Cross-Border Data Flows:
A Review of the Regulatory
Enablers, Blockers, and
Key Sectoral Opportunities in
Five Asian Economies:
India, Indonesia, Japan,
the Philippines, and Vietnam

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1. Executive Summary

A recent study found that India's GDP could be USD1.2 trillion higher if it accelerated its participation in all types of global data flows.[1] In Japan, artificial intelligence (AI) and the Internet of Things (IoT) are expected to boost economic growth by up to 4.1%, increasing 2030 GDP estimates by 40%. The Indonesian government, meanwhile, estimates that it will be able to add an additional 2% per annum in GDP growth, and almost 4 million jobs, by increasing access to broadband and data – particularly by SMEs.[2]

This last point is particularly important. Ensuring SMEs access global data flows via digital technologies is increasingly crucial to governments' economic growth and social enablement. Likewise, SMEs' access to global markets—their ability to sell their goods, market their services, and source suppliers, partners or skillsets—is crucial to nations' inclusive growth and innovation. Some countries, like Indonesia, are already setting short-term objectives for themselves: to see nurture 1,000 technopreneurs and to grow five unicorns by 2020.[3]

Put simply, access to data represents a huge potential in terms of potential economic growth and social enablement opportunities.

It is not surprising then, that many governments are setting forth 'digital economy' agendas, including policy and regulatory frameworks, to ensure they maximize participation and opportunity. Seeking to enable SMEs, spur innovation, develop start-up communities and ecosystems, promote inclusivity, and regenerate industries, these frameworks encompass *all* sectors of the economy, bringing it closer to the so-called 4th Industrial Revolution. In other words, the digital economy, very quickly, has become—or, is becoming—*the* economy.

However, such a cross-cutting agenda is not without its challenges. Regulations put in place to enable or protect one part of the economy can damage growth in neighboring sectors or industries, often unintentionally. In India, Prime Minister Modi's sudden introduction of demonetization caused significant disruption throughout the economy, spurring all manner of innovative workarounds; in Indonesia, limitations on cross-border data flows as part of an 'over-the-top' (OTT) regulatory proposal limited the access to mobile neonatal services and to free education services such as the Khan Academy. In this case, neither the Ministry of Health nor the Ministry of Education had been made aware of the unintended effects.

These and other similar cases highlight the importance and urgency of properly measuring the ramifications – both in terms of benefits and requirements – of cross-border data flows.

This research report takes an investigative look at the way five Asian economies—India, Indonesia, Japan, the Philippines, and Vietnam—are aggressively transitioning to more digitally enabled economies. While there are similarities in the drivers of these transitions, there are also significant differences in the approaches being adopted.

The Philippines, for example, has no explicit 'digital economy' policy, whereas India has become 'Digital India' and Japan is striving to be the 'World's Most Advanced IT Nation'. Conversely, the Philippines has no explicit cross-border data flow restrictions and was the first Southeast Asian country to formally adopt a 'Cloud First' approach. Additionally, its central bank actively encourages banks to experiment with digital technologies and services in a bid to promote financial inclusion and growth—including putting core banking facilities on the cloud.

The choices being made across these five countries are indicative of developments elsewhere in the region. They also have implications for SME opportunities, for start-up community access, sectoral growth, investment, and overall development roadmaps. Close examination of the digital economy trajectories of the five countries allow five main findings to stand out:

1. **Data access:** restrictions on data flows negatively impact business operations and economic growth.

2. **Policy making:** there is a need to adopt a more holistic and coordinated policy-making agenda to successfully transition to a digital economy.

3. **Regulatory enablement:** regulators need to shift from sector-specific risk managers to economic enablers (i.e., from 'police' to 'referees').

4. **Industry:** certain sectors are being enabled faster than others, *but* governments have the chance to influence and accelerate this process.

5. **Sustainable development:** capacity-building and reskilling is fundamental to economies' sustainable growth as they transition; this is true not only for the general population, but also for practitioners, and for policy-makers/regulators.

1.1. Restrictions on Data Flows Negatively Impact Business Operations and Economic Growth

Data localization and data sovereignty requirements—in almost any form—have the potential to negatively impact growth, foreign direct investment (FDI), social development, and economic productivity.[4] Such restrictions adversely impact business operations by directly:

- limiting companies' ability to use cloud computing;

- blocking access to the latest digital tools and services, causing companies to be unable to perform certain transactions; and therefore

- preventing or limiting access to new global markets.

SMEs and start-ups are inevitably hit hardest by such restrictions, as they have limited ability to work around the restrictions. They tend to end up bearing the brunt of indirect costs, including:

- reduced ability to compete effectively;

- increased administrative compliance costs, which they are forced to bear themselves; and

- limited access to cloud-based services and tools that would otherwise reduce IT costs, improve security, or develop new lines of business.

Data localization requirements are often enacted due to governments' obligation to protect citizen's privacy and sensitive data. This is the case of the financial and healthcare sectors, for instance. In most cases, the assumption is that data stored within a country's borders is not only more easily accessible by relevant parties, but also better safeguarded. However, such assumptions have been shown to be flawed as they fail to account for the more limited resources or capacity to address modern cyber-threats of domestic companies, particularly smaller companies.

Table 1 summarizes the key regulatory restrictions on cross-border data flows faced in the five Asia Pacific economies.

Table 1: Asia Pacific Economies – Restrictions of Cross-Border Data Flow Measures

Table 1: Detail of Restrictions of Cross-border Data Flow Measures
INDIA   • The Information Technology Act 2000[5] is complemented by the Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules 2011[6] (IT Rules). Under the IT Rules, data transfer is only permitted if it is necessary for the performance of a contract, or where the subject has consented to the transfer. Sensitive data can only be transferred offshore where the jurisdiction provides the same level of data protection as India.   • Section 4 of the Public Records Act 1993 prohibits public records from being transferred out of India except for official public purposes.[7]   • In 2012, India enacted the "National Data Sharing and Accessibility Policy", which effectively means that government data must be stored in local data centers.[8]   • In 2014, the Indian National Security Council proposed a policy that would institute data localization by requiring all email providers to set up local servers for their India operations, and mandating that all data related to communication between two users in India should remain within the country.[9]   • In 2015, India released a National Telecom Machine-to-Machine (M2M) roadmap that requires all relevant gateways and application servers that serve Indian customers to be located domestically.[10]   • In 2017, the Ministry of Electronics and Information Technology (MeitY) released Guidelines for Government Departments on Contractual Terms Related to Cloud Services. The guidelines require any government contracts to contain a localization clause mandating all government data residing in cloud storage networks to be located on servers in India.[11]   Sector specific: • In 2014, India enacted the Companies (Accounts) Rules law that requires backups of financial information, if primarily stored overseas, to be stored in India.[12]
INDONESIA   • In 2012, the Ministry of Communication and Informatics (Kominfo) issued Government Regulation No. 82 of 2012 (GR82)[13] under the umbrella of the Electronic Information and Transactions Law[14]. Article 17(2) of GR82 requires data centers that have information on public services, and disaster recovery centers to be located in Indonesia.   • In 2016, Kominfo issued Ministerial Regulation No. 20 of 2016.[15] This regulation on personal data protection reiterates data residency requirements in GR82 and requires electronic system providers[16] to have data centers and disaster recovery centers located in Indonesia.   Sector specific: • In 2016, the Financial Services Authority (OJK) issued POJK No. 38 of 2016.[17] It requires banks to use data centers and disaster recovery centers in Indonesia. Some exceptions allow banks to host specific information outside of Indonesia provided that the data does not contain identifiable customer information and that OJK has given its approval.   • In 2016, OJK issued POJK 69 of 2016.[18] This regulation requires insurance and re-insurance companies (both common and Syariah) to use data centers and disaster recovery centers in Indonesia. The regulation further specifies that personal identifiable information and transaction-related information must be located within Indonesia.   • In 2017, the Bank of Indonesia (BI) issued BI No. 19 of 2017.[19] This regulation requires all domestic transactions to be processed through the National Payment Gateway (NPG).
JAPAN   • In 2017, amendments to the Act on the Protection of Personal Information (APPI)[20] prescribed requirements for transfers of personal information to a third party in a foreign country, including: that the destination country's rules must align with APPI, and/or that the destination country must be participating in APEC CBPR scheme.

PHILIPPINES
• In 2015, Circular No. 889 was issued.[21] Under this circular, offshore outsourcing of a bank's domestic operations is only permitted when the service provider operates in jurisdictions which uphold confidentiality.[22]
VIETNAM
• In 2013, the Decree No. 72[23] entered into force. The decree imposes requirements on IT companies to establish at least one server inside the country "serving the inspection, storage, and provision of information at the request of competent state management agencies."   • In 2016, the Ministry of Information and Communications (MIC) issued Circular No. 38.[24] Under the circular, providers of cross-border public information which (a) has more than 1 million visits from Vietnam per month or (b) leases a data center to store digital information in Vietnam, are required to provide contact information to the MIC.[25]

1.2. The Need for Holistic and Coordinated Policy Making

The benefits of the digital economy can only be properly captured and maximized if the approach is coordinated from the top so that it cuts across and enables all sectors. This includes agencies that are not traditionally seen to be in 'technology'-focused areas, such as agriculture and fisheries, manufacturing, manpower, and so on.

In India, the need to drive policy both horizontally across government agencies, as well as from the top-down, has been recognized by the Modi government through a succession of programs: Digital India, the GI Cloud Initiative, IndiaStack, Make in India, and Aadhaar, the country's unique identity number program.

Japan accompanied its 2015 declaration to become the 'World's Most Advanced IT Nation', with a 2016 'White Paper on Information and Communications in Japan' identifying where ICT could be utilized to augment existing sectors of the economy, and where further investment in ICT was required to contribute directly to economic growth. The digitization of Japan's healthcare industry, for example, is seen as paramount to the sustainability of its public health insurance scheme. The subsequent 'Future Vision towards 2030' focused on realizing the full economic benefits of digital technologies, as well as the importance of data-enabling initiatives (launching regulatory sandboxes, removing digital borders, keeping regulation 'light-touch' for the benefits of the Internet to be realized).[26]

While Vietnam has yet to outline a specific plan to develop its digital economy, the government plays a key enabling role in driving the digital economy through its (1) National Broadband Plan, (2) promotion of e-commerce, (3) cybersecurity and data protection policies, and (4) roadmap for the Fourth Industrial Revolution. Of the four, the development of a Fourth Industrial Revolution roadmap is what most corresponds to a nascent digital economy policy. The Fourth Industrial Revolution, according to the government, will introduce a wave of new technologies that will "build on the fusion of digital, physical, and biological technologies, Internet of Things, and artificial intelligence".[27]

In this regard, the Philippines and Indonesia can be seen as outliers, neither of whom have released overarching digital economy plans. Indonesia has, however, targeted becoming the largest digital economy in Southeast Asia by 2020, and the Philippines did introduce the Philippines Digital Strategy (PDS) in 2011 – with both initiatives having the support of their respective presidents.

1.3. Shifting Regulators from Risk Management Agents to Economic Enablers

Disruptive innovations are a natural consequence of technological evolution. As technology transforms the way companies operate and provide their goods and services, innovative new business models emerge and disrupt the existing market. As a result, traditional definitions of industries and sectors are increasingly being challenged. Technology enables companies to expand across different sectors and provide their services to customers in a variety of industries. But the application of legislation – and most importantly, the framing of competition – is currently based on sectoral definitions, even though this is less and less the way consumers perceive the services they consume.

This brings into question how governments and societies are organized and the way in which value is created. The example of Uber is often cited, but its impact is neither company- nor sector-specific. Service providers such as Uber, Didi, Grab, and Airbnb bring into question what *type* of companies they are: are they taxi and hotel firms, transportation and hospitality businesses, or are they just software companies? Are they *platforms*? Is an Uber driver an Uber employee or a self-employed entrepreneur? Such designations can have profound implications for how national tax and social security systems work.

A key consideration for regulators in approaching such disruption is to determine *the nature of the markets* in which companies operate, understand how their business models work, and pinpoint how they differ from those of traditional service providers. Further, regulators must consider how traditional service providers are responding and changing their own business and delivery models. Once the changing market conditions are understood, regulators must consider all regulatory implications.

Regulation is always a balance of competing interests and goals. Regulation of the major disruptors of the day, digital services and service providers, is thus challenging in many ways:

- On what ground (and within which sector) is the regulation justified?

- Do current regulations deter new entrants and stifle innovation and competition? If so, how can the goals of regulation be met while encouraging new entrants and encouraging innovation and competition?

- Do current regulations continue to be relevant to meet the stated goals for the regulation given (a) the speed with which new technologies and business models evolve, and (b) that digital services cut across both different sectors and different jurisdictions? Or do the goals for regulation need to be reevaluated – or the regulations need to be adapted – in light of the new and rapidly evolving market conditions?

It is within this context that India's impending Data Protection Act is seen as crucial for facilitating economic growth through innovation while ensuring data flow and digital trade do not negatively impact citizen privacy. Overly restrictive regulations on cross-border data flows will slow or prevent business transactions, increasing costs and obstructing the delivery of products and services to the market. As of January 2018, India does not yet have a stand-alone data protection legislation; however, this is set to change, with both MeitY and the Telecom Regulatory Authority of India (TRAI) in the process of conducting consultations around data protection and data privacy in preparation for issuing new rules. In many ways, there are good reasons for a new framework to be brought into place to facilitate the many digital policy initiatives underway. The question is how enabling – or constraining – will such frameworks be? And if issued by multiple agencies, how aligned can they be?

