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THAILAND ECONOMIC MONITOR 2017

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Digital
Transformation

**THAILAND ECONOMIC MONITOR:
DIGITAL TRANSFORMATION
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Executive Summary

The Thai Economy

The Thai economic recovery has continued to broaden and gain momentum, reflecting an increase in external demand amid global growth and a recovery from severe drought. The economy grew by 3.3 percent in 2017Q1, exceeding market expectations, as farm incomes and merchandise and tourism exports rose and fiscal stimulus policies continued. Merchandise exports recorded 6.6 percent growth, the highest growth observed in the last four years, due to both rising global commodity price and trading partner growth. Economic indicators suggest that the goods export upswing became increasingly broad-based and sustained in 2017Q2. The agricultural sector expanded by 7.7 percent due to rising agricultural prices and recovery from severe drought in 2015-2016.

Domestic demand remained lackluster. Both private investment and private consumption growth remained sluggish. Private investment contracted by 1.1 percent in 2017Q1, reflecting spare production capacity in the manufacturing sector although certain subsectors showed lowered spare capacity due to increased external demand. Overall credit issuance remained subdued as lending standards tightened while loans to large corporates turned positive in 2017Q1 for the first time since 2015. Loans to SMEs and households continued their deceleration trend. Softening food prices resulted in a deceleration in headline inflation.

The recent improvement in economic performance builds on the gradual recovery of the past two years. Private consumption expanded by 3.1 percent in 2016, compared to 2.2 percent in 2015, largely driven by improved farm income, stimulus measures and gradual recovery in consumer confidence. Both public consumption and investment continued to expand by 1.7 percent and 9.9 percent, respectively. Continued growth in services exports, merchandise exports in 2016Q4 and lower imports supported a substantial contribution of net exports to GDP growth. Gross fixed capital formation decelerated, partly due to challenges in implementing large public infrastructure projects and subdued private investment.

The broadening export upturn and public infrastructure plans are contributing to an improvement in Thailand's economic outlook. Economic growth is projected to reach 3.5 percent in 2017 and 3.6 percent in 2018, as inflation is expected to return gradually to the low end of the inflation target range (1.0-4.0 percent). Continued agricultural recovery and strengthened household balance sheets will support private consumption growth while the export upswing will eventually spur manufacturing activity, capital goods import and private investment. However, a self-sustained recovery will hinge rising domestic demand supported by continued expansionary fiscal and monetary policies. Public infrastructure investments to connect lagging regions and upgrade rail through dual tracking can crowd in private investment, raise economy-wide productivity and improve investor sentiment.

The ongoing recovery still faces considerable uncertainty and downside risks. First, uncertainty about policy continuity may weigh on consumer and investor confidence. However, the passing of the draft constitution in the public referendum held in August 2016, the royal succession from King Bhumibol Adulyadej to King Maha Vajiralongkorn and the royal endorsement of the new constitution in April 2017 have so far helped to mitigate this risk. Second, a deterioration in global economic prospects, such as increased trade protectionism, slower-than-expected growth in China, Europe or the United States and the possibility of financial market disruptions in emerging markets, may impede the Thai export momentum and private investment recovery. Risks from household and corporate debt are contained by the strong balance sheets of commercial banks which have tightened lending standards and slowed lending.

In the long-term, Thailand has the opportunity to raise potential growth above 4 percent by addressing structural bottlenecks. Ample monetary, fiscal buffers and sound fundamentals give Thailand room to raise potential growth to meet the aspirations set out in the 20-year national strategy even while society ages rapidly. While initial reform steps in areas such as improved governance of government-owned specialized financial institutions and more progressive taxes are promising, maintaining reform momentum while addressing areas such as education quality, services liberalization and public infrastructure management as well as underlying institutional effectiveness for implementation will be critical.

Thailand continued to make progress in reducing poverty. Extreme poverty as measured by the international extreme poverty line (USD 1.90 per day, 2011 purchasing power parity [PPP]) is no longer a concern for Thailand and has fallen to around 0.03 percent in 2015. Based on the national poverty line (in 2013, approximately USD 6.20 per day 2011 PPP), the poverty rate fell from 12.3 percent in 2011 to 7.2 percent in 2015. In 2016, poverty rates are expected to have fallen at a slower rate, with poor households concentrated in rural areas affected by drought and still-low agricultural prices. Nevertheless, farm income growth turned positive in 2016H2 following recovery from drought.

Reaching the Digital Frontier

In a little over two decades since 1994, the digital economy now constitutes a significant and growing part of the overall economy. In a forthcoming publication, Oxford Economics estimates that the digital economy is now worth \$11.5 trillion globally, equivalent to 15.5% of global GDP. The Internet has become a pervasive phenomenon, disrupting multiple industries, creating new business models and becoming a powerful force in its own right. Digital technologies, being general purpose technologies, are transforming our economies and societies as profoundly as the steam engine in the 18th century or electricity in the 19th.

The Government of Thailand recognizes the significance of the digital economy and created a Ministry for Digital Economy and Society in 2016. It has developed a National Digital Economy Masterplan with a 20-year time horizon, divided into four phases. These include laying the digital foundations, achieving digital inclusion, moving to full transformation, and finally achieving the status of global digital leadership. It has launched initiatives like Digital Thailand, Thailand 4.0 and a special program for developing the Eastern Economic Corridor (including a digital park and a University 4.0).

Thailand's performance on various digital economy related indices and rankings has been mixed. Thailand ranked 82 out of 175 countries on ITU's ICT Development Index (IDI) 2016. The IDI adopts a triple set of rating criteria clustered around ICT access, usage, and skills. Thailand ranked 62 among 139 countries as per the World Economic Forum's (WEF's) Networked Readiness Index (NRI) 2016, which assesses the "factors, policies, and institutions that enable a country to fully leverage ICTs for increased prosperity". The World Bank's Digital Adoption Index measures digital adoption by businesses, people and government and assigns Thailand a score of 0.55 of 1, comparable to Malaysia but below China. The United Nations E-Government Survey 2016, which analyzed progress in using e-government and its effectiveness in the delivery of basic economic and social services to people, ranked Thailand at 77 out of 193 countries. Waseda University's recent 2017 digital government rankings placed Thailand at rank 21 out of 65 countries covered. While different rankings adopt different criteria, broadly Thailand has performed better in terms of affordability and usage of mobile services, as well as financial attractiveness as an investment destination; but has not performed as well on skills and regulatory environment.

How can Thailand build on its digital strategy to reach the digital frontier? Thailand's National Digital Economy Masterplan has a number of worthwhile initiatives focused on all the right things, namely development of hard infrastructure, acceleration of the digital economy, promoting digital society, digital government, workforce development and soft infrastructure (legal, regulatory and security). However, Thailand would benefit from addressing the following issues as part of its digital strategy going forward:

1. Identification of a selected few keystone initiatives that can be game changers for the development of the digital economy.
2. Adoption of an approach that can help break existing institutional silos in the government. Rigid organizational siloes are widely recognized as a problem in Thailand.
3. Adopting a more forward looking and future oriented approach that scans emerging opportunities and connects them with the decision-making processes in government.
4. Placing greater emphasis on quick wins and more efficient implementation.
5. Leveraging international expertise and innovation better as part of Thailand's efforts to transform its digital economy.

In order to identify a limited set of high impact priorities it might be good to look at digital economy trends and focus on those that are likely to have economy-wide impact. Erik Brynjolfsson, and Andrew McAfee in their recent book 'Machine, Platform, Crowd: Harnessing our Digital Future' have identified the rapidly increasing and expanding capabilities of machines (as exemplified by AlphaGo), the rise of upstarts as platforms like Uber, Airbnb, Facebook, and Alibaba, and networks of experts and

consumers (the crowd) as the three trends that will reshape the business world. Gartner has identified the following top ten strategic technology trends for 2017 such Artificial Intelligence (AI) and Advanced Machine Learning (ML), Intelligent Apps, Intelligent Things (Robots, Drones, Autonomous Vehicles) and Virtual Reality and Augmented Reality.

Thailand can choose to focus on trends that are foundational for the Digital Economy, have high potential for socio-economic impact, and present frontier opportunities for Thailand. There are opportunities in four categories to consider:

- digital foundations (data, networks, digital twins).
- transformative business models (Blockchain).
- digital skills.
- cross-cutting institutions for the digital age.

For example, developing a national strategy on data and action plan would be beneficial for Thailand. Currently, Thailand's approach to data is limited to the promotion of open data in government, and integrating data for providing better services to citizens and businesses. We suggest that Thailand look at data in a broader perspective (including private sector data). For example, an increasing amount of data will be generated by machines or processes related to the Internet of Things, including factories of the future and autonomous connected devices and systems. However, no overall policy frameworks exist with regard to non-personal machine generated data or to the conditions in which such data can be exploited or traded.

One specific focus area would be network slicing to ready broadband networks for the industries of the future in key requirements: latency, throughput, capacity and availability. Broadband infrastructure in Thailand will face exploding demands of data and heterogeneous requirements of different industries e.g. automotive, healthcare, logistics, retail or utilities. The network requirements for a factory with automated and flexible production systems would differ from those of a hospital doing robotic surgeries, or from the requirements of self-driving cars. To cater to these different requirements, networks will need to support different requirements for latency, throughput, capacity and availability. This would require a paradigm shift towards network slicing which can meet such needs. The European Commission is supporting a coalition of network operators¹ and academic institutions to focus on network slicing for 5G, and has provided \$8.9 million in funding for the initiative.

¹ The Alliance includes NEC, Ericsson, Nokia, InterDigital, Orange, and Telefonica, as well as several academic institutions.

Chapter 1. The Thai Economy

1.1 Recent Economic Developments

External demand in the context of global growth as well as recovery from severe drought strengthened and broadened the ongoing Thai economic recovery. The economy grew by 3.3 percent in 2017Q1, beating market and authorities' expectations, due to recovery in farm income from drought and in particular an upturn in merchandise exports to US, EU, China and ASEAN as well as tourism receipts, particularly from China and Russia. Continued fiscal stimulus provided a foundation for the recovery. Merchandise exports recorded 6.6 percent growth, the highest growth observed in the last four years, due to both rising global commodity price and trading partner growth. Economic indicators suggest the goods export upswing became increasingly broad-based and sustained in 2017Q2. Although the agricultural sector expanded well by 7.7 percent due to rising agricultural prices and recovery from severe drought, the long-run welfare of farming households will be constrained by weak water management, access to markets and transport costs (see Box 2 on Enabling the Business of Agriculture).

Sluggish domestic demand, in particular private investment and low capacity utilization, remains a hurdle for a broad-based economic recovery. Both private investment and private consumption growth remained lethargic. Private consumption grew by 3.2 percent in 2017Q1, comparable to the trend observed in previous quarters, while household debt remained high at 79.9 percent of GDP. Private investment contracted by 1.1 percent in 2017Q1, reflecting spare production capacity in the manufacturing sector at 62.2 percent although certain subsectors show improvement. In 2016, private investments grew marginally by 1.1 percent in construction, and by 0.2 percent in machinery and equipment, mainly in telecommunications, alternative energy, and logistics and warehouses. Overall credit issuance remained subdued as lending standards tightened while loans to large corporates turned positive in 2017Q1 for the first time since 2015. Loans to SMEs and households continued their deceleration trend. Softening food prices resulted in slowing headline inflation.

Private investment as a share of GDP declined to a 5-year low of 17.8 percent of GDP from already low levels due to structural bottlenecks as well as domestic and global uncertainty. The investment share fell precipitously following the 1997 Asian crisis, remained stuck at low levels below 20 percent of GDP, and never recovered unlike peers such as Malaysia, Indonesia and the Philippines. Investment has served to merely maintain the capital stock rather than facilitate. Investment further declined in recent years to 17.8 percent of GDP. Firms cited political uncertainty as the main obstacle to doing business in Thailand (World Bank Enterprise Survey 2016). Political uncertainty weighed on investor sentiment as firms perceive a lack of policy continuity and possible delays in planned reforms and public infrastructure projects. Other constraints cited in the enterprise survey, such as electricity and transportation, highlight the importance of infrastructure. For large firms, labor regulations proved to be a major issue. In addition, Amarase et al (2013)² finds that protected sectors exhibit less creative destruction and flows of capital to productive firms associated with healthy investment levels. Still, the small scale of improvements in private investments and business sentiment indicators suggest that economic recovery is not yet broad-based, and underscores the importance of accelerated reforms and public investments to underpin stronger long-term growth.

² Amarase, Nakarin, Tosapol Apaitan, Kiatipong Ariyapruhya (2013). Thailand's Quest for Economic Growth: From Factor Accumulation to Creative Destruction. Bank of Thailand Working Paper. The paper finds some evidence of creative destruction in Thailand. First, flows of capital associated with factor reallocation from low productivity firms to high productivity firms occur in narrowly defined sectors, particularly in electronics or those with high export shares. As a result, aggregate productivity growth is boosted. Second, new firms undergo a selection process whereby innovative firms survive, grow in size and become industry leaders. However, protected or less competitive sectors show less flows of capital as well as less firm entry and exit. The forces of creative destruction are not prevalent throughout all sectors, suggesting that the economy is bifurcated possibly resulting in depressed investment and productivity growth.

While domestic private investment remained sluggish, Thai foreign investment abroad has surged as Thai firms expanded production networks and pursued resources and markets abroad. The rise of Thai foreign investment abroad marks a structural shift as Thai firms became internationalized and economic integration allowed firms to access resources and labor in developing countries as well as intellectual property and markets in developed economies. Boston Consulting Group's (BCG) list of top multinationals (MNCs) from emerging markets all over the world now includes five Thai MNCs: Charoen Pokphand Group, Indorama Ventures, PTT, and Thai Union Frozen. Malaysia, Indonesia, and the Philippines combined register five firms on the list. The structural shift in outward FDI started to emerge in 2003 with the amount rising from around USD 500 million in 2005 to almost USD 12 billion in 2012, making Thailand a net exporter of capital for the first time.

Thailand's economy expanded by 3.2 percent in 2016, a slight improvement compared to 2.9 percent in 2015, underpinned by continued fiscal stimulus, private consumption and services exports. Quarterly GDP attained growth rates of 3.2 percent and 3 percent in Q3 and Q4 of 2016, respectively. Private consumption expanded by 3.1 percent, compared to 2.2 percent in 2015, largely driven by improved farm incomes, stimulus measures and gradual recovery in consumer confidence. Both public consumption and investment continued to expand by 1.7 percent and 9.9 percent, respectively. Continued growth in services exports, merchandise exports in Q4 and lower imports supported an increase in net exports of 2.2 percent. Gross fixed capital formation decelerated, partly due to challenges in implementing large public infrastructure projects and subdued private investment (See Thailand Economic Monitor June 2016 for a discussion of Thailand's public infrastructure management). Signs of a recovery in goods export were observed end-2016.

Net exports was the largest contributor to growth, mainly driven by a continued expansion of tourism and lower imports. The tourism sector remained an important growth driver, with tourist arrivals increasing by 8.9 percent in 2016, despite a slowdown in the number of Chinese tourists due to measures to curb illegal tour operators implemented in the second half of the year. Consequently, service export growth totaled 9.3 percent through 2016. Nevertheless, sustaining high growth in tourism will become challenging due to limited destination and constrained soft and hard infrastructure (see Box 1. Leveraging Tourism for Growth). Merchandise exports showed signs of improvements towards the end of the year, particularly in electrical appliances, electronics products, and automobile and parts. These resulted largely from increased demand from Europe, the US, and Japan, as well as the relocation of production bases of pneumatic tires and solar cells from China.

