipate a significant increase in intra-ASEAN trade thanks to strengthening in consumption and investment in the region, as well as efforts to eliminate tariff protection.

Both the intra-ASEAN and Sino-ASEAN trade will create a growing demand for transportation infrastructure and services and create immense growth opportunities for both airlines and ocean liners. However, many transportation companies operating in Southeast Asia are not yet ready to capitalise on these opportunities and face an increasingly competitive environment bringing constant pricing pressures.

In the following pages, we explore how airlines and ocean liners can position themselves to benefit from the anticipated trade growth in ASEAN.

Aviation

The state of the aviation industry

The demand for air travel across Southeast Asia is set to soar, with an expected CAGR growth of 5.8 percent from 2016 to 2036, off the back of rising consumer affluence and the liberalisation of air traffic.³⁶⁶

Southeast Asia's middle-income class is poised to become the key engine of growth in the next decade, rising from 29 percent in 2010 to 65 percent of the population by 2030, equating to almost half a billion people with the propensity to travel.³⁶⁷

Supply for this increased demand has been boosted by the liberalisation of air traffic, through the implementation of the ASEAN Open Skies agreement, which was aimed at gradually removing certain key aviation barriers, such as restrictions on capacity and competition. This surge in demand and liberalisation of air traffic is being met with a planned increase in plane capacity, led by Malaysia and Thai AirAsia, with planned increases of six and seven new aircrafts, respectively.³⁶⁸

This increase in supply is coupled with an increase in price competition between carriers, which is putting downward pressure on airfares, as well as the opening up of more travel destinations and denser air traffic networks. This is all good news for consumers, who will enjoy a greater availability of affordable air travel options to more destinations.

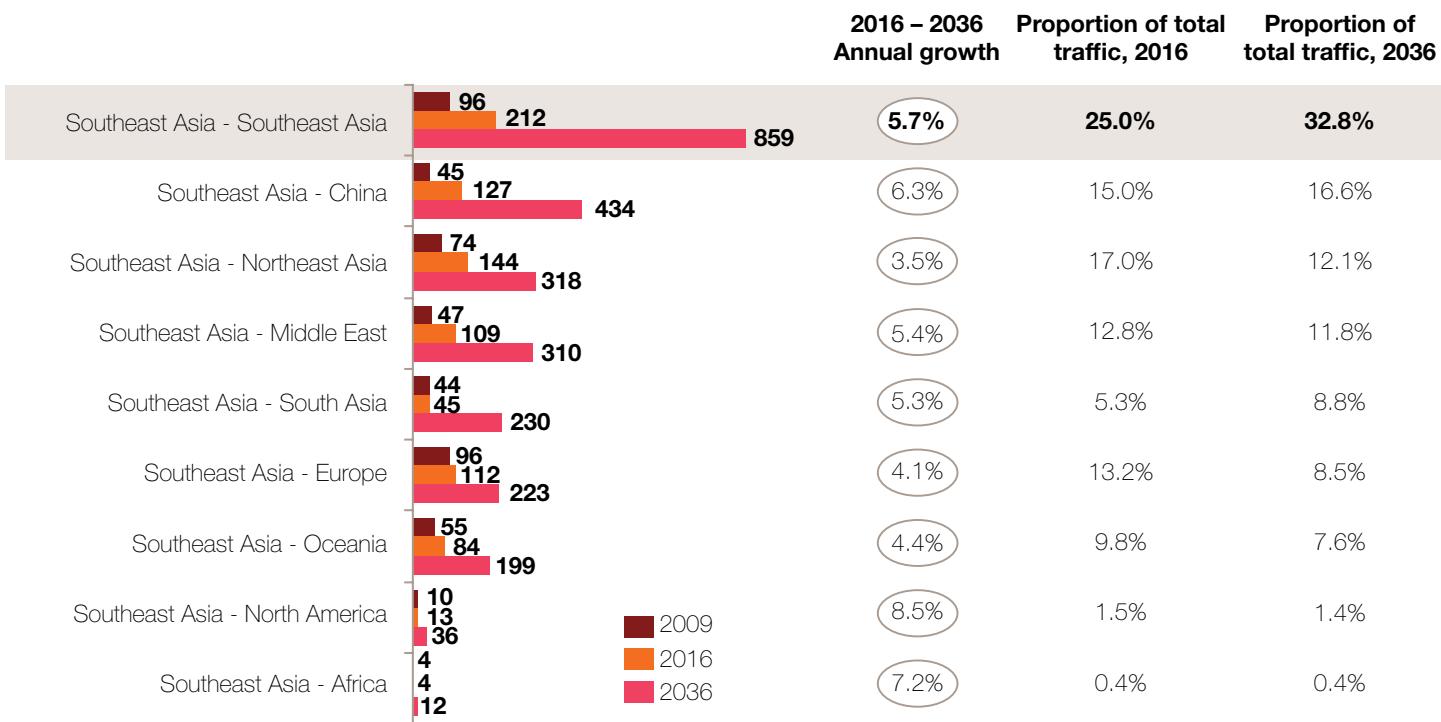
Future potential

As each country within Southeast Asia develops and grows, it is natural to expect that air travel within ASEAN will increase, and in this vein it is expected that intra-ASEAN air travel will contribute to a third of the traffic by 2036, particularly owing to burgeoning demand between Tier Two cities. Air traffic between these cities is expected to grow at a CAGR of 5.7 percent, growing their share of total ASEAN traffic from 25 percent in 2016 to an anticipated 32.8 percent in 2036.

Not surprisingly, the flight routes between ASEAN and China are also an increasing bright spot due to high travel demand spurred by large tourist arrivals from China. The Southeast Asia–China route is expected to grow at a CAGR of 6.3 percent from between 2016 and 2036, increasing its share of total traffic from 15.0 percent to 16.6 percent (see Figure 8.1).

Figure 8.1: Intra-Southeast Asia Air Travel Will Contribute to A Third of the Traffic by 2036 Due to Burgeoning Demand in Tier 2 Cities

Forecast passenger traffic for ASEAN
Revenue Passenger Kilometers (RPK) in billions

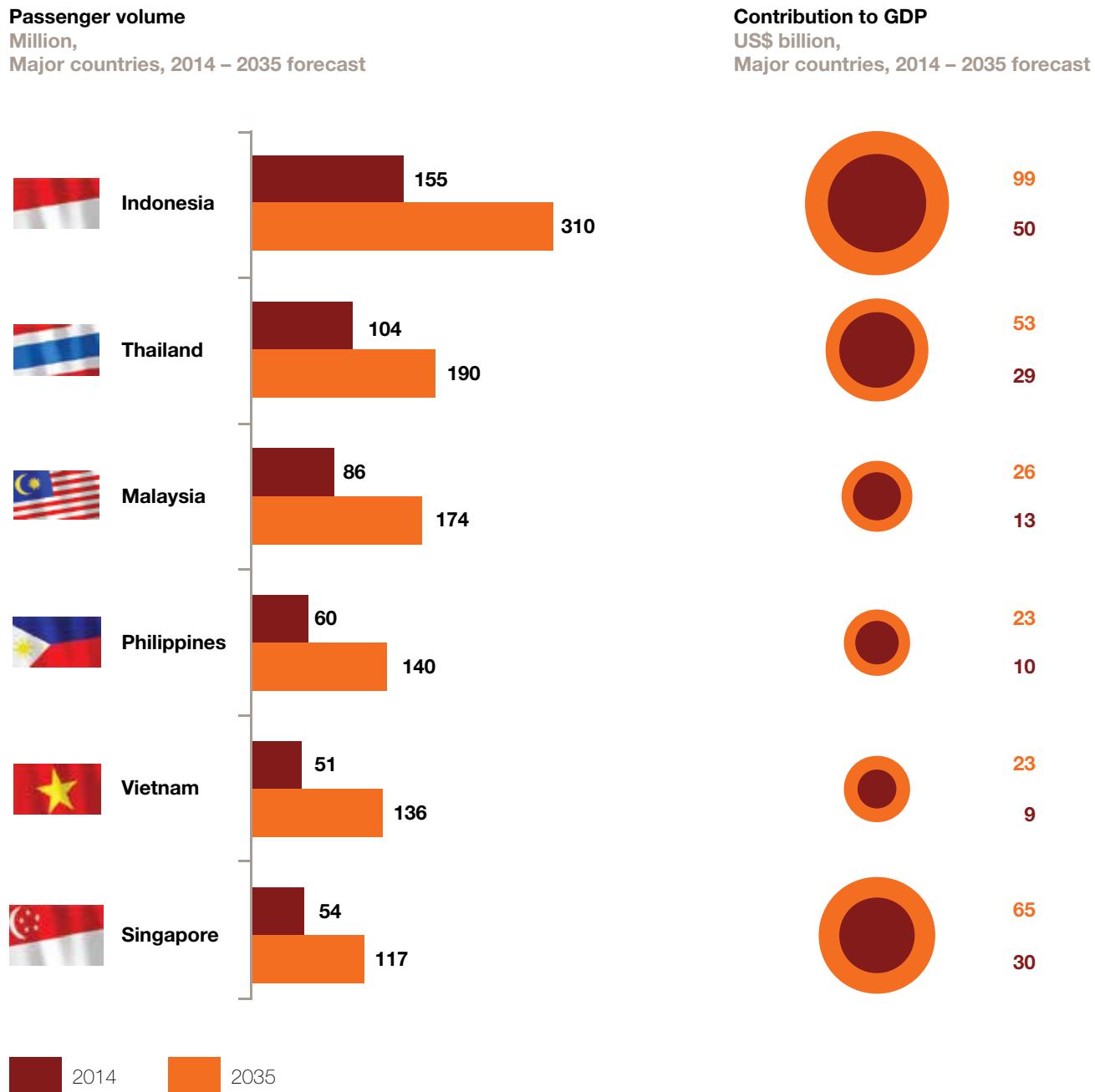


Source: Boeing Current Market Outlook³⁶⁹, PwC analysis

Usanee Sangsingkeo, Executive Vice President, Aviation business unit, and Acting President of Thai Airways International shares the same view;

“The increase in air passengers in Southeast Asia and from China presents greater opportunities for Thai Airways. The company will focus on regional flights...”³⁷⁰

Figure 8.2: Within Southeast Asia, Indonesia and Thailand Stand Out with Vast Potential Due to Rising Religious Air Travel and Strong Tourism



Source: International Air Transport Association³⁷¹, PwC analysis

Within ASEAN, Indonesia and Thailand stand out as having vast potential due to rising religious air travel and strong tourism.

Indonesia, in particular, benefits from the domestic travels of its large population, most notably during religious holidays, such as the Idul Fitri holiday, where 4.6 million people are estimated to have undertaken mudik (homecoming) via air travel in 2016. The large number of passengers is likely to grow due to the increase in the affordability of air travel for consumers.³⁷²

Bayu Sutanto, Head of Scheduled Flight Division head of the Indonesian National Air Carriers Association, estimated aviation growth to be typically 2.5 times that of economic growth, underscoring the growth potential of aviation in tandem with the economy.³⁷³

These factors are expected to lead to 310 million air passengers a year by 2035, contributing as much as US\$50 billion in GDP in Indonesia (see Figure 8.2).

Thailand, for its part, continues to attract tourists despite the political coup in 2014, memories of the widespread flooding in 2011, and the crackdown on

cheap Chinese tour packages in 2016. In fact, 32.6 million international tourists visited Thailand in 2016, representing a year-over-year increase of 8.9 percent, driven largely by Chinese tourists. Chinese tourists accounted for 27.2 percent of total international arrivals in 2016. Furthermore, the political tension between China and South Korea in 2017 may have directed more Chinese tourists to Thailand.³⁷⁴

Industry challenges

Despite growing opportunities, the full-service carriers (FSCs) face challenges. Owing to low-cost carriers' (LCCs') aggressive price cutting and a ramp-up in capacity, FSCs struggle with fare pressures and underutilised capacity, hence low profitability.

In addition, the pipeline of high-speed rail (HSR) investments in the region introduced a new competition in the growing short-haul to mid-haul routes.

Although the Open Skies policy has been partially implemented, the region is still holding on to its protectionist stance, limiting foreign FSCs' access to the growing demand in cities (see Figure 8.3).

Figure 8.3: Challenges Full-service Carriers Face in ASEAN

Developments in the market



Increasing competition from Low Cost Carriers

LCCs have been increasing plan capacity and price cutting

Regulation



Competition from High Speed Rail (HSD)

Emergence of high speed rails provided new alternative to the short-mid haul routes

Regulation

Protectionism stance in ASEAN

Restricted air freedom prevents airlines from flying some routes

Challenges FSCs face



Utilisation pressures



Pressure on fares



Restricted access to high growth routes

Source: PwC analysis

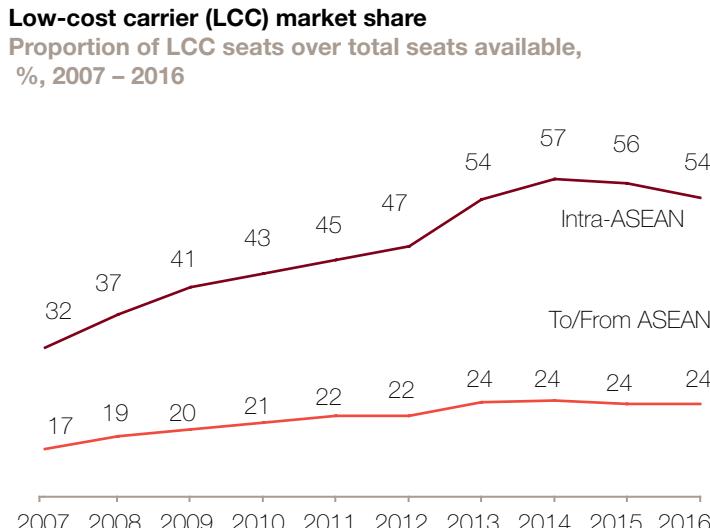
Increasing competition from low-cost carriers (LCCs)

The first challenge is the increasing competition from LCCs, especially on short-haul flights, which is the key growth segment in the ASEAN market in the next decade. LCCs have gained market share in intra-ASEAN flights, from 32 percent in 2007 to 54 percent in 2016, and that figure is expected to rise as a result of the growth of the middle class and their increased affluence (see Figure 8.4).

This challenge is exacerbated by the promotion of intra-ASEAN travel through the Open Skies policy, which has helped LCCs in Southeast Asia thrive. The impacts of similar trends can be seen in other markets such as the United States and European Union, where Southwest Airlines and Ryanair have grown into large regional players at the expense of the FSCs thanks to aviation liberalisation.

LCCs pose stiff competition to FSCs in both capacity utilisation and pressure on fares.

Figure 8.4: FSCs are Facing Increasing Competition from LCCs, Especially in Short-haul Flights, the Growing Segment



Source: DBS Group Research³⁷⁵, PwC analysis

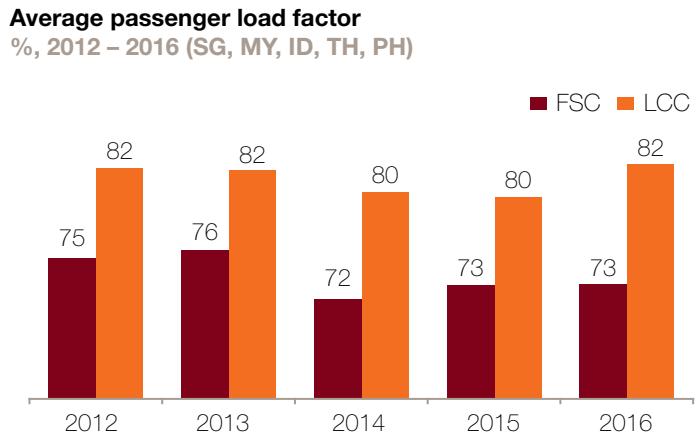
Utilisation pressures

FSCs are facing utilisation pressures; their passenger load factors are consistently six to nine percentage points lower than those of LCCs, owing to LCCs' gain in market share (see Figure 8.5).