Somewhat similarly, India's financial technology (fintech) industry falls under the purview of four regulatory bodies: the Reserve Bank of India (RBI), the Securities and Exchange Board of India (SEBI), the TRAI, and the Insurance Regulatory and Development Authority (IRDA). Each of these regulatory bodies plays an important role. But if Fintech is to be enabled to expand financial access the regulators will need to adapt their perspective from one of regulatory controls to one of economic enablement.

In Indonesia, policies implemented by the government to encourage e-commerce growth are being promoted at the same time as a proposal to impose taxes on electronic trade, illustrating the government ministries' siloed approach to development. One agency (in this case the Ministry of Finance) can inadvertently erect barriers to digital trade, even as another is attempting to encourage growth.

In August 2015, the Japanese health ministry announced the removal of regulatory barriers to telemedicine in a move to spur medical start-ups to offer such services and improve access to medical consultation services. In addition to requiring medical practitioners to be licensed in Japan, Article 20 of the Medical Practitioner's Act restricted practitioners to "personally performing" examinations, thus bringing into question the legality of telemedicine. Adopting a more lenient regulatory approach has been a major impetus in the development of digital healthcare in Japan. In 2017, the government, looking to further promote medical care using technology, released the Next Generation Medical Infrastructure Act, to actively promote the secure use of anonymized healthcare data and thus further develop the sector.

1.4. Leveraging Digital: Key Sectoral Opportunities

This paper also examines the growth opportunity from the digital economy by identifying specific sectoral opportunities within each economy. As shown in Table 2, the identified sectors are:

- sectors which are a major part of the existing economy, such as outsourcing in India and the Philippines;

- sectors which stand to benefit from leveraging innovative tools and platforms, such as e-commerce in Indonesia and tourism in Vietnam; or

- sectors which can use digital tools to solve existing social issues, such as healthcare in Japan and Vietnam.

Table 2: Digital Opportunities by Sector

Country	Digital Opportunity Sectors
India	Outsourcing, Manufacturing, Financial Services, Healthcare
Indonesia	Agriculture, E-commerce
Japan	Healthcare, Payments
Philippines	Business Process Outsourcing, Remittances and Financial Flows, Tourism and Health
Vietnam	Healthcare, Transportation, Tourism

For some economies, it is about making use of the latest innovations, such as big data analysis, smart technologies, and IoT, while for others it is about improved access to markets, reducing IT costs, or addressing an existing gap in the market.

1.4.1. India

- **Outsourcing**: Analytics outsourcing is witnessing huge growth in India, as leveraging data analytics tools allows the provision of increasingly customized offerings. The Indian analytics services industry is growing at a CAGR of 25% and is poised to reach USD2.3 billion by 2018.[28] From location-tracking solutions to decision-making insights, a vast number of industries rely on data. To provide added value to consumers, data must flow freely across international borders.[29] **Market Equations** is a local company that is helping businesses solve critical problems through the application of advanced analytics and industry best practices.

- **Manufacturing**: With the increased use of IoT and sensors in consumer technology, the manufacturing sector has begun looking to implement networks of sensors and actuators for data collection, monitoring, decision-making, and process optimization. Under the government's Smart Cities Mission, there is an aim to develop 100 smart cities, with a view to change the way India manufactures, designs, and develops products.[30] These evolutions are leading to the creation of new services such as remote factory management, which would scale up the transfer of data across borders. **Wipro** is a company that uses cognitive computing, hyper-automation, robotics, cloud computing, data analytics, and other emerging technologies to create the smart manufacturing environments that define the Industry 4.0 paradigm.

- **Financial Services**: The government's recent demonetization program (i.e., eliminating large-denomination currency from the financial system) played an important role in reducing the country's cash-dependency and boosting digital payments. In the first quarter of 2017, smartphone and Internet users drove mobile wallet transactions in India, amounting to USD3.6 billion, up 60% from the previous quarter. Domestic digital payment companies such as **Paytm**, have benefited enormously from this changing fintech ecosystem, and have been moving rapidly to capitalize on the opportunities to offer cross-border remittances and e-commerce.

- **Healthcare**: The presence of world-class hospitals and skilled medical professionals has strengthened India's position as a preferred destination for medical tourism. As of 2017, India's medical tourism market was worth USD3 billion, and is expected to double to USD6 billion in 2018.[31] **Heealthy** is a medical tourism start-up that aims to make medical travel simpler and bring data-intensive research to cross-border patient care.

1.4.2. Indonesia

- **Agriculture**: Indonesia is one of the world's top palm oil, rubber, coffee, tea, and cocoa producers. A labor-intensive industry, it employs 33% of the country's labor force but accounts for only 14% of the GDP.[32] Stakeholders stand to gain from higher levels of productivity and crop yield where certain processes can be automated through technological innovation. **CI-Agriculture** was established in 2014 to focus on translating huge amounts of data into purposeful information for farmers to improve productivity.

- **E-commerce**: Indonesia's 2017-2019 E-Commerce Roadmap sets an ambitious target of developing an e-commerce sector worth USD130 billion in online transactions by 2020, up from USD3.6 billion in 2015.[33] **Tokopedia** is a leading Indonesian consumer-to-consumer (C2C) marketplace, with more than 90 million visitors as of September 2017. Its use of cloud technology to process and analyze data enables rapid scalability to manage online traffic flows, reduced costs from data center upkeep, and outsourced technology and support to prevent cyberattacks such as a distributed denial of service (DDoS).[34]

1.4.3. Japan

- **Healthcare**: Japan's Healthcare 2035 plan was drafted with the goal of exporting healthcare services to a global market[35] and in turn ease the economy's fiscal deficits.[36] The policy capitalizes on Japan's domestic healthcare sector advantages – high technological integration, highly-regarded standards, and the population's renowned longevity – to tap unmet demand in the global market for reliable healthcare services. The **Sunrise Japan Hospital** opened in Phnom Penh to provide advanced healthcare treatments to Cambodians. To address language difficulties between Japanese-speaking and Khmer staff, the hospital uses a multilingual cloud-based service that allows patients to input their symptoms, medical history, and other supporting information into the system in Khmer. This data is then analyzed and translated into Japanese or English, allowing doctors to consult the information even if they are located in Japan.

- **Payments**: Cash is still the primary mode of payment in Japan and accounts for 70% of all retail payments.[37] The government has been actively taking steps to reduce the country's cash-dependency with the aim to boost digital payments adoption in time for the upcoming 2020 Tokyo Olympics. Specifically, it has set goals for Japan's larger cities and tourist destinations to fully accept cashless payments and for the rate of cashless payments to double from 19% (in 2017) to 40% by 2027.[38] To stimulate digitization of the payments industry, measures have also been taken to encourage the development of digital currency. From 1 April 2017, the Financial Services Agency (FSA) amended the Banking Act to define digital currencies and recognize them as a payment methods.[39] This has given rise to companies such as **Japan Net Bank**, which operates purely online and leverages cloud platforms to host critical information and disaster recovery functions.

1.4.4. Philippines

- **Business Process Outsourcing (BPO)**: The Philippines is one of the world's top BPO locations, supported by the relatively low cost of living, and a young, educated , and English-speaking workforce.[40] The sector employs 1.4 million people and generates close to USD25.5 billion annually.[41] The BPO sector is built upon low-cost and efficient cross-border data flows across all of its vertical

sectors. **Global BrainForce**, a local BPO enterprise, began as a start-up in 2012 and has since become a key provider of offshore IT services, including software development on all delivery platforms.

- **Remittances and Financial Flows**: With over USD2 billion being remitted monthly by around 12 million overseas Filipinos, remittances are the country's biggest source of foreign exchange income. They account for about 10% of GDP[42] and grew by over 5% in 2017. **Ayannah** is a remittance start-up that offers a variety of digital financial services, enabling online and mobile transactions through its cloud-based platforms.[43]

- **Tourism and Health**: Health tourism brings an average of 100,000 visitors a year to the Philippines. As a result, both government and the private sector in the Philippines are actively promoting healthcare and health tourism. For example, the **Health Research and Development Information Network (HERDIN)** has over 40,000 records of health research resources, while the **Philippine Health Research Registry (PHRR)** is a publicly-available database of ongoing health and health-related researches from 2011 onwards.[44]

1.4.5. Vietnam

- **Healthcare**: Healthcare in Vietnam is underfunded.[45] Hospitals in major cities are overcrowded, medical equipment is outdated, and human resources are dwindling.[46] As one moves away from the larger cities, the numbers of doctors, healthcare services, and facilities available falls significantly. Vietnamese patients often need to travel long distances to receive treatment.[47] It is within this context that online information healthcare provider **ViCare** was established, offering a remote health service that plugs information gaps by connecting patients to information, online services, and locally-available practitioners.

- **Transportation**: As Vietnam's e-commerce industry continues to increase, its transportation services must keep pace to ensure e-commerce transactions are fulfilled in a timely and efficient manner. With the government aspiring for cross-border e-commerce to grow to represent 15% of export turnover, it needs to ensure that investments into transportation networks remain forthcoming.[48] To stand out among the hundreds of new freight-forwarding services in Vietnam, **sShip** is employing the use of cloud computing and Google Maps services to optimize routes and communication lines between clients.

- **Tourism**: Tourism is now one of the fastest-growing sectors in Vietnam, with total contribution to GDP hitting 9.1% in 2016, and contributing 7.3% of total employment.[49] Recognizing its potential, Vietnam has been targeting the use of innovative new operations to improve return tourism. **Triip** was founded upon that idea that unique activities and experiences in Vietnam could be crowdsourced by locals who are experts in their own backyards, catering to travelers looking for unique local experiences which they would not normally get from traditional tours and travel guides.

1.5. Capacity Building for Sustainable Development

Digitization and access through online platforms stands to enable specific groups such as the unemployed, people not actively seeking job opportunities, and those in informal employment. It also enables employers to conduct online searches of candidates, broadening the base of recruits – in some cases across entire countries or regions – as well as shortening the time between notice of hiring and employment of a candidate. In Indonesia, the use of online platforms has been estimated to add 3.7 million jobs by 2025.[50] However, this requires training and digital literacy for both candidates and recruiters if it is to happen at scale across the region.

Moving business processes and functions to the cloud can also encourage the normalization of remote working, or 'teleworking', by allowing employees to access corporate networks from any location or device. In Japan, the government hopes that enabling flexible working conditions through telework will yield a more inclusive society that allows those involved in medical treatment, child rearing, or nursing care to contribute to the economy.[51] It is estimated that the addition of stay-at-home mothers into the

formal workforce through telework could expand the labor force by 1.5%.[52] By 2020, the government aims to have the number of people working from home at least once a week account for 10% of the entire working population.[53] To achieve this, the government needs to revise its guidelines for employment-type telework.

In Vietnam, while the general population has been swift to embrace mobile Internet use for entertainment, news, and social media, its private sector business still lags in terms of digital transformation. In 2017, it was estimated that only 1.7% of local businesses were involved in the digital economy and that they contributed less than 5% to the GDP.[54] Participants pointed to a lack of awareness in how to adopt ICT tools to aid traditional businesses as a key constraint. Similar findings have come from India and Indonesia.

But perhaps the greatest challenge is to be found in raising the capacity of government to adopt digital technologies and push through necessary reforms. Constant reorganization and reshuffling of government departments and personnel changes have played a limiting role in India, Indonesia, and the Philippines. Frequent changes in structure and personnel, and the lack of government adoption of ICT, will continue to stymie the national and regional prospects for digital economy growth.

1.6.   Structure of the Report

The remainder of the Report looks at each of the five countries, adopting a similar approach and set of questions:

- **Digital economy drivers:** briefly identifies the government's stated position on the digital economy, if there is one, and highlights the policies that have been put in place to further this agenda.

- **Cross-border data flows:** examines the impact of cross-border data flows, particularly on economic development in the country, analyzing how it is perceived, promoted, and measured.

- **Regulatory and policy frameworks:** sees the regulations that exist to either block or enable cross-border data flows, and how policy initiatives promote digital economy development and data flows.

- **Sectoral case studies:** assesses the real and potential impact of data flows based on the country's economic strengths, and depicts major success stories.

The final chapter provides a set of recommendations for promoting cross-border data flows and overall digital economy growth.