Private consumption was another key contributor to growth, fueled mostly by increased incomes in the agriculture and services sectors, as well as fiscal stimulus. Private consumption spending received a boost from tourism and tourism-related services. Higher output and prices for rubber and palm oil, as well as higher paddy yields, supported incomes in the agricultural sector, which accounts for the largest share of employment in the country. Temporary tax deductions in support of domestic tourism and year-end expenditures also contributed to private consumption growth in H2 of 2016. The Consumer Confidence Index continued on a gradual downward trajectory, despite signs of recovery in the second half of the year (see Figure 4), likely aided by the passing of the draft Charter in the August 2016 public referendum and the smooth royal transition following the passing of King Bhumibol Adulyadej. Household consolidation of balance sheets after rapid debt accumulation and consumption stimulus policies in previous years should facilitate consumption recovery going forward.

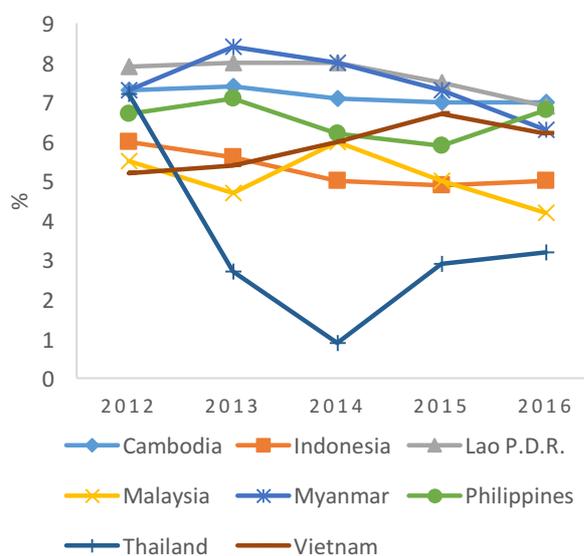
Public expenditure continued to underpin growth and gross capital formation, though at a decelerated rate. Public investment growth remained high at 9.9 percent, though lower than projected partly due to challenges in implementing large infrastructure projects in the context of weaknesses in

public investment management as well as fragmented fiscal, planning and implementing institutions. In the face of subdued private investments, gross fixed capital formation growth decelerated to 2.8 percent from 4.4 percent in 2015. Public consumption expenditure also decelerated by 1.3 percentage points in the face of lower than project disbursements rates.

Table 1. Thailand Selected Economic Indicators

	2012	2013	2014	2015	2016	2017f	2018f
Real Gross Domestic Product	7.2	2.7	0.9	2.9	3.2	3.5	3.6
Private Consumption	6.7	0.9	0.9	2.2	3.1	3.1	3.0
Government Consumption	7.2	1.8	2.8	3.0	1.7	3.2	3.0
Gross Fixed Capital Investment	10.7	-1.0	-2.2	4.4	2.8	4.0	4.2
Exports, goods and services	4.9	2.7	0.2	0.7	2.1	2.2	2.4
Imports, goods and services	5.6	1.7	-5.3	0.0	-1.4	2.6	2.9
Output Gap	2.5	1.5	-0.7	-0.8	-0.7	-0.4	-0.2
Consumer Price Index, av.	3.0	2.2	1.9	-0.9	0.2	0.7	1.6
Current Account Balance, % of GDP	-0.4	-1.2	3.7	8.1	11.4	8.5	7.7

Figure 1. Real GDP Growth, selected ASEAN countries, Y-o-Y



Source: World Economic Outlook, IMF

Figure 2. Total Investment as a Share of GDP

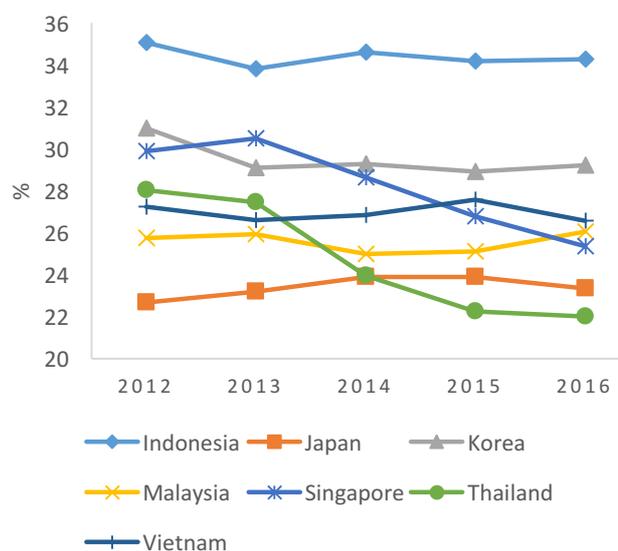
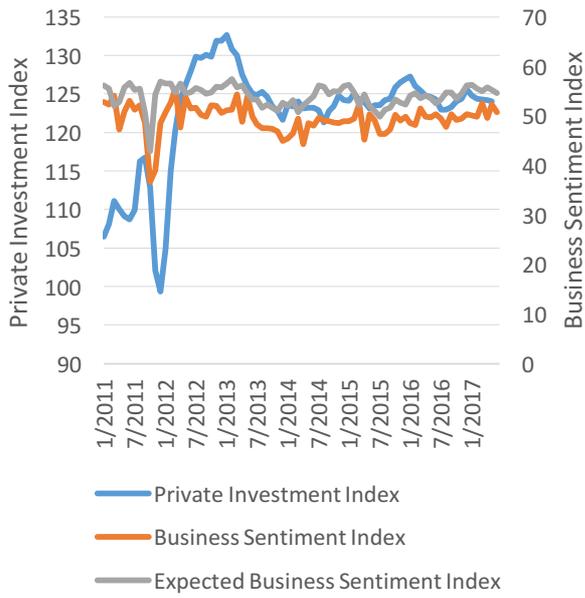
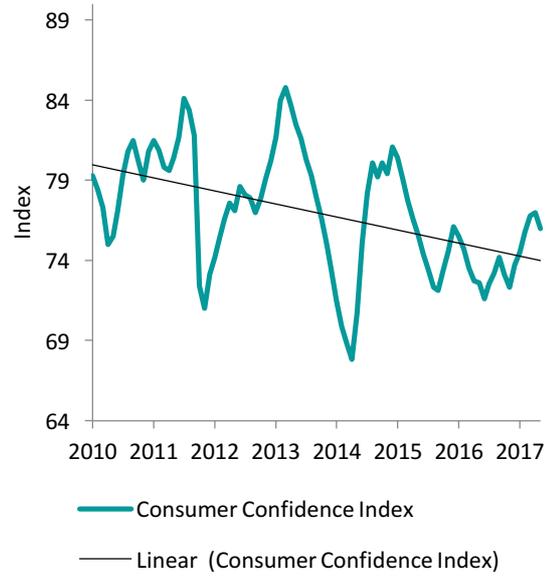


Figure 3. Investment and Business Sentiment Indices



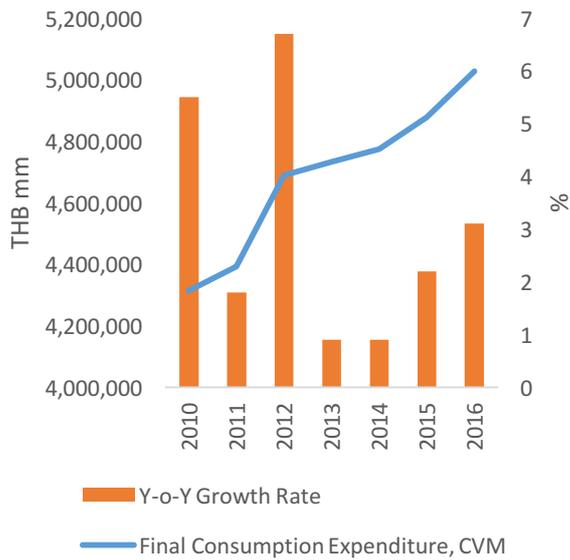
Source: Bank of Thailand

Figure 4. Consumer Confidence Index



Source: CEIC

Figure 5. Real Private Consumption Expenditure Growth



Source: National Economic and Social Development Board

Figure 6. Real Investment Growth (y-o-y)

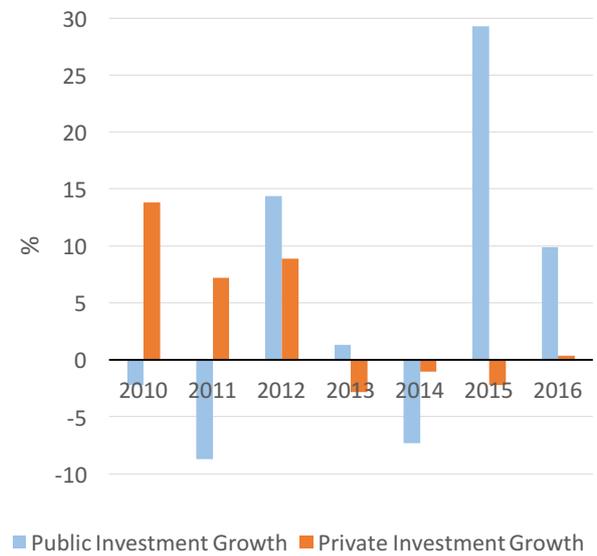
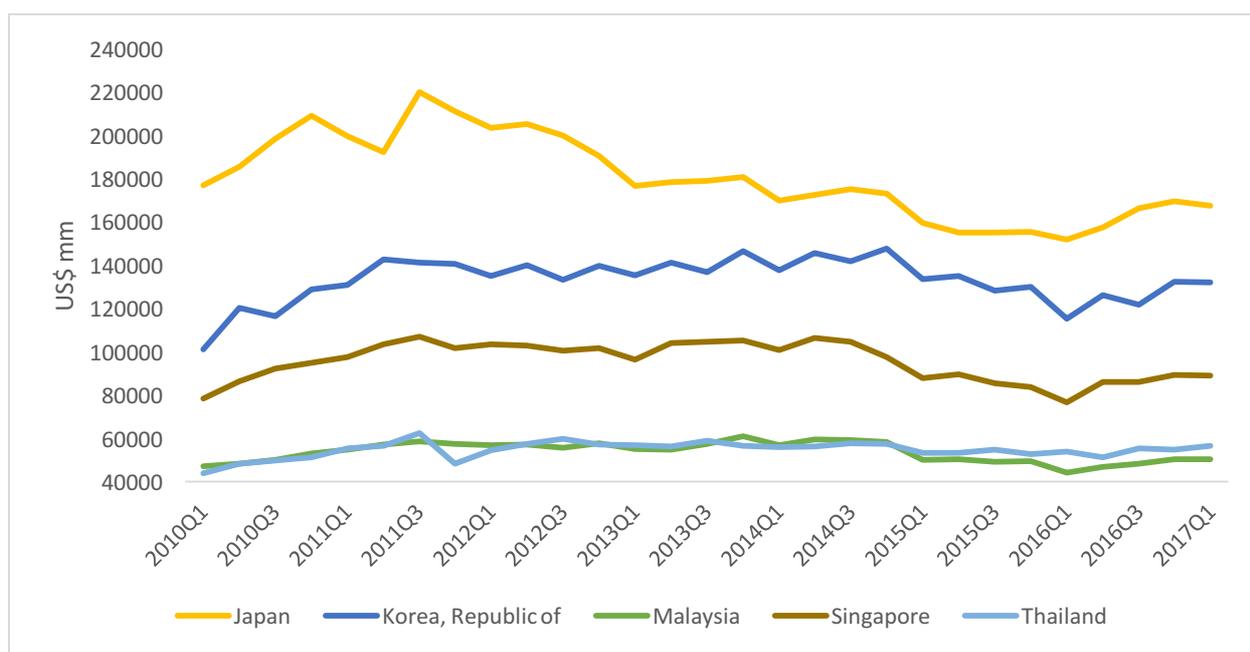


Figure 7. Quarterly Merchandise Exports Value



Source: World Trade Organization

The fiscal stance remained expansionary to support economic recovery. The fiscal deficit is expected to widen to 3.7 percent of GDP in FY2017, up from 2.6 percent of GDP in FY2016. Public investment continued to expand significantly by 9.7 percent in Q1 of 2017 comparable to 8.6 percent in the previous quarter as a result of expansion in both government and state enterprise investment particularly construction while public debt remained at 42.3 percent of GDP. The annual budget disbursement, equivalent to 32.1 percent of the 2017 annual budget, was higher than the same period of last year and the target disbursement rate.

Front-loaded fiscal policy is expected to help maintain the momentum in public investment. In the beginning of the FY2017, the Ministry of Finance front-loaded fiscal spending by expediting budget execution. All agencies prepared to disburse from the first quarter (October-December 2016). The procurement process could commence once the budget scrutiny committee approved the draft Budget Act FY2017 end-September 2016. As a result, the capital budget disbursement rate reached 43.2 percent or THB 237 billion (USD 6.8 billion) out of the total THB 548.9 billion (USD 15.7 billion) end-May 2017. The amount is around 85 percent of actual capital spending whole year each year during FY2011 - FY2015. Moreover, disbursement is expected to surpass last year actual capital spending of THB 363.4 billion (USD 10.4 billion).

Achieving the capital disbursement target for FY2017 will be challenging. With only three months remaining before the end of the fiscal year and the onset of Thailand's rainy season, achieving the capital disbursement target of 87 percent or THB 477.5 billion (USD 13.6 billion) as set by the government at the beginning of fiscal year now appears difficult.

Public transportation projects form the centerpiece of public infrastructure investment plan. Among all the agencies, the Ministry of Transport (MoT) boasts the highest capital budget at THB 138.5 billion (USD 4 billion) or 25.2 percent of the total capital budget for FY2017. As of May 2017, the MoT had disbursed THB 85 billion (USD 2.5 billion) or 61.6 percent, well above the total average capital disbursement rate of 43.2 percent. Nonetheless, MoT's remaining capital budget is still considerable at THB 53.5 billion (USD 1.5 billion), the largest unspent amount across all ministries.

Public investment remains a key growth driver for the Thai economy in FY2017 and beyond as envisioned in the Transportation Action Plan despite slow capital budget execution. The Ministry of Transport introduced the Transportation Action Plan in FY2017 to propel public infrastructure investment and strengthen investor confidence in the Thai economy. The Action Plan is linked to the 20-year National Strategy and the 12th National Economic and Social Development Plan which emphasizes transport modality shifts, increased connectivity, and enhanced mobility. The Action Plan consists of 36 investment projects totaling project investment cost of THB 895.8 billion (USD 25.6 billion) spread across 7 fiscal years from FY2017-2024. The key area is the double track rail network which consists of 10 projects accounting for 45.6 percent of total project investment cost. The second is the Mass Transit Development (urban railway network) of 6 projects accounting for 24.7 percent. The third is the Motorway and Expressway of 5 projects which account for 18.7 percent.

Planned public investment projects rely heavily on debt financing. On financing, the government is relying heavily on borrowing for 64 percent of the total project investment cost with the remaining 22 percent from Public-Private Partnerships (PPP) and only a tiny 8 percent from the annual budget. Investment is expected to peak in FY2020. Securing financing through borrowing and PPPs as well as project management will be crucial to the planned investments.