The impact of increased competition from LCCs is exacerbated by the growth in capacity of these players. ASEAN and the Middle East are the only two regions with nearly as many aircraft on order as they have in the active fleet.

This increased capacity results in stiff competition from LCCs in short-haul flights as well as from Middle East and Chinese carriers in long-haul routes that will continue to put pressure on utilisation.

Figure 8.5: The Competition, Coupled with Expansion in Industry Capacity, Puts Pressure on FSC's Utilisation Rate



Passenger load factor measures how much of an airline's passenger carrying capacity is used.

Analysis includes SIA, SilkAir, Scoot, Tiger, AirAsia Malaysia, AirAsia X Malaysia, Garuda Indonesia, Citilink, Lion Air, Bangkok Airways, Thai Airways, Cebu Air and the Philippine Airlines.

Source: Annual reports of Southeast Asian airlines³⁷⁶, PwC analysis

Pressure on fares

The erosion of passenger yield due to price cutting from the LCCs continues to put pressure on FSC fares. Passenger yield for FSCs slipped five years in a row, from 2012 to 2016, reflecting the pricing pressure in Southeast Asia (see Figure 8.6).

With planned fleet growth in the region, carriers will have to compete to fill their new seats, putting pressure on fares.

Competition from both LCCs in short-haul routes and Middle East and Chinese carriers in long-haul routes will also continue to put pressure on fares.

Competition from high-speed rail (HSR)

FSCs are facing competition from not only lower-cost airlines, but another mode of travel. China's Belt and Road Initiative (BRI) has ignited rail developments in ASEAN, giving rise to new competition in short- to mid-haul routes in the next three to five years. With a new alternative transport in the short- to mid-haul routes, FSCs would likely face greater pressure on both utilisation and fares.

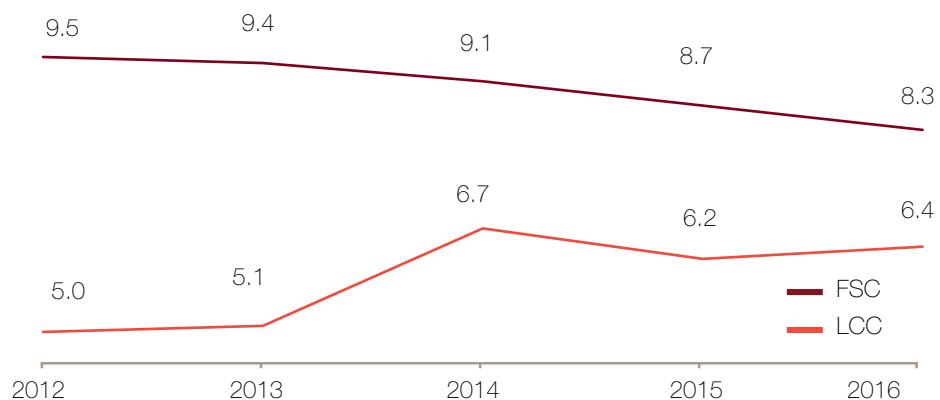
It was estimated that a total of US\$41 billion will be invested in railway construction projects announced across Southeast Asia in the second half of 2017. The investment represents 60 percent of ASEAN member states' planned investments in rail systems, although the majority of the projects are still at an early stage.³⁷⁸

China plans to build more than 7,000 kilometres of rail lines, linking with ASEAN from Yunnan to Singapore. The first line will be the Jakarta–Bandung HSR, which is expected to start operating in 2019, followed by the Nakhon Ratchasima–Bangkok stretch in 2021 and Vientiane–Kunming in 2022, and the Kuala Lumpur–Singapore stretch in 2026 (see Figure 8.7).

Figure 8.6: Passenger Yield for FSCs Continues to Slip for 5 Years in A Row, Reflecting the Pricing Pressure in Southeast Asia

Average Passenger Yield

USD cents per km, 2012 – 2016 (SG, MY, ID, TH, PH)



Measure of average fare paid per mile, per passenger, calculated by dividing passenger revenue by revenue passenger miles. It indicates the revenue that the airline is able to achieve for each seat that we sell. Analysis includes SIA, SilkAir, Scoot, Tiger, AirAsia Malaysia, AirAsia X Malaysia, Garuda Indonesia, Citilink, Lion Air, Bangkok Airways, Thai Airways, Cebu Air and the Philippine Airlines.

Source: Corporate annual reports³⁷⁷, PwC analysis

Figure 8.7: China Plans to Build More Than 7,000 km of Rail Lines, Linking with Southeast Asia from Yunnan Through to Singapore

High Speed Rail (HSR) routes in Southeast Asia based on China's vision of the Belt and Road Initiative



Source: Nikkei Asian Review³⁷⁹, HSBC³⁸⁰, PwC analysis

Kunming – Vientiane

427 km, US\$6 billion
Under construction
Expected to operate in 2022

Vientiane – Nakhon Ratchasima

In discussion

Nakhon Ratchasima – Bangkok

250 km, US\$5.5 billion
Construction started on first 3.5 km
Expected to operate in 2021

Bangkok – Kuala Lumpur

Conceptual stage

Kuala Lumpur – Singapore

350 km, US\$15 billion
Bidding period
Expected to operate in 2026

Jakarta – Bandung

142 km, US\$5.5 billion
Construction stalled
Expected to operate in 2019

These efforts further reinforce the economic narrative between China and ASEAN regionalisation. As part of China's efforts to develop infrastructure in the region, Southeast Asia's geographic proximity, infrastructure gap, and lack of financing make for an attractive partner in the BRI. ASEAN is currently China's third-largest trading partner. After the implementation of the upgraded ASEAN–China Free Trade Area in 2010, ASEAN might pass the E.U. as China's largest trading partner in the future.

Considering the pipeline of rail developments, FSCs need to brace themselves for intense competition in the short- to mid-haul routes. In fact, many precedents have already given us an idea of how the ASEAN air landscape could change.

In Taiwan, the airlines' market share between Taipei and Kaohsiung fell from 24 percent to 13 percent with the introduction of HSR services. Similarly, in Korea, the two main airlines providing services between Seoul and Daegu reduced monthly air departures from 517 to 293 prior to the entry of HSR, and slipped further to 183 two months after the introduction of HSR.³⁸¹ In China, Civil Aviation Administration of China (CAAC) Director General Li Jiaxiang stated that around 50 percent of flights over distances of less than 500 kilometres and 20 percent of flights between 800 and 1,000 kilometres became unprofitable in 2009 owing to competition from HSR. The Centre for Aviation estimated the loss in revenue of China's aviation industry from the HSR, from reduced traffic and price pressure, at up to 4 percent of total revenues.³⁸²

Nowhere is the competitive thrust in the region more evident than in the intra-ASEAN and Sino-ASEAN routes. The impending competition from the HSR is real, and FSCs need to consider how competition from both the LCCs and HSR is going to manifest itself to benefit from the robust growth in short- to mid-haul routes.

Protectionism stance in ASEAN

On top of the rising competition, FSCs are not going to have an easy ride given the ongoing protectionism in the region. Even though the Open Skies policy has been signed, the current agreement grants the third to fifth freedoms of the air (see Figure 8.8), but keeps the essential seventh restricted. The third and fourth freedoms were generally already granted in practice and many airlines were able to bypass the fifth restriction through cross-border ventures. The seventh freedom, which refers to the right of a carrier to operate between two foreign hubs outside its home country, has been excluded from the current agreement. The restrictions come with a hefty economic cost. For instance, the seventh freedom represents a loss of approximately US\$650 million of additional GDP potentially accrued to the overall Indonesian economy if policies were adopted by 2025.³⁸³ As the former Secretary General for the Malaysian Ministry of International Trade and Industry, Tan Sri Dr. Rebecca Fatima Sta Maria shares, the ambition of the Open Skies policy is to ultimately work towards an ASEAN Community Carrier, where its connectivity becomes a key component for the establishment of the AEC. However, the reality is that the group is not ready to discuss the more 'sensitive' matter of ownership. There is not much work being directed towards harmonising regulation as well as technical and safety matters as there is no formal platform for the regulators.

“

ASEAN needs to dive deeper and speedier into (harmonising regulations and technical and safety standards) if the aspirations as stated in the Master Plan for ASEAN Connectivity and the Kuala Lumpur Transport Strategic Plan are to be translated into meaningful actions. ”

Tan Sri Dr. Rebecca Fatima Sta Maria

Former Secretary General
Ministry of International Trade and Industry
Malaysia

Figure 8.8: Examples of Freedoms of the Air

In aviation, commercial flights by airlines are negotiated by states in the form of "freedoms", which will usually be granted in bilateral negotiation between governments.

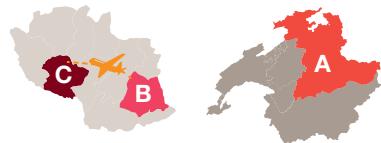
Third freedom

To carry revenue traffic from carrier's home territory (A) to treaty partner's territory (B)



Seventh freedom

To carry revenue between two territories (B to C) by a carrier operating outside its own territory (A)



Fourth freedom

To carry revenue traffic from a treaty partner territory (B) to the carrier's home territory



Eighth freedom

Carry treaty partner's domestic revenue traffic (from City B1 to City B2) in country B on flights operating out of or into carrier's home territory (A)



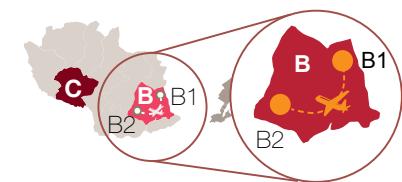
Fifth freedom

To carry revenue traffic between two or more treaty partner territories (B to C) on flights operating out of carrier's home territory



Ninth freedom

Carry treaty partner's domestic revenue traffic (from City B1 to City B2) in territory B. No Country A origination or landing required.



A – Home country of the airline B – Treaty country C – Treaty country

Source: Boeing³⁸⁴

Concurrently, protectionist measures such as subsidies for government-owned carriers and foreign ownership restrictions are common in ASEAN. For example, Indonesia remained reluctant to open up its secondary cities, the Philippines excluded Manila from agreements, and Lao PDR has yet to free up Luang Prabang and its national capital Vientiane.

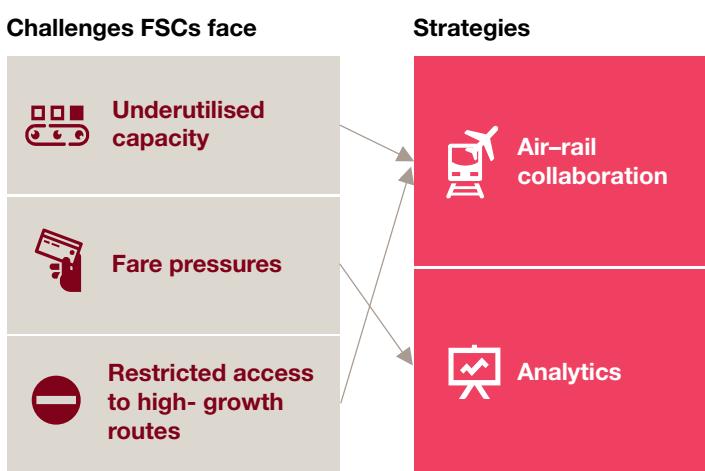
The disparities in member states' level of development lead countries toward protectionism; this will remain as a major challenge as the emerging economies in the region strive to narrow the gap in economic development.



Strategies for aviation in ASEAN

The rising competition, increasing price pressure, and protectionism may significantly hinder the growth of FSCs. Two strategies that FSCs could consider to address these challenges are air-rail collaborations and an increased use of analytics.

Figure 8.9: Strategies to Address the Challenges FSCs Face



Source: PwC analysis

Air-rail collaboration

FSCs can consider developing air-rail collaborations to address low utilisation arising from increasing market competition, and at the same time can work around protectionism. The former CEO of low-cost carrier Spirit Airlines, Ben Baldanza, aptly put across “Airlines sell what the economists call a spoilable product. Once the airplane takes off, if the seat is empty the ability to get revenue for that seat is lost forever.”³⁸⁵ It might require a step back to think of a rail operator as a partner rather than a competitor, especially in the high-growth mid-haul travel market where the penetration of LCC threatens both. The strategy also falls nicely in the FSC space in ASEAN as many air carriers and rail operators are state-owned, which makes the collaboration between state-owned companies easier.

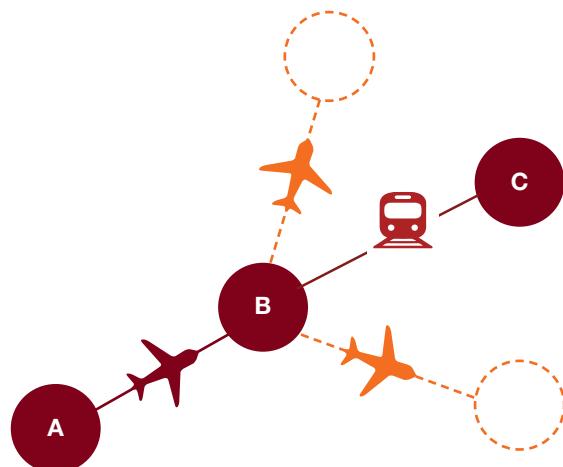
How does this work?

The air-rail collaboration uses railway services as additional spokes in the network of services to extend or substitute for existing aircraft services. The rail service complements the air service by replacing or adding a short- or medium-distance connection (see Figure 8.10).

In such arrangements, the trains are integrated into the code-sharing system, such that trains are assigned airplane codes. An online integrated reservation system is also created that aligns the flight and rail schedules based on availability. Customers can then buy a single ticket through either the air or rail distribution channels for the multimodal trip. This service often offers features such as integrated ticketing, baggage handling, schedule coordination, end-to-end check-in, meals and refreshments on board the train, accumulation of frequent flyer miles, and delay and connection assistance.

To illustrate this, with the expected completion of high-speed rail from Jakarta to Bandung in Indonesia in 2019, Garuda Indonesia, the national carrier, might consider offering a single travel ticket from Singapore to Bandung. The leg from Singapore to Jakarta would be served by Garuda Airlines, and the leg from Jakarta to Bandung by high-speed rail.

Figure 8.10: Using Rail as An Additional Spoke



Source: PwC analysis

In another example, the AIR&RAIL intermodal service is available to passengers travelling to and from Brussels and Midi Railway Station and Charles de Gaulle Airport in Paris. Air France forecasts traffic volumes yearly to book one or two carriages per journey from Thalys. Any additional seats are booked on an ad hoc basis based on what is available. Air France also provides integrated ticketing and a dedicated luggage hold for Air France passengers at the Brussels check-in counter.³⁸⁶

By combining the catchment area and points of service between air and rail, a substantial network economy is created to counter the competition from LCCs. It also provides additional connectivity points which foreign FSCs cannot access due to protectionism. In the case where the FSCs remove its flight route entirely and partner with a rail to serve that route, the aircrafts can be freed up to be utilised for more profitable routes.