2. India: Growth-Driven Digital Agenda

2.1. Highlights

- Digital transformation in India is represented by government efforts on Digital India[55], the GI Cloud Initiative (MeghRaj)[56], demonetization advancing progressive cashless transactions[57], IndiaStack[58], Make in India[59], and Aadhaar (the country's Indian resident unique identity number program).[60] Likewise, the private sector is transforming digitally in the e-commerce and outsourcing services sector, leveraging emerging technologies and cloud platforms.[61]

- Digitization is central to economic growth forecasts which put India's nominal GDP on track to compound annually by more than 10% over the coming decade. The Digital India program itself has been estimated to boost India's GDP between USD550 billion to USD1 trillion by 2025.[62]

- The economic opportunity for India in leveraging data flows to grow its digital economy is therefore huge. For Indian companies to stay competitive, they need to be able to send not only goods and capital across-borders, but also data. Over the last decade, if India had accelerated its participation in all types of global flows to match leading countries, its GDP would have been higher by USD1.2 trillion.[63]

- India's regulations on cross-border data flows are primarily controlled by the Information Technology Rules, 2011.[64] These rules limit the transfer of "sensitive personal data" abroad in two restrictive cases – when "necessary" or when the subject consents to the transfer of data abroad. Because it is difficult to establish if transferring data abroad is "necessary", this provision effectively restricts cross-border data flows except when individuals consent. The implications of this ambiguity are significant.[65] Empirical evidence shows that data localization and other barriers to data flows impose significant costs, reducing India's GDP by 0.7% to 1.7%. Such barriers also negatively impact growth, FDI, and economic productivity.[66]

- With an unprecedented number of data-intensive platforms and services, enabling cross-border data flows is key to fostering trust in the data ecosystem. These opportunities cannot be realized through a mandate-based approach in the form of forced data localization, which limits growth opportunities. Local businesses are especially impacted by forced data localization measures as they increase costs for both businesses and consumers.

- Local companies are increasingly relying on the cloud to host their businesses, but data localization laws threaten this model of low-capital investment. Any restrictive measures disrupt consumer access to online services, and local businesses are subsequently unable to reaphe benefits.

- Indian companies, particularly in the outsourcing, manufacturing, fintech, e-commerce, and healthcare sectors, have highly digitalized production chains, with reliance on data to produce and exchange consumer services online. Cross-border data flows are a growth enabler for companies in these sectors, as they provide access to markets and innovation. For example, in the **information technology outsourcing sector**, data flows help India grow as an **analytics hub** and provide a boost to the **start-up and cloud** ecosystem. In the **manufacturing sector**, data flows leveraging digital technologies allow supply chains to be more networked and distributed. **E-commerce and Fintech** growth in India, driven by a combination of increasing Internet penetration and reduced data access costs, can realize its full potential through nondiscriminatory treatment to digital services and seamless access to interoperable digital payment platforms. Free flow of data in the **healthcare sector** enables India to modernize its primary healthcare services sector, extend access throughout the country, and become a regional competitor in the medical tourism sector.

2.2. India's Digital Economy Agenda

India's projected growth rate of 7.2% in 2018-2019 is driven by the perception of a large and increasingly open economy attracting large volumes of FDI, favorable demographics, and government policy reforms.[67] Notable among these has been Prime Minister Modi's Digital India campaign.[68] Structured into three vision areas and nine pillars, the program envisages a complete digital transformation of the Indian society and the development of a knowledge economy. The program aims to leverage technologies such as the cloud, big data analytics, machine learning, and artificial intelligence (AI) to develop digital infrastructure, transform healthcare, accelerate digital payments, and strengthen data security, among others.

This wide-ranging digitization is central to the forecasts that put India's nominal GDP growth on track to compound annually by more than 10% over the coming decade.[69] Some of the initiatives touted as driving broad economic growth include:

- The IoT policy published by MeitY, which estimates the IoT industry in India to grow to a sector worth USD14.4 billion by 2020.[70]

- Cisco estimates India's Internet of Everything (IoE) *pillars* (Internet of Things, Internet of People, Internet of Data, and Internet of Process) to be worth USD500 billion over the next decade.[71]

- India's information technology and business process management (IT-BMP) sector is projected to grow at 8% in 2017 to reach USD154 billion.[72] Moreover, India's leading role in IT-BPM services exports will have a spillover impact on the country's data processing needs, which will further expand with the growth in digital business and the push towards e-governance.

- The Digital India program itself has been estimated to boost India's GDP between USD550 billion to USD1 trillion by 2025.[73]

- Moreover, if the Digital India project could increase *broadband* penetration across India (currently estimated at about 7%) by 50% and mobile penetration in rural India (currently estimated at about 45%) by 30% in two years (2017–2019), the corresponding increase in GDP is estimated to be 9%, or some USD180 billion.[74]

### *Box 1: India's Digital Renaissance Founded on Cross-border Data Flows*

Cross-border data flows have been a driver to the innovation landscape in India for some time, and are broadly recognized in both government and business circles, including:

- **Zoho Corp**., founded in 1996 in Chennai, operates data centers in California and New Jersey.

- **Myntra**, an e-commerce platform, and **redBus**, an online bus ticketing company, have also hosted their servers with global cloud providers.

- **Flipkart**, one of the largest regional e-commerce platforms, relied on data centers in Canada for its initial operations.

- **Fortis Healthcare** has migrated from its own corporate data center to an outsourced cloud service provider, leading to significant cost savings and to remote healthcare service delivery.

Source: IAMAI (2015) Make in India

With rapidly increasing Internet penetration, Internet-related businesses are already estimated to contribute 3.2% of Indian GDP (Figure 1). The contribution comprises: private investment (28%)[75], public expenditure (5%)[76], private consumption (20%)[77], and trade balance (47%).[78] At 47%, the trade balance is easily the largest portion and, being driven by business conducted over the Internet, provides a significant revenue opportunity from ICT led-exports.[79] Moreover, while the urban Indian population of 444 million has 269 million (60%) Internet users, rural India's population of 906 million comprises only 163 million (17%) Internet users. This means that there is still a potential base of some 750 million additional people who have yet to come online.[80]

Figure 1: Internet Contribution to GDP (%)
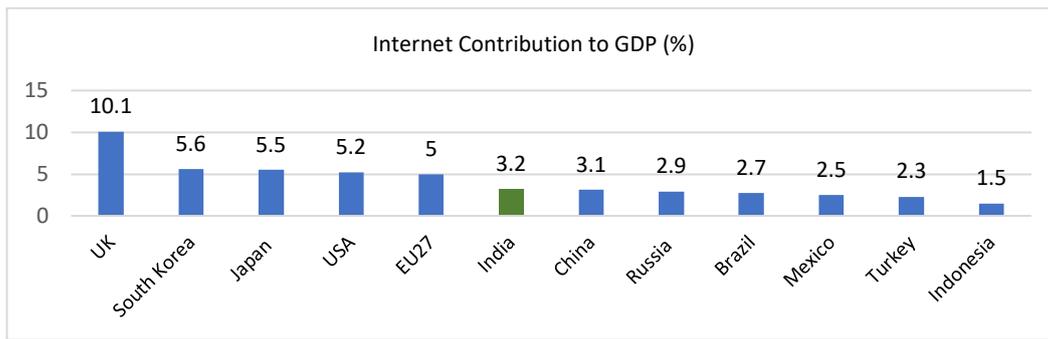
Source: BCG & IAMAI (2015) India@Digital Bharat

A study by the Indian Council for Research on International Economic Relations (ICRIER) estimated that the Internet's contribution to India's GDP would grow to nearly 16% by 2020, which would translate to USD534 billion, with half emerging from Internet-based apps.[81] The study shows that a 10% increase in total Internet traffic and mobile Internet traffic increases India's GDP by 3.3% and 1.3% respectively.[82] The enormous opportunity for the SME sector to grow through e-commerce platforms was also called out. E-commerce has rapidly become an important channel of job creation in India and is forecast to create 1.5-2 million jobs by 2018.[83] The impact of the Internet on GDP through various platforms is broken down in Error! Not a valid bookmark self-reference..[84]

Table 3: The Impact of the Internet on Indian GDP (USD billion)

e-commerce	17
Advertising and Classified	0.8
Online Content	0.3
Device	12
Connectivity	5.6
Private Infrastructure	22
Government Spending	1.4

Source: BCG & IAMAI (2015) India@Digital Bharat

In addition to the government's Digital India campaign, programs such as IndiaStack, Make in India, and GI Cloud (MeghRaj) promote cloud acceleration and usage of big data analytics.

- **IndiaStack** is an application-based and interoperability-driven platform enabling different private and public stakeholders to build customized products and services through mobile apps.[85]

- **Make in India** aims to develop India into a global manufacturing hub by incentivizing foreign companies to set up their facilities in India. Foreign investments in Make in India industries would be influenced by data regulations for the latter.[86]

- **GI Cloud initiative** (MeghRaj) promotes a cloud computing environment for government departments and agencies to leverage cloud technology for effective delivery of e-services.[87] As India's digital economy evolves further, data will become even more inextricably interwoven and shared.[88] In 2017, MeitY introduced the "White Paper of the Committee of Experts on a Data Protection Framework for India". The paper highlights the importance of cross-border data flows, particularly in trade of goods and services, IT-BPM industrial growth, analytics, cloud services, start-up ecosystem and telecommunications sector.[89]

As such, regulatory restrictions requiring data localization stand to have a significant negative impact on the entire landscape of India's growth agenda. This is especially true for the competitiveness of SMEs and start-ups that increasingly rely on cloud services to reduce IT costs and enable regional reach. Most

importantly, policy makers the world over are increasingly recognizing that the adoption of restrictive policies by *other* countries will severely impact Indian IT companies and the overall Indian growth agenda. This has led to the India-EU Free Trade Agreement (FTA) negotiations, where India has demanded the EU relax restrictions on movement of personal data of European citizens to India.[90] Rather problematically, India's own policy direction on data localization may end up running contrary to the position taken in these negotiations.[91]

2.3.   The Economic Impact of Limiting Cross-Border Data Flows

Data localization policies and barriers to cross-border data flows impose large costs on the Indian economy by:[92]

- **Undermining firm competitiveness and economic productivity**. The barriers force companies to spend more than necessary on IT services, among other increased costs.

- **Undermining innovation and access to innovative services.** Organizations use data to create better insights, which, in turn, lead to innovation. Enacting barriers to data flows makes it harder and more expensive for companies to gain exposure, and to benefit from ideas, research, technologies, and best practices that accompany data flows.

Emerging empirical evidence such as the MGI Connectedness Index show that if India had, over the past 10 years, accelerated its participation in all types of global flows to match leading countries, its GDP would have been USD1.2 trillion higher (or 58% larger).[93] Thus, despite the country's thriving business process offshoring sector – one of the world's largest – India ranks only 70th in the world for data flows,[94] illustrating that other countries have increased data flows far faster.[95]

Similarly, a 2016 study from Chatham House and the Center for International Governance Innovation (CIGI) shows that restrictive data regulations, including forced data localization, have increased prices and decreased productivity in India, resulting in a loss of 0.25% of real GDP annually.[96] The study also calculates potential total factor productivity (TFP) losses due to data processing regulations. TFP losses are estimated to be around 1.35% in the communications sector, 0.53% in the ICT business services sector, and 0.21% in the finance and insurance sector.[97]

In another study, the European Center for International Political Economy (ECIPE) quantified the economic losses resulting from immediate data localization requirements to be rather low at -0.1%. However, if India were to introduce an economy-wide data localization measure, the impact on GDP would increase to -0.8%, reducing India's projected growth by approximately 20%. The domestic and foreign direct investments that drive Indian exports and long-term growth, would also drop by 1.9%, with welfare losses amounting to USD3.1–14.5 billion.[98] The negative welfare effect would cost an Indian worker almost 11% of their average monthly salary.[99]

The dramatic impact of such restrictions goes a long way to explaining the Modi government's Digital India narrative. Moreover, what previously was a business (and often an export) story has rapidly become a consumer and a social growth story. By 2016, Indian digital consumers accounted for 11% of worldwide digital consumers,[100] generating over 30–40 TB of data daily.[101]

2.4.   Mapping India's Data Flow Regulations

2.4.1.   Data Protection and Data Privacy

As of January 2018, India does not have stand-alone data protection legislation; however, this is set to change, with both MeitY and the Telecom Regulatory Authority of India (TRAI) in the process of conducting consultations around data protection and data privacy in preparation for issuing new rules.[102] In many ways, there are good reasons for a new framework to be brought into place to facilitate the many digital policy initiatives underway. The question is how enabling – or constraining – will such frameworks be, and if issued by multiple agencies, how aligned?

The most prominent data protection provisions to date have been those highlighted in the **Information Technology Act, 2000,** [103] in particular, Section 43A, which addresses "reasonable security practices and

procedures". This is complemented by the **Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules, 2011**.[104]

While some limited rules are in place for the transfer of sensitive data offshore, that data can be transferred only to a country where sensitive data will be adequately protected. "Sensitive data" is defined under the 2011 rules as information relating to a data subject's password, financial information, health, sexual orientation, medical records, and biometric information.[105] Notably, the extent to which the rules apply to data associated with individuals outside India (and thus to cross-border data flows) is not clear. The implications of this ambiguity for trade and innovation could be significant.[106]

2.4.2.   Data Localization

Beyond these two policies, India enacted the **National Data Sharing and Accessibility Policy in 2012**, which detailed that government data (data that is owned by government agencies and/or collected using public funds) must be stored in local data centers.[107] The **Indian National Security Council** also proposed a policy that would institute data localization by requiring all email providers to set up local servers for their India operations and mandating that all data related to communication between two users in India should remain within the country.[108] Similarly in 2015, India released a **National Telecom Machine-to-Machine (M2M) roadmap** that requires all relevant gateways and application servers that serve Indian customers be located domestically.[109]

In the context of financial services, India enacted the **Companies (Accounts) Rules law** that required backups of financial information, if primarily stored overseas, to be stored in India.[110] Indian government agencies have also made data localization a requirement for cloud providers competing for public contracts. For example, MeitY issued guidelines for cloud providers seeking accreditation for government contracts to store all data in India.[111]

2.4.3.   Appropriate Regulatory Frameworks Needed

The importance of creating appropriate regulatory frameworks in this regard is rapidly being recognized as important by India's respective government agencies and businesses, as is the importance of maintaining data security without hindering flow of information and its commercial application. It is within this context that India's impending **Data Protection Act** is crucial for facilitating economic growth through innovation while ensuring data flow and digital trade does not negatively impact citizen privacy.