Net exports was another substantial contributor to growth, mainly driven by a continued expansion of tourism, strengthened recovery in the US and Europe, and lower imports. The tourism sector remained an important growth driver, with tourist arrivals increasing by 8.9 percent in 2016, despite a slowdown in the number of Chinese tourist due to measures to curb illegal tour operators implemented in the second half of the year. Consequently, service export growth totaled 9.3 percent through 2016. Nevertheless, sustaining high growth in tourism will become challenging due to limited destination and constrained soft and hard infrastructure (see Box 1. Leveraging Tourism for Growth). Merchandise exports also showed signs of improvements, particularly electrical appliances, electronics products, and automobile and parts. These resulted largely from increased demand from Europe, the US, and Japan, as well as the relocation of production bases of pneumatic tires, solar cells and hard disk drives from China.

The share of private investment in GDP continued falling to 17.8 percent of GDP in the face of domestic and global uncertainty, and low capacity utilization. Nonetheless, private investment recorded a marginally positive annual growth of 0.4 percent for the first time since 2013, aided by lessened political uncertainty and stronger exports. Private investments grew by 1.1 percent in construction, and by 0.2 percent in machinery and equipment, mainly in telecommunications, alternative energy, and logistics and warehouses. Still, the small scale of improvements in private investments and business sentiment indicators suggest that economic recovery is not yet broad-based, and underscores the importance of accelerated reforms and public investments to underpin stronger growth.

On the production side, growth continued to be driven by the services sector, which expanded by 4.3 percent (see Figure 7). Hotels and restaurants (10.3 percent) and construction (8.3 percent) continued to be the fastest-growing sectors in the economy, though accounting for a relatively small share of total GDP. Growth in these sectors was driven largely by the increased number of tourist arrivals, from 29.9 million in 2015 to 32.6 million in 2016, and increased investments in public infrastructure. The weight of tourism in Thailand's production and export growth further highlights the importance of maintaining competitiveness

in the sector by addressing weaknesses and removing constraints for future growth (see Box 1. Leveraging Tourism for Sustained Growth).

Figure 8. Tourism Contribution to Exports



Source: CEIC

Tourism is an important has thus far remained a solid source of revenue through the country’s economic ups and downs. Thailand is considered one of the world’s top tourist destinations and generates approximately 12 percent of GDP from tourist receipts. Thailand has an impressive ability to attract new groups of tourists (from Russia and now China) and different segments of the tourist market (from low-budget tourists to golfers to medical tourists). With tourist numbers doubling over the past decade, authorities are planning for even more rapid growth: the Electricity Generating Authority of Thailand (EGAT) presumes that by 2032, Thailand will receive more than 100 million tourists a year, 40 percent of them visiting Phuket and neighboring areas such as Krabi.

However, there are growing concerns over Thailand’s ability to manage its natural resources in the wake of so many arrivals. Numerous examples of short-sighted planning and degradation of formerly pristine coastal resort destinations can be found. As an example of the challenges involved in supporting such rapidly growing tourist numbers, the power consumption of a tourist is four times higher than that of a local resident on average.³ Existing locations are overused and may become unsustainable (see Box 1. Leveraging Tourism for Sustained Growth).

Agriculture showed signs of recovery from a contraction caused by a severe drought in 2015, and output expanded by 0.6 percent. Recovery was stronger in Q4 2016, when agricultural output expanded by 3 percent y-o-y. Higher output and prices for rubber and palm oil, as well as higher paddy yields, supported farm income and private consumption growth. Mining output contracted marginally by 0.4 percent, down for a 2.2 percent expansion in 2015. In the long-run, managing the impact brought by cycles

³ "Future of Krabi's power plant unclear." Bangkok Post. 27 September 2015.

of flood and drought through improved water management is a key priority (see Box 3. Enabling the Business of Agriculture).

Manufacturing growth remained at relatively low levels, with output expanding by 1.4 percent, in the face of continued structural constraints such as political uncertainty and infrastructure bottlenecks. Growth was stronger in export-oriented industries, particularly in late 2016 as merchandise exports increased in line with higher demand from main trading partners. Rising merchandise exports and increased production of electrical appliances and electronics were offset by a contraction in the automotive sector, which had been growing in recent years. Capacity utilization remained low at a low average of 65.64 percent.

Fiscal revenue collection increased by 8.2 percent in FY2016 fueled by higher corporate income tax revenues and higher excise taxes on fossil fuels. The annual budget disbursement also increased by 8.4 percent, though execution of both current and capital public expenditures fell short of the targets. The public sector balance registered a surplus of 1.3 percent of GDP. Fiscal room remains ample, with a virtually unchanged public debt to GDP ratio of approximately 42 percent through FY2016 and Q1-FY2017, well below the 60 percent debt ceiling set by the Ministry of Finance.

Thailand's external position strengthened further. Combined with a slight strengthening in the terms of trade, higher net exports contributed to an increase in the trade balance surplus to US\$ 35.8 billion. The current account surplus totaled 11.4 percent of GDP, compared to 8.1 percent of GDP in 2015. Foreign reserves increased by 3.2 percent to US\$ 197.6 billion by December 2016, equal to 3.8 times short-term foreign debt. Total external debt remained stable at 32.5 percent of GDP

Thailand continues to be an important source and recipient of personnel remittances, being among the top 30 countries for both inward and outward remittances⁴. Personal remittance inflows totaled approximately US\$ 6 billion or 1.5 percent of GDP in 2016 (see Figure 10), most of which originate from the United States, Malaysia, Japan and Western European countries. Similarly, paid remittances in 2015 totaled approximately US\$ 4 billion or 1 percent of GDP, with Myanmar, China, Cambodia and Japan being among the largest recipients. An important fraction of these outward remittances originate from the estimated 3.7 million migrant workers in Thailand, most of which are Myanmar, Cambodian or Laotians.

⁴ Out of more than 150 countries for which the relevant data is available

BOX 1: LEVERAGING TOURISM FOR SUSTAINED GROWTH

Thailand is one of the most popular tourist destinations in the world, receiving almost 30 million visitors annually. Thailand is increasingly able to attract affluent tourists willing to spend for high quality services, on average \$137 per day in 2015 (up from \$50 per day in 2007), during a relatively long stay (on average 10 days). This has enabled tourism to become a strong driver of economic growth, exports and non-agricultural employment.

Thailand ranks 34th among 136 countries in terms of its competitiveness for travel and tourism in 2017. According to the Travel and Tourism Competitiveness Index, Thailand's competitive advantage as a tourism destination stem principally from its natural resources, price competitiveness, tourist service and air transport infrastructure. Nonetheless, Thailand's ranks among the bottom half of countries on several dimensions, including environmental sustainability, ground and port infrastructure, health and hygiene and safety and security.

Table 2: Travel and Tourism Competitiveness Index: Thailand

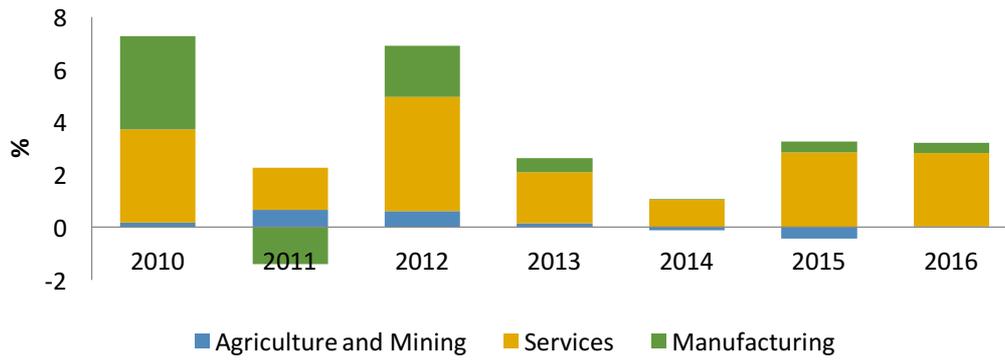
Overall 2017 rank (out of 136 countries): 34			
Business Environment	45	Price Competitiveness	18
Safety and Security	118	Environmental Sustainability	122
Health and Hygiene	90	Air Transport Infrastructure	20
Human Resources and Labor Market	40	Ground and Port Infrastructure	72
ICT Readiness	58	Tourist Service Infrastructure	16
Prioritization of Travel and Tourism	34	Natural Resources	7
International Openness	52	Cultural Resources and Business Travel	37

Source: World Economic Forum, "Travel and Tourism Competitiveness Report, 2017"

Addressing these constraints across these dimensions would be important for tourism to maintain its role as a robust growth driver. Thailand's poor and declining ranking for ground and port infrastructure (from 62nd in 2013 to 72nd in 2017) and limited ICT infrastructure leads to tourist concentration in a few areas of Bangkok, Phuket and Chiang Mai. Limited exposure to education and training for travel and tourism activities in some regions (e.g. tour guides, cuisine, cultural experiences) further undermine the potential expansion of the tourism sector in new destinations. Accelerating implementation of infrastructure investments, enhancing digital utilization and strengthening support for better tourism-related skills would facilitate further dispersion of tourists by unlocking new destinations, and increase absorptive capacity for tourists.

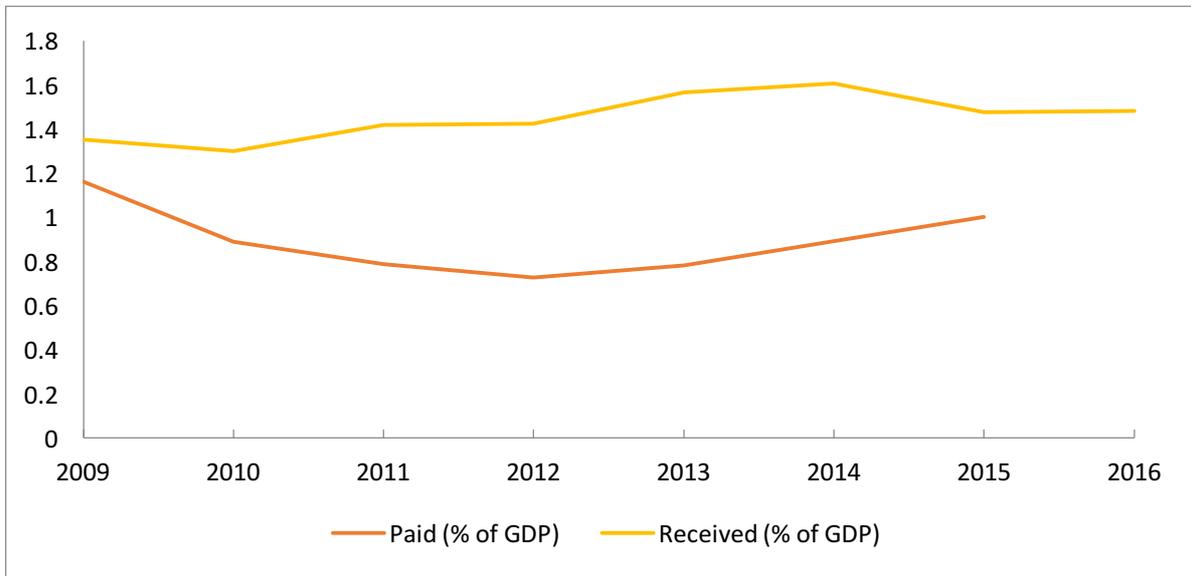
Sustainable natural resource management is another key priority in for Thailand's tourism strategy. Natural resources have been negatively affected in the most popular destinations, which may in the medium-term threaten the attractiveness of Thailand as a tourist destination and hinder continued growth of the sector. Solutions to this challenge would require a more systematic process for local demand analysis, integrated planning & promotion, improving capacity for monitoring natural and cultural assets, and support forums for community involvement and awareness of tourism development based on clearly defined mandates, roles and responsibilities.

Figure 9. Contribution to GDP Growth, Production



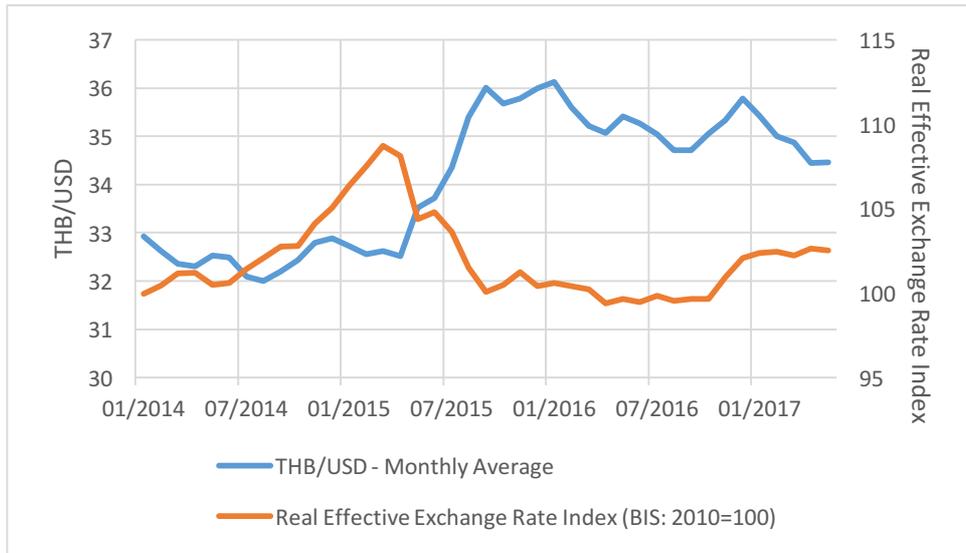
Source: National Economic and Social Development Board and World Bank staff calculations.