In the following section, we will look deeper into air-rail collaboration to see how airlines can best position themselves to establish this partnership and capture market opportunities.

What are the benefits?

Given the increasing intra-ASEAN and Sino-ASEAN trade, as well as the rising competition with LCCs and railways in ASEAN, air-rail collaboration provides a compelling case for passengers, travel providers, airlines and rail operators.

For passengers and travel providers

- **Experience seamless travel**

This proposition provides passengers and travel providers with more options, as well as meeting customer needs for a seamless transport chain by enabling travel with separate operators in just one booking, hence facilitating the increasing demand for travel along the growing intra-ASEAN and Sino-ASEAN routes. Customers' purchase decisions are increasingly moving beyond a specific product or service to encompass buying an idea or experience. If implemented well, this collaboration will provide an integrated customer experience across verticals and touch points for a differentiated solution.

For airlines

- **Remain relevant in a growing but competitive route**

Collaboration between rail and air enables airlines to stay relevant in the growing but competitive routes — the intra-ASEAN and Sino-ASEAN routes, rather than losing a significant share of them. Yuan Huifang, the Deputy GM of Sales at Hainan Airlines, shared similar sentiments when HSR commenced operations in China, “High-speed rail services heavily affect the business of flights which cover less than 500 kilometres. But we want to find a way to co-operate with rail systems.”³⁸⁷

- **Better serve the regions despite air restrictions**

While ASEAN countries are still grappling with protectionism, the collaboration provides foreign FSCs an alternative they can use to serve the growing traffic in Tier Two cities despite restrictions in air freedom. Intermodal agreements usually enjoy government support, unlike agreements between airlines, which sometimes attract significant antitrust scrutiny.

- **Provide greater connectivity without significant investment**

Air operators will be able to serve more connectivity points without investment in additional aircraft. The additional connectivity points also act as feeders for international traffic while FSCs focus on operating the international routes.

- **Better utilise aircraft for more profitable routes**

Using trains as a substitute for feeder flights could free up slots for more profitable routes. This is pertinent for airlines which operate in congested airports, a key concern in ASEAN, and where slots are scarce and expensive.

For railway operators

- **Increase in market share**

It will not only be the airlines, but also the rail operators that stand to gain in a few ways. In the event of substitution, rail operators stand to gain from the passengers redirected from the flights to the rail service for short- to mid-haul routes, thereby increasing load factor and market share. Having said that, it is only possible if the HSR has enough train slots and platform capacity to guarantee the agreed-upon number of air-rail passengers to ensure this is a sustainable model.

- **Access to captive long-haul air passengers**

This collaboration will extend the distribution channels and reach air passengers who are unaware of HSR alternatives, or who have considered LCC or coaches for the last leg to their destination.

- **Timely consideration with BRI rail developments**

The new railways which are planned within China's Belt & Road Initiative will enhance connectivity across the region. Many of these rail projects are currently in the planning and design phase, reviewing how new railways and stations can connect with other planned or existing infrastructure and transportation points. Therefore, an early discussion would help inform the needs of the infrastructure and connectivity design for an air-rail collaboration, facilitating subsequent implementation.

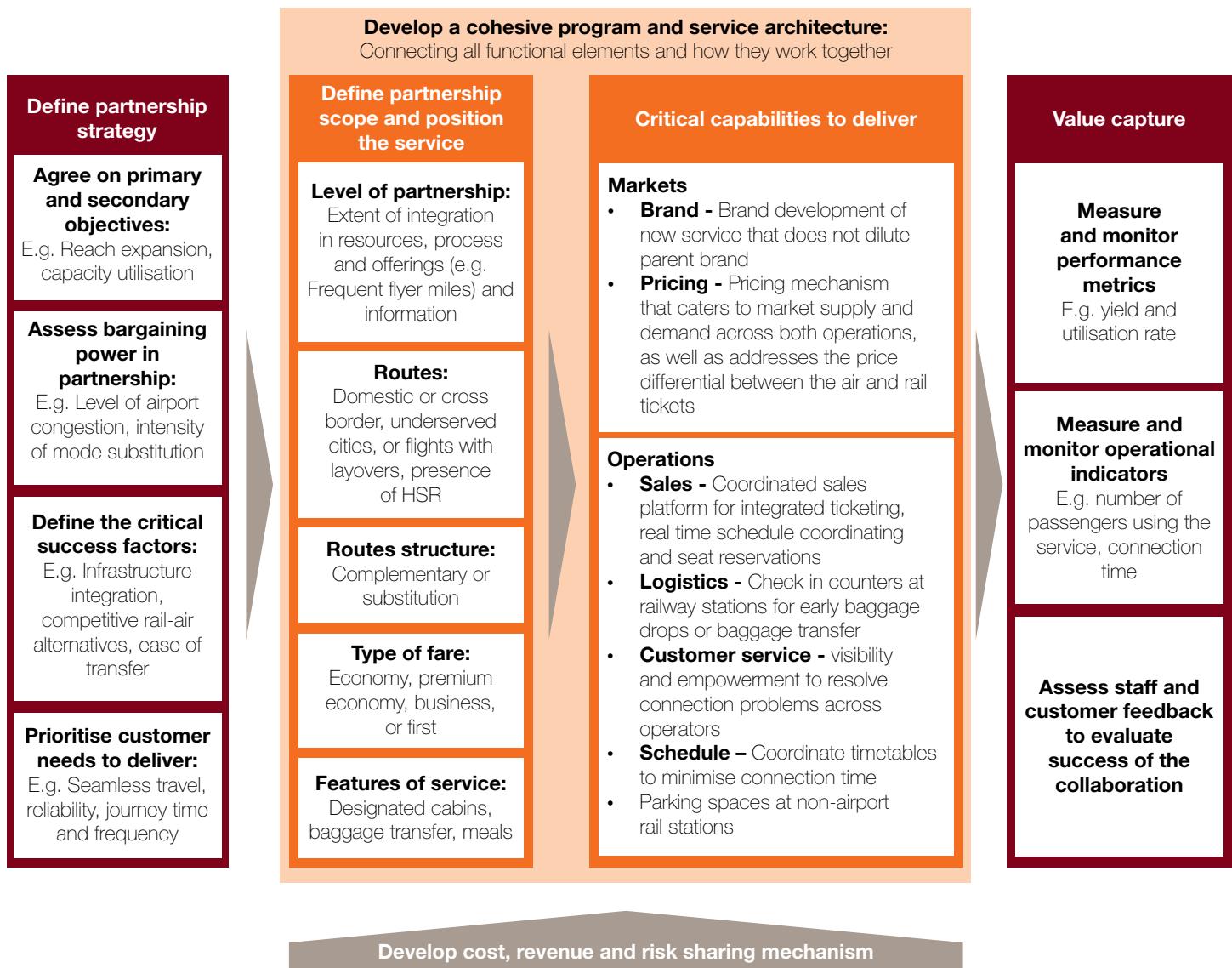
How can we do it?

Collaborations can be considered in two phases. In the first phase, airlines can consider partnerships with HSR operators outside ASEAN (e.g. China Railway Corporation) which have already established a HSR infrastructure, for example, across Suzhou, Wuxi, Changzhou, and in Ningbo from Shanghai Hongqiao and Pudong airport. This will allow the FSCs to leverage existing infrastructure and learn the ways of collaboration.

Airlines will then have greater knowledge and confidence to push forward with collaborations with the HSR companies entering the ASEAN market in the second phase. The first high-speed rail is anticipated to commence operation in 2019, followed by the rest of the HSR projects through to 2026. It is important for airlines to engage the rail companies early to incorporate partnership elements of the system and data architecture, as well as transport arrangements between the airport and rail stations during the design phase.

A well-orchestrated execution will be critical to pushing forward a partnership that brings two seeming competitors together. The scope of the partnership needs to be clearly defined and a mutually beneficial positioning of the service agreed up in order to protect the competitive interests of both parties (see Figure 8.11).

Figure 8.11: Development Framework of An Air-rail Collaboration



Source: PwC analysis

- **Define collaboration strategy**

Collaborating can be both challenging and resource intensive, much more for a seemingly competitive partner. Thus, a robust collaboration strategy is essential in guiding subsequent investment decisions. A keen understanding of the level of airport congestion and intensity of mode substitution provides the anchor with which to establish demand for the service, as well as the bargaining power of each party. This should then lend weight to the outcome each party wishes to achieve. The strategy should also adopt a customer-centric lens to identify the key customer needs to deliver (for example, service reliability, travel frequency), as well as the critical success factors, such as infrastructure integration, to make this happen.

- **Define partnership scope and position the service**

Defining the scope and positioning will pave the way to making decisions on the level of partnership, routes chosen, type of fares, and level of service to be accorded. The extent of integration of resources, process, and offerings (e.g. frequent flyer miles loyalty programme), as well as the extent of data sharing, will need to be clearly laid out in the collaboration.

This is not a uniform strategy that is targeted at all types of rail service or all routes available. In most circumstances, it will make more sense for airlines to collaborate with HSR instead of standard-gauge rail to ensure that the level of service is more compatible and travel time is more comparable. Airlines also need to choose the HSR routes in consideration of the journey distance. Up to about 1,000 kilometres, the speed advantage of air is greatly reduced because airports have stringent check-in and security processes which take up more time and complicate the whole travel process (see Figure 8.12).

“

ASEAN depended heavily on air transport since the 1960s. However, both a problem and an opportunity are now emerging. Major ASEAN airports are becoming very congested. And at the same time, high speed rail is emerging as an alternative on key city pairs. Integrating air and rail will enable ASEAN to move short haul traffic to rail, allowing airports to focus on higher value long and medium haul traffic. ”

Edward Clayton

Strategy& Lead Partner
South East Asia Consulting
PwC Malaysia

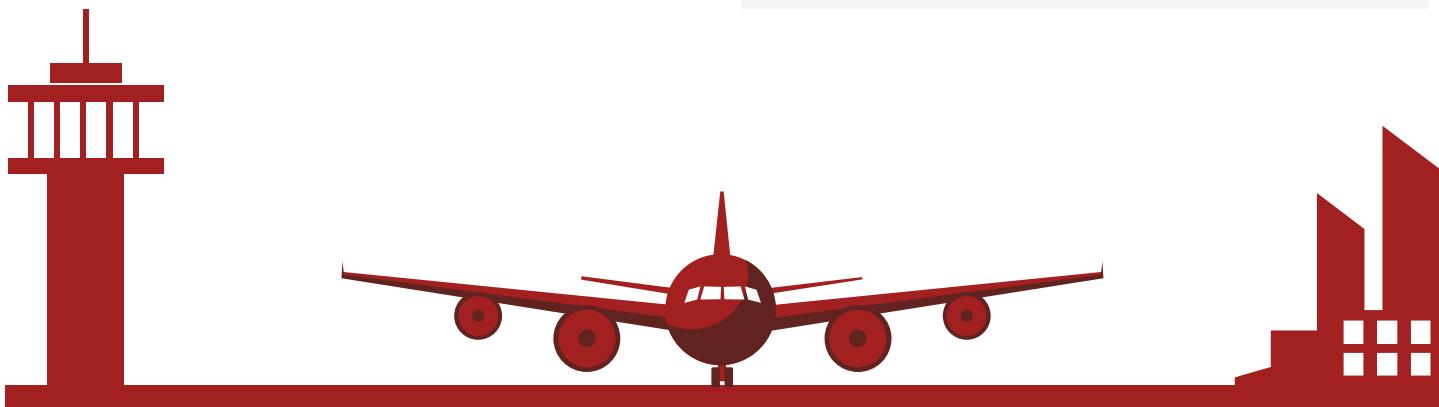
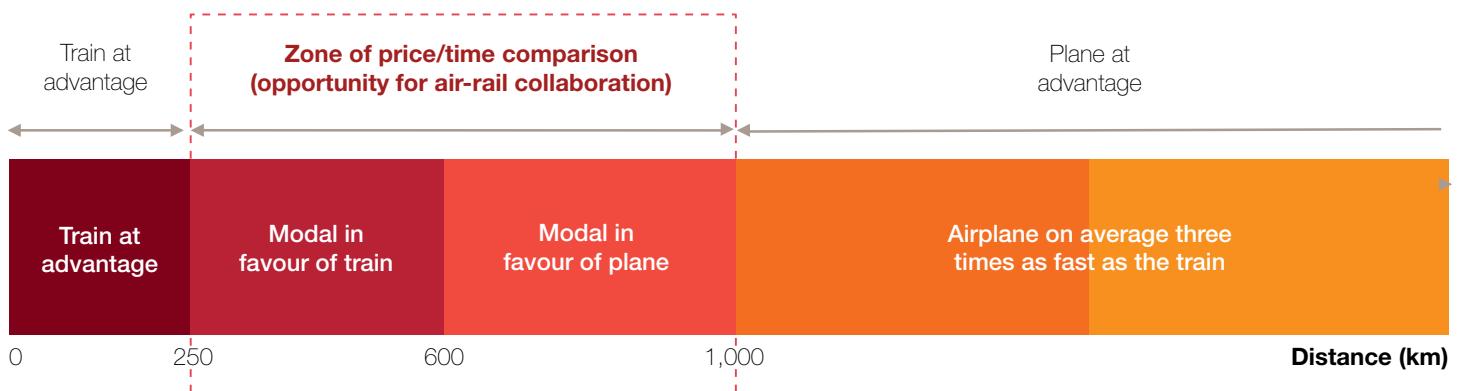


Figure 8.12: Routes with Opportunity for Air-rail Collaboration



Source: Universidade de Lisboa³⁸⁸



- **Critical capabilities to deliver**

Capabilities such as a coordinated sales platform with real-time schedule coordination and an excellent pricing mechanism that addresses the price difference between air and rail and varies according to seats remaining will need to be in place to support the delivery system.

Logistics plays another important role; provisions are needed for early baggage check-in at railway stations, baggage transfer, and, most importantly, passenger transfer at the intermodal points to ensure seamless travel. For example, you can onboard the next available flight or train at no extra charge if a passenger misses a connection or the train or plane is delayed.

The customer service team needs to be adequately trained and be provided with the visibility and empowerment to own and resolve problems that happen across operators. This is especially important in ASEAN, where the concept of air-rail collaboration is new and customers need to build their confidence in this model.

- **Cost, revenue, and risk-sharing mechanism**

Often, the success of collaboration is hampered by unclear incentives or a lack of clarity in the revenue and risk sharing model. In some circumstances, the costs and risks are passed on to the smaller player in the collaboration, or the allocation does not reflect the value-add of the expense of contributing partners. In other circumstances, the model does not apply to a wide range of situations. A successful model would be designed to balance decision making between larger and smaller players, and incentivise smaller players to be involved when returns are low.

- **Value capture**

Once implemented, well-designed operational and performance metrics, as well as staff and customer feedback, will provide a good measure of the amount of value captured. This should include operational indicators such as connection time and number of passengers who bought tickets, as well as performance indicators such as utilisation and yield. By showing who benefits and by how much, airlines and rail operators will gain a better grasp of how to optimise the delivery system and how to price the value delivered. They will better understand to what extent this collaboration is economically viable.



Case study: Singapore Airlines U.K. Rail–Fly partnership

Singapore Airlines launched a U.K. Rail–Fly partnership with First Great Western and Heathrow Express in 2014. The partnership offers customers through-ticketing service from 11 destinations in Southwest England and Wales to more than 90 Singapore Airlines destinations in 30-plus countries under one booking to simplify the end-to-end travel process.

Figure 8.13: Airports and Train Stations Connected in the Rail–Fly Partnership



This air–rail service offers multiple benefits.