Overly restrictive regulations on cross-border data flows will slow or prevent business transactions, increasing costs and obstructing the delivery of products and services to the market.[112] With the ongoing Digital India roll-out, the dramatic push for digital payments, rising e-commerce penetration, and an unprecedented number of mobile and web based platforms and services exchanging Personally Identifiable information (PII), a comprehensive yet clear and consistent data protection regime has become a necessity for advancing trust in the emerging data ecosystem.[113]

2.5.   Sector Case Studies

2.5.1.   Outsourcing: Supporting the World's Business Processes

The Indian service sector grew at approximately 8% per annum and contributed 66.1% of India's GDP in 2015-2016.[114] Outsourcing has become a critical component of India's service sector. The outsourcing industry in India can be categorized into more specific labels: information technology outsourcing (IT outsourcing), business process outsourcing (BPO), finance and accounting outsourcing, knowledge process outsourcing (KPO), human resources outsourcing, and analytics outsourcing. IT-BPO is frequently treated as a single outsourcing category because IT outsourcing and BPO share many common features including operational cost savings and extensive data usage.

Data privacy concerns are particularly relevant to IT-BPO because of the sensitive nature of information processed in IT-BPO transactions, such as personal data relating to, for example, an insurance claim, health records or a credit card transaction. BPO and KPO are the two major outsourcing industries in India, with banking and financial services comprising nearly 40% of the outsourcing services delivered.[115]

The IT-BPO industry has moved significantly away from low-end call center work, and is now managing a range of business processes, which involve services ranging from cloud to IoT. This is reflected in India's share of around 38% of the overall business process management (BPM) sourcing market.[116] The IT-BPM sector in India expanded at a compounded annual growth rate of 13.7% over 2010–16, 3–4 times higher than the global IT-BPM growth and is estimated to expand at a growth rate of 9.1% to USD350 billion by 2025.[117] As India progresses in the outsourcing industry, cross-border data flows will act as a critical enabler for business growth.

In tandem, analytics outsourcing in India is witnessing huge investments, leveraging data analytics tools to provide customized offerings. The Indian analytics services industry is growing at an annual rate of 25% and is poised to reach USD2.3 billion by 2018.[118] Analytics solutions have scaled up from descriptive analytics capabilities to predictive and prescriptive modelling. India has been growing as an analytics hub, providing analytics solutions across different sectors: energy, healthcare, banking, telecom, insurance, agriculture, aviation, retail, e-commerce, hospitality, and even non-governmental organizations (NGOs).

Enterprises are now increasingly outsourcing data analytics processes to talent-rich, cost-efficient regions such as India. Adoption has been highest amongst telecom, banking, financial services and insurance (BFSI), and e-commerce sectors, which continue to invest and innovate with smart analytics. A vast number of industries rely on data from their locations around the world to make routine decisions. To facilitate this decision-making process and provide added value to consumers, data must flow freely across international borders.[119]
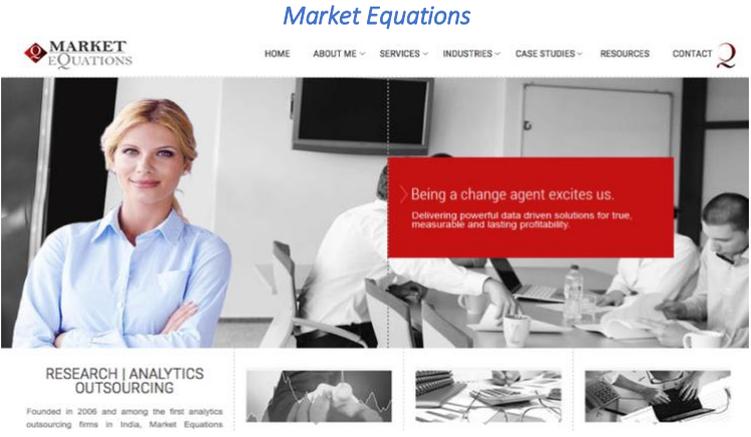
Market Equations

Founded in 2006, Market Equations is a research and analytics outsourcing company that helps businesses solve critical problems through the application of advanced analytics and industry best practices.[120] Its main activity, the provision of information, resources, and big data analysis, relies on cross-border data flows.

Market Equations applies extensive analytics on customer, product, transactional, account, service, and social data. Its analysis accurately forecasts demand by geography and products, to optimize inventory and order management systems and to maximize profitability for businesses. Demand forecasting is used by businesses globally to build efficiencies in inventory management, increase order fulfilment rates, optimize holding costs, and improve customer satisfaction.[121] As part of the company's analytics offering, Market Equations developed an inventory and order management predictive model for an e-commerce retailer in the UK. Key challenges faced by the retailer were frequent stock outs, demand-supply gap, unsold inventory and stock levels, and shipment delays. Market Equations developed and validated the inventory and order management model to optimize inventory levels.[122]

The solution ensured data integrity and hygiene, conducted product clustering to study trends and patterns, analyzed product categories by sales, seasonality, and stock levels to uncover irregularities.[123] In this regard, the cross-border nature of outsourcing business enables data flows and resource sharing between different locations globally, demonstrating the extent of collaboration and exchange of information, knowledge, and human resources.

To leverage global supply chains by outsourcing support functions, data must be allowed to flow across-borders. Cross-border data flow in the outsourcing sector will help Indian companies to sustain their competitive advantage, i.e., providing higher levels of business efficiency at lower costs. Restricting the free flow of data would impede India's outsourcing sector from providing innovative resources and tools to external markets.

2.5.2. Manufacturing: Automate and Innovate

Organized manufacturing is the biggest private sector employer in India. Overall, more than 30 million people are employed by the sector. The government, through its **National Manufacturing Policy**, aims to achieve 25% GDP share for the manufacturing sector, and create 100 million new jobs in the sector by 2022. The sector's existing contribution to India's GDP is estimated at 16.5%.[124]

With the rise of IoT solutions in consumer tech, the manufacturing sector has begun looking to implement networks of sensors and actuators for data collection, monitoring, decision-making and process optimization.[125] As an example, Indian railways will be rolling out locomotives with solutions such as remote diagnostics and predictive maintenance and these trains will be part of a wider ecosystem connected to the industrial Internet.[126] Under the Government's **Smart Cities Mission**, there is an aim to develop 100 smart cities around the Fourth Industrial Revolution, with a view to changing the way India manufactures, designs, and develops products.[127]

These evolutions are leading to the creation of new services such as remote factory management, which would scale up transfer of data across-borders. A data localization mandate would create obvious hindrances in promoting India as a hub for delivery such services.

Wipro

Wipro Ltd. is an Indian information technology, consulting, and business process services company that delivers solutions to enable its clients in more than 175 cities across six continents. Headquartered in India, Wipro aims to deliver business outcomes by combining digital strategy, customer centric design, advanced analytics and product engineering approach.[128]

The company uses cognitive computing, hyper-automation, robotics, cloud, analytics, and emerging technologies. In the manufacturing sector, Wipro integrates intelligence with operations. Leveraging the use of cloud has allowed Wipro to focus on major constituents of Industry 4.0, such as creating smart manufacturing environments. Underlying tools include:

1. *Strategies* to validate, digitize, visualize and transform manufacturing operations. The low-capex environment allows clients to adopt and integrate smart manufacturing practices relatively quickly and cost efficiently.

2. *Cloud based manufacturing* applications to provide real-time business insights.

3. *Remote monitoring and control* in manufacturing plants to help reduce infrastructure maintenance costs, and ensure faster resolution of operational problems.

Using cloud, Wipro has supported a large number of manufacturing clients across multiple jurisdictions. Cloud computing, enabled by the free flow of data, ensures that Wipro maintains cash flow, while reducing operating costs and being able to innovate to compete—i.e., to move to more efficient manufacturing processes, given the price sensitivity of customers in the sector.

Leveraging cloud has allowed Wipro to deploy IoT solution for data capture, storage and analysis. The telematics-based technology allows users to collect vital parameters of machine performance and its location using sensors on three fronts: (1) service, (2) operations, and (3) security. Targets for the IoT system include ensuring quick resolution of technical issues (within 72 hours of reporting). This minimizes up-front capital investments with services provided on a subscription basis rather than a capex undertaking. Being able to support multiple clients in this fashion even within a single focused sector, allows Wipro to provide end-to-end system integration services and managed services from the single platform.[129]

The manufacturing industry in general is heavily dependent on secure and efficient access to data. Restrictive measures to confine data within India, will not only affect Internet-related services, but potentially any manufacturing business that uses the cloud to produce and deliver data enabled services. Restricting cross-border data flows would inhibit Wipro's access to innovative technologies and its ability to reach external markets. Wipro would have to invest into local hardware and servers, increasing its overall costs, which would be passed onto its clients.

## 2.5.3. Financial Services: Demonetization and Cashless Payments

The Indian fintech market is forecast to grow from USD1.2 billion to USD2.4 billion by 2020.[130] This supports the market opportunity for companies to take advantage of big data and interoperable cashless transactions. Prominent business areas in the sector include payments, credit-scoring, lending, remittances and insurance.

The fintech industry in India falls under the purview of four regulatory bodies: the Reserve Bank of India (RBI), the Securities and Exchange Board of India (SEBI), the TRAI and the Insurance Regulatory and Development Authority (IRDA). Each of these regulatory bodies plays an important role. Among the key policy initiatives by the RBI has been the issuance of payment bank licenses for entities to provide banking services such as demand deposits, remittance services, mobile payments, net banking and third-party fund transfers. RBI also launched a **United Payments Interface (UPI)**, which brings multiple payment service providers together on a single platform and enables peer-to-peer payments. The other regulators have also undertaken initiatives, prominent among them being the relaxation of listing norms for start-ups, as well as norms for crowdfunding by SEBI. IRDA has proposed norms for selling and servicing insurance products through e-commerce.[131]

The 2016 demonetization program – i.e., eliminating large denomination currency from the financial system by the government has also played an important, if dramatic, role in reducing the country's cash-dependency and boosting digital payments.[132] In the first quarter of 2017, smartphone (299 million) and Internet (460 million) users drove mobile wallet transactions in India, amounting to USD3.6 billion, up 60% from the previous quarter.[133] Domestic digital payment companies, such as Paytm, have benefited enormously from this changing Fintech ecosystem, and have been moving rapidly to capitalize on the opportunities.[134]

Collaboration between large financial service companies and fintech firms is growing, increasingly leveraging emerging technologies such as blockchain for cross-border remittances, trade finance, and vendor financing. Banks are also using chatbots to facilitate conversational analytics for more efficient customer service. As an example, the State Bank of India (SBI) has initiated the use of smart contracts, based on blockchain technology, and developed by Bankchain—a consortium of 27 banks that uses blockchain solutions for the banking sector to streamline IT procurement.[135]

Separately, the IndiaStack program, a set of application programming interfaces (APIs), has been established to allow governments, businesses, start-ups and developers to utilize the digital infrastructure to create a presence-less, paperless, and cashless service delivery. IndiaStack is intended to enable data to move freely and securely, thereby democratizing the market for data.[136]
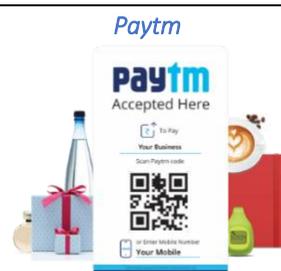
Paytm

Paytm, India's largest payment company, was launched in 2010 as a mobile recharge service provider and evolved gradually into an e-commerce marketplace, through the enablement of cross-border data flows. The online payment platform currently includes mobile recharges, utility bill payment, wallet payment and wallet to wallet and wallet to bank transfers for many Internet based companies.[137]

Paytm's payment platform is enhanced through the use of cloud technology (in this case Alibaba cloud, *Aliyun*) which accommodates a growing new user base and enables multiple transactions in real-time.[138] Through the cloud platform, Paytm has access to data analytics and insights into customer trends.[139] Paytm has a strong focus on data science and uses it to identify stock keeping units which help increasing the margins and preventing card fraud.

Paytm has over 250 million registered users for its digital wallet[140], carrying over 75 million transactions per month. Paytm's focus on enabling offline payments for SMEs by using smartphones and QR codes has changed the payment landscape in India.[141]

Paytm's digital wallets, facilitating cross-border inward remittances and cross-border shipping of Indian brands to other countries, require cross-border data flows. Paytm's e-commerce arm, which invariably involves cross-border data flows, enables even the smallest local business to reach consumers and suppliers anywhere in the world.