Figure 10. Personal Remittances



Source: World Bank

Figure 11. THB/US\$ Nominal Exchange Rate and Real Effective Exchange Rate



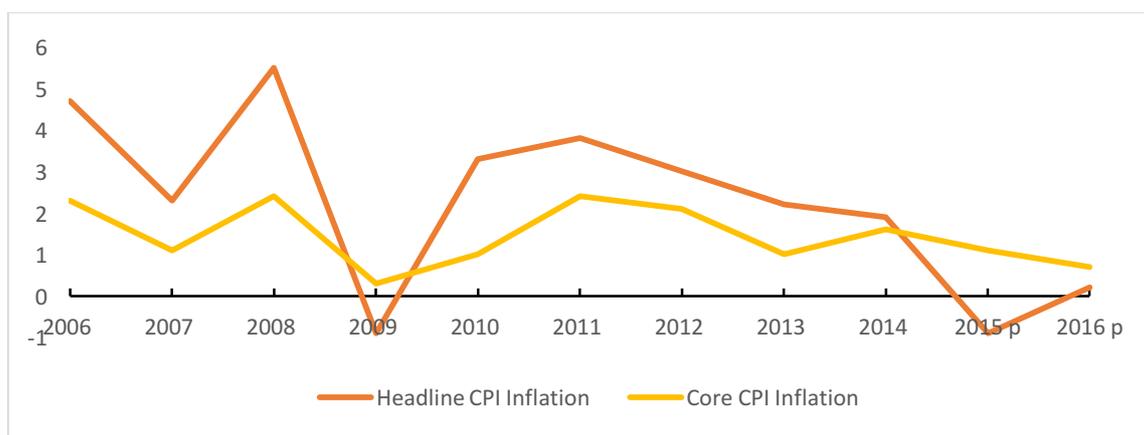
Source: Bank of International Settlements

Table 3. SUPPLY SIDE OF GDP, REAL Y-O-Y GROWTH RATES

	2014	2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Share of 2016 GDP
Total Agriculture	-0.6	-5.7	-2.0	-0.4	0.9	3.0	8.3
Agriculture	0.4	-6.0	-2.7	-0.9	0.6	2.7	7.6
Fishing	-13.3	-2.3	5.7	6.0	5.6	5.4	0.8
Non-Agriculture	1.1	3.9	3.7	3.9	3.2	3.2	91.7
Mining	-1.6	2.2	3.7	0.6	-0.9	-4.8	2.8
Manufacturing	0.1	1.5	-0.2	2.2	1.6	2.2	27.4
Electricity, Gas, Water Supply	2.7	4.3	2.6	7.7	4.9	1.8	2.8
Construction	-2.4	4.3	2.6	7.7	4.9	1.8	2.8
Retail and Wholesale	-0.6	3.9	4.6	4.7	5.2	5.6	15.4
Hotels and Restaurants	2.4	14.6	4.6	4.7	5.2	5.6	4.7
Transport and Communication	3.2	5.1	6.4	4.2	6.5	5.2	7.2
Financial Intermediation	7.5	5.1	6.4	4.2	6.5	5.2	7.8
Real Estate	0.6	1.9	2.2	2.1	1.1	1.9	6.3
Public Administration	1.2	1.1	3.5	1.3	-1.8	0.1	6.1
Education	1.2	-0.2	2.6	0.3	-2.4	-0.7	4.3
Health	7.1	4.2	4.9	3.3	0.9	4.3	2.0
Other Social Services	0.0	4.3	9.4	11.3	11.4	7.1	1.8
Domestic Services	-4.4	3.7	0.0	-0.5	1.6	-2.4	0.2
Gross Domestic Product	0.9	2.9	3.1	3.6	3.2	3.0	100

Headline inflation averaged 0.2 percent in 2016, remaining below the 1-4 percent tolerance band for the second year in a row, both due to low energy prices and declining core inflation (Figure 12). Despite low inflation, the Bank of Thailand maintained the policy rate at 1.5 percent since April 2015. The Thai Baht averaged 35.29 per US\$, a slight 2.9 percent depreciation compared to the previous year given expectations of a US Fed Fund rate hike, but recovered by the end of the year (Figure 11). Strong fundamentals and a strong external position led to recent appreciation pressure. However, in real effective exchange rate terms, the baht has yet to hit the highs observed in 2015.

Figure 12. Headline and Core CPI Inflation (% change)



Source: Bank of Thailand

The stability for Thailand's financial system remained robust and supported by a strong external position, including a continued current account surplus, high levels of international reserves and low levels of external debt. Moreover, capital buffers in the banking system remained high, with capital adequacy and liquidity coverage ratios above 17 percent and 160 percent, respectively. Nonetheless, slow economic recovery has led to some financial fragilities, particularly as household debt continued to increase faster than incomes, and investors seek higher returns from riskier financial products such as complex securities and unrated bonds. Moreover, the size of savings cooperatives increased significantly in 2016 as they offered higher returns than commercial banks, and accounting for 17.5 percent of total loans to households in 2016. Closer monitoring of these cooperatives will be important as pressures to seek higher yields are likely to result in riskier investments which could lead to financial fragilities unless adequately regulated.

Real GDP growth in 2017 continued on a positive trend, reaching 3.3 percent in Q1 (y-o-y). Stronger growth was underpinned by a 7.7 percent expansion (y-o-y) in agriculture, as the sector benefitted from increased rainfall and higher commodity prices. However, non-agricultural growth showed a slight deceleration, particularly driven by a contraction in mining, and lower construction and manufacturing growth. On the expenditure side, higher farm incomes contributed to a continued expansion in private consumption which, together with fiscal expenditures, continued to be strong drivers of growth. Exports of goods expanded significantly by 2.6 percent, mainly in agricultural, electronics, electrical appliances and petroleum-related products. A significant expansion in imports of intermediate and capital goods, together with improvements in forward-looking business sentiment indicators, point to possible improvements in industrial growth going forward.

BOX 2: ENABLING THE BUSINESS OF AGRICULTURE IN THAILAND

The Enabling the Business of Agriculture (EBA) is a World Bank Group initiative that identifies and monitors regulations and policies that affect agriculture and agribusiness markets. The project presents globally comparable data that can inform decisions and encourage policy dialogue with the objective to create an environment that is conducive to local, regional, and international business in agriculture.

Enabling the Business of Agriculture 2017 presents data that measure legal barriers for businesses operating in agriculture in 62 economies and across 12 topic areas. It provides quantitative indicators on regulation for seed, fertilizer, machinery, finance, markets, transport, information and communication technology (ICT), and water. Two types of indicators emerge: legal indicators and efficiency indicators. Legal indicators are derived from a reading of the laws and regulations. In a few instances, the data also include some elements which are not in the text of the law but relate to implementing a good regulatory practice—for example, online availability of fertilizer catalogue. Efficiency indicators reflect the time and cost imposed by the regulatory system—for example, the number of procedures and the time and cost to complete a process such as certifying seed for sale in the domestic market. Data of this type are built on legal requirements and cost measures are backed by official fee schedules when available.

Table 4: What EBA measures – 12 areas of regulation studied

Topic	What is measured
Seed	Time, cost, and requirements to register a new seed variety Protection and licensing of plant breeder rights Quality control of seed in the market
Fertilizer	Time, cost and regulation for fertilizer registration Quality control of fertilizer in the market Requirements for importing of fertilizer
Machinery	Time, cost and requirements for tractor registration, inspection and maintenance Time, cost and requirements for tractor testing and standards Requirements for importing of tractors
Finance	Requirements for establishing and operating deposit-taking microfinance institutions and financial cooperatives Requirements for third-party agents to provide financial services and provision of e-money by non-financial institutions Use of agriculture relevant assets as movable collateral, and availability of credit information on small loans and from non-bank institutions
Markets	Establishment and operation of producer organizations Phytosanitary requirements on management and control of pests and diseases Documents, time, cost and requirements for domestic trade and export of agricultural goods
Transport	Time, cost and requirements to operate commercial trucks Time, cost and requirements for cross-border transport
ICT	Licensing of mobile operators
Water	Individual water use for irrigation Integrated water resource management

Compared to global and regional peers, Thailand performs fairly well in the areas of seed, fertilizer machinery and finance regulations. For example, out of the 62 economies surveyed, Thailand ranks 16th in providing an enabling environment for the import, use and quality control of fertilizer, and 24th in enabling the use of agriculture machinery. Nonetheless, the enabling environment for transport, water

and markets for agricultural products falls below global and regional averages, as well as other upper middle income peers, ranking in the bottom quintile among these dimensions.

Table 5. Thailand’s Ranking by EBA Topic (out of 62 economies)

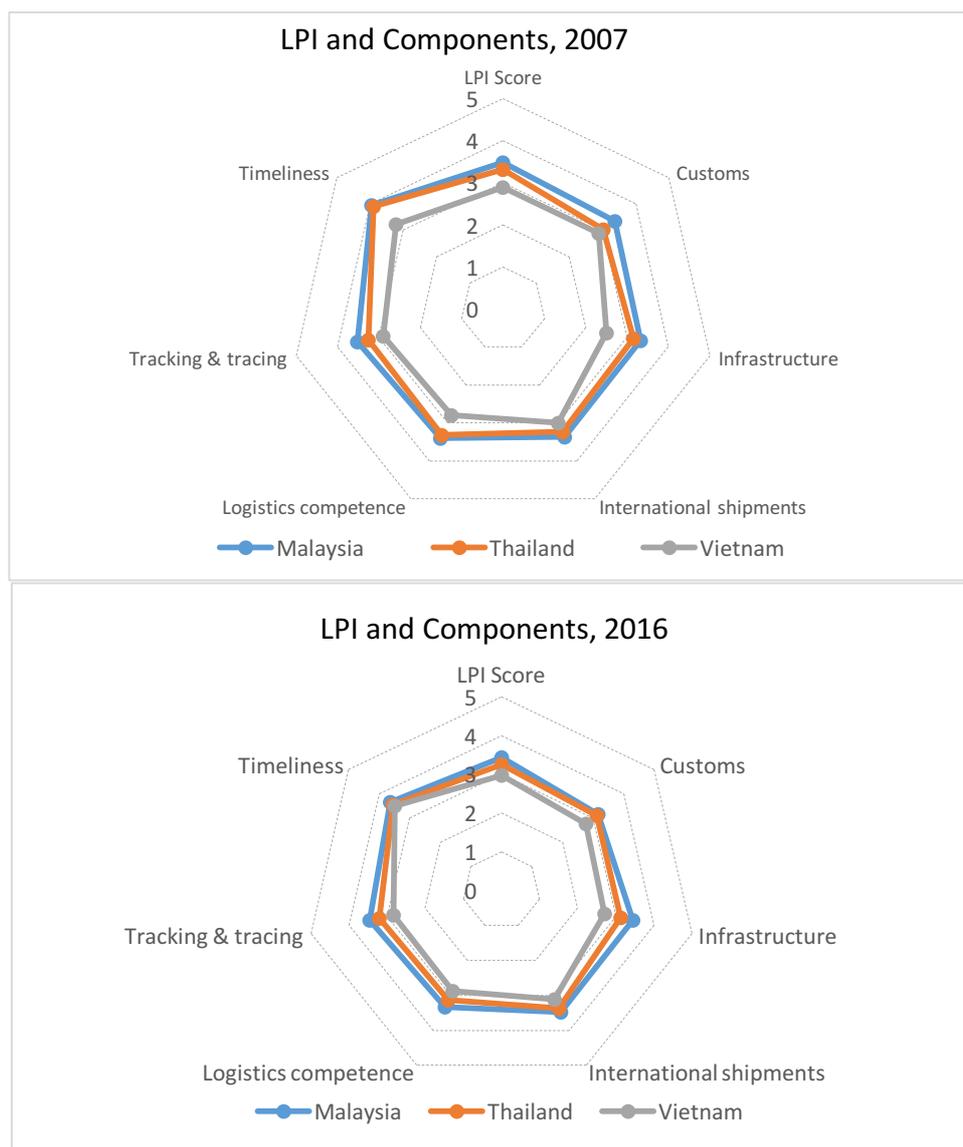
Topic	Ranking	Topic	Ranking
Seed	32	Markets	52
Fertilizer	16	Transport	53
Machinery	24	Water	60
Finance	29	ICT	31

1.2 OUTLOOK FOR 2017

Real GDP growth is projected to be 3.5 percent in 2017, accelerating from the previous year. Major contributors to the stronger recovery include merchandise exports and tourism. Consumption would continue to underpin growth, although modestly, as consumer confidence improves and households deleverage after the end of the first-car program, whereas private and foreign direct investment are likely to slowly improve due to improved external demand with headwinds from political uncertainty. The current account balance is expected to narrow as domestic demand and imports recover. Fiscal stimulus, with public investment as the key contributor, will remain a major driver of growth but the large public infrastructure projects will face long-standing implementation challenges. The budget for FY2017 enacted on October 1, 2016 was set at 2.73 trillion baht, increasing by 0.5 percent from FY2016. The fiscal deficit is expected to widen to 3.7 percent of GDP in FY2017 with the supplementary budget of 190 billion baht, up from 2.6 percent of GDP in FY2016.

The implementation of public infrastructure projects (dual track rail and rail upgrading) in 2017 and structural reforms would help crowd in private investment and contribute to a more positive outlook. The cabinet has approved a Transport Ministry action plan covering 36 infrastructure projects worth 896 billion baht for investment in 2017. Five projects (investment value of 55 billion baht) are began construction within the first half of 2017 while 15 projects (469 billion baht) are currently in the procurement stage. Key projects include the Chinese high-speed rail, dual tracking, and new mass transit lines in Bangkok. The first phase of the Bangkok-Nakhon Ratchasima Chinese high-speed rail project has been approved at a cost of 179.4 billion baht. Thailand’s global ranking in logistics performance has fallen given delays in infrastructure implementation and logistics reforms.

Figure 13. Thailand Logistics Performance Index (LPI) (Thailand's Global Ranking Fell from 31st to 45th)



Agricultural income growth and declines in poverty rates will moderate in line with low global commodity prices. Rising agricultural income in the recent years mainly reflected a global commodity price cycle and not long-term productivity increases in agriculture. As the agricultural prices fall back to more normal levels, growth could become less inclusive, with the rural poor negatively affected. Constrained by education attainment and skills levels, a large share of the poor workers might not be able to reap the full benefit of the job opportunities in the high-end services sector. As a consequence, poverty is expected to decline at a slower rate in rural areas.

Incoming data shows strengthening merchandise export growth. Exports grew more than expected by 13 percent year-on-year in May (excl. gold and petroleum-related goods) amid demand recovery in Asia as well as the cyclical growth of global electronics demand. Auto parts, motorcycles, electrical appliances, processed agricultural products, rubber products, electronics, and I/C all grew significantly. The positive export momentum may continue, as suggested by the average 15.9 percent year-on-year growth (April-May) of imports of raw materials and intermediate goods (excluding fuels) and North Asia's robust export

growth (especially in electronics and tech products). However, greater baht appreciation and Thailand's strong external position could limit strong export growth.

Tourism will continue to be a major but more moderated driver of growth. Tourism, in particular from China, rebounded after the Thai authorities' clampdown end-2016 on zero-baht tour operators. However, the high growth rates observed in previous years are unlikely to repeat due to the lack of new large source markets. Global economic growth and upgraded soft and hard infrastructure in Thailand can continue to support tourism expansion.

Domestic demand recovery will continue to be gradual and uneven in the face of domestic and global uncertainty. Private investment growth is projected to be anemic given concerns regarding global and domestic policy continuity. Manufacturing capacity utilization remains in excess despite a pickup in merchandise exports and public investment. Private consumption faces headwinds from household debt, uneven provincial GDP growth and low MPI expansion. Low commodity prices will translate into slow farm income and rural consumption growth despite some the ongoing pickup in motorcycle purchases and semi-durables as households consolidate their balance sheets and slowly ease the household debt overhang.

Emerging Challenges

The first risk is a deterioration in global economic prospects, particularly trade protectionism, implementation of Brexit and Chinese economic slowdown, which will weigh on Thai export recovery. Trade protectionism and the implementation of the Brexit vote reflect a significant rise in economic, political, and institutional uncertainty, which is expected to adversely affect global growth. In addition, uncertainty about the U.S. administration's trade policy weighs on euro area sentiment, increasing the likelihood that accommodative monetary policy will continue to be pursued. Euro area weakness will also impact Japan where growth remains fragile. For Thailand, the euro area accounts for almost 10 percent of total exports and 12 percent of FDI. The ongoing Chinese economic stabilization could also result in a greater-than-expected slowdown given highly leveraged corporates. Nonetheless, Thai authorities have ample monetary and fiscal buffers while a flexible exchange rate serves as a buffer against external shocks.

A second risk is a rise in Thailand's political uncertainty if ongoing political reforms become postponed or fail to satisfy broad segments of society. In such a scenario, political uncertainty could delay public spending, planned public infrastructure projects and economic reforms and weigh on consumer and investor confidence. However, the passing of the draft constitution in the public referendum held in August 2016, the accession of Crown Prince Maha Vajiralongkorn and royal approval of the new constitution in April 2017 help mitigate this risk.