Cost savings — Customers save US\$195 (13 percent) when travelling on an economy SaverExpress fare from Bristol to Heathrow, to catch a connecting flight to Brisbane. This saving is US\$265, when travelling BusinessExpress (January 2014 rates).

Ease of travelling — Travellers need not navigate through the operational hassle and security checks of the local airports while travelling in the region.

Integrated ticketing — A travel schedule which requires three separate bookings in three transactions with three different providers can be combined into one single transaction.

Schedule coordinating — The website shows the best times to connect with each flight, but also provides travellers flexibility to choose a preferred timing if they want to break the journey and have stopovers at a connecting point.

Insurance — Insurance coverage is provided against delays, providing customers assurance while they are using two modes of travel.

Integrated loyalty programme — Singapore Airlines' frequent flyers can earn KrisFlyer miles on the complete journey, including the rail leg.

The partnership was recognised for Integrated Air-Rail Partnership at the Global AirRail Awards 2014 in Oslo. The success was echoed by British Airways, which followed suit with a collaboration with First Great Western and Heathrow Express for combined tickets for air and rail along the same route one year later.

This is an example of the first phase of collaboration proposed earlier, wherein an ASEAN FSC can collaborate with a HSR system outside Southeast Asia to leverage the established system and also to learn as it implements the programme.

Case study: China Eastern Air and China Railway

Closer to home in Asia, we are already seeing the success of collaborations. This is where ASEAN can learn from its northern neighbours how a China-based air carrier can establish this collaboration with a rail operator in its own country.

China Eastern Air secured a partnership with China Railway to provide an air-rail integrated proposition. China Eastern Air Holding Co. signed a strategic cooperation agreement in Shanghai to launch the joint transport product “Air-Rail Pass” in May 2012 from Shanghai Hongqiao International Airport, marking China’s first air-rail combined service. The service allows passengers to transfer between international and domestic services and train operations with a single ticket.

Figure 8.14: Airports and Train Stations Connected in the Collaboration



This proposition presented a few key features:

- **Cost savings** — The joint ticket price is about 50 percent of the total cost of a flight and railway tickets, according to China Eastern Airlines Senior Manager of Marketing Zhang Chi.
- **Free intermodal transportation** — The airline provides free transportation services between both airports and the railway station, ensuring an ease of transition.
- **Compensation for delays** — Compensation will be provided to passengers for either flight or railway delays.

The collaboration has resulted in multiple benefits for China Eastern Air. The most direct benefit is that it allows the airline to address intense competition from high-speed rail. The five airports in China’s Pearl River Delta region met in 2012 and forecasted that the development of HSR would cost the airlines 4 million passengers from 2011 to 2015.³⁹⁰ This collaboration also allows China Eastern Air to concentrate on building its global presence. China Eastern President Ma Xulun aspired to build China Eastern into a major international airline; however, only about 45 percent of the airline’s revenue came from international business in 2012. By collaborating with the rail operators to serve the domestic routes, China Eastern can allocate more of its aircraft to serving the international routes.³⁹¹

On another note, the collaboration is expected to drive growth in leisure travel traffic along with a new visa-free policy. China Eastern Air had previously developed diverse intercity travel packages to attract foreign customers. With the implementation of Shanghai’s 72-hour visa waiver, and the ability for HSR to reach neighbouring cities within an hour or two, it is timely to develop an integrated product that encourages transfer passengers to consider a leisure tour, made possible by the visa-free policy. In its first month of launch, the service attracted new passengers from Japan and South Korea, marking a positive start to realising its strategic ambitions.³⁹²

What are the challenges?

A well-considered approach will be critical to addressing the challenges in such collaborations, including intermodal connectivity, competitive dynamics, and the risk of brand dilution.

- **The intermodal connectivity**

The air-rail collaboration appears to be a good proposition until the companies take on the transfer of passengers in between stations. Passengers who have their rail service disrupted will need to be provided with a means of travelling to and from the railway station and the airport. In countries such as the Philippines, where roads are prone to flooding and quickly become congested once it rains, this will translate to further disruptions to commuters.

- **Ally or competitor?**

It is unintuitive for rail and air to collaborate for good reasons. They are essentially competitors for the same customers travelling on the same route. For example, flag carrier Air France used to operate a 300-mile trip from Paris to Strasbourg, usually taking approximately six hours door to door. However in 2007, a high-speed train service operated by SNCF completed the journey in two and a half hours, making the aviation alternative obsolete. By 2016, the trip from Paris to Strasbourg took only 1 hour and 45 minutes. Subsequently, the airline ceased its four-times-a-day air service. A successful collaboration requires management will, mutual trust, and clear parameters to ensure both sides reap the benefits with the support of connected customer management, distribution, and logistics systems, while protecting each other's interest in the market.

- **Risk of brand dilution**

While the brand positioning of a flight option and rail option might be similar in countries such as Germany, the perception of flight and rail might vary in ASEAN, where many countries are still developing their infrastructure. This issue requires careful consideration as FSCs might risk brand dilution by offering an air-rail service. In addition, the service might not take off because passengers are reluctant to take up the offer.

Analytics

FSCs can consider leveraging analytics to address the price pressure the FSCs are facing. The airlines can gain a full view of the customer journey to offer a unique, personalised package to each individual customer based on the customer's past behaviours, interactions, and stated preferences. These preferences and behaviours can then be used to predict and eventually influence the customer's future buying behaviour.

What are the benefits?

- **Differentiated offering and pricing to address fare pressures**

FSCs can gain in a few ways from the use of analytics to personalise offerings. By customising and pricing flight experience to each individual customer, FSCs can create a differentiated offering in a generic marketplace, reinforce the premium brand, and create new revenue streams. The pricing can then take into account personalised discounts on base fares, enabling FSCs to combat the fare pressures.

- **Enhanced customer loyalty**

The ability to engage customers at a more personalised level will also pave the way to greater customer loyalty. Studies have shown that it costs up to seven times as much to acquire a new customer than to retain an existing one. In a competitive industry such as air travel, constantly fighting for customer acquisition, long-term loyalty is especially valuable as these customers have a greater probability of trying new services and lesser sensitivity to price changes.

- **Increased revenue potential**

With a full view of the passenger's journey and rising smartphone penetration, the airline's touch and influence can be further expanded by creating a dialogue with the customer and influencing the revenue potential throughout the full journey.

This can be enabled by analytics that develop attribute-level customisation, determine a passenger's likely actions, identify the customer's propensity to purchase specific services, and calculates profitability for each individual passenger. The assessment is based on data collected from the passenger's selection and purchase of previous flights. A tailored offering can then be offered in real time.

What are the challenges?

- **Fragmented view of data**

Analytics' building blocks, customer data, often reside in multiple segmented silos across multiple systems and databases. It will be challenging to create and maintain a point-to-point integration that provides real-time access from a customer purchase platform such as a website or phone applications.

The customer experience programme will require a central data hub that aligns with the current system architecture.

- **Difficulty in capturing unstructured data**

In addition to structured data such as check-in records or number of bags, an increasing source of unstructured data such as campaign responses, social media data, or agent interactions will be critical to providing a full view of the customer journey and truly customised experience for the customer. However, unstructured data will be difficult to capture for analysis.

Example: United Airlines

Prior to 2014, United Airlines collected and analysed customer choices at the market level to identify popular products and market with these insights in mind. In 2014, United Airlines then adopted a new approach which allowed it to focus on its insights, from the market level to each individual customer.

It used a "collect, detect, act" system that gathered and analysed 150 variables in a customer profile, which includes previous destinations and prior purchases, to determine that specific customer's likely actions and offer a tailored package in real time.

This approach led to an increase of more than 15 percent in year-over-year ancillary revenue for United Airlines, according to Scott Wilson, the company's Vice President of E-commerce and Merchandising.³⁹³



Maritime

The state of the maritime industry

The maritime industry holds great potential in ASEAN, owing to its geographic endowments, its long coastlines, and a growing economy. ASEAN is blessed with a geographic disposition favourable to maritime trade. The access to major sea lanes provides connectivity to the global markets. It also encompasses the Straits of Malacca — the world's busiest shipping lane, acting as a critical transit point between major commodity routes. Nearly one-third of the 61 percent of total global petroleum and other liquids that moved on maritime routes transited the Strait of Malacca in 2015. More than 94,000 vessels pass through the Straits every year, carrying one-fourth of the world's traded goods, including approximately 15.2 million barrels of oil per day in 2015.³⁹⁴

ASEAN also lacks land connectivity within large economies in the region, such as Indonesia and the Philippines, providing favourable conditions for maritime activities. Housing an archipelagic region with more than 24,000 islands and a 300,000-kilometre

coastline (longer than that of the U.S., Canada, or Europe), Southeast Asia possesses a natural opportunity for ship building, port operations, and sea transport.

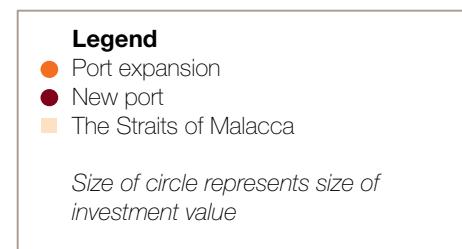
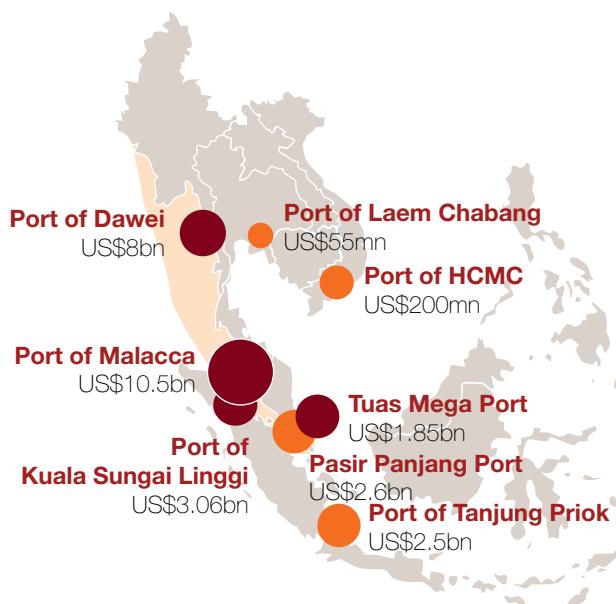
With an annual growth projected to average 5.2 percent from 2016 through 2020, ASEAN is estimated to become the fourth-largest single market in the world by 2030. The engine is set in motion, and an increasingly affluent population of 630 million provides the much needed impetus for the maritime industry to grow.³⁹⁵

Future potential

ASEAN has dedicated investments to turn these advantages into progress in the maritime sector. The region has grown at a CAGR of 2.5 percent in container throughput over the past five years, dominated by Singapore and Malaysia, which take up 60 percent of the market.³⁹⁶ At the same time, the Southeast Asian states are further investing in new ports and expanding existing ones to sustain growth. The development of Tuas mega port in Singapore, work in the Port of Malacca, and the expansion of the Port of Tanjung Priok are some notable projects (see Figure 8.15).

Figure 8.15: ASEAN States are Investing in New Ports and Expanding Existing Ones to Sustain Growth

Major port expansion and new construction Projects, Investment value US\$



Considerable activity along the Strait of Malacca, in part due to China's Belt and Road initiative

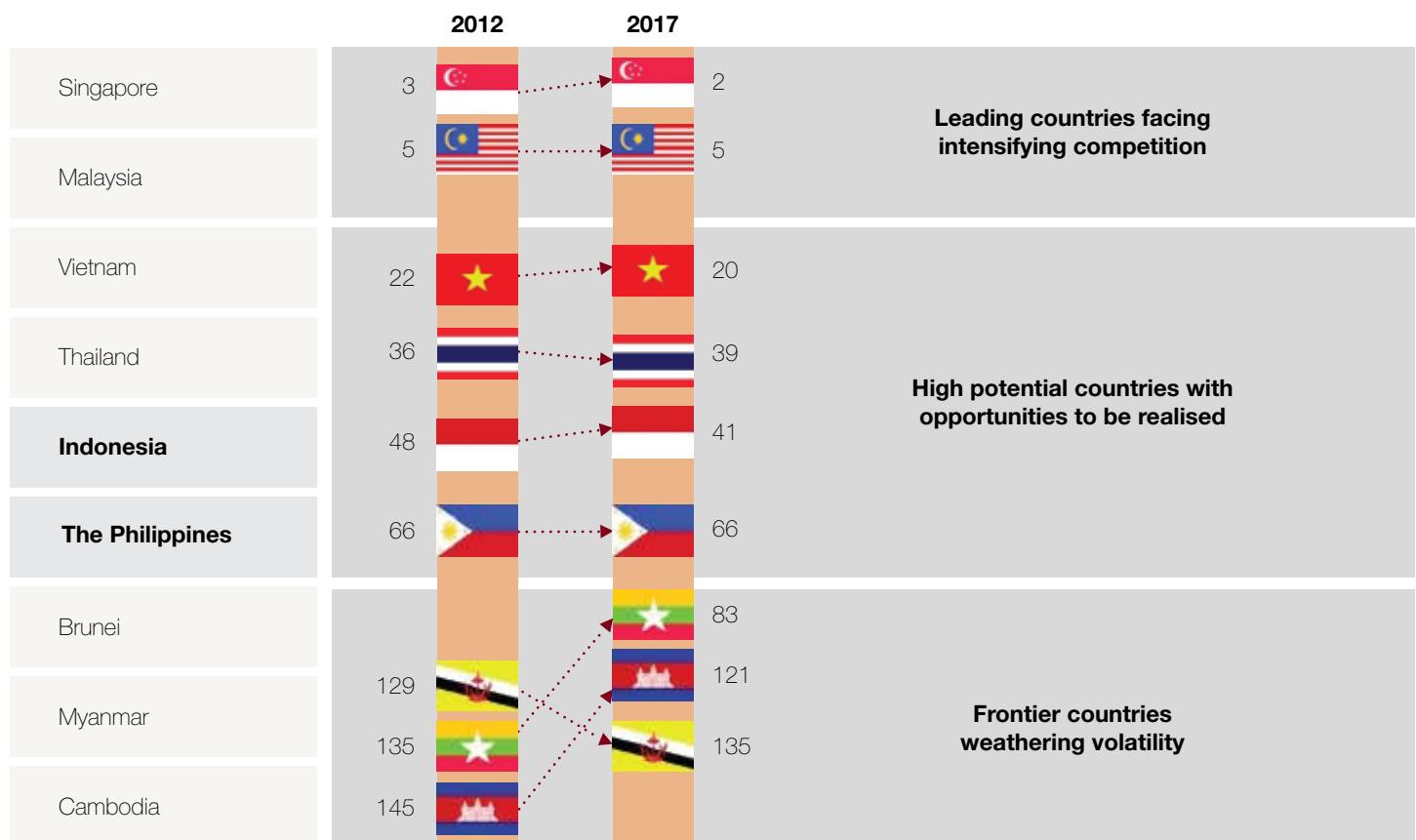
Source: PwC analysis

Amongst ASEAN countries, Indonesia and the Philippines stand out as having strong but underdeveloped maritime potential, due to their archipelagic nature and location near major international shipping routes.

Figure 8.16: Indonesia and Philippines Stand Out as Countries with Strong Natural Endowments But Underdeveloped Potential

Linear Connectivity Index

Global ranking (1 – best), 2012 – 2017



UNCTAD's Liner Connectivity Index records how well integrated countries are with global container shipping networks. It is based on five components: number of ships, their container-carrying capacity, maximum vessel size, number of services, and the number of countries which deploy container ships in their ports.