The use of cloud technology has enabled Paytm to scale locally across verticals in India. For example, with its payment bank license approved by the Reserve Bank of India (RBI), Paytm will be able to open checking or savings bank accounts. Paytm's payments bank savings account can accept deposits of up to USD1,500 and enable users to conduct transaction using their mobile device.[142] It plans to use this as a platform to further enable micro transactions via its wallet and also as a revenue source by cross-selling financial products. Further, Paytm is using the same platform to provide an increasing multitude of other services. For example, in partnership with Reliance Infrastructure, Paytm launched a mobile ticketing facility, "Skiiip Q", that allows commuters to book tickets remotely from outside metro stations. Instead of using tokens or smart cards, commuters can travel using a QR code generated by the mobile app.[143]

Paytm's ability to scale globally and enter additional markets has been undergirded by the free flow of data. In 2017, Paytm launched a bill payment app in Canada allowing Canadians to pay for utility bills using its app, including phone, cable, electricity, water and Internet bills, as well as property taxes and insurance. Paytm's natural next step for this business will be to enable cross-border transfers to India.[144] Paytm's growth and understanding of the Indian market has attracted international investors, including SoftBank, SAIF Partners, Alibaba Group, Ant Financial (Alipay) and Mediatek.[145] Paytm has received a total funding of around USD740 million with Alibaba being its leading investor, owning close to a 25% stake.[146] Japan-based SoftBank invested USD1.4 billion in Paytm's parent company, One97 Communications. The company will use the funds to target its goal of 500 million customers by 2020.[147]

Cross-border payments and commerce, by definition, require businesses to operate globally. Cross-border data flows can significantly contribute to a sharp fall in data storage costs, with local businesses being able to access massive computing power to analyze data, create new products, and focus on their core business model. Imposing data localization requirements therefore come as a direct cost for local businesses such as Paytm, as they are forced to locate data centers onshore or use onshore facilities. Paytm's time to market and ability to scale would also be directly impacted if they were not able to leverage the scale and agility of international cloud providers.[148]

2.5.4. Healthcare: Improving Health Outcomes through Data Flows

Healthcare has become one of India's largest sectors, both in terms of revenue and employment. Between 2008-2020, the market was expected to record a growth rate of 16.5%, with total industry size estimated to reach USD160 billion by 2017 and USD280 billion by 2020. Within this context, the government has been emphasizing eHealth initiatives such as a **Mother and Child Tracking System (MCTS)** and a **Facilitation Center (MCTFC)**.[149]
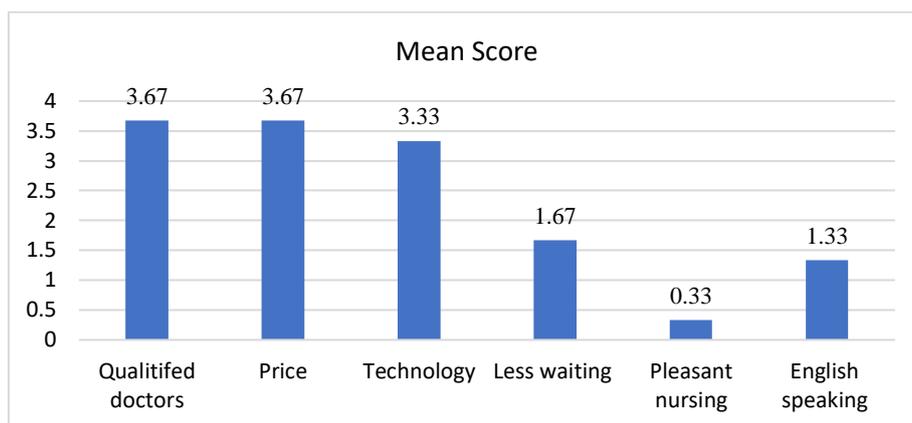
In 2015 the health ministry created the **National eHealth Authority** to formulate the **National eHealth Policy and Strategy (NeHA)** for coordinated eHealth adoption in the country. NeHA aims to lay down operational guidelines and protocols, policies for sharing and exchange of data, and audit guidelines.[150] The Indian government also introduced a uniform system for maintenance of electronic medical records by hospitals and healthcare providers in the country.[151]

As of 2016, the telemedicine market in India was valued at only USD15 million but forecast to grow robustly at 20% between 2016-2020.[152] Telemedicine is being focused upon bridging the rural-urban divide in terms of access to medical facilities, and extending low-cost consultation and diagnosis facilities. Major hospitals, including Apollo, AIIMS, and Narayana Hrudayalaya have adopted telemedicine services and entered into a number of public-private partnerships (PPPs).[153]

In addition, a number of providers are beginning to use cloud technology, in particular so that doctors can store and access data from anywhere, to provide real-time solutions. In this vein, digital health knowledge resources, electronic medical records, mobile healthcare, hospital information system, and hospital management information systems are some of the technologies gaining wide acceptance.[154] Not insignificantly, the comparatively low cost of good medical services in India and the growth of the sector has resulted in the rise of medical tourism, attracting patients from across the world to India, and to Indian consultations.

A survey from the city of Mumbai, India, analyzed key factors influencing the choice of India as a medical tourism destination. Error! Not a valid bookmark self-reference. illustrates the factors driving the emergence of India as a hub for medical tourism.[155] The presence of world-class hospitals and skilled medical professionals has strengthened India's position as a preferred destination for medical tourism. As of 2017, the medical tourism market size in India had hit USD3 billion and is expected to double to around USD6 billion in 2018.[156]

Figure 2: Factors Favorable to Medical Tourism in India[157]

Mean Score

Qualitifed doctors	Price	Technology	Less waiting	Pleasant nursing	English speaking
3.67	3.67	3.33	1.67	0.33	1.33

Source: IES Management College Indian Medical Tourism: Opportunities & Challenges

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Heealthy

Solving the complex through Research

We identify and solve the most complex and critical problems in health care by combining data analytics, consultant research and top clinical talent with our highly personal methodology.

Whether you're dealing with a chronic condition, questioning surgery or facing a life-threatening illness, Heealthy Medical Tourism Team can guide you in the right direction

Heealthy, is a medical tourism start-up in India, which utilizes data intensive research to deliver cross-border patient care.[158] The free flow of data, and the flexibility of cloud technology allows Heealthy to access the latest information and resources in order to provide new and improved experiences for customers and patients.[159] For example, the start-up's clinic and hospital network spans five continents and provides patients with coverage in 23 countries. This gives Heealthy the ability to map patients with doctors and connect them with healthcare facilities.

Leveraging the data network and the on-demand resource model of the cloud, Heealthy provides research-based medical treatment through real-time data processing and analytics.[160] For example, Heealthy uses customer-specific data points (e.g. needs, treatment requirements, extent of medical problem, location preference) to find optimal treatment solutions and access to quality, affordable medical care. This includes:

1. Data intensive research: Focused on identifying and addressing complex and critical healthcare problems by combining data analytics and a network of providers at scale. This includes providing data-based solutions to patients dealing with chronic conditions, looking for time-sensitive surgery or facing life-threatening illness. Depending on the underlying needs, the group assists in ensuring accredited clinics and hospitals are accessible.

2. Identification of medical problem: Users are able to share health-related data via mail, chat or voice calls *on a secure platform*, which a team of general practitioners analyzes to understand users' ailment and suggest best possible doctors and hospitals.

Heealthy also utilizes a blockchain-based operating system to ensure medical transactions are transparent, secure and interoperable. The strength of this approach lies in the borderless transfer of data enabling the scale and scope of Heealthy's platform.

Digital transformation in healthcare has enabled significant use of cloud services for remote healthcare monitoring and remote healthcare delivery. In the context of medical tourism, cross-border transfers of personal data allow healthcare firms to analyze electronic health records and improve effectiveness of medical treatments. Importantly, patients can have access to need based treatments and specialized doctors anywhere in the world. Restricting the free flow of data would constrain the ability of companies like Heealthy to perform its business operations effectively, as access to increasing amounts of information, and the ability to securely share and access this information from anywhere would be inhibited.

3. Indonesia: Regulatory Barriers to an Ambitious Digital Economy Agenda

3.1. Highlights

- The Government of Indonesia aims to become the largest digital economy in Southeast Asia by 2020, with a target to grow e-commerce in the country to USD130 billion.[161] To reach its objectives, the government has created a series of plans, including the Roadmap for the National E-commerce System 2017-2019[162] and the National Broadband Plan 2014-2019.[163]

- Estimates for the impact of digital technologies and the free flow of data include an additional 3.7 million jobs created by 2025;[164] up to 80% higher growth in revenue for SMEs;[165] and an additional 2% per annum in GDP growth by increasing broadband penetration rates and usage of digital technologies by SMEs.[166]

- In terms of sector specific benefits, manufacturing is estimated to contribute USD34.4 billion to GDP and retail USD24.5 billion by 2025 as the result of digitalizing processes and utilizing cross-border data flows.[167]

- Growth opportunities stretch economy wide. In agriculture, for example, a data analytics platform, HARA, developed by CI-Agriculture, provides timely reminders on when to use fertilizers and pest control resulting in higher crop yield and productivity; while in the much-vaunted e-commerce sector, a company such as Tokopedia has been able to become an early 'unicorn' by utilizing services from international cloud computing companies such as Alibaba Cloud to target the unmet demand in the market at lower cost and much greater efficiency than its competitors.

- However, digitally restrictive policies stand to constrain or arrest the growth, including the government's data sovereignty law (Government Regulation 82, or GR82)[168] and Regulation No. 20 of 2016 on Personal Data Protection in Electronic Systems[169]. These policies mandate data localization limiting the ability of businesses to take advantage of technologies such as cloud computing, that require cross-border data flow.

- Policies restricting access to data and the ability to use cross-border service providers such as cloud computing and data platforms stand to reduce GDP significantly – by up to 0.5% pa, according to some estimates.[170] Local companies will be restricted from accessing information, resources, opportunities and processing capabilities, limiting their ability to perform various transactions; inhibiting growth; and increasing costs – which will, in turn, be passed on to consumers. Such developments do not bode well for Indonesia achieving its digital aspirations.

## 3.2. The Emerging Digital Economy Framework of Indonesia

3.2.1. Developing the E-commerce Industry

The digital economy in Indonesia can be seen to have contributed to the country's economic growth between 2012-2017 from the growth of the e-commerce industry. Fueled by smartphone adoption, the number of online shoppers in Indonesia has nearly doubled from 4.6 million in 2013 to 8.7 million shoppers in 2016.[171] Almost half the population owned a smartphone in 2016,[172] and 75% of e-commerce transactions were conducted through mobile devices.[173] Transactions are both domestic and international – while Indonesians have tended to purchase local brands, they have increasingly purchased goods from overseas or from multinational companies.[174]

By extension, the country has experienced a dramatic increase in cross-border data flows and trade in e-commerce. With more than 85 million Indonesians connected to the Internet,[175] and with the opportunity to substantially expand this base, Indonesia is aiming to become the next big e-commerce market in Asia.[176]

Recognizing the potential of the digital economy, the government released the **Roadmap for the National E-commerce System 2017-2019** in August 2017 to boost e-commerce trade.[177] The Roadmap sets the target of developing an e-commerce sector worth an astonishing USD130 billion in online transactions by 2020, up from USD3.6 billion in 2015,[178] listing 31 initiatives across seven sectors (Figure 3).[179]

Figure 3: E-commerce Roadmap: Selected Initiatives across Seven Sectors
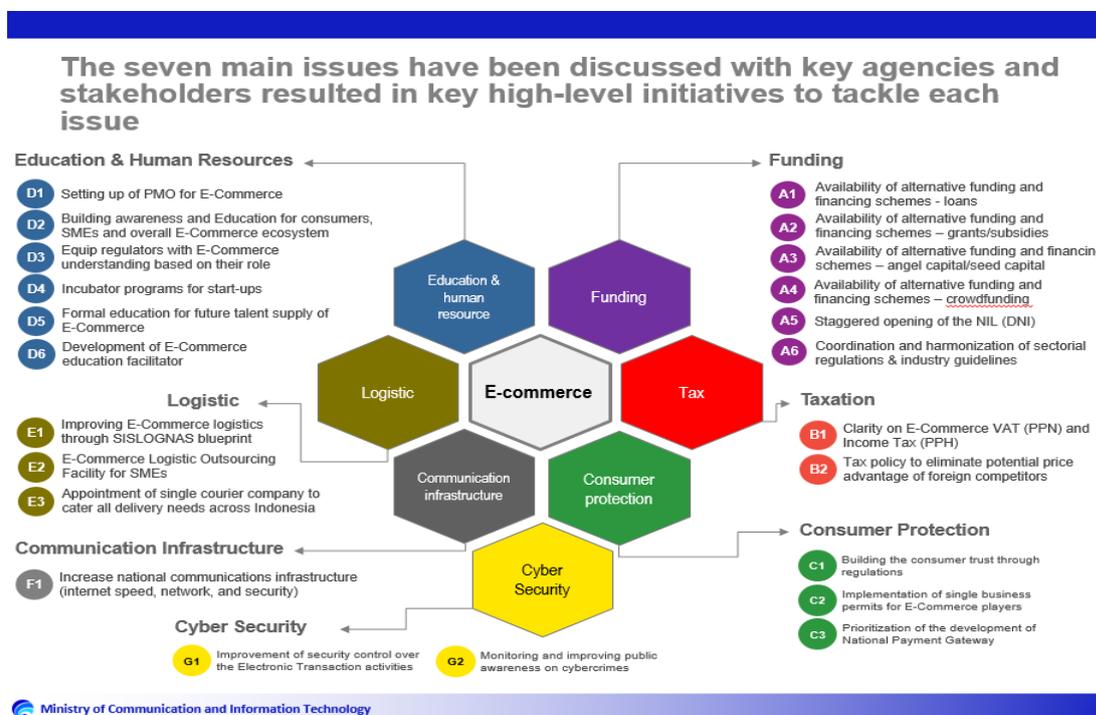
Source: Ministry of Communication and Information Technology (2017) The Digital Energy of Asia

While some of the initiatives incentivize growth in the sector, such as the proposal to create more funding and financing schemes for e-commerce companies, other initiatives may potentially dampen its growth, such as a tax for e-commerce companies. A 10% value-added tax has been mooted by the Finance Minister for online goods purchased through platforms such as Lazada, Tokopedia and Bukalapak,[180] which could slow the sale of goods through these platforms. This would limit revenue generation from the sector, and potentially innovation such as the leveraging of big data technologies to analyze vendor acquisition (Lazada)[181] or to improve customer recommendations (Tokopedia).