1.3 POLICY WATCH

The government has focused on economic reforms aimed at raising Thailand's potential growth to achieve high income and inclusive growth as envisioned in the new 20-year national strategy. Initial steps taken are promising. Some highlights from the ongoing reform efforts include:

1. **Eastern Economic Corridor (EEC).** The EEC is a special economic zone that extends the Eastern Seaboard, a manufacturing hub. The corridor is intended to accommodate investment in targeted industries such as next-generation cars, smart electronics and affluent medical and wellness tourism. Under the EEC bill, certain laws will be waived to eliminate legal restrictions

regarding skilled labor and foreign investments such as the foreign holding limit. The EEC policy committee recently approved infrastructure development projects worth almost THB 700 billion for the eastern seaboard, consisting of high-speed train railway, an airport, and extension of a deep-sea port and an industrial estate.

- a. The four projects consist of the high-speed train route from Bangkok to Rayong (THB 215.1 billion), U-tapao Rayong-Pattaya International Airport and aviation city (THB 310.38 billion), Phase 3 development of Laem Chabang deep-sea port (THB 155.83 billion), and phase 3 development of the Map Ta Phut industrial estate (THB 10.15 billion).
2. **State-owned enterprises (SOE) governance.** The SOE sector has been plagued by financial weakness, inefficiency, political interference, and sector interests. The State Enterprise Policy Committee (SEPC) was appointed by the current government to overhaul the structure of state enterprises. The SEPC will set strategy for SOEs and establish a national holding company to hold the assets of SOEs that have clear commercial mandates (i.e. PTT, Thai Airways International, TOT, CAT, Krungthai Bank, MCOT, Transport Co, Airports of Thailand, Thailand Post, Thanaluk Pattana Subsin, Bangkok, and Aeronautical Radio of Thailand). Other international examples of such a state holding structure include France's Agency for State Holdings, Kazakhstan's Samruk Kazyna and Singapore's Temasek. The corporate structure provides a clear and transparent framework for investment, commercially-driven restructuring and streamlining, and divestiture and will allow Thailand to better meet its infrastructure challenges. For example, the long-pending Suvarnabhumi airport phase 2 expansion is being implemented by AOT. In fact, SOEs are responsible for implementing most public infrastructure investment. Legislation for the holding company has been approved by the cabinet. One important element of the legislation and regulation is the board selection criteria which will be crucial for minimizing political interference and sector interests as originally intended by the lawmakers. The issue of privatization currently remains off the table. The cabinet has approved the law and regulations are currently being drafted.
3. **Specialized financial institutions (SFIs) supervision.** SFIs comprise around 22 per cent of Thai financial institutions' assets.⁵ The Bank of Thailand is now the sole regulator and supervisor of SFIs last year after several state-backed banks saw rising bad loans due to imprudent lending and quasi-fiscal policies. This role was enshrined in the revised Financial Institutions business act in late 2016 and mitigates the conflict of interest inherent in the previous arrangement in which the Ministry of Finance set strategy for the SFIs while also supervising and regulating the SFIs. This transfer of oversight authority will also improve supervision and transparency by upgrading the supervisory regime to be more in line with that of commercial banks. The new supervisory regime will ensure that the SFI's credit process, corporate governance, and capital and liquidity buffers are in line with Basel II standards. More importantly, it also limits the government's ability to abuse SFIs for quasi-fiscal policies. The MOF will continue to set strategy and nominate executives for approval by the BOT while being responsible for losses incurred from policy lending as identified through, for example, Public Service Accounts. An SFI Fund will also be set up through levies on SFI deposits, similar to the Deposit Protection Agency for commercial banks. The SFI Fund will be used to recapitalize SFIs facing financial difficulties. BOT has

⁵ Specialized financial institutions are policy banks owned by the Thai government and comprise the Bank for Agriculture and Agricultural Co-operatives (BAAC), the Government Savings Bank (GSB), the Government Housing Bank (GHB), the Islamic Bank of Thailand, the Small and Medium Enterprise Development Bank of Thailand (SME Bank), the Export-Import Bank of Thailand (EXIM Bank), the Thai Credit Guarantee Corporation (TCG), and the Secondary Mortgage Corporation (SMC).

already set up a new SFI supervision department and begun issuing regulations to cover the governance, profitability and accountability of SFIs early this year. Implementation and assessing losses due to previous government policies

4. **Taxes.** Ongoing tax reforms are aimed at addressing wealth inequality, improving the competitiveness of the tax structure, streamlining tax administration and expanding the tax base. While Thailand's tax revenue-to-GDP ratio of 17 percent is comparable with other East Asian countries and rapidly growing economies, there is still room to expand the tax base particularly in light of Thailand's infrastructure investment plans.
 - a. **Inheritance and gift tax.** First introduced late-2015 and effective February 2016, the small inheritance tax (5 percent for lineal descendants above a threshold of 100 million baht) will not add significantly to fiscal revenue but nevertheless is an important step toward addressing wealth inequality. The tax is now in effect and the government expects to collect about 3 billion baht per year.
 - b. **SME tax amnesty.** Small and medium-sized enterprises (SME) total more than 2.7 million or 96 percent of Thai enterprises) and account for roughly 80 percent of employment. However, many SMEs keep more than one accounting book to evade taxes thereby depressing tax revenue and increasing the size of the unobserved informal sector. The Cabinet recently approved a tax amnesty in January 2016 to encourage more SMEs to enter the tax system and reduce the vast informal sector. SMEs will be exempted from income tax for one year and subject to a reduced rate of 10 per cent for another year if they agree to pay taxes properly in the future and keep only one accounting book. Possible future electronic integration of financial record-keeping systems between (and within) companies, banks and the authorities can lessen loose accounting. In addition, commercial banks have also been instructed not to lend to businesses that do not have tax records approved by the Revenue Department. About 400,000 small- and medium-sized enterprise operators have registered with the Revenue Department during the registration up until March 2016, exceeding the target of 100,000. Currently there are 2.7 million SMEs in Thailand, 600,000 of which are operating in a corporate form, while the rest are individuals. Around 400,000 of the corporate SMEs are active. Of the 400,000 active SMEs, around 340,000 are expected to be operators with annual income of less than 30 million baht while around 80,000 have annual income of between 30 million baht and 500 million baht. Electronic integration is expected to add 5 billion baht to tax revenue per year.
 - c. **Foreign direct investment tax incentives.** To boost private investment, which has been sluggish for several years, there will be new tax incentives for Thai and foreign investors offered by the Board of Investment for ten new special economic zones nationwide. According to the BOI, approval was granted to 2,320 projects worth Baht 875 billion in 2014, with only 38 per cent of these schemes implemented, while new projects approved by BOI totalled 362 worth a combined Baht 48 billion this year. To speed up implementation of approved schemes, the Cabinet has offered more incentives and extended privileges to promoted investors, including those getting approval between January 1, 2014, and June 30, 2016. However, international experience suggests that the role of incentives in attracting new investment is limited. Investors increasingly focus on more fundamental factors, such as skilled labor, infrastructure, or intellectual property protection.
 - d. **The lands and building tax.** The revised Lands and Building tax, approved by the Cabinet and currently under consideration by parliament, will allow the government to

raise taxes progressively, expand asset-based tax revenue, alleviate wealth inequality, raise land utilization and promote fiscal decentralization through increased local administration tax revenue. Taxes on assets account for less than 5 percent of tax revenue. The tax sets ceiling rates of 0.2 percent of appraisal value for land used for agricultural purposes, 0.5 percent for residences, 2 percent for commercial use and 5 percent for vacant or undeveloped land. The tax will be levied on first homes and land used for agricultural purposes with appraisal prices starting at 50 million baht, with the rate applied to the amount exceeding 50 million baht. Owners of first homes and farms with an appraisal price below 50 million baht will be free from the tax liability. The tax will also apply to second homes on a progressive basis, with rates of 0.03 percent to 0.30 percent for homes with an appraisal value of less than 5 million baht to more than 100 million baht. The tax also financially penalizes landowners who leave land sites undeveloped. For vacant or undeveloped land, the tax rate will be imposed at 1 percent for land left vacant or unused for 1-3 years, 2 percent for 4-6 years and 3 percent for more than seven years. Earlier versions of the tax drafted under both the current and previous governments faced substantial opposition from landowners and the tax was subsequently watered down. As such, only 10 percent of homeowners who own more than one house or own houses valued above 50 million baht will be taxed. The bill came into effect in 2017. Details regarding about how the taxes will be charged and collected are still unclear. Authorities are also setting up capacity for land valuation. An estimated 200 billion baht will be collected.

5. **Rice loan scheme.** A new rice subsidy program, budgeted at 54 billion baht, was issued to delay sales of rice for the 2016/17 production year. Farmers received credit not exceeding 90 percent of the market price of their rice and subsidies of 10 percent for storage (for farmers with barn storage) and an additional 20 percent for harvesting and paddy quality improvements. The total subsidy is estimated to be at 13,000 baht for Hom Mali per rai, 11,300 baht for Pathum Thani per rai and 10,500 baht for white rice at a maximum of 15 rai per household. The credit portion will be offered at a low interest rate of approximately 3 percent. The Cabinet has approved 35.9 billion baht for Hom Mali rice paddy and 18 billion baht for Pahum Thani and White rice paddy. These measures began on 1 November 2016 and ended February 2017.
6. **Minimum wage.** The minimum wage was raised slightly from 300 baht to 305-310 baht in 69 of 77 provinces, effective from January 2017 onwards. The last minimum wage increase, announced in 2011, led to a substantial increase in the real minimum wage.
7. **Cash handouts to registered low-income earners.** Using a database of 8.3 million registered low-income earners, the government has approved cash handouts of 3,000 baht to 3.1 million persons with an annual income below 30,000 baht and 1,500 baht to 2.3 million persons with annual income between 30,000-100,000 baht.
8. **National savings fund.** There are an estimated 25 million informal workers most of whom are not covered by government pension, social security or private provident funds. The government implemented the long delayed National Savings Fund, a voluntary matching defined contribution aimed at covering informal workers aged 15-59, under the 2011 National Savings Fund Act. Members contribute a minimum of 50 baht per month, up to a maximum of 1,100 baht per month, and the amount is matched fully or in part by the government. The level of co-contribution by the government increases with the age of the member. When the member becomes 60 years of age, the accumulated amount of money in the individual account will be used for calculating the monthly annuity to be paid until death. Take-up remains low at approximately 520,000 members—mostly self-employed workers in the agricultural sector and women—probably due to

the difficulty of saving amid an economic slowdown. As Thai society ages, the National Savings Fund can grow to become an important part of Thailand's social safety net.

9. **National e-payments.** As part of the plan to improve soft infrastructure, the government is implementing five national e-payment projects such as PromptPay (a bank-based transfer system based on national ID and phone number as unique identifiers), e-tax for tax filing, receipts, invoice and withholding tax, government e-payment, social welfare disbursement and debit card usage expansion.
10. **The Business Security Act** came into effect on July 2016 with the introduction of Thailand's first collateral registry as the technology enabler. The Act provides access to only licensed financial institutions and the taking of business collateral, meaning that only business entities falling under the scope of the Companies Act can take advantage of the new Act. A vast majority of SMEs are not formally registered legal entities and may have valuable collateral but are not in the position to take advantage of the new Act. The Act is part of broader efforts to improve the ease of doing business (See Box 3. Thailand prioritizes ease of doing business reforms).
11. **Aging society.** The cabinet approved measures to help the elderly find employment and housing while easing fiscal burden as the population rapidly ages. Already over 10 percent of the Thai population, or more than 7 million people, are 65 years old or older.
 - a. Tax incentives for elderly employment. Firms will be allowed to have double tax deduction on wages paid to the elderly, who can earn up to a maximum of THB 15,000 monthly. These elderly employees can constitute a limited 10 percent of the workforce and must not be a shareholder, director, or incumbent or former executive of a business.
 - b. Reverse mortgages. The cabinet approved "reverse mortgages" in which senior citizens aged above 60 years can put up their debt-free homes as collateral and receive lump sums of the loan until they die or until their contracts expire. The loan size would depend on the age of the applicant, value of their property and the interest rate. While take-up in advanced economies is generally low, reverse mortgages may prove risky given Thailand's low financial literacy
 - c. Compulsory pension fund. The fourth approved measure is a compulsory pension fund for all government and private sector employees, government officials and state enterprise employees who were not previously members of a provident fund.
 - d. A welfare fund for the elderly poor. The cabinet has approved an increase in the excise duty on alcoholic beverages and cigarettes in order to support a welfare fund for the elderly poor. The fund will receive about THB 4 billion annually from the Excise Department. The number of elderly poor around the country is estimated to be 3.5 million.

Going forward, the sustained pace and quality of reforms as well as sound implementation will be crucial for translating the reform effort into the desired economic outcomes. The government's 20-year strategic plan is envisaged to help ensure administrative consistency and coordination across agencies as well as continuity across governments. Continued reforms in additional areas such as public investment management, education and competition will be particularly important to take Thailand from middle- to high-income status.

BOX 3: THAILAND PRIORITIZES EASE OF DOING BUSINESS REFORMS

A Thai business owner in Chiang Mai might open a small resort serving local people as well as tourists. It would probably take him about two months to set up his business after finding the location, staff and getting the company registered. He would find it reasonably easy to start his business.

At the same time, a foreign investor living in Vietnam and considering whether to invest 3 million baht in Thailand to start a restaurant might have a different experience. She would likely find the process a bit complex and challenging. Most websites with the relevant information are written in Thai, the paperwork involved in registering a company can be pretty daunting for foreigners, and getting work permits and a business license can take longer than expected. Thailand's business environment plays a pivotal role in attracting private investment, both Thai and foreign, and these experiences may reflect many people's sentiments setting up a business here.

A strong business-friendly environment makes it easy for people to invest, start and run a business, and improves the competitive position of Thai businesses in global markets. It also benefits people. Small business owners, who create most jobs and are responsible for the well-being of many families in Thailand, gain. Consumers who can buy better goods and use services offered from more businesses gain as well as a strong business environment means faster, better, and cheaper services for people living in Thailand.

Thailand has a good business environment by global comparisons, as measured by the World Bank Doing Business report, which measures the ease of doing business in 190 economies. Last year, Thailand ranked 46th, retaining a spot among the top 50 economies for ease of doing business.

Figure 1 Thailand's Performance across Doing Business Indicators



However, Thailand's score has remained broadly flat in recent years while other advanced middle-income countries have been catching up or pulling ahead. Singapore has been ranked first or second for many years. Improving the business environment further and attracting more investments will be critical for Thailand to increase its integration into regional and global value chains, become an economic

powerhouse in the ASEAN region, and realize its vision to become a high-income economy.

Measures to ease starting a new business, accessing credit for small and medium enterprises (SMEs) and facilitating trade all go a long way toward realizing government objectives. Recent critical reforms include an update of the Customs Act to international standards, which could shorten the time for clearance audits and investigations, as well as the introduction of an electronic ID system that would replace the need to present physical state certified copies to access public services, a significant simplification of bureaucratic requirements.

Thailand has undertaken key reforms aimed at simplifying starting a business and paying taxes. In 2016, Thailand introduced reforms that made business registration simpler by creating a single window for registering payments and started to provide credit scores to banks and financial institutions. It has made importing and exporting easier by introducing electronic submission of

customs declarations. Further trade-related reforms will be an important priority, especially as Thailand seeks to increase foreign investment in the country.

Thailand has now made further improvements in the business environment a top policy priority.