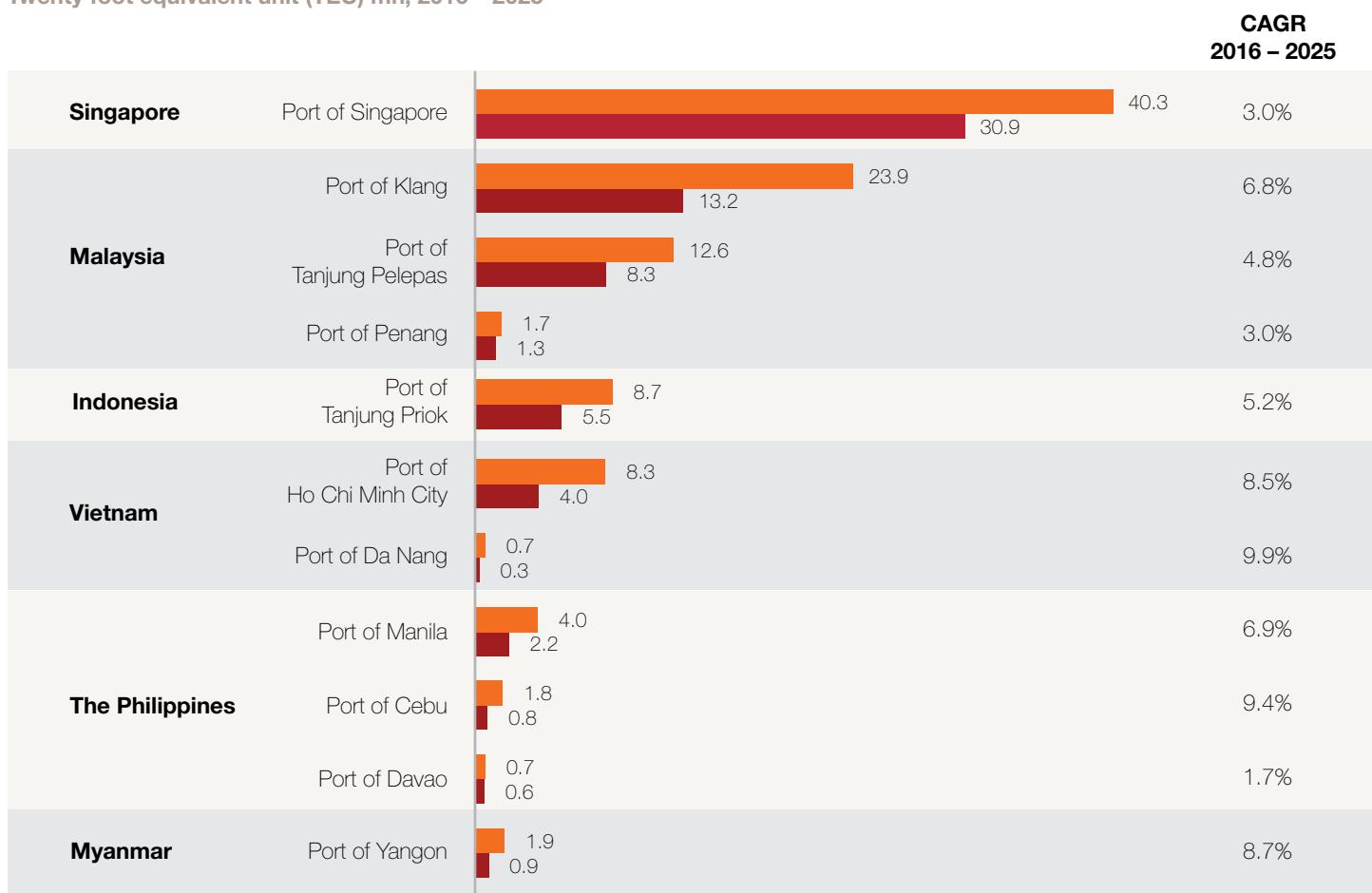
Source: World Bank³⁹⁷, PwC analysis

Indonesia, Vietnam, and Thailand are competing to be major manufacturing bases for automotive and electronic companies, including Toyota and Samsung Electronics. The expansion in manufacturing will drive demand for shipping (see Figure 8.16). We anticipate major ports in Malaysia, Indonesia, the Philippines, and Vietnam to outpace the rest in their throughput growth (see Figure 8.17)

Figure 8.17: Major ports in the Malaysia, Indonesia, Vietnam and Philippines are Anticipated to Outpace the Rest in Their Throughput Growth

Major ASEAN ports throughput forecast

Twenty foot equivalent unit (TEU) mn, 2016 – 2025



Source: Business Monitor International³⁹⁸, PwC analysis

These countries provide more economic momentum and trade route options to ocean liners in the midst of the shift in the global ocean carrier alliance landscape.

The alliance came about on the back of industry overcapacity, losses in recent years, price competition, and the need to ensure that ever-larger vessels are optimally loaded. The bankruptcy of South Korea's Hanjin Shipping in 2016, the seventh-largest shipping line, also increased the urgency for carriers to restructure themselves. This resulted in the formation of three major alliances in April 2017 (see Figure 8.18).

Figure 8.18: The Ocean Liner Industry was Already Facing Several Challenges, Leading to the Eventual Formation of 3 Major Shipping Alliances

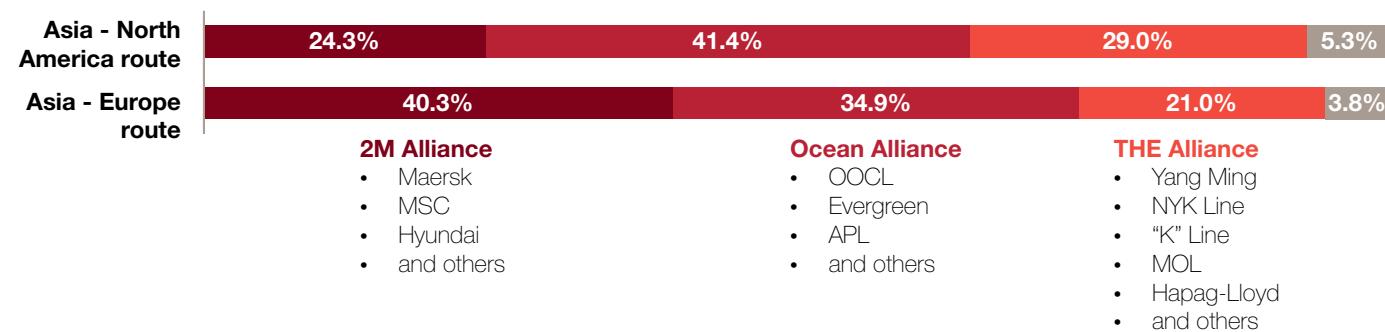


Source: PwC analysis

Figure 8.19: The New Alliance Represents Around 75 Percent of Global Ocean Freight Capacity

Share of capacity by route

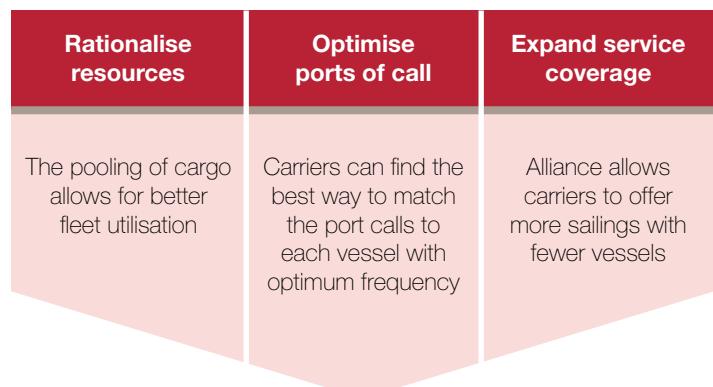
As of 1st April 2017



Source: *The Wall Street Journal*³⁹⁹, PwC analysis

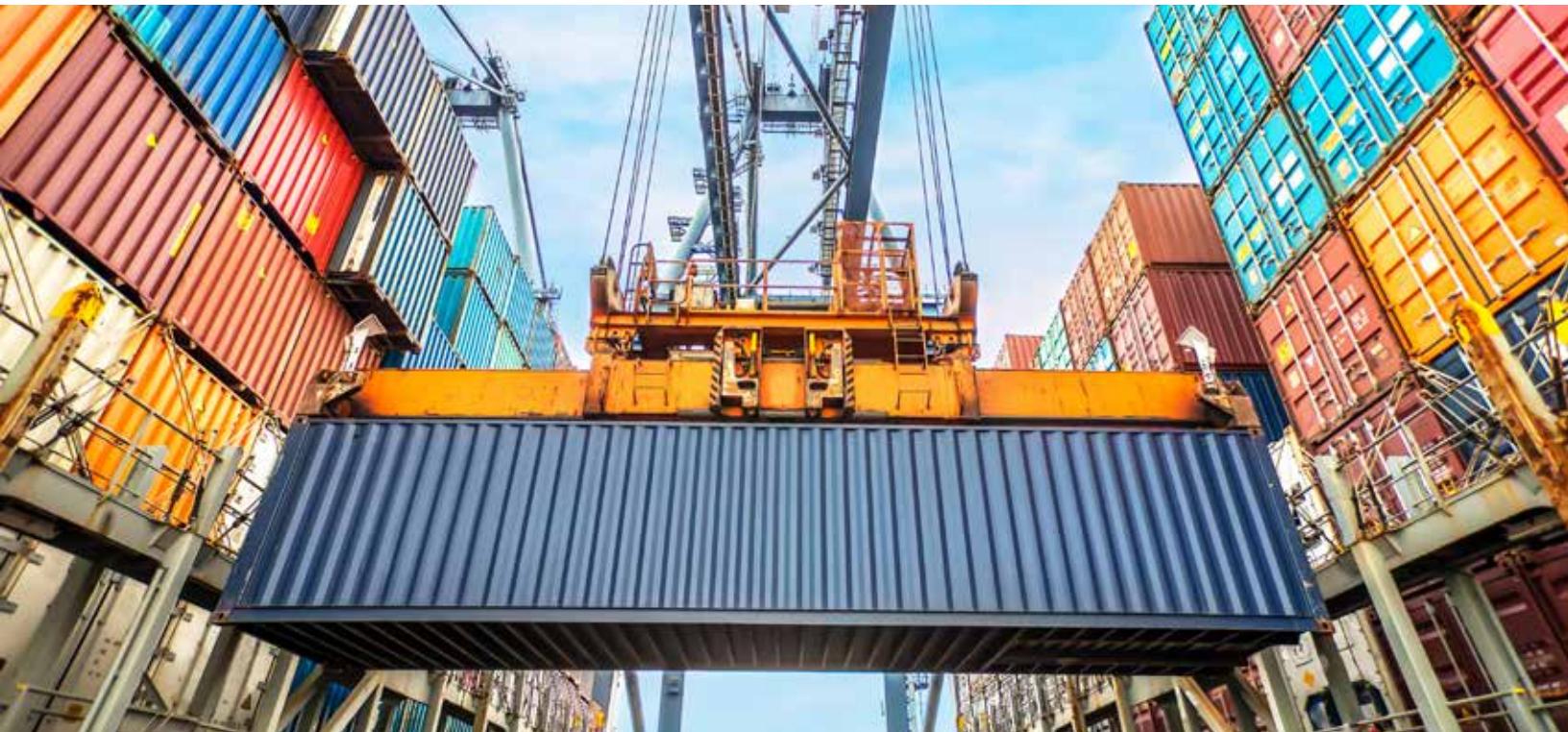
The alliances bring about timely gains in economies of scale with rationalisation of fleet and port calls. They help to rationalise resources as the pooling of cargo allows for better fleet utilisation. Carriers can also find the best way to match the port calls to each vessel with optimum frequency. Additionally, the alliance allows carriers to expand service coverage and offer more sailings with fewer vessels. With the realisation of economies of scale, carriers can then reduce operating cost, which is a significant factor for vessel operations (see Figure 8.20).

Figure 8.20: The Alliances Bring About Timely Gains in Economies of Scale with Rationalisation of Fleet and Port Calls



With the realisation of economies of scale, carriers can reduce operating costs, which is significant to vessel operations

Source: PwC analysis

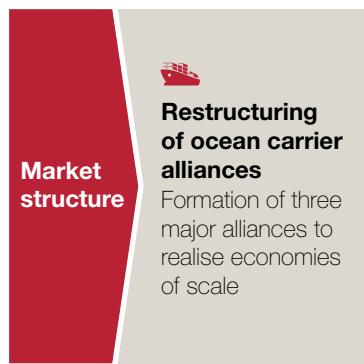


Industry challenges

Challenges do exist in such alliances. Alliances can exacerbate problems in operation bottlenecks and service commoditisation, posing hurdles to cost savings.

Figure 8.21: Challenges Ocean Liners Face

Developments in the market



Source: PwC analysis

Challenges ocean liners face



Operation bottlenecks

Unlike an ocean liner, a port has immovable assets. Therefore, it is important to ensure the assets are utilised productively to deliver the port's value and returns. Many ports in ASEAN are already struggling with terminal operations' lack of reliability. Some of these situations arise from a lack of communication. When communication falters, carrier plans are not aligned with the terminal operating preferences, and terminal operators are unable to validate the loading plans ahead of the berthing of vessels.

Merging of ocean alliances has further exacerbated the situation as the less frequent but larger volume per call creates surges and pressure on yard operations.

The ocean alliances are primarily involved with vessel sharing, and this co-operation ends once the container reaches the port, often creating problems with the terminal and rail operations.

- On the terminal front, alliances might operate with multiple terminal interests within a port, such that containers that are discharged from a single ship have to be transported to different terminals and risk getting mixed up.
- On the rail front, carrier alliances can complicate train loading priorities, such that the rail lines need to handle massive surges in demand from different shipping lines (see Figure 8.22).

The chronic industry overcapacity overlaid with a competitive pricing environment, coupled with the port inefficiencies incurring additional costs creates uncertainty as the cost incurred can potentially outweigh the cost savings (see Figure 8.23).