3.2.2. Encouraging the Growth of Start-ups

Another initiative to grow Indonesia's digital economy is the Ministry of Communication and Information Technology's (Kominfo) goal of nurturing five Indonesian start-up "unicorns" by 2019, such as Go-Jek and Tokopedia.[182]

Given the current data localization-focused regulatory frameworks, an immediate question that comes up is whether the government is hurting or helping the prospects of existing and potential unicorns. Kominfo has been advocating for the government to take an active role in ensuring a more conducive environment for digital startups, such as enabling smoother employment processes, and encouraging the test-bedding of new start-up ideas.[183]

3.2.3. Infrastructural Challenges and Solutions

One of the main barriers, however, continues to be the slow speed of the Internet, and the inadequacy of broadband infrastructure. According to Akamai, Indonesia's average speed was a mere 7.2Mbps in 2017 (Table 4).[184] It is challenging both for start-ups and multinationals to transfer, access, and process large or

even moderate amounts of data on slow Internet speeds. This challenge will compound any reluctance to transform digitally.

Table 4: Average Connection Speed of Indonesia and its Neighboring Countries, 2017

Global Rank	Country	Q1 2017 Average Mbps
7	Singapore	20.3
58	Vietnam	9.5
62	Malaysia	8.9
77	**Indonesia**	**7.2**
100	Philippines	5.5

Source: Akamai (2017) State of the Internet Q1 2017 Report

Recognizing limited access and the bandwidth constraints as barriers to growth, in 2014 the government announced the IDR278 trillion (USD19.5 billion) **National Broadband Plan 2014–2019**[185] to provide ICT connectivity to all islands and districts in Indonesia.[186] The Plan set specific targets for fixed broadband and mobile connectivity:[187]

- For urban centers, it aims to provide fixed broadband connectivity (20Mbps) to 71% of households and 100% mobile broadband (1Mbps) to all; and

- For rural areas, it aims to provide fixed broadband connectivity (10Mbps) to 49% of households and mobile broadband (1Mbps) to 52% of the population.

These targets are a significant challenge in an archipelago of 17,500 islands spanning some 6,400 kilometers and home to more than 260 million people.[188] Currently, 74% of all districts in the country are connected by fiber optic. After many years of delay due to problems with financing, Indonesia is aiming to complete a 75,000-kilometer fiber optic digital Palapa Ring that runs around the archipelago by 2019. Once completed, more than 85% of the country will have access to a broadband backbone, with the rest connected by alternative technologies such as satellite.[189] The government carried out an example of such a plan in November 2017, when Kominfo assigned the 2.1GHz and 2.3GHz spectrum to mobile network operators Indosat, Hutchinson 3[190] and Telkomsel[191] to extend 4G services to remote areas.

The three biggest telcos—Telkomsel, Indosat and XL Axiata—have also partnered with Google Loon to test out its technology in Indonesia.[192] A balloon will deliver Internet access to remote areas by utilizing spectrum owned by the telcos and is said to be able to reach download speeds of 10Mbps. From this example, the government is seen to be supportive of initiatives to expand Internet services to encourage digital service delivery such as e-banking and e-health services to remote areas. It plays a role in encouraging the growth of data flow within and across borders.

3.3. Emerging Drivers of Data Flows in Indonesia

3.3.1. Social Media Consumption

The rapid growth in smartphone adoption by Indonesians in recent years can be attributed in part, to the falling prices of smartphones,[193] and the accompanying tariff war amongst a competitive market of mobile telecom service providers. The growth of smartphones has also been accompanied by aggressive data demand from consumers (Figure 4).[194]

Figure 4: Growth of Smartphones vs Data Traffic in Indonesia
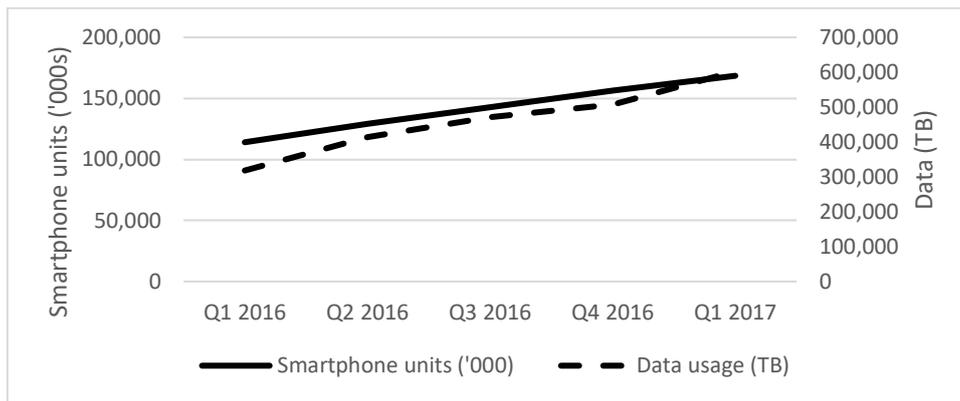
Source: BMI Research (2017) Competitive Landscape - Indonesia - Q12018, Indonesia Telecommunications Report
Note: Data for Indosat's data traffic not available for Q4 2016 and Q1 2017

International websites, such as Google, YouTube and Facebook, continue to be among the most popular sites and generators of content and of traffic in Indonesia, and are consistently in the top 10 most popular websites rankings,[195] indicating a significant percentage of data traffic is coming from international sources. The most popular activity that Indonesians engage in on the Internet is accessing social network sites,[196] with users spending 3 hours and 16 minutes on social media a day,[197] the most popular being Facebook.[198]

The extent of Facebook use goes well beyond simple social media; it is used extensively by micro, small and medium enterprises (MSMEs) to market and sell their products. Proposed restrictions on cross-border data flows such as the announced e-commerce tax, would therefore not only curb certain communication channels among the population, but also have a dampening effect on domestic e-trade conducted electronically. Notably, when Finance Minister, Sri Mulyani, announced the possibility of a 10% value-added tax on e-commerce platforms, she also announced that there would be no value-added tax on goods *traded through social media*,[199] ostensibly so as not to harm e-trade conducted by MSMEs via digital platforms.

3.3.2. Tip of the Data Flows Iceberg: Potential for Business Growth

The Indonesian government must find a balance between encouraging economic growth and managing the digital economy. At stake is a large amount of revenue from business growth in digital.

Figure 5 shows the growth potential between 2014-2015 for revenues and data demand, where revenue grew by 40%, with a corresponding increase of 60% of internet traffic.[200] These figures are only the tip of the iceberg, and business revenue growth has been substantially larger without the constraints and restrictions on cross-border data flows. This has particularly resulted in increased compliance costs on business, due to opaque data residency requirements.

Figure 5: Opportunities enabled through Digital Technology
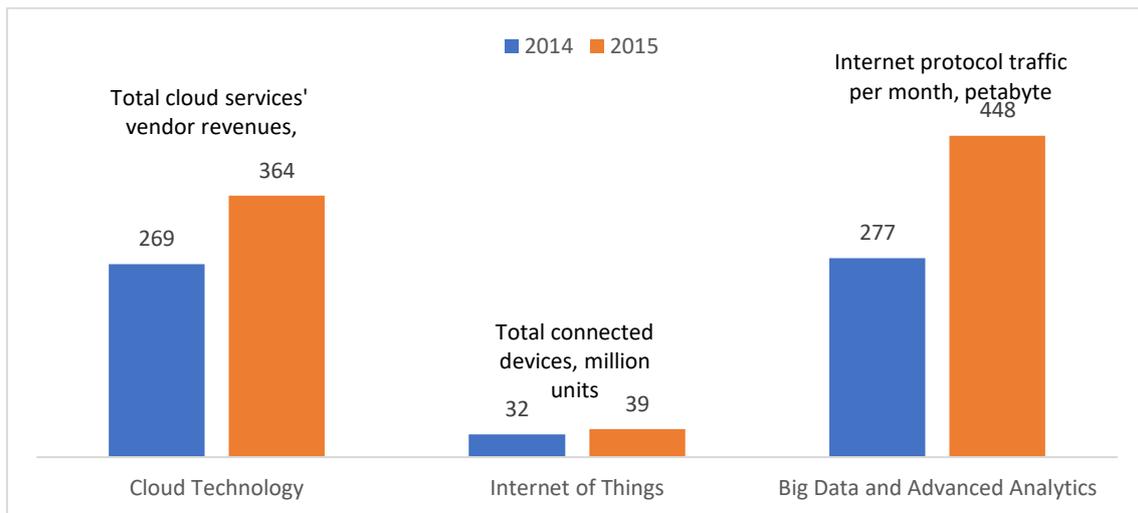
Source: McKinsey&Company (2016) Unlocking Indonesia's Digital Opportunity

From this, we see the potential that digitalization can bring to Indonesia's economy. It has been estimated that digitalization could add a total of at least USD150 billion to the country's GDP in 2025, enabling a substantial increase in labor productivity.[201] In particular, the manufacturing (worth USD34.4 billion) and retail sectors (worth USD24.5 billion) stand to benefit through digitalization, as there is currently low adoption of technology and high reliance on labor.

Other industries slated to benefit dramatically include transport, and agriculture, with most of the productivity improvements coming from operation optimization.[202] However, achieving these benefits assumes that Indonesia allows access to data, including cross-border data, and gives companies the ability to use competitive service providers such as those in cloud computing and data platforms.

3.3.3. Better Employment

Digitalization also stands to enable specific groups such as the unemployed, as well as people not actively seeking job opportunities and those in informal employment, to access and leverage online platforms to search for job opportunities (see Box 2).[203] It also enables employers to conduct online searches of candidates, broadening the base of recruits (in some cases across the entire archipelago), and shortening the time between notice of hiring and employment of a candidate. The use of online platforms has been estimated to add 3.7 million jobs by 2025.[204]

Box 2: Kalibrr: HR Recruitment Done Differently

Kalibrr, an online job search platform launched in the Philippines in 2014 and now available in Indonesia, connects employers and potential candidates online. It allows employers to connect directly with candidates through SMS, enabling quicker communication. By 2015 the company already had 65,000 active job seekers and 3,000 companies on the platform, including Go-Jek, Facebook and Shopee.

Kalibrr's aim is to refine and quicken how companies hire talent. The cloud-based platform assesses applicants and matches them to the right jobs, and if they lack skills, trains them. Job postings on the platform are free, with Kalibrr allowing companies to search for candidates in its database for free. Revenues are generated by communications over the platform once a company accepts a candidate's application.

Source: Judith Balea (2015) How Kalibrr is disrupting the recruitment industry; Kalibrr (n.d.) Employers

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Data localization rules threaten the growth of such cross-border opportunities. Those working from home will face issues accessing websites and services, and Indonesian companies will become increasingly less competitive compared to companies from other countries. The cost of this limitation has been estimated to reduce Indonesia's GDP by 0.5%; domestic investments by 2.3% and exports by 1.7% due to the loss in competitiveness.[205]

3.4.   Regulatory and Policy Constraints on Data Flows

While the government is promoting digital economy development, a number of recent regulations (drafts or recently enacted) threaten to constrain economic progress because of the limitations on cross-border data flows. These include umbrella-type regulations such as: Government Regulation No. 82/2012 on electronic system and transaction operation (GR82)[206] (under the umbrella of the Electronic Information and Transactions Law[207]), and Regulation No. 20 of 2016 on Personal Data Protection in Electronic Systems.[208]

3.4.1. Government Regulation 82 (GR82)

GR82 is Indonesia's data sovereignty law, with Article 17(2) requiring electronic system operators for public services to establish a data center and a disaster recovery center in Indonesia.[209] There have been numerous justifications provided for this approach, some of which appear reasonable, such as ensuring local law enforcement authority has access to Indonesian citizens' data for criminal investigation purposes.

However, such approaches are more likely to undermine than enable those objectives. Not all data, including within the public service, are of equal importance; requiring all data to be stored in-country is neither the most efficient, nor an effective way to regulate data access and storage. An alternative approach, increasingly employed around the world,[210] is to require data to be categorized into different sensitivities.