The work of the government's Doing Business task force has focused, with World Bank Group support, on identifying key reforms to strengthen the business environment across ten areas: starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts, and resolving insolvency. The World Bank Group is pleased to support this important reform initiative and contribute to Thailand's efforts to strengthen the business environment.

Most of the key reforms focus on how to ease business entry and operation for SMEs. This is achieved by reducing complexity and regulatory processes, increasing transparency, securing property rights, and increasing access to credit. Some of these reforms have already been introduced earlier this year. Reform actions range from short-term measures that would include greater clarity in specific acts like the Business Security Act to help SMEs access funds to longer term measures such as completing the full implementation of the National Single Window system for all agencies and categories of goods to achieve a fully paperless process for the clearance on import, export and transit goods.

Continuing these reforms to promote a better business environment are key for Thailand to realize its 20-year strategy and Thailand 4.0. They will not guarantee success, but they will help. In addition, implementing public infrastructure investments, developing skilled workers through quality education, and promoting innovation, will all be critical to improve the country's competitiveness.

As Thailand makes it even easier to do business, Thai and foreign entrepreneurs alike will find Thailand an attractive place to invest. Entrepreneurs, from the small Thai business owner to a foreigner living in Vietnam, will be able to bring capital, create more and better jobs, and help the Thai economy grow faster, resulting in higher incomes for more people to improve their families' well-being and lives.

Chapter 2. Reaching the Digital Frontier

Background

Don Tapscott first introduced the term “digital economy” in 1994 when the Internet was still a novelty, with his book ‘The Digital Economy: Promise and Peril in the Age of Networked Intelligence’. In a little over two decades since 1994, the digital economy now constitutes a significant and growing part of the overall economy. In a forthcoming publication, Oxford Economics estimates that the digital economy is now worth \$11.5 trillion globally, equivalent to 15.5% of global GDP. The Internet has become a pervasive phenomenon, disrupting multiple industries, creating new business models and becoming a powerful force in its own right. Digital technologies, being general purpose technologies, are transforming our economies and societies as profoundly as the steam engine in the 18th century or electricity in the 19th.

The Government of Thailand recognizes the significance of the digital economy and created a Ministry for Digital Economy and Society in 2016. It has developed a National Digital Economy Masterplan with a 20-year time horizon, divided into four phases. These include laying the digital foundations, achieving digital inclusion, moving to full transformation, and finally achieving the status of global digital leadership. It has launched initiatives like Digital Thailand, Thailand 4.0 and a special program for developing the Eastern Economic Corridor (including a digital park and a University 4.0).

Thailand’s digital economy policy framework focuses on the following six strategies:

1. Build country-wide high-capacity digital infrastructure to ensure accessibility, availability, and affordability.
2. Boost the economy with digital technology i.e. driving a new S-Curve, raising competitiveness, building new businesses as well as creating values.
3. Create a knowledge-driven digital society by encouraging participation and ensuring inclusive and equal usage of digital technologies.
4. Transform into digital government ‘One Government’ that is open and accommodates people and businesses.
5. Develop workforce for the digital era by enhancing worker skills, creating jobs as well as building domestic strength.
6. Build trust and confidence in the use of digital technology by updating laws and regulations, encouraging investment and ensuring security in digital data and transactions.

Thailand’s international rankings

Thailand’s performance on various digital economy related indices and rankings has been mixed. Thailand ranked 82 out of 175 countries on ITU’s ICT Development Index (IDI) 2016. The IDI adopts a triple set of rating criteria clustered around ICT access, usage, and skills. Thailand ranked 62 among 139 countries as per the World Economic Forum’s (WEF’s) Networked Readiness Index (NRI) 2016, which assesses the “factors, policies, and institutions that enable a country to fully leverage ICTs for increased prosperity”. The World Bank’s Digital Adoption Index measures digital adoption by businesses, people and government and assigns Thailand a score of 0.55 of 1, comparable to Malaysia but below China. The United Nations E-Government Survey 2016, which analyzed progress in using e-government and its effectiveness in the delivery of basic economic and social services to people, ranked Thailand at 77 out of 193 countries. Waseda University’s recent 2017 digital government rankings placed Thailand at rank 21 out of 65 countries covered.

On ease of doing business, Thailand has been ranked 46 out of 190 countries for 2017. The country ranked 34 out of 98 countries on the Global Competitiveness Index for 2016-17. Thailand has done relatively well on AT Kearney’s Global Services Location Index (2016) ranking 6th out of 55 countries covered.

While different rankings adopt different criteria, broadly Thailand has performed better in terms of affordability and usage of mobile services, as well as financial attractiveness as an investment destination; but has not performed as well on skills and regulatory environment.

ICT Status in Thailand

In 2016, according to the Household Survey on ICTs⁶, computer usage among households in Thailand was 32.2%, internet 47.5% mobile phones 81.4% and smart phones 50.5%. On all these indicators, urban households did much better compared to rural areas, with computer usage at 39.6% (rural 26.2%), internet 57.4% (rural 39.5%), mobiles 86.6% (rural 77.2%) and smart phones at 60% (rural 42.8%). In terms of regions, Bangkok was the highest on all counts with the Northeastern region being the lowest.

While 73.6% of users in the age group of 25-34 years used the internet, the proportion for those over 50 years was only 13.8%. Internet usage was highest for accessing social networks (91.5%), and for downloading video, audio and gaming content (88%). There is gender equality as far as internet usage is concerned in Thailand.

According to IDC⁷, IT spending in Thailand is expected to grow at a CAGR of 3.7% reaching US\$13.6 billion by 2019. 53% of the spending is contributed by consumer purchases of mobile devices, PCs and printers. The spending on telecom services has been growing at a CAGR of 6.9% and was estimated to be US\$10.7 billion by the end of 2016.

According to the Alliance for Affordable Internet⁸, Thailand ranked 17th out of 58 countries under the 2017 Affordability Drivers Index. Its rank was low on the Herfindahl index for market concentration with a rank of 38 out of 58 countries (rank 24 out of 37 developing countries) in 2017. This is due to the fact that one of the mobile players has close to 50% of market share for mobile. Of the three major mobile operators AIS has the largest market share of 44.4%, followed by DTAC 27.4% and True 26.2% (2016).

The economy is digital

As digital technologies become ubiquitous, it is becoming difficult to determine the boundaries of the digital economy. In 2014 that the European Digital Forum provocatively made the statement that “There is no “digital economy” – the economy is digital”⁹. In a similar vein a paper prepared by the Internet Society for OECD’s 2016 Ministerial Meeting on the Digital Economy started by saying that in most OECD countries, “the digital economy has become the economy”¹⁰. According to the OECD, the digital economy “encompasses the physical infrastructure that digital technologies are based on (broadband lines, routers), the devices that are used for access (computers, smartphones), the applications they power (Google, Salesforce) and the functionality they provide (IoT, data analytics, cloud computing)”¹¹. There is however, a blurring between the digital and the non-digital realms, which makes the task of designing and operationalizing strategies for the digital economy all the more difficult.

⁶ National Statistical Office, Ministry of Digital Economy and Society, ‘The 2016 Household Survey on the Use of Information and Communication Technology’.

⁷ IDC, Thailand ICT Market Landscape Study, 2016.

⁸ <https://goo.gl/UTAaHH>

⁹ <https://goo.gl/jAkX15>

¹⁰ <https://goo.gl/KMDSZP>

¹¹ OECD, ‘Harnessing the Digital Economy for Developing Countries’, page 11, December 2016, (<https://goo.gl/Twcvkx>).

Importance of Focus

Recent research by AlphaBeta¹² showed that as many as 72 different government departments are involved in some countries for implementing digital economy related initiatives. This only makes more important to prioritize, coordinate and align actions across these various stakeholders.

The need for prioritization and focus brings to mind the famous case of Alcoa in the late eighties. When Paul O'Neill became the CEO of Alcoa in October 1987, the company was facing multiple challenges including worker-management tensions, low productivity and declining profits. Paul O'Neill famously set his goal not to increase profits or productivity, but to make Alcoa a "zero worker injury company". One year into Paul O'Neill's taking charge, the company's profits hit a record high. By the time O'Neill left Alcoa in 2000 to become Treasury Secretary, the company's annual net income increased from \$200 million to \$1.484 billion and its market capitalization grew from \$3 billion in 1986 to \$27.53 billion. The singular focus on worker safety resulted in Alcoa putting in place one of the first global networks as part of its management information system to monitor worker injuries. The goal of zero worker injuries was one on which workers could not fight management. Injuries often occurred when machines were not maintained or serviced properly. Thus, the maintenance of machines had to be improved, and old equipment had to be retired thereby impacting productivity. A single metric aligned different parts of Alcoa's business in a way that has now become a case study in successful management, and an example of how changing a "keystone habit" can have huge beneficial effects.

There are other examples of highly focused strategies. Elon Musk is widely recognized as a very successful visionary with a track record of effective execution. His company Tesla has adopted the mission to accelerate the world's transition to sustainable energy. Another of his companies, SpaceX, aims to revolutionize space technology, with the ultimate goal of enabling people to live on other planets. According to Gary Keller, if a "company doesn't know what it's ONE Thing is, then the company's ONE Thing is to find out"¹³. This is true as much for countries as for companies. In a speech to the US Congress in May 1961, President John F. Kennedy stated the highly aspirational goal "of landing a man on the moon and returning him safely to Earth" before the decade was out. This resulted in the successful landing of Apollo 11 on the moon on July 20, 1969.

In the case of promoting the digital economy in Thailand, it will be important to identify a small set of goals that can help align and center all actions and initiatives in a consistent and coherent way. For example, Singapore's Committee on the Future Economy has identified building strong digital capabilities as a key strategy, focusing on just three priorities, namely i) adoption of digital technologies by SMEs; ii) developing deep capabilities in data analytics; and iii) cyber security, and harnessing data as an asset.

Thailand's National Digital Economy Masterplan has a number of worthwhile initiatives focused on all the right things, namely development of hard infrastructure, acceleration of the digital economy, promoting digital society, digital government, workforce development and soft infrastructure (legal, regulatory and security). However, Thailand would benefit from addressing the following issues as part of its digital strategy going forward:

6. Identification of a small subset of keystone initiatives that can be game changers for the development of the digital economy.
7. Adoption of an approach that can help break existing institutional silos in the government. Rigid organizational siloes are widely recognized as a problem in Thailand.
8. Adopting a more forward looking and future oriented approach that scans emerging opportunities and connects them with the decision-making processes in government.

¹² <https://goo.gl/FG3Uym>.

¹³ Gary Keller and Jay Papasan, *The One Thing*, Bard Press 2013.

9. Placing greater emphasis on quick wins and more efficient implementation.
10. Leveraging international expertise and innovation better as part of Thailand's efforts to transform its digital economy.

Keystone initiatives

In order to identify a limited set of high impact priorities it might be good to look at digital economy trends and focus on those that are likely to have economy-wide impact. Erik Brynjolfsson, and Andrew McAfee in their recent book 'Machine, Platform, Crowd: Harnessing our Digital Future' have identified the rapidly increasing and expanding capabilities of machines (as exemplified by AlphaGo), the rise of upstarts as platforms like Uber, Airbnb, Facebook, and Alibaba, and networks of experts and consumers (the crowd) as the three trends that will reshape the business world.

Gartner has identified the following top ten strategic technology trends for 2017:

1. Artificial Intelligence (AI) and Advanced Machine Learning (ML)
2. Intelligent Apps
3. Intelligent Things (Robots, Drones, Autonomous Vehicles)
4. Virtual Reality and Augmented Reality
5. Digital Twins
6. Blockchain and Distributed Ledger
7. Conversational Systems
8. Mesh App and Service Architecture
9. Digital Technology Platforms
10. Adaptive Security Architecture.

It will be beneficial to focus on trends that are foundational for the Digital Economy, have high potential for socio-economic impact, and present leapfrog opportunities for Thailand. We consider such opportunities in four categories:

- (i) digital foundations (data, networks, digital twins)
- (ii) (ii) transformative business models (Blockchain);
- (iii) digital skills; and
- (iv) cross-cutting institutions for the digital age.

At a fundamental level, data and high speed networks underpin each of the top strategic technology trends. Unless Thailand gets these foundations right, systematically progress on any of these trends will be very difficult. The development of AI and Advanced ML, Intelligent Apps, Intelligent Things or Conversational Systems for example, each require access to large and diverse datasets. Data is of critical importance to other trends as well, as is the availability of hard digital infrastructure for transporting data.

Importance of Data

According to Jack Ma, the Executive Chairman of Alibaba, data is the new 'natural resource'¹⁴. The importance of data can be seen from the fact that six of the top ten companies in the world by market capitalization are companies that are in the business of data. These include Apple (\$752 billion), Alphabet (\$579.5 billion), Microsoft (\$507.5 billion), Amazon (\$427 billion), Facebook (407.3 billion) and Tencent Holdings (\$277.1 billion)¹⁵. Data is becoming increasingly valuable and will have huge spillovers in other sectors. Given its sheer potential for impact across industries and sectors, we consider it to be the most important digital asset that deserves focused attention.

¹⁴ 'Alibaba's Jack Ma Just Predicted the Next 30 Years of Technological Change', Fortune October 13, 2016 (<https://goo.gl/aztz8Y>).

¹⁵ Forbes rankings for 2017 of the World's Biggest Public Companies (<https://goo.gl/pK7vXV>).

According to McKinsey estimates¹⁶, the volume of data flows has multiplied by a factor of 45 since 2005. Cisco (Visual Networking Index)¹⁷ estimates that annual global IP traffic reached 1.1 ZB per year by the end of 2016, and will grow at a compound annual growth rate (CAGR) of 22 percent till 2020. In China, close to 20 percent of imports and exports now take place on digital platforms. By 2014, cross-border data flows accounted for \$2.3 trillion in economic value (McKinsey). Given the significant value of data flows, data policies will be critical and require focused attention, particularly those relating to data generation, capture, transmission, storage, security, privacy, analytics, standardization and intelligent usage of data.

The 4th industrial revolution also implies that intelligent information platforms that link products and services will offer much greater value compared to standalone systems. The development of such platforms will critically depend on the access to data.

National Strategy on Data

Developing a national strategy on data would be beneficial for Thailand. Currently, Thailand's approach to data is limited to the promotion of open data in government, and integrating data for providing better services to citizens and businesses. We suggest that Thailand look at data in a broader perspective (including private sector data). For example, an increasing amount of data will be generated by machines or processes related to the Internet of Things, including factories of the future and autonomous connected devices and systems. However, no comprehensive policy frameworks exist with regard to non-personal machine generated data or to the conditions in which such data can be exploited or traded.

The European Union¹⁸ is in the process of developing a framework for data access which could help inform Thailand's approach, revolving around the following objectives:

1. Improve access to anonymous machine-generated data.
2. Facilitate and incentivize the sharing of such data.
3. Protect investments and assets ensuring fair sharing of benefits between data holders, processors and application providers within value chains.
4. Avoid disclosure of confidential data and
5. Minimize lock-in effects especially for SMEs and startups and private individuals.

A national strategy on data could touch upon these as well as issues of i) data standardization; ii) free flow of data; iii) access to machine-generated data; iv) liability and safety issues related to data; v) establishing 311 type of data services to facilitate the location, processing and brokering of data; vi) creation of data maps; vii) providing support to data matching services; and viii) helping grow data exchanges and markets. Most of these interventions, for example, underpin Korea's recent Master Plan for the Intelligent Information Society¹⁹. Malta, currently holding the Presidency of the European Union, is also developing a National Data Strategy²⁰ which could serve as a source of insights and lessons for Thailand.