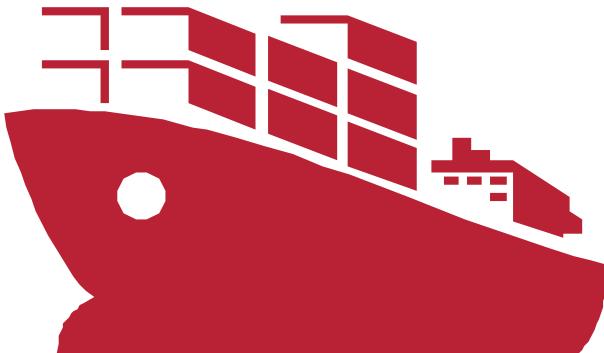
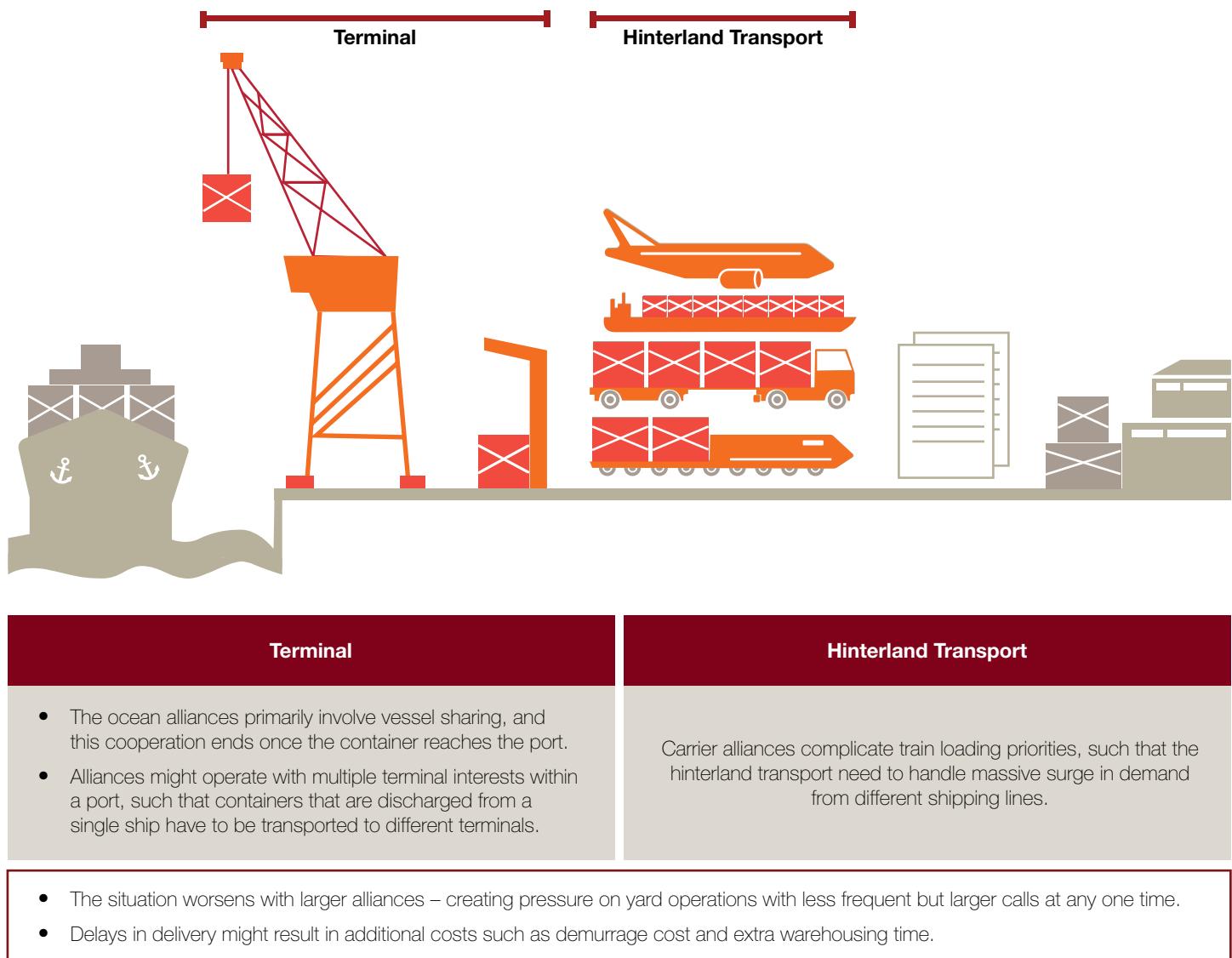
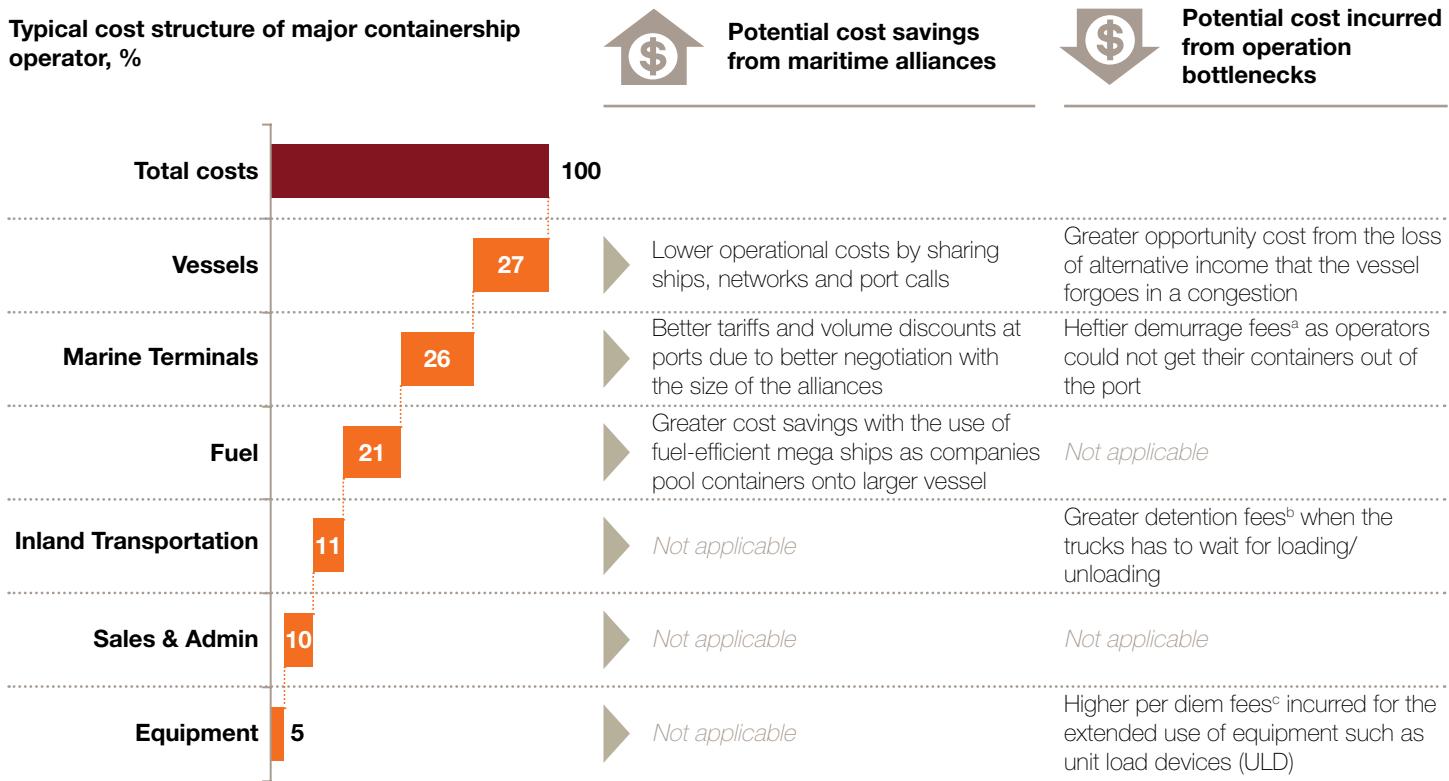


Figure 8.22: Merging of Ocean Alliances Further Exacerbates Congestions with Surges and Pressure on Yard Operations



Source: PwC analysis

Figure 8.23: The Operation Bottlenecks Create Uncertainty as the Cost Incurred Can Potentially Outweigh the Cost Savings



^a Demurrage is a charge for the use of space, with fees applied after a specified period of “free time.” Demurrage was originally intended to encourage faster cargo movement so that terminals are not used for storage by shippers.

^b The detention charge usually applies to domestic trucking. The trucking or drayage company bills you for the so-called detention of their trucker or driver in cases. This happens when the loading or unloading of your shipment or containers takes too long.

^c Per diem applies when you require the use of equipment beyond a set amount of free time.

Source: A.P. Moller Maersk Annual Report 2013⁴⁰⁰, PwC analysis

Potential service commoditisation

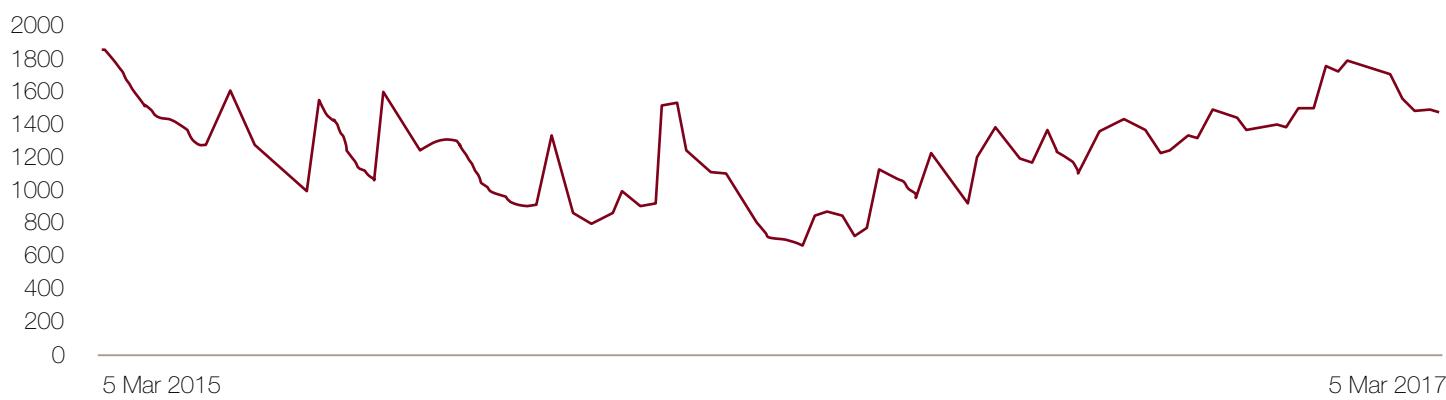
Container freight rates have been under persistent downward pressure due to industry overcapacity of larger container ships. The formation of alliances might provide further justification for the competitive pressure on prices, as companies are expected to offer better rates thanks to cost savings from the alliance. It becomes increasingly difficult for ocean carriers to differentiate on other measures such as speed or customer service when they cannot offer a service that is faster or more reliable than their alliance partners (see Figure 8.24).

In addition, the shippers receive their goods from a different vessel or operator each time, further reducing the ability for ocean liners to build a brand in the market. Unless ocean liners are able to find a way out of the conundrum, the service risks being commoditised as shippers lose the benefit of competitive choices. Similar to services such as Internet service providers, despite small variations in the service packages, they compete largely on price because the high-speed connection is essentially the same everywhere.

Unless the shipping companies differentiate on other measures such as speed of customer service, the service risks getting commoditised as shippers lose the benefit of competitive choices.

Figure 8.24: The Formation of Alliances Might Provide Further Justification to the Competitive Pressure on Prices, Commoditising Freight Services

World Container Index
2 year spot freight rate trend
US\$/40ft container, 2015 – 2017



The World Container Index assessed by Drewry is a composite of container freight rates on 8 major routes to/from the US, Europe and Asia.

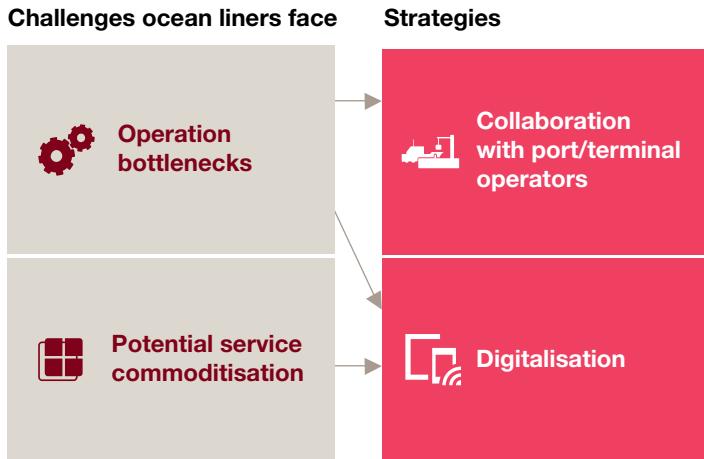
Source: *Drewry⁴⁰¹, PwC analysis*

Strategies for maritime in ASEAN

Operational bottlenecks and the potential for service commoditisation may threaten to reduce the profitability gained from ocean alliances, but there are ways to address these challenges (see Figure 8.25)

Collaboration and digitalisation could potentially be the answer to these problems. “Everyone benefits from collaboration and data sharing,” said Andreas Mrozek, Global Head Marine & Terminal Operations for the Hamburg Sud Group, one of the world’s largest container shipping lines. “It starts with the customers and moves to the carriers, then the terminal operators, vendors, freight systems, and truck companies, and keeps going down the line. Closer collaboration is a compelling value proposition for each supply chain partner.”⁴⁰²

Figure 8.25: Strategies to Address the Challenges Ocean Liners Face



Source: PwC analysis

Collaboration between ocean liners and land-side operations

How does this work?

To address the operation bottlenecks, both ocean liners and terminal operators can consider collaboration with port and intermodal services to streamline operation complexity while achieving greater cost savings. Otherwise, an effort to achieve cost competitiveness through consolidation might just mean a transfer of cost to the rest of the supply chain.

At the same time, the collaboration secures stable demand and supply through preferential agreements such as dedicated berths or prioritised ports of call, thereby anchoring the alliance and the terminal’s market dominance in the face of competition.

What are the benefits?

The collaboration can be implemented in different ways, each bringing a unique set of benefits.

• For the ocean liners

- **Obtain favourable handling conditions**
The terminals can provide favourable handling conditions for the vessels, for example, a dedicated berth or prioritised service with shorter waiting time. This will shorten the time vessels spend at the terminals, saving the ocean liners from possible demurrage fees, detention fees, or per diem fees.
- **Increase operational efficiency**
By combining the container depots, connecting the operating systems and management teams, ocean carriers can increase efficiency and reduce turnover times. This will also reduce human errors and mix-ups that might incur additional operational costs.

- **Achieve lower costs in consolidated intermodal agreements**

With better coordination with rails and trucks at intermodal junctions, ocean liners can achieve a greater flow in logistics through a single intermodal agreement, or achieve a lower trucking rate by combining the volume and adopting a more centralised management. These factors contribute to cost savings when the vessels dock at a berth, addressing the potential risk of not being able to realise cost savings arising from the alliances.

- **For the terminal operators**

- **Gain influence on the choice of ports**

Terminal operators are facing increasing pressure as the carrier alliances seek to leverage their position to lower handling costs, while at the same time invest in infrastructure upgrades to cater to ever-larger vessels. They are also facing greater uncertainties as the port selection is increasingly influenced by the growing alliance, rather than port-specific attributes that operators have control over. With the collaboration, terminal operators have an opportunity to exert an influence on the alliance on their choice of ports, in a way that goes beyond port-specific attributes. Further, if the terminal plays an active role in organising land operations across various service providers, it has an option to offer ocean liners an end-to-end land service at a competitive rate.

- **Secure capacity**

Terminals face uncertainty from the realignment of alliances as home ports could potentially gain or lose a substantial amount of cargo when the alliances negotiate bulk agreements for better rates. For example, in 2017, companies operating

under the newly formed Ocean Alliance moved their shipments from Port Klang in Malaysia to the Port of Singapore, effectively taking away approximately a third of Port Klang's income. At the same time, this contributed to a 9.6 percentage point jump for PSA International Pte. Ltd. in the second quarter of 2017 to 8.5 million TEU.⁴⁰³

Larger ports are also taking the opportunity to demonstrate capacity commitment to lock in large alliance customers, as not many ports are designed to handle a substantial increment of volumes quickly. By establishing a collaboration and inking the agreement to be the preferred port of call from the ocean liners in an alliance, terminals get an assured traffic flow of shipments.