In October 2017, Kominfo's Minister Rudiantara indicated that he was considering revising the data localization requirements to incorporate data classification, rather than simply mandating for full-blown data residency.[211] The three suggested levels were:

- **Strategic data**—must be stored in data centers and disaster recovery centers located in Indonesia. Examples are data related to national security, such as data belonging to the military or intelligence agency.
- **Important data**—does not need to be stored in local data centers or disaster recovery centers. However, the data owner or cloud service provider must guarantee that the Indonesian government can access the data for law enforcement purposes.
- **Other data**—has no requirements on storing data in local data centers or disaster recovery centers.

As of December 2017, Kominfo had not released revisions to GR82, and the article on requirements to establish a data center and a disaster recovery center in Indonesia—which came into effect fully in mid-October 2017—still stands.

3.4.2. Minister of Communications & Informatics Regulation No. 20 of 2016 regarding the Protection of Personal Data in an Electronic System

This regulation echoes the data residency requirements of GR82, but as applied to personal data. The regulation does not recognize the possibility of using de-identification or anonymization of personal data; hence anonymization of personal data would not give automatic rights to data controllers to process or store the data outside of Indonesia.[212]

Besides these overarching regulations, individual sectors such as the financial service industry have their own regulations on data localization. For financial services, these include:

3.4.3. Regulation by the Financial Services Authority No.38/POJK.03/2016 on implementation of risk management in the use of information technology by commercial banks (POJK 38/2016)

This requires banks to use data centers and disaster recovery centers in Indonesia. It allows banks to host very specific data overseas, provided that banks submit an application to the Financial Services Authority

(OJK), and do not use identifiable customer data.[213] This regulation impedes full digital transformation by financial services, as international banks and its branches will likely need to consolidate data for processing in their home country.

3.4.4. Regulation by the Financial Services Authority No.69/POJK.05/2016 on business operations of insurance companies, Syariah insurance companies, re-insurance companies and Syariah re-insurance companies (POJK 69/2016)

This has similar regulations applied to the insurance industry, where the insurance and re-insurance companies (both common and Syariah) are required to use data centers and disaster recovery centers in Indonesia. The regulation further specifies the type of data that needs to be located in-country, which includes personal identifiable information and transaction-related information.[214]

3.4.5. Bank Indonesia Regulation No.19/10/PADG/2017 on National Payment Gateway (BI 19/2017)

This regulation centralizes all payment transactions to a single gateway.[215] This local payment gateway consists of four switching companies; which have been selected by the government. Before the National Payment Gateway (NPG) is implemented, payment processing companies can choose the switching company it routes transactions through, with no requirements on whether it is based in Indonesia or overseas. The NPG has two impacts for payment processing:

- International payment processing companies like Visa and MasterCard, and those offering alternative payment channels such as Apple, Samsung, and Facebook, will lose their current licenses on payment processing and hence likely to incur much higher cost by having to re-apply for licenses (which may then be passed on to consumers); and

- Consolidation of payment processing into one central system heightens security risks instead of distributing the risk across payment processors.

3.4.6. Regulatory Overlaps

To support Indonesia's digital ambitions, the government would need to have clear rules on data flows. There are currently overlapping rules (e.g. GR82 and Regulation No.20/2016), which do not provide sufficient clarity to industry players on the government's requirements. To provide this clarity, ministries and agencies should consolidate and issue statements or policies on their agency's stance on data flows. Enabling cross-border data flows would provide more choices to MSMEs and individuals to choose applicable cloud services without being restricted by data residency requirements.

3.5. Sector Case Studies

3.5.1. Agriculture: Digitalizing for Efficient Harvests

Indonesia is one of the top producers in the world for crops such as palm oil, rubber, coffee, tea and cocoa. It produces more than half of the world's supply of palm oil, for example.[216] While a large proportion of the palm oil industry is controlled by large companies, this is not the case for other agricultural sub-sectors. Rice and cocoa are managed by smallholder farmers in rural areas, many of whom are poor and receive limited formal education. They leverage on unpaid family members to work. The agriculture industry is more labor-intensive than other industries, as it employs 33% of the labor force but accounts for only 14% of GDP.[217] Besides depending on a high proportion of labor compared to other industries, smallholder farmers receive meagre returns for their crops, as they trade their crops with middle men, who get a larger sum of income before trading the crops with manufacturing companies to process.

This presents many challenges for the country's agriculture industry. As the farming processes depend on family members, there is high variability in level of productivity. The agriculture supply chain is heavily dependent on middle men who transport the crops to be processed. If various production and supply

chain processes can be automated through digitization in the agricultural sector, stakeholders stand to gain from higher levels of productivity and crop yield, and better cost control. For example, the use of radar and optical images to monitor hydrological data can inform farmers on the amount of water required for their crops. Such technology heavily depends on data transfers between monitoring devices and a database to store and process data. According to one ADB report, 7% yearly increases in smallholder productivity, amounting to USD50 billion more in agriculture revenues by 2030, are possible.[218]

One company that has begun offering information services to farmers, *8villages,* provides its updates via text messaging on topics such as crop prices, weather forecasts and farming tips (Box 3).[219] The services provided depend on data exchange across borders, especially in instances when there is a major change in crop prices and there is educational information on farming processes from other countries. With information at hand enabled by cross-border data flows, farmers can improve on their farming and irrigation techniques to reach higher crop yields and increase their profits.

Box 3: 8villages: Using Data to Empower Farmers

Founded in 2011, 8villages is a mobile information platform that provides rural farmers in Indonesia the ability to communicate and improve their business.

8villages provides farmers with timely and relevant information, such as crop prices, weather forecasts and farming tips by using cloud-based technologies. It partners with agriculture companies to offer localized farming knowledge to farmers by sending information via SMS. Farmers are also able to exchange information with experts, such as asking questions related to plant growth and conditions. For example, by alerting farmers of the different techniques to counter pests, farmers can use techniques most appropriate for their crops, potentially lowering crop loss.

In 2014, USAID teamed up with 8Villages to launch the Aqua Farmer Information System (AquaFIS), a mobile phone service that helps small-scale aquaculture farmers in Indonesia access real-time data, Android applications, and online forums. With the service, farmers no longer need to rely strictly on irregular training and consultations from experts and extension agents. Farmers can find out in real time when and how much to feed their fish, which type of feed to use for their particular species of fish, or how to treat disease. AquaFIS helps close the growing disparity in knowledge and skills, especially among smallholder farmers who live in remote areas and may have waited days for assistance without the mobile phone service.[220]

The improvement in farming practices has led to production increases, and the buyer/seller networks have expanded, further increasing both the need for access to finance, and in a much more limited way, actual access to finance. 8Villages plans to expand the services to other parts of Indonesia and other countries in ASEAN. Eventually, the platform will create a network between aquaculture farmers across the region and the multiple players in the aquaculture value chain including local fishing companies, input suppliers, buyer and producer organizations, and microfinance institutions.

Alternatively, data localization measures will restrict the ready access of 8villages to information, resources and opportunities, in turn inhibiting rural farmers and their livelihood.

Source: 8villages, TechInAsia

The government has also created programs for the use of technology in agriculture. The Indonesian Economist Association and the Indonesia Chamber of Commerce developed a Partnership for Indonesia's Sustainable Agriculture (PISAgro) to promote the use of innovative planting techniques, such as flowering technology, which can lead to higher quality of tropical fruits.[221] Besides focusing on crop growth, the government has also created an e-commerce pilot project to monitor price fluctuations and allow farmers to market their products online; in line with the goal of bringing 1 million farmers and fishermen to participate in the digital economy by 2020 through the Go Digital 2020 policy.[222] Creating a platform for farmers to sell online will address the challenge of having middle men take a cut of profits, giving farmers the opportunity to earn a higher share of income.

CI-Agriculture—HARA
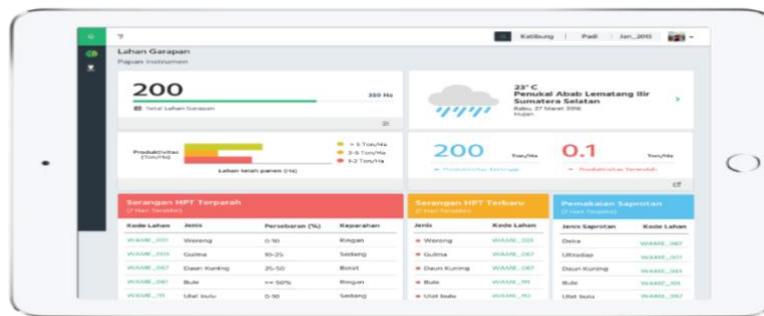
Collective Intelligence-Agriculture (CI-Agriculture) is utilizing analytics to offer data intensive services to farmers in Indonesia. One example is HARA, a platform using data collected from crops and farmers to provide advice on when to plant, when to use fertilizers and when to use pest control. Data on land and soil conditions is gathered by drones using aerial photography and sensors placed on crops.[223]

Farmers are presented with information and evidence-based recommendations, on both a real time or ongoing basis, resulting in up to 80% improvement in productivity,[224] 60% improvement in crop yield, 50% reduction in farming inputs, and 25% reduction in crop failure rates.[225]

CI-Agriculture's use of cloud computing has reduced costs to farmers, and allowed the deployment of new services at a faster speed. For example, the use of cloud, and processing data on-demand, enabled CI-Agriculture recently to create prototypes and test them almost immediately at minimal cost before offering them to the wider farming communities in Indonesia.[226] Using cloud, what would have previously taken two years was rolled out to market in one month.

3.5.2. E-Commerce: Expanding Markets through Better Data Analytics

With only 2.2% (USD5.29 billion) of the USD245 billion retail sector (2016) being captured through digital transactions[227], there is a huge amount of growth left for e-commerce in Indonesia – despite the already heady growth of recent years.

E-commerce is seen to bring about a net market expansion effect, with consumers seeing an increase in consumer welfare due to improved information, product access, and lower prices, while MSMEs benefit from lower supply costs, immediate transactions, and far greater market reach – with digitalization boosting overall revenues by up to 80%.[228]

Another benefit is the availability of consumer behavior data. Large amounts of market and consumer data are much more readily available on e-commerce platforms and able to be processed in a timely and cost-effective manner, enabling products, services and marketing to be tailored directly and individually to consumers.[229]

Indonesia can accelerate its growth by adopting policies that keep the Internet free and open to ensure access to goods and services that are useful to businesses and consumers. This facilitates a conducive environment to reap the full benefits of the Internet and e-commerce.[230] In recent years, the adoption of technology in the e-commerce sector has matured from the earlier days of e-commerce with better security of online payments, more sophisticated service provision to customers and the widespread usage of track and trace services and devices adopted by e-commerce companies and its third-party providers. There is room for further development as the e-commerce market grows and expands.
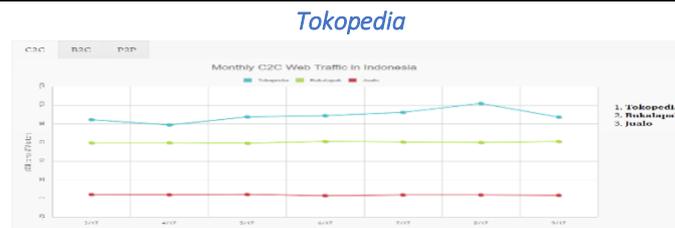
Tokopedia

Source: ecommerceIQ (2017), Tokopedia's Web Traffic per Month

By 2017, some two million individuals and businesses in Indonesia were managing their own online store on the Tokopedia platform,[231] capitalizing on shared resources and reducing their own business running costs, and Tokopedia was seeing 50.7 million average monthly visits.[232]

To accommodate these high volumes of traffic, Tokopedia utilizes cloud services, such as data storage and processing, that can cater to both rapidly growing demand and fluctuating levels of demand and growth.

Tokopedia's use of cloud technology to accommodate high (and at times variable) traffic volume and process data has enabled rapid scalability, reduced costs, and ensured better support to prevent cyberattacks. (One of the benefits for Tokopedia in being hosted by an international cloud service provider is the ability to scale quickly for local and regional market growth: something that would not be possible with a cloud provider that had limited presence in Southeast Asia.[233])

Tokopedia's core applications and online web servers were initially hosted on different systems, making it increasingly difficult for the e-commerce company to manage as more users joined its platform. The use of Nutanix, a cloud computing provider offering software-defined storage, to host different virtual systems on a single hardware platform, cut the number of servers required from 25 to two, reducing power consumption by five times.[234]

To understand its user browsing behavior and provide personalized ads to non-frequent shoppers so that sales will increase, Tokopedia engaged RevX, a New York- and India-based company that provides data-intensive mobile advertising algorithms to re-engage users. By utilizing RevX's advertising system, Tokopedia experienced four times higher returns on advertising spending, bolstering sales figures.[235]

Utilizing these services may be difficult if regulation makes the storage of big data an unaffordable reality in Indonesia. Data localization requirements often come at a cost for businesses such as Tokopedia, as they are forced to locate data centers onshore or use onshore facilities. This may prevent them from choosing the most cost-effective option.[236]

Further, emerging markets such as Indonesia remain high-risk environments for data centers,[237] due to the lack of reliability, resilience and redundancy in local infrastructure. Local providers also may not have the financial ability to build sufficient physical protection for data centers, resulting in increased cybersecurity risk. For many countries that are considering forced data localization laws, local companies would be required to pay 30-60% more for their computing needs than if they could go outside the country's borders.[238] These measures would have curbed Tokopedia's growth.