Timely progress in this agenda would be aided by the appointment of a Chief Data Officer (CDO) within the Ministry of Digital Economy and Society, to lead the work on data standards, data governance, data security, data sharing, metadata management, data quality and data architecture. The position of CDO could also be considered by other government ministries, departments and agencies, given the pivotal importance of data across all sectors.

¹⁶ Digital globalization: The new era of global flows, McKinsey & Co. (<https://goo.gl/hEpAQ9>).

¹⁷ Cisco Visual Networking Index, (<https://goo.gl/LDw2ZE>).

¹⁸ European Commission, Building a European Data Economy, January 2017.

¹⁹ Mid to Long Term Masterplan in Preparation for the Intelligent Information Society, (<https://goo.gl/3x7TTt>).

²⁰ 'Malta is establishing a holistic plan to manage data as an enterprise asset', Malta Information Technology Agency, June 14, 2017 (<https://goo.gl/vfzxQX>).

Keystone initiative on data:

A keystone initiative on data could be to transition to a requirement for insuring data assets in Thailand, which could be facilitated through a Public-Private Partnership (PPP) on cyber-risk reinsurance. This is likely to have the following cascading impacts:

1. It would require companies and government agencies to take stock of their data, assign value to their data and secure their data assets.
2. It would introduce a market mechanism to ensure data security as cyber risk insurance premiums would rise for data assets that are not secure.
3. The model would act as a check on high valuations of data as inflated valuations would result in inflated premiums.
4. It would help take stock of data on a continuing basis within government and the private sector resulting in better information on data availability, and data valuations. This would in turn help in creation of data markets, and better regulation of data flows.
5. The initiative could help develop cyber-risk assessment skills in Thailand promoted largely by the private sector.
6. Thailand would emerge as one of the most secure data locations internationally.
7. Thailand could potentially become a test bed and learning platform for global insurance companies in cyber-risk insurance.
8. The initiative could also provide opportunities for the development of blockchain based insurance models that track data assets thereby lowering costs of insurance and supporting innovations in Thailand.

Network Slicing

Future ready networks: Together with data, the network infrastructure is another foundational piece of the digital economy. Thailand's current strategy on digital infrastructure is based on a nation-wide roll out of broadband, turning Thailand into an ASEAN connectivity hub, and providing broadband at a price less than 2% of GNI per capita.

Broadband networks will have to deal with the growing data demands resulting from new technologies and devices coming to the market. For example, 4K televisions, which are already in the market, have a download requirement of 100 Mbps while 8K televisions, on display at CES 2017 and soon to hit the market, will require data download speeds of 300 Mbps. Coupled with the rapid increase in Internet of Things (IoT), this means that networks will have to contend with huge demands of exponentially increasing data flows.

Thailand has made impressive gains in terms of relative broadband speeds. Akamai's Q1 report for 2017 ranks Thailand at #8 internationally with peak data speeds of 106.6 Mbps (Singapore #1 184.5 Mbps). Thailand ranked 21 in terms of average data speeds (16 Mbps) as compared to South Korea at #1 (28.6 Mbps). However, the demands on Thailand's broadband networks is only going to increase.

Leading companies are already preparing for the exploding demand for bandwidth. Google is partnering with Facebook, TE SubCom, and Pacific Light Data Communication on the Pacific Light Cable Network connecting Hong Kong to Los Angeles with a bandwidth capacity of 120 Tbps. The project is scheduled to be completed in the summer of 2018. Facebook is also building a trans-Atlantic submarine cable project Marea, from Virginia Beach in the US to Bilbao in Spain with a capacity of 160 Tbps which will be completed in October, 2017. This may be compared with Thailand's current international bandwidth of about 4 Tbps, which is a small fraction of these capacities (see Annex 2).

Broadband infrastructure in Thailand will face exploding demands of data and heterogeneous requirements of different industries e.g. automotive, healthcare, logistics, retail or utilities. The network requirements for

a factory with automated and flexible production systems would differ from those of a hospital doing robotic surgeries, or from the requirements of self-driving cars. To cater to these different requirements, networks will need to support different requirements for latency, throughput, capacity and availability. This would require a paradigm shift towards network slicing which can meet such needs. The European Commission is supporting a coalition of network operators²¹ and academic institutions to focus on network slicing for 5G, and has provided \$8.9 million in funding for the initiative.

Thailand has drawn up ambitious plans for a nationwide roll out of 5G by 2020. Nonetheless it will be important for Thailand to systematically develop network slicing capabilities which will allow efficient and agile management of the network, with individual slices of the network being separately optimized for video, IoT, or critical communications depending on need. Engaging on the concept of network slicing will also help Thailand to better prepare for Industry 4.0 and other applications.

Keystone initiative on digital infrastructure

There are a number of projects slated to begin in 2017 as part of the development of Thailand's Eastern Economic Corridor. It might be worthwhile to begin planning for 5G and network slicing to cater specifically to projects in the EEC including the Eastern Aertropolis in U-Tapao, High speed train from Bangkok to U-Tapao, Sea Ports of Laem Chabung, Map-Taput, and Sattahip, industries including electric vehicles, robotics, medical, aircraft parts, Future Cities and the Digital Park. The National Broadcasting and Telecommunications Commission is in the process of allocating bandwidth for IoT and for the Thai-Chinese high-speed railway. There seems to be some delay in the allocation of bandwidth for 5G, though this will hopefully be addressed in the near future.

A focus on the EEC may have the following cascading impacts:

1. It would help better understand the needs of potential investors who may consider investments within the EEC and have future ready infrastructure in place.
2. The EEC would become a test bed for the telecom operators for testing 5G and network slicing technologies for eventual roll out to other parts of Thailand.
3. Real life use cases would help improve the economics of 5G rollout.
4. Investors in the EEC would become aware of new opportunities to leverage 5G and network slicing and may consequently plan for more futuristic infrastructure and solutions.
5. Thai operators will have the opportunity to collaborate with international players and better align with emerging standards and technologies on network slicing.

Merger of the physical and virtual worlds (Digital Twins)

Gartner has identified 'digital twins' among its list of top ten strategic technology trends for 2017. According to Gartner, "A digital twin is a dynamic software model of a physical thing or system that relies on sensor data to understand the state of the thing or system, respond to changes, improve operations, and add value"²². It is estimated that by 2020 there will be more than 21 billion connected sensors and endpoints, and digital twins will exist for potentially billions of things. We see the merging of the physical and digital worlds as represented in the phenomenon of "digital twins" as a trend that potentially has a wide-ranging sweep cutting across different sectors and verticals, and therefore presents significant opportunities for Thailand.

²¹ The Alliance includes NEC, Ericsson, Nokia, InterDigital, Orange, and Telefonica, as well as several academic institutions.

²² Gartner, Top Ten Strategic Technology Trends for 2017.

We are witnessing the beginnings of a trend towards the merger of the digital and physical worlds. As part of this trend we will see a rapid growth in the digital representation of people, objects, places and processes – a phenomenon linked to the creation of digital twins²³. The concept of digital twins is not new. Computer aided design models and process simulations have been with us for decades. However, the rapid growth in the Internet of Things including smart phones with sophisticated cameras is resulting in the creation of a higher fidelity digital representation of the real world. In parallel we are seeing rapid advances in Augmented, Virtual and Mixed Reality (AR, VR, and MR) devices and applications. It is expected that by 2020 consumers and businesses will have easy access to quality devices, systems, tools and services for AR, VR and MR.

In this context, Thailand could consider launching a national strategy on digital twins. If it does, it will be the first country to have such a strategy. The strategy could for purposes of illustration, encompass (i) creation of digital content, (ii) development of digital skills, (iii) support to SMEs (iv) support to farmers, (v) introduction of ‘Business Operating Systems’ (BOS)²⁴ in government, (vi) digitization of urban settlements and (vii) promotion of applications in education, health and tourism.

The creation of content could be done in close partnership with the private sector, with minimal investments by government. For example, mandating use of Building Information Modeling (BIM) for construction permits²⁵ (above a particular SFT threshold to begin with) would result in the digitization of building plans and create a demand for relevant skills paid for largely by the private sector. Similarly, the digitization of eco-tourism sites through use of drones, or devices like Google Street View Trekker could be done at low cost.

The development of skills could be done in partnership with leading companies like Facebook (Oculus), Microsoft (Hololens), Apple (ARKit), Samsung and Magic Leap besides others. This would help prepare Thailand for the next wave of disruptions.

The new versions of eCommerce will use AR and MR technologies as part of enhancing the buying experience. Buyers contemplating purchase of furniture will be able to visualize how new furniture would look in their homes using AR/MR applications on their smart phones. Jewelry brands are already allowing customers to see how pieces of jewelry appear on them, using their smart phones. These examples illustrate the value that could potentially be created if objects and their designs are digitized. Digitization of designs would also help Thailand’s businesses to be better prepared for the emerging disruption of 3D printing. Supporting Thailand’s SMEs and businesses in creating digital twins would therefore have multiple benefits: creation of a new class of jobs, a more sophisticated manufacturing and design sector, greater competitiveness and better preparedness for the future.

The Government of Andhra Pradesh in India is planning to use drones for mapping the entire state every 3 months to generate data that can be used in multiple ways, including for monitoring physical infrastructure (e.g. the condition of rural roads). Thailand could launch a major program for using drones for precision agriculture (besides tourism), thereby providing benefits to people in rural areas as part of a national strategy of digital twins. The program could be designed in a way that the private sector is incentivized to provide services to farmers, thereby creating competition in the provision of such services.

A program for introducing Business Operating Systems and digitizing government processes and services could prove invaluable in redesigning government services around citizen journeys and vastly improve user

²³ According to Gartner, a digital twin is a digital representation of a physical object, person, place or process.

²⁴ “The term business operating system (BOS) refers to standard, enterprise-wide collection of business processes used in many diversified industrial companies. The definition has also been extended to include the common structure, principles and practices necessary to drive the organization”. (Wikipedia)

²⁵ See this article on BIM adoption in major countries: <https://goo.gl/FrX8rk>.

experience. Similarly, digitizing existing urban areas (starting perhaps with designated Smart Cities) could help in better urban planning, and better citizen engagement through visualization of future states.

Besides the examples provided above, AR/VR and MR have immediate applications in education, health and tourism. These sectors could be specifically targeted as part of a national program.

Keystone initiatives:

Examples of keystone initiatives that could be introduced for Digital Twins include Business Operating Systems for those agencies in government that figure in the Doing Business rankings (see Thailand's latest rankings in Annex 3). This could help in exploring a radical redesign of processes to improve Thailand's performance on the rankings.

Thailand proposes to develop new eco-cities within the Eastern Economic Corridor. A virtualization of each city covering the dimensions of people, places, things and processes would provide valuable experience in implementing a national program on digital twins.

1. This could be a means to attract companies engaged in cutting edge AR/VR and MR technologies.
2. The industry cluster on Immersive Content in the EEC could both contribute and benefit from the initiative.
3. The creation of digital twins for the eco-cities would allow for simulation, modeling and planning in a way which would not be possible otherwise.

Transformative Business Models: Blockchain

Distributed Ledger Technology (DLT) or Blockchain promises to be a highly disruptive technology in the years to come. The Internet has evolved from the "Internet of Data" based on the TCP/IP protocol, to the "Internet of Content" with the coming of the World Wide Web. We are now seeing the next major evolution towards the "Internet of Value" represented by blockchain/distributed ledger technologies, which hold the potential for massive disruption. Blockchain technology has successfully demonstrated its potential as a global scale, peer-to-peer distributed network for the creation and the exchange of value (with Bitcoin being one example). It is now expanding to areas other than cryptocurrencies and could upend a wide range of industries and sectors.

Blockchains are likely to become an important part of the digital economy. According to the World Economic Forum²⁶, '80% of banks are predicted to start blockchain projects by 2017, and \$1.4 billion has already been invested into the technology over the past three years'.

Another World Economic Forum report suggests that by 2027, 10% of the world GDP will be stored on blockchain systems and by 2023, the tipping point of government applications in blockchain system could be achieved²⁷.

Dubai has recognized the importance of the technology and has initiated an ambitious Blockchain strategy. Dubai aims to have 100% government transactions on Blockchain by 2020. It also aims to support 1000 startups engaged on the technology, besides linking up with 27 other countries to facilitate travel using Blockchain. The Dubai government estimates that its blockchain strategy has the potential to save 25.1 million hours of economic productivity each year, and unlock 1.5 billion USD in savings annually in document processing alone²⁸.

²⁶ <https://goo.gl/Ycs1tb>

²⁷ <https://goo.gl/22oiVd>

²⁸ <https://goo.gl/YF22wf>

Thailand may consider supporting proof of concept (POC) initiatives with respect to DLT in various sectors (in addition to Fintech where Thailand has been quite active) so that Thai companies and government agencies gain more experience and develop greater expertise.

Keystone initiative

Thailand could identify one or more of the Doing Business Indicators and launch an international challenge for blockchain companies to develop Proof of Concept solutions. This would not only provide a clear problem to be solved for companies, but could potentially attract innovative companies from across the world to contribute to the solutions.

Digital Skills

We are likely to see significant disruptions in labor markets due to the rise of artificial intelligence, robotics as well as increasing spread of blockchain. While this is a distinct challenge, it also presents an opportunity for Thailand to prepare itself and benefit from the changes on the horizon.

Thailand would benefit from a sophisticated system for globally tracking the demand for digital skills on a continuing basis. It is important to have a global perspective since digital skills are highly portable and digital services can be delivered to any part of the world from Thailand. A Digital Skills Tracking System could leverage Big Data analytics and draw on data from companies like Burning Glass, EMSI, and others that track job postings globally. The analysis of such data can help identify the fastest growing skills/competencies, geographies, firms and hiring platforms. In addition, the system could be geared to pick up market signals on the emergent demand for skills by leveraging structured and unstructured data. These market signals would be captured from a range of sources including, but not limited to, venture capital investments, patent families' filings, leading journals, economic data and market intelligence reports.

The results of the tracking system could help Thailand to have better insights into skill requirements as well as identify promising tech companies as potential targets for outreach. The Digital Skills Tracking System could be under the Strategic Foresight Unit proposed later in this paper, and form one of the tools available to the unit for horizon scanning and risk assessment.

It will also be important to put in place a highly agile and responsive skills development program to benefit from the Skills Tracking System. This could be done by engaging with companies like Flatiron (among others) with a credible track record of responding to the market demand for skills, and also establishing innovative institutions for skills development. We present below the case of University 42 as an illustration of one such institution.

University 42

University 42 is an initiative launched by the French billionaire Xavier Niel. The University initially started in Paris and has now established a campus at Fremont in California²⁹. The University has no faculty, no syllabus and no fees³⁰. 42 is open to anyone between the ages of 18 and 30 whether they possess an academic degree or not. The training lasts 3 to 5 years, with students required to work in teams of seven, on 21 levels of real world problems. 42 offers its students the very best in terms of IT resources, and depends on their resourcefulness to access cutting edge knowledge and expertise from peers and external experts, in the course of developing solutions at each level.

²⁹ <https://www.42.us.org/>

³⁰ This University has no teachers, syllabus or fees, Wired (<https://goo.gl/zRPVfA>).