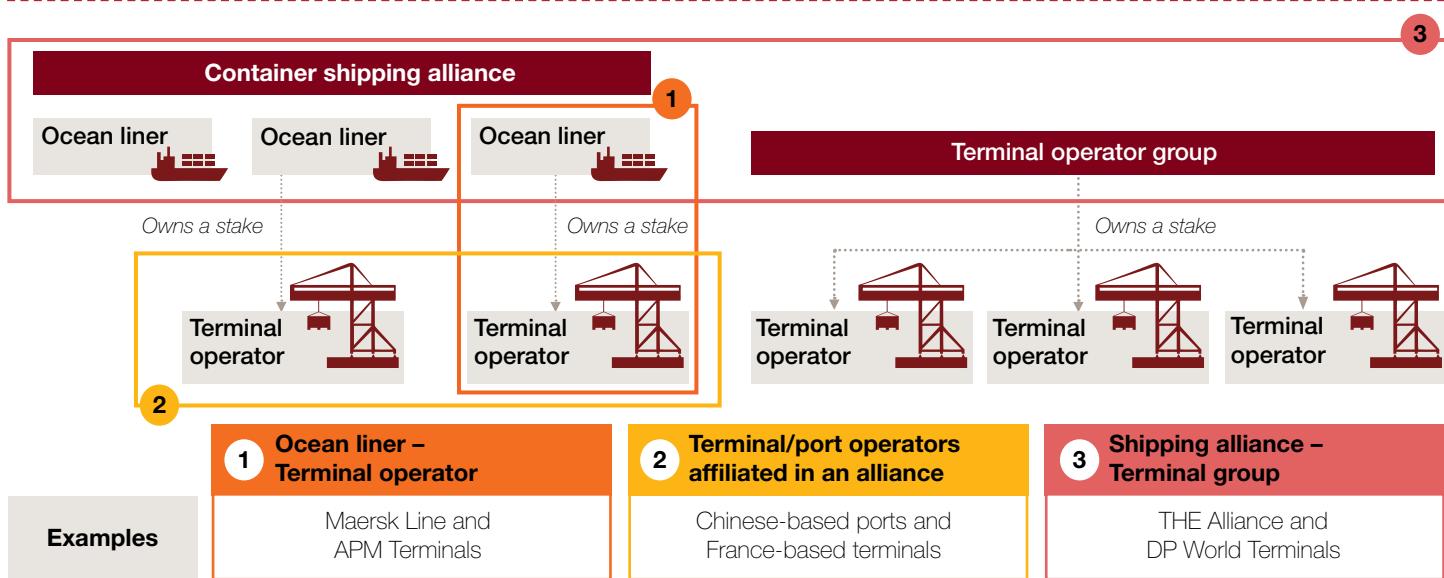
- **Achieve cost savings**

Depending on the extent of collaboration, cost savings can potentially be realised with shared investments and resources. For example, companies can co-invest in an online port community system, an extensive network to facilitate the exchange of electronic information across terminals, ocean liners, and customs. The system can allow early booking notification of container terminals, booking of land-side transport, custom declaration documentation, barge planning requests, or declaration of berthing dues through one single interface with multiple stakeholders at the same time. Essentially, the collaboration serves to consolidate the influence of the ocean liners and the terminal operators, and to capture economic opportunities together in major economic centres.

How can we do it?

With the emergence of major players and alliances across liner and terminal sectors, one can explore different models of collaboration to achieve the greatest leverage on the supply chain, three of which are illustrated in Figure 8.26.

Figure 8.26: Ways for Liners to Collaborate with Terminals



Source: PwC analysis

Collaboration 1: Ocean liner–terminal operator

- In what way is this collaboration different?** The ocean liner–terminal operator collaboration is a partnership exclusive to a single ocean liner and a single terminal operator. This works well when the ocean liner and terminal operator are major players in their respective industries, with a large fleet of vessels that fulfills a significant portion of the needs of the network of terminals around the world. At first glance, the ocean liner and terminal operator seem to have an inherent conflict of interest — one seeks to lower the port-related fees which the other seeks to maximize its profit serving the ocean liner. In some circumstances, this conflict of interest gets moderated with shared ownerships arising from mergers and acquisitions, for example, when a shipping company owns a terminal.

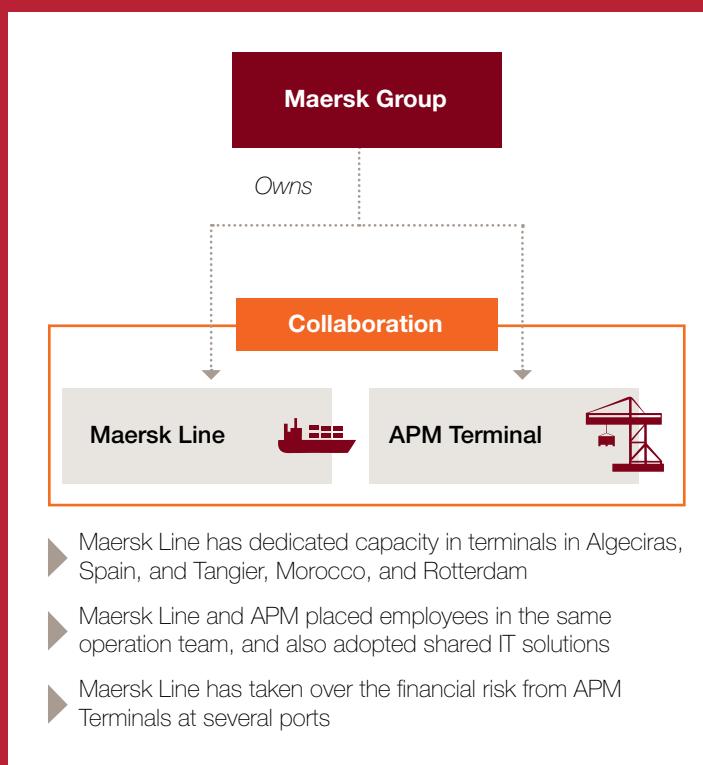
- How are the benefits different?**

Having shared ownership allows the partnership to have greater autonomy and transparency to extend partnership to various aspects. The most obvious one would be entering a commercial agreement whereby the liner is secured dedicated capacity in strategically important terminals, and in return the terminals gain a stable demand. The partnership can be further developed into having shared employee pools or IT solutions for greater operational savings and stability in operations. With the autonomy in depth and scope of the collaboration, both liner and terminal can achieve security in volume demand, and at the same time achieve efficiency gains in operational streamlining and shared resources.

Case study: Maersk Line and APM Terminals

Maersk and APM Terminals has signed an agreement whereby Maersk Line has access to dedicated capacity terminals such as Algeciras, Spain, and Tangier, Morocco, and Maasvlakte II in Rotterdam, under which some of the risks and the benefits associated with terminals are transferred to Maersk Line.⁴⁰⁴

Figure 8.27: Collaboration Between Maersk Line and APM Terminal



Challenges

- What seems like a perfect match might bring about headwinds too. For a terminal that serves more than 60 carriers across approximately 70 ports, the close relationship and preferential treatment of one single ocean liner might create uneasiness amongst the other carriers.
- Other ocean liners could construe this as a lack of terminal neutrality, a code of conduct market players adhere to. In 2015, the chairman of the Port of Gothenburg, Ulrica Messing, raised concerns that APM terminals might be favouring vessels from their parent company, therefore causing port delays amongst the rest of the customers.
- Therefore, terminal operators need to ensure that balance their treatment of different ocean liner companies fairly across their network to avoid negative repercussions.⁴⁰⁵

Collaboration 2: Terminal/port operators affiliated in an alliance

- **In what way is this collaboration different?**

Many ocean liners have partial ownership in terminals and therefore in this collaboration, terminal or port operators are affiliated to ocean liners in the same alliance to combine resources in order to improve terminal operations where the parent ocean alliance calls. Although the growing alliance of ocean liners puts pressure on terminal performance, the ocean liners can also pull the terminals that they owned together to co-operate.

- **How are the benefits different?**

Terminal operators can combine efforts to increase efficiency at terminals by co-investing in port operation systems, combining the purchase of equipment at better prices, or co-investing in other terminals to complement their existing terminal network.

There will be greater incentives for terminal operators to improve operations, particularly at ports where the parent alliance calls. Similarly, the alliance members will be incentivised to gravitate their volumes toward ports where their partners have terminal investments and have implemented terminal improvements.

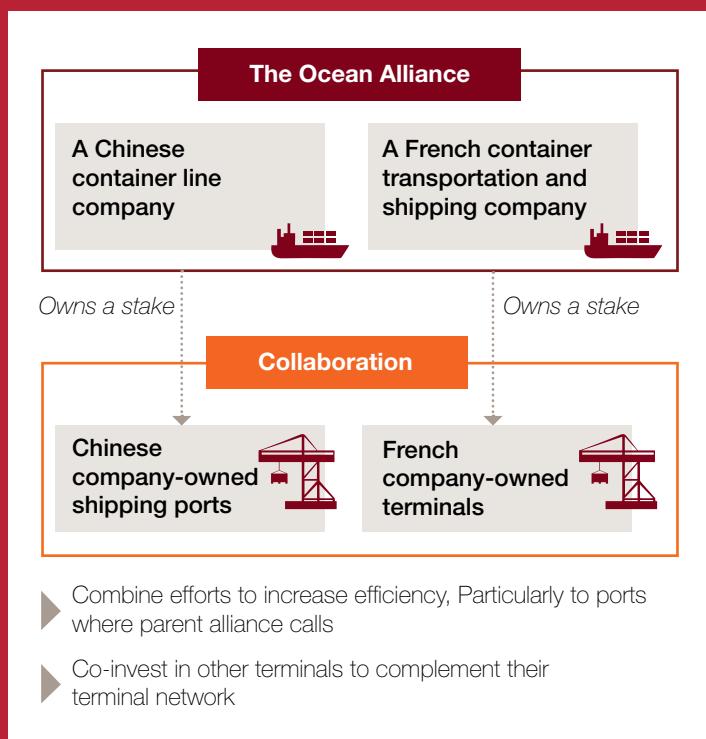
By combining the efforts to increase efficiency at these terminals, and calling at these ports first, both the ocean liners and the terminals will stand to gain.



Case study: Chinese company-owned shipping ports and French company-owned terminals

In 2017, a China-based shipping ports company and a French carrier signed a memorandum of understanding on the co-operation in terminals around the world, primarily in ports where the shipping lines are operated by members of the Ocean Alliance.

Figure 8.28: Collaboration Between Chinese Company-owned Shipping Ports and French Company-owned Terminals



Challenges

- Some of these ocean liner alliances are newly minted, and the members do not share a long history of partnership. Furthermore, even though the ocean liners have a partial ownership in terminals, they might not have full control on what the terminal does. Thus, it might be difficult for members of the alliance to bring their terminals to work together. The success of the co-operation will depend on the cohesion of parent alliance and extent of control ocean liners have on the terminals they have shares in.
- Furthermore, these terminals might be competitors serving the same economic centres and therefore there could be a conflict of interest if competing terminals are made to co-operate.

This partnership brought about the co-operation of more than 30 ports from the China-based firm and 28 terminals.⁴⁰⁶

The co-operation is also anticipated to channel additional funds from China because the China-based firm is a key instrument in the Chinese government's Belt and Road Initiative to develop transportation, resources, and trade overseas.

Collaboration 3: Shipping alliance–terminal group

- **In what way is this collaboration different?**

In this collaboration, the shipping alliance can appoint a terminal group as the preferred terminal to handle all their calls. In return, the partner terminal provides a prioritised service to vessel calls from this alliance. The realignment of alliances often brings uncertainty as ports can potentially gain or lose a substantial amount of cargo or calls. However, this is also an opportunity for both the ocean liners and large port terminal groups to lock in capacity commitment through a collaboration.

- **How are the benefits different?**

For the large port terminal groups, it is an opportunity to demonstrate their capability to handle a substantial increment of volumes quickly. For the ocean liners, a large terminal group can offer access to multiple ports, which can provide operational backup and reduce the risk of delays in the supply chain.

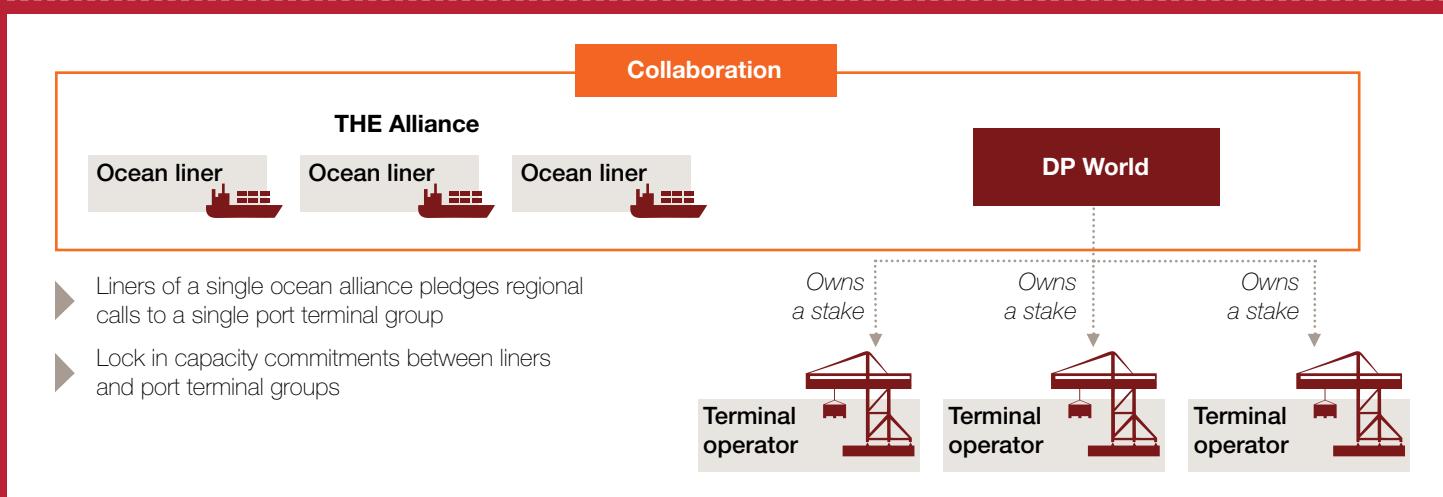


Case study: THE Alliance and DP World

THE Alliance showed the way in 2017 by handling all of its U.K. calls along ten of its trade routes with Dubai-based DP World's deep-water terminals. DP World is the only operator with two deep-water terminals in the U.K., one at Southampton and another at the London Gateway, making it the only provider in the United Kingdom that can offer flexibility when one port gets congested.

To further optimise efficiency in the supply chain, the port is also integrated with DP World London Gateway Logistics Park, which provides access to nearly 1 million square metres of distribution space for retailers and logistics firms such as UPS, which is already sited there.

Figure 8.29: Collaboration Between THE Alliance and DP World



Challenges

- On land, the co-operation largely rest on one single terminal operator group. On one hand, it offers better control across the terminal network. On the other hand, the development of the collaboration rests on one single company's growth trajectory, the terminals it acquired and any weaknesses in operation.
- On sea, it can be challenging to align port preferences amongst shipping liners across the entire alliance. This is especially so for gateway ports where the port of call is also substantially influenced by the shipper's demand. Even if the ocean liners agree on calling the same port, there could be potential for conflict if more than one ocean liner in the alliance has interests in different terminals in the same port.

This strategy is already showing results for DP World. The company posted a stellar growth in revenue of 9.5 percent (3 percent at constant currency rate) in the first half of 2017, attributing part of it to the “game changing Asia-Europe service with THE Alliance.”⁴⁰⁷

Digitalisation

In addition to the collaboration between ocean liners and terminals, companies can further address their challenges with digitalisation.

Addressing potential service commoditisation

- **Utilise dynamic pricing**

Ocean liners can consider addressing the issue of potential service commoditisation with the use of analytics. Ocean liners are facing the potential of service commoditisation, as it is difficult to differentiate a large part of their service as the ocean liners share vessels, schedules, and port of calls in an alliance. Furthermore, poor visibility of cargo utilisation at the point of transaction and the inability to predict utilisation limit sales personnel from making pricing decisions that maximise the profitability of each vessel.

However, with the adoption of analytics, ocean liners can gain visibility of cargo utilisation at the same time it is being fulfilled, and calculate the probability of last-minute changes such as cancellations. The system can then show how the remaining slots can be priced based on ship utilisation, origin and destination of cargo, type of cargo, handling requirements, and commodity trends. In this way, ocean liners can charge customers a higher price when the demand is high, all in real time.

The development of the new pricing model will allow the carrier to react less to demand but start influencing it. With the implementation of dynamic pricing based on cargo utilisation, ocean liners will be able to gain back their negotiating power and resist the competitive pressure on prices.



Addressing operational bottlenecks

- Optimise resource utilisation during loading and unloading**

Digitalisation also addresses operational bottlenecks. Many ports in ASEAN are already struggling with the lack of reliability in terminal operations. Many times ocean liners find their plans not aligned with the terminal operating preferences, and terminal operators are unable to validate the loading plans ahead of the berthing of vessels. This is exacerbated with the ocean alliances as they bring in surges that put pressure on the terminal.

With sensor technologies and cloud-based platforms, companies can make a quantum leap on how they measure and incorporate data for analysis in addressing the bottlenecks. The system captures signals on the crane position, status of vessel berthing, and number of trucks in the line. Signals will be fed into the terminal's central operating system platform to help the terminal planners visualise and interpret a large quantity of data collected from a multitude of sources, all in real time. The terminal planners can then sync up the movements of trucks, containers, and cranes to reduce idling time. Real-time decisions can also be made to deploy additional resources to resolve bottlenecks and improve productivity, thereby reducing operating cost.

- Synchronise hinterland transport from the terminal**

Often, productivity drops at the intermodal interfaces when the container leaves the vessel. Trucks and rail lines need to handle massive surges in demand from different shipping lines in the same vessel, leading to schedule clashes, potential mix-ups, and long waiting times during congestion in the terminal.

Digitalisation has enabled real-time scheduling and autonomous transportation systems to provide a more integrated hinterland transport from the terminal. For instance, the Port of Rotterdam has implemented a new online route planning tool, Navigate, to integrate deep sea vessel schedule data with its barge, rail, and truck schedules for shippers to find and compare routes. This provides greater visibility on the logistics coverage, reduces the time-consuming tasks of continuously updating schedule data for ocean carriers, reduces schedule clashes, and provides better predictability of when the goods will reach the warehouse or another terminal after they have been unloaded.

In another example, in 2017, Singapore's Ministry of Transport and PSA Corporation signed an agreement with Scania and Toyota to develop an autonomous truck platooning system to transport containers between port terminals in Singapore. The objective is to organise a number of trucks — with a human-driven truck leading a convoy of driverless trucks using connectivity technology and automated driving support systems — as well as to fully automate the processes for precise docking and undocking of cargo. If successful, the system will allow for more freight movement during sudden surges in operations despite a limited number of drivers. This also means more freight movement can be conducted at night to ease traffic congestion.

The opportunities for improvements lie not only within the actual movement of goods, but also in the back-end process. This is especially so as ocean liners need to deal with a complicated set of documentation, such as certificates of origin, bill of lading, vessel manifests, and customs declarations, which are made worse with different ocean liner companies now consolidating their goods all in one vessel.

With the adoption of blockchain, the amount of documentation can be reduced throughout the supply chain. At the same time, the ocean liners, distributors, regulators, and customers gain visibility into real-time, secure data using this distributed database technology (see Figure 8.30).

“

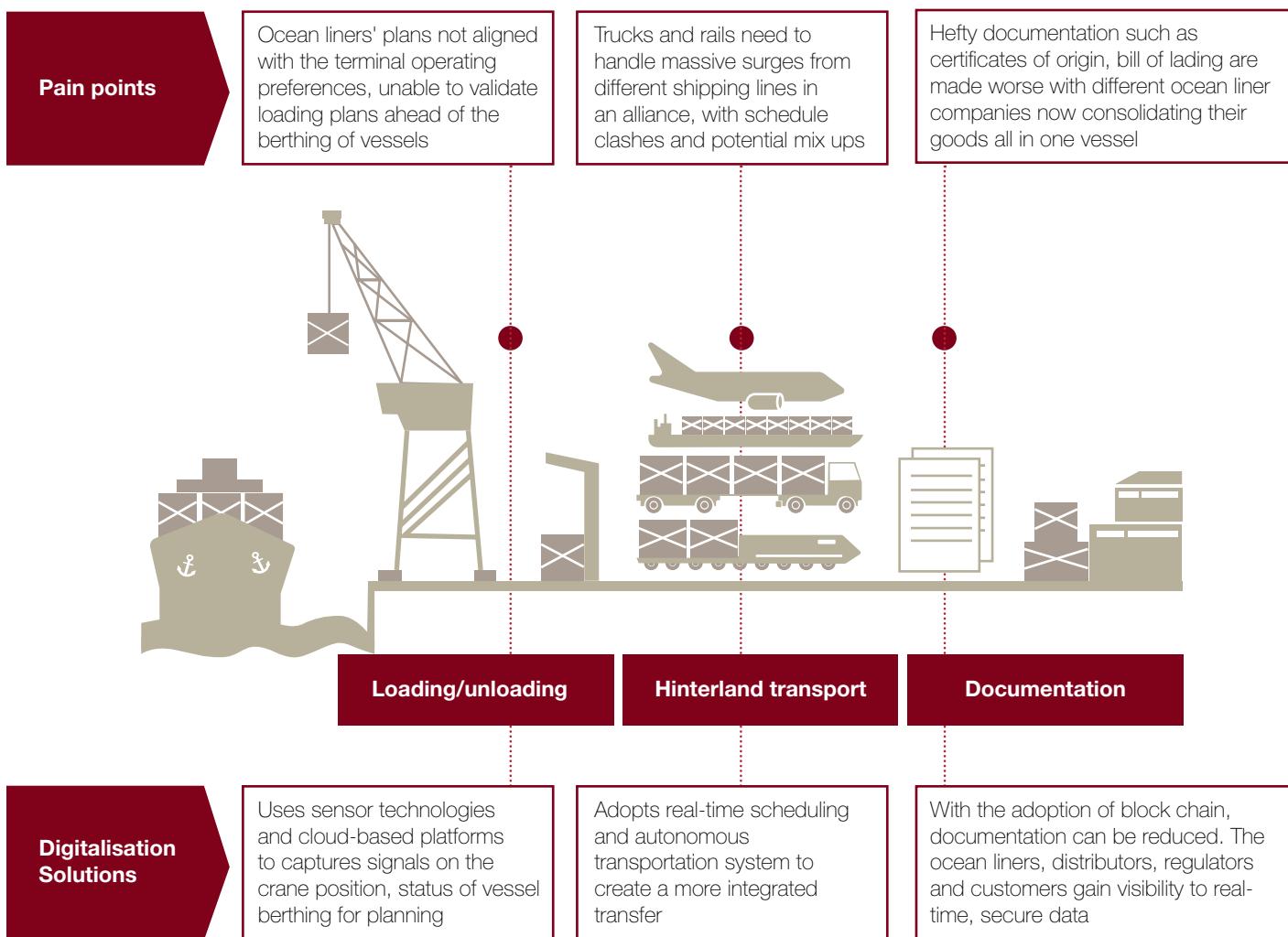
It is important to capture all the processes, and the impact of each process in the chain can then be analysed for targeted improvements through data analytics. Over US\$16 trillion worth of merchandise goods are exported annually. If we could, through better process and technology like blockchain, etc., save even a day in processing time and release funds earlier, it would significantly reduce working capital requirements. ”

Gurinder Singh

Global Subject Matter Expert,
Maritime Industry



Figure 8.30: Examples of How Digitalisation Address Pain Points in the Maritime Industry



Source: PwC analysis

Given the increasingly intertwined logistics and land operations the ocean alliances bring, digital connectivity can be a timely solution to ensure that cost competitiveness via consolidation does not end up transferring costs away to other segments of the supply chain.



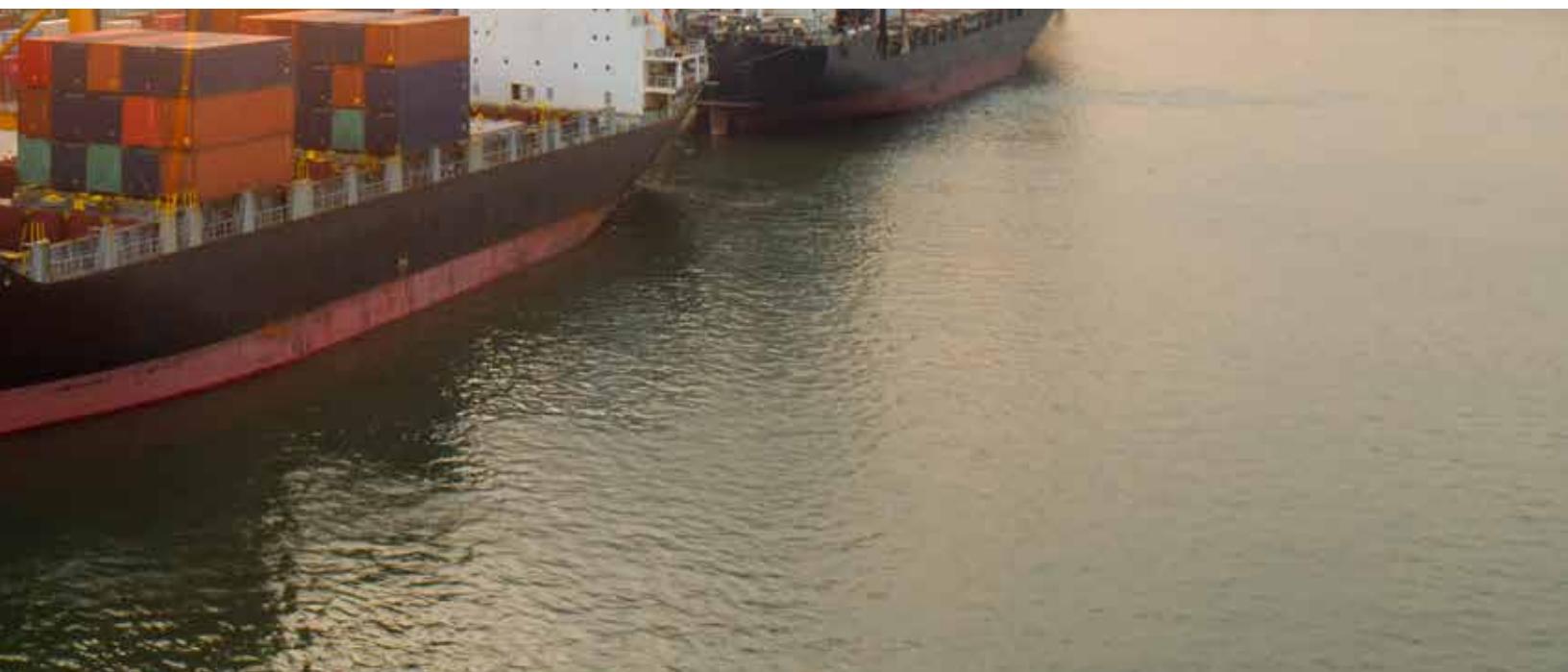
Conclusion

The airlines and ocean liners operate in vastly different industries, but both face strong global competition and pressure on pricing, which makes it difficult to capture rising opportunities in ASEAN.

Collaboration across adjacent sectors can play a part in addressing rising competition and operational complexities. By collaborating with railways to extend additional spokes in the network of services, airlines will be able to maintain a share in the growing short- to mid-haul routes amidst intense competition, better serve the region despite its air restrictions, and at the same time better utilise their aircraft for more profitable routes. Meanwhile, a collaboration between ocean liners and terminals helps to consolidate the influence and capture economic opportunities in major economic centres, secure shipping demand and terminal availability with dedicated berths or prioritised ports of call, and streamline land-side efficiency which threatens to offset the cost savings that alliances are trying to realise.

Analytics are anticipated to be a critical enabler with the airlines and the ocean liners, not only in addressing the pressure on pricing but also in improving operational efficiency. The airlines can adopt customer analytics to customise and price flight experience for individual customers. This way, FSCs can create a differentiated offering in a generic marketplace, reinforce the premium brand, and create new revenue streams to address the fare pressures. As for the ocean liners, the implementation of dynamic pricing based on cargo utilisation will allow them to gain back their negotiating power and resist the competitive pressure on prices. In addition, analytics will support streamlined operational complexities to achieve cost savings for the ocean liners.

By adopting collaboration across adjacent sectors and analytics solutions, companies can rightly address these issues, capitalise on the opportunities available, and unlock the potential for trade and e-commerce in the ASEAN region.



Conclusion

We have seen that ASEAN has made remarkable progress over the past 50 years, not only in terms of achieving strong economic growth, but also in significantly improving the living standards of its people. However, a lot more remains to be done to reduce the economic and social disparities between its member nations. Governments need to act cohesively in developing policies which maintain and grow the inflow of foreign investment by improving intra-regional trade, strengthening key institutions, especially within education and healthcare, and preparing for the social impacts of the 4th Industrial Revolution.

However, governments will not succeed alone. The private sector has a key role to play in ensuring that ASEAN achieves its true potential, by developing and executing innovative strategies and business models, which address its ever more demanding consumer base, whilst simultaneously overcoming the region's challenging characteristics in a more efficient and profitable manner.

The Future of ASEAN – Time to Act, identifies a number of cross sector themes to enable companies to continue to grow successfully. The 4th Industrial Revolution is already beginning to make its mark across ASEAN, and will continue to do so, enabling banks, healthcare and consumer goods companies to connect more directly and frequently with the region's growing emerging middle class consumers. Beyond enhanced experience and services, digital capabilities will enable companies to overcome some of ASEAN's infrastructure and business environment challenges, whilst also bringing efficiencies to their supply chains and manufacturing operations. Corporates need to work with governments to ensure that these advances are responsibly executed and that provisions are made for those victims of Industry 4.0.

However, Digital is not the sole answer to ASEAN's challenges. ASEAN has evolved from a manufacturing base to also becoming a growing consumer market. This promotes the need for more localised production, sourced from the region to facilitate affordable propositions. Medical devices and automotive players are already beginning to develop the capabilities and workforces to execute this strategy and other sectors will follow fast. And finally, just as the governments within ASEAN converge to enact policies to facilitate prosperity and growth, so will its sectors. Companies need to acknowledge that they cannot fulfil their full potential across ASEAN in siloes, but rather through working in partnerships, both within their industries, as with alliances between ocean liners and ports or across industries, with banks and telecoms players.

The world is looking to ASEAN to lead global growth and if it is to rise to this challenge, governments and corporate need to shake off the era of passive growth, based on low wages and commodity exports, and develop more proactive policies and strategies to fulfil its destiny. It truly is Time to Act.

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