An advantage of the University 4.2 model is that the University can potentially spawn exciting technology startups, besides producing top tier IT talent.

Keystone initiatives

1. Development of a sophisticated model for capturing global demand for digital skills tapping expertise globally.
2. Exploring innovative models for establishing University 4.0 proposed within the Eastern Economic Corridor.

Institutional design

We now turn to issues of institutional design that can be game changers for Thailand. We present below two key institutional pieces that Thailand would do well to consider, so as to better prepare itself for the future and to break organizational silos and begin introducing agile and cross-sectoral teams for designing policies and strategies for the future.

Strategic Foresight

We are witnessing today an accelerating pace of technological change and rapidly evolving business models. Systematically keeping track of these changes is important in order to benefit from the opportunities that arising and better prepare for emerging risks. The capability for Strategic Foresight has therefore become an important tool in the policy maker's toolbox. "Strategic foresight is the ability to create and maintain a high-quality, coherent and functional forward view, and to use the insights arising in useful organizational ways. For example, to detect adverse conditions, guide policy, shape strategy, and to explore new markets, products and services. It represents a fusion of futures methods with those of strategic management"³¹. Strategic Foresight in today's world can be a powerful tool for gaining competitive advantage.

Singapore established a Center for Strategic Futures in 2009 and brought it under the Prime Minister's Office in 2015. Singapore has used Strategic Foresight with great success. For example, its exercise in Future's planning in 2012 identified Autonomous Vehicles and the Automation of Work as major areas for policy intervention. This was much before these topics had become the subject of popular discourse. As a result, Singapore gained a head start over other countries in systematically planning for these emerging opportunities. It succeeded in attracting NuTonomy to start trials of its autonomous vehicles in the country. Singapore's Land Transport Authority (LTA) is now partnering with the company to begin trials of an autonomous mobility-on-demand transportation service to be launched in 2018. Singapore has also invested significantly in developing a Big Data Analytics based Risk Assessment and Horizon Scanning tool, which helps identify market signals in areas of emerging technologies and business models.

The role of Strategic Foresight in Thailand has traditionally been with the National Science and Technology Agency (NSTDA). Thailand could consider elevating the importance of Strategic Foresight by institutionalizing it at the highest level in government, and closely integrating it with the decision-making structures of planning and budgeting.

Many developed countries have established institutions focusing on Strategic Foresight besides Singapore. Some examples include: UK Foresight Office, Policy Horizons Canada, Center for Strategic Foresight (Korea), European Strategy and Policy Analysis System, Commonwealth Science and Industrial Research Organization - CSIRO Futures (Australia), Committee for the Future (Finland), Centre d'Analyse stratégique (France), and the Ministry of Education and Research (Germany). This list is illustrative and not exhaustive. However, with few exceptions (Singapore being one) most of these agencies are not well integrated within the decision-making structures of government.

³¹ Developing and Applying Strategic Foresight, Richard A. Slaughter (<https://goo.gl/pgsQJp>).

Thailand has the opportunity to develop a model that is much more action oriented, with a capability to rapidly translate strategic insights into policy initiatives and action on ground. This could be done for example by establishing an empowered Strategic Foresight Unit situated in the Prime Minister’s Office, combining Singapore’s model of a Centre for Strategic Futures with the Malaysian Prime Minister’s Delivery Unit. This would result in a hybrid Strategic Foresight Unit that is both future focused and implementation oriented. Moreover, a shorter cycle for conducting foresight will enable timely responses as new opportunities and threats emerge at a faster pace.

Without a well-resourced capability for Strategic Foresight, it will not be possible for Thailand to be nimble footed and future focused in identifying opportunities (and risks) for development, including for the development of its digital economy.

Agile Policy Unit

As in most countries, policy making in Thailand is siloed in various ministries. The digital economy by its very nature requires a more cross-cutting horizontal approach to policies and regulations. Regulation of electric powered autonomous cars for instance, would require coordinated approaches involving the ministries of transport, digital economy, energy and even finance (for payment systems using smart contracts for example). Therefore, institutional structures that allow for a more horizontal and more crosscutting approach to policy making and regulation would support the development of the digital economy in Thailand.

The development of Strategic Foresight as a key capability could be combined with a shift in the policy-making paradigm towards being more proactive in reaching out to companies (and academic institutions) in emerging areas of technology, and creating the conditions to attract them to Thailand. Close cooperation between the Strategic Foresight Unit and the Board of Investments will also be important in this regard.

Crosscutting policy making and regulation and translating strategic foresight into actionable initiatives could be supported by a cross-sectoral Agile Policy Unit³². This Unit would be empowered to proactively engage with technology companies and help establish regulatory sandboxes for example, cutting across the vertical silos of government. Agility is the ability to rapidly adapt and move in new directions. A number of large companies (e.g. Google, Netflix, Spotify, ING) have adopted agile decision making as part of their organizational design (see ING model in the Annex 1). The government can learn from these experiences.

It might be argued that government is very different from the private sector and it may be impractical to superimpose private sector structures on the complex organization of government. However, as we look into the future, governments are expected to work more closely with the private sector in any case. We will witness a blurring of boundaries between public and private in the delivery of government services. Agility in government will become a key source of competitive advantage, and there is much to learn from the private sector in this area.

There is demonstrable evidence that small dedicated reform teams that are connected to the highest decision making levels in government and are empowered to develop reform strategies, build consensus, coordinate and mobilize resources, are more likely to succeed. Botswana, Cape Verde, Malaysia, Mauritius, and Taiwan (China) are all examples of countries that grew out of poverty in less than 30 years and successfully

³² A Google search on “Agile Policy Unit” yields no results. Obviously this presents an opportunity for Thailand to develop a model that is unique and novel.

adopted this approach despite their varied cultural and administrative backgrounds (ranging from strong autocratic governments to weak multiparty coalitions)³³.

An advantage of the approach will be to create a cadre of policy makers who are tech-savvy, and are comfortable working in cross-sectoral settings, and in ways that emphasize speed and agility in both decision making and implementation.

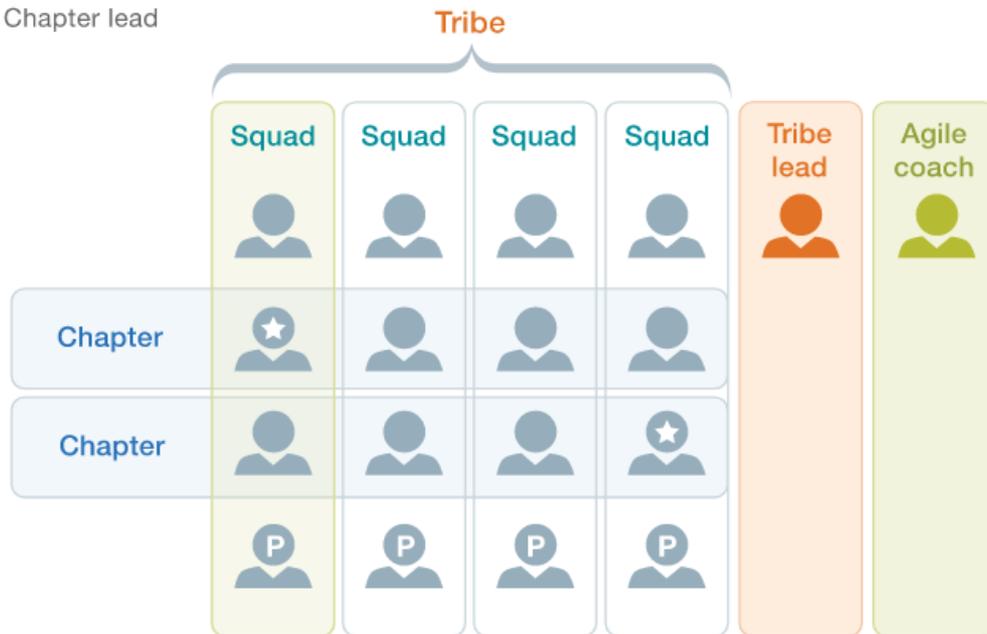
Conclusion

Thailand has a huge opportunity for reaching the frontier in the digital era. However, the challenge for Thailand will be to put in place structures and processes that can effectively translate ideas to action, and convert potential to reality.

³³ Reform Teams: How the Most Successful Reformers Organized Themselves, Alberto Criscuolo and Vincent Palmade, World Bank (<https://goo.gl/kDnNMZ>), February 2008.

Annex 1: ING's New Agile Organizational Model (not fixed, but constantly evolving)

- P Product owner
- ★ Chapter lead



Tribe

(collection of squads with interconnected missions)

- includes on average 150 people
- empowers **tribe lead** to establish priorities, allocate budgets, and form interface with other tribes to ensure knowledge/insights are shared

Agile coach

- coaches individuals and squads to create high-performing teams

Squad

(basis of new agile organization)

- includes no more than 9 people; is self-steering and autonomous
- comprises representatives of different functions working in single location
- has end-to-end responsibility for achieving client-related objective
- can change functional composition as mission evolves
- is dismantled as soon as mission is executed

Product owner

(squad member, not its leader)

- is responsible for coordinating squad activities
- manages backlog, to-do lists, and priority setting

Chapter

(develops expertise and knowledge across squads)

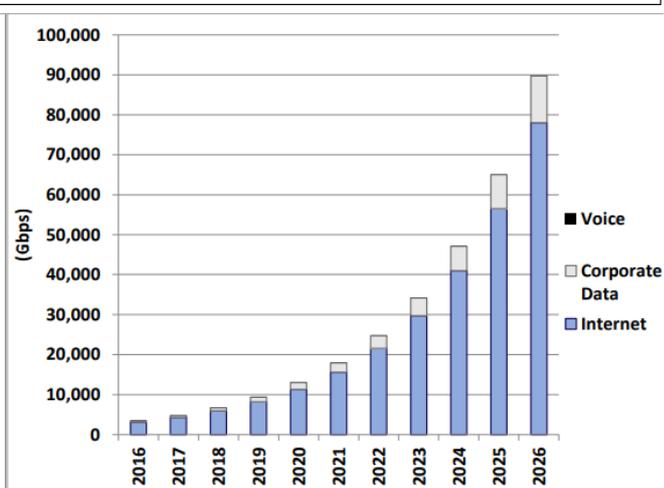
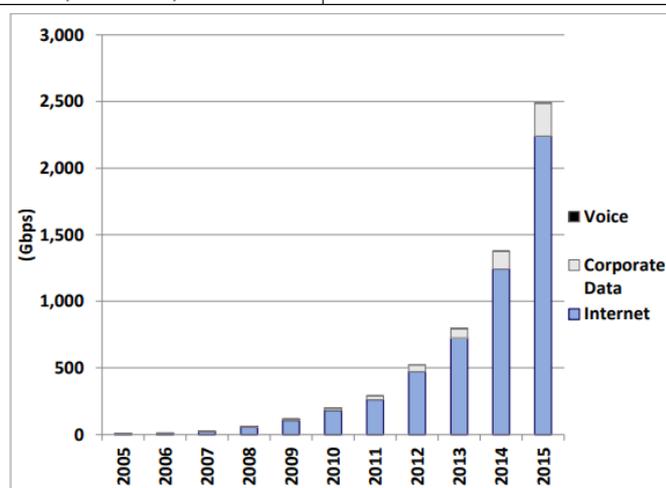
- **Chapter lead**
- is responsible for one chapter
- represents hierarchy for squad members (re: personal development, coaching, staffing, and performance management)

McKinsey&Company | Source: ING

Source: McKinsey & Company 'ING's Agile Transformation' (<https://goo.gl/ygTTVP>).

Annex 2: Historical and Forecasted International Bandwidth in Thailand (Gbps), 2005-2026 (Source [ESCAP](#))

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
International Internet	7	10	22	55	105	180	262	472	725	1,240	2,241
International Corporate Data	1	1	2	6	11	19	28	49	70	136	247
International Switched Voice	1	1	1	1	1	1	1	1	1	1	2
Total International Bandwidth	8	12	25	62	117	200	290	522	796	1,378	2,489
CAGR (2005-2015)	77%										
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
International Internet	3,115	4,299	5,932	8,186	11,297	15,590	21,514	29,690	40,972	56,542	78,027
International Corporate Data	343	516	771	1,146	1,695	2,339	3,227	4,454	6,146	8,481	11,704
International Switched Voice	2	2	2	3	3	3	4	4	5	6	6
Total International Bandwidth	3,459	4,817	6,706	9,335	12,995	17,932	24,745	34,148	47,123	65,028	89,738
CAGR (2016-2026)	38%										



Annex 3: Thailand's Ease of Doing Business Rankings 2017

THAILAND		East Asia & Pacific		GNI per capita (US\$)	5,620
Ease of doing business rank (1–190)	46	Overall distance to frontier (DTF) score (0–100)	72.53	Population	67,959,359
✓ Starting a business (rank)	78	✓ Getting credit (rank)	82	Trading across borders (rank)	56
DTF score for starting a business (0–100)	87.01	DTF score for getting credit (0–100)	50.00	DTF score for trading across borders (0–100)	84.10
Procedures (number)	5	Strength of legal rights index (0–12)	3	<i>Time to export</i>	
Time (days)	25.5	Depth of credit information index (0–8)	7	Documentary compliance (hours)	11
Cost (% of income per capita)	6.6	Credit bureau coverage (% of adults)	53.0	Border compliance (hours)	51
Minimum capital (% of income per capita)	0.0	Credit registry coverage (% of adults)	0.0	<i>Cost to export</i>	
				Documentary compliance (US\$)	97
Dealing with construction permits (rank)	42	Protecting minority investors (rank)	27	Border compliance (US\$)	223
DTF score for dealing with construction permits (0–100)	75.65	DTF score for protecting minority investors (0–100)	66.67	<i>Time to import</i>	
Procedures (number)	17	Extent of disclosure index (0–10)	10	Documentary compliance (hours)	4
Time (days)	103	Extent of director liability index (0–10)	7	Border compliance (hours)	50
Cost (% of warehouse value)	0.1	Ease of shareholder suits index (0–10)	7	<i>Cost to import</i>	
Building quality control index (0–15)	11.0	Extent of shareholder rights index (0–10)	4	Documentary compliance (US\$)	43
		Extent of ownership and control index (0–10)	5	Border compliance (US\$)	233
Getting electricity (rank)	37	Extent of corporate transparency index (0–10)	7		
DTF score for getting electricity (0–100)	83.22	Paying taxes (rank)	109	Enforcing contracts (rank)	51
Procedures (number)	5	DTF score for paying taxes (0–100)	68.68	DTF score for enforcing contracts (0–100)	64.54
Time (days)	37	Payments (number per year)	21	Time (days)	440
Cost (% of income per capita)	42.5	Time (hours per year)	266	Cost (% of claim)	19.5
Reliability of supply and transparency of tariffs index (0–8)	6	Total tax rate (% of profit)	32.6	Quality of judicial processes index (0–18)	7.5
		Postfiling index (0–100)	47.32		
Registering property (rank)	68			✓ Resolving insolvency (rank)	23
DTF score for registering property (0–100)	68.34			DTF score for resolving insolvency (0–100)	77.08
Procedures (number)	4			Time (years)	1.5
Time (days)	6			Cost (% of estate)	18.0
Cost (% of property value)	7.4			Recovery rate (cents on the dollar)	67.7
Quality of land administration index (0–30)	15.0			Strength of insolvency framework index (0–16)	13.0