4. Japan: Digitalizing an Aging Society for Revitalized Growth

4.1. Highlights

- Japan's digital economy is underpinned by the country's strong appetite for advanced Internet technologies and the government's supportive policy framework for ICT integration and data flows. Japan has committed to bilateral and multilateral agreements to preserve the free flow of data across borders. Its recognition of the vital role of cross-border data flows to socio-economic development has led the government to take concrete measures to remove barriers to the free flow of data, such as amending the Personal Information Protection Act (PIPA) to allow the transfer of personal information outside Japan.

- Regulatory clarity on the pre-requisites for such cross-border transfers can be further enhanced to increase business confidence, for example by publishing a list of white-listed jurisdictions with similar data protection laws to Japan. With these policy enhancements, organizations will be better equipped to evaluate their business activities involving cross-border transfers of personal information, and work to implement the appropriate safeguards in place to comply with the PIPA, and other related data transfer regulations.

- Cross-border data flows are seen as crucial to the achievement of Japan's socio-economic objectives, and have the potential to revitalize Japan's economy. For example, rising demand for Japanese products and services from overseas is driving Japan's cross-border e-commerce sector, with Chinese consumers spending USD6.6 billion on purchases from Japan in 2015. Full utilization of AI and the IoT have been estimated to increase Japan's 2030 GDP estimate by 40%. Japanese companies' growing appetite for public cloud services could potentially create positive spillover effects on telework adoption, which would help bolster Japan's slowing economic growth by including more underemployed citizens into Japan's shrinking formal workforce.

- The healthcare and financial services industries have been specifically identified by Prime Minister Shinzo Abe's Growth Strategy 2017 as areas through which innovation and the adoption of advanced technology that leverage the free flow of data can address Japan's most pressing social issues:

  o The digitalization of Japan's **healthcare** industry is paramount to the sustainability of its public health insurance scheme, which is forecasting escalating costs as the above-65 age group rises to account for 40% of the country's population by 2050. Telemedicine will not only reduce the weight of its aging society on its healthcare infrastructure, but also represents a means for the industry to export Japan's healthcare expertise overseas as a solution to fiscal deficits. The latter would rely heavily on the cross-border exchange of information and data, and any restriction to data flows would threaten its potential.

  o The government also aims to **reduce the country's dependency on cash**, such as by setting goals for larger cities and tourist destinations to fully accept **cashless payments** by 2020, and to double the rate of cashless payments from 19% (in 2017) to 40% by 2027. The development of innovative payments products will drive this agenda, and cross-border data flows will enable fintech companies to source for the most suitable payment solutions from a global marketplace.

4.2. Japan's Digital Economy Drivers

Recognized as a mature ICT market with historical leadership in technological integration in manufacturing, Japan was ranked fifth in a study benchmarking "significant digital economies".[239] The digital economy push from the Japanese government, however, has a different dimension when compared to many other Asian economies: by 2013 the Internet usage rate among Japanese enterprises

had already peaked at 99.9%, while fiber optic as a percentage of total fixed broadband networks has reached 75%, vastly outperforming the OECD average of just 21%.[240]

This points to the fact that connectivity is fundamental, but not the sole determinant of a digital economy, and Japan's digital economy growth will be driven by the combination of both its highly-connected population and a supportive policy framework for ICT integration and cross-border data flows.[241]

The realization of economic growth targets through Prime Minister Shinzo Abe's "Abenomics" (fiscal expansion, monetary easing and structural reforms)[242] has been slowed by social factors such as low spending and an aging population. Seeking to bolster the Japanese economy, the Japanese government drafted broadly ambitious digital plans. The **2015 Declaration to be the World's Most Advanced IT Nation**[243] and the **2016 White Paper on Information and Communications in Japan**[244] map out Japan's goals to engage ICT along two key paths: utilizing ICT to augment existing sectors of Japan's economy, and investing in the ICT sector to contribute directly to Japan's economy.

*Figure 6: Japan's ICT Market Size to Total Market Size*
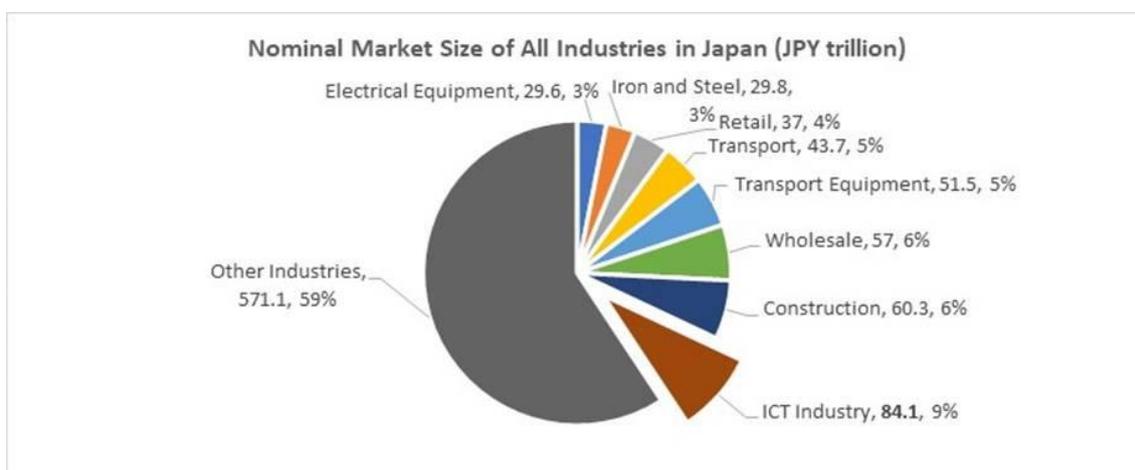
Source: MIC (2016) 2016 White Paper on Information and Communications Japan

According to the 2016 White Paper, the ICT industry market size in Japan was the largest among all major industries at JPY84.1 trillion (USD741 billion), comprising 8.7% of the total market size in 2014 (Figure 6). Real GDP contribution of ICT in 2014 was JPY51.5 trillion (USD457 billion), also the largest among all major industries, making up 10.8% of the total, and is forecast to boost Japan's real GDP by JPY33.1 trillion (USD294 billion) in 2020 (Figure 7).

The ICT industry has also led to the emergence of the fintech market, with a market size of JPY3.5 billion (USD31 million) in 2015 and estimated to grow to JPY57 billion (USD506 million) by 2020,[245] and the sharing economy, with a market size of JPY28.5 billion (USD253 million) in 2015, and forecast to grow to JPY60 billion (USD583 million) by 2020.[246] Japan's 2015 Declaration also describes how ICT will modernize Japan, bringing benefits at the micro-level to lifestyle, jobs, security, community interaction and public service access—harnessing data, software and information systems to affect social structures.

Figure 7: Japan's Forecast GDP and Forecast GDP Inclusive of ICT Growth
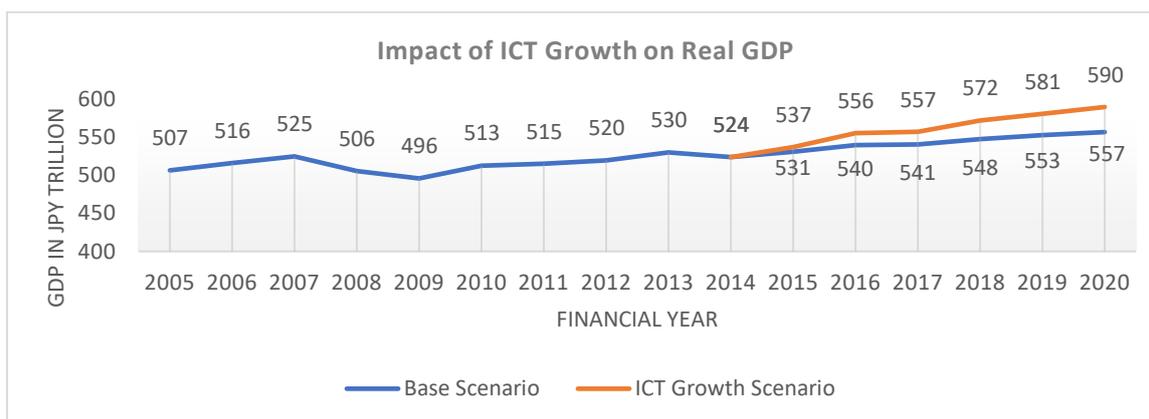
Source: MIC (2016) 2016 White Paper on Information and Communications Japan. Numbers after financial year 2014 are predictions.

In order to realize the full economic benefit of digital technology, the government in May 2017 also formulated its **Future Vision towards 2030**.[247] This vision is aimed at identifying and overcoming the challenges in adopting technological innovations including IoT, big data, AI and robotics, and becoming a global leader in Connected Industries.[248]

To do so, the vision sets out objectives to implement rules to spur the development of data utilization systems for acquiring and utilizing real data, by expanding coverage of the Industrial Standardization Act and introducing regulatory sandboxes.[249] The Ministry of Economy, Trade and Industry (METI) has also declared its support of the removal of digital borders and recognition that regulation should be "light-touch" for the benefits of the Internet to be realized.[250]

More recently, Abe's **Investments for the Future Strategy 2017** (also known as the **Growth Strategy 2017**),[251] a major economic policy guided by Abenomics, reiterates the central role of ICT in overcoming Japan's socio-economic issues by positioning the actualization of **Society 5.0** at the core of the Strategy.

Society 5.0 aims to go further than an industry-focused approach and digitize the Japanese society as a whole by prioritizing innovation and the adoption of advanced technology, such as AI and big data, to solve Japan's social issues such as a shrinking workforce. To do so, Society 5.0 will target three priority areas: healthcare, transport and fintech.[252] The healthcare and financial services sectors, in particular, have a significantly high potential of achieving accelerated digitization and innovation growth by leveraging cross-border data flows (see below).

4.3.   Connected Industries and Society Driving Accelerated Data Flows

According to a study by the United Nations Conference on Trade and Development (UNCTAD), ICT services added USD223 billion in value to the Japanese economy in 2015, while e-commerce value was equivalent to 60% of GDP.[253] The study also found that nine million people (or about 7% of Japan's total population) had engaged in cross-border business-to-consumer (B2C) e-commerce with such purchases amounting to USD2 billion in 2015.[254] Nonetheless, this represented a mere 2% share of Japan's total B2C market, signaling that despite high e-commerce usage, there remains a strong preference for consuming goods and services from local companies.

Figures from the same study show that Chinese consumers spent 30 times more on purchases from Japan than Japanese consumers spent on Chinese goods (see Figure 8).[255] This highlights that, amidst domestic market saturation, demand from overseas markets is driving cross-border e-commerce in Japan; presenting a ripe opportunity for Japanese companies looking for growth.

Figure 8: Cross-border B2C E-commerce Transaction Values, 2015
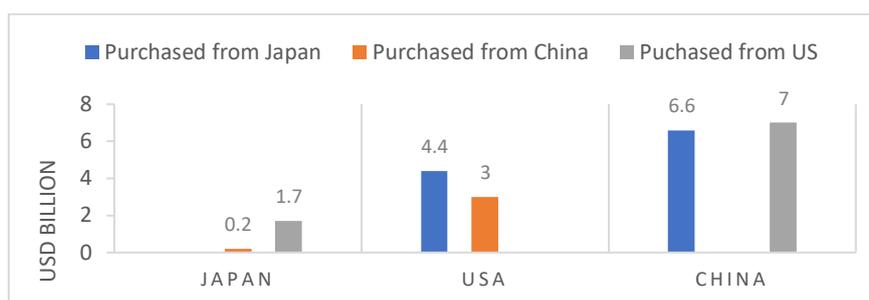
Source: UNCTAD (2017) Information Economy Report 2017: Digitalization, Trade and Development

Japanese businesses are also increasingly adopting public cloud, paving the way for cross-border data flows to become an integral part of any business; not just businesses that conduct overseas transactions. According to a Gartner study,[256] cloud computing adoption grew by 0.8% to 16.9% in 2016. The same study found that Japanese companies' willingness to invest in external clouds were double that of on-premise investment, indicating that despite a historical preference for on-premise cloud infrastructure, companies are beginning to realize the benefits of outsourcing cloud, indicating an emerging driving force for cross-border data flows.

Moving business processes and functions to the cloud could also encourage the normalization of remote working, or teleworking, by allowing employees to access the corporate network from any location or device. Teleworking is an agenda that the government has been pushing to expand the country's shrinking working force. It hopes that by enabling flexible working conditions through telework, an inclusive society can be created where those involved in medical treatment, child rearing or nursing care can still contribute to the economy.[257]

It is estimated that the addition of, for example, stay-at-home mothers into the formal workforce through telework could expand Japan's labor force by 1.5%.[258] By 2020, the government aims to have the number of people working from home at least once a week account for 10% of the entire working population.[259] To achieve this, the government is also looking to revise its guidelines for employment-type telework. Existing telework guidelines only accommodate employees who work from their own homes (not another remote location, such as a satellite office or café), and the revision stands to drive the adoption of telework by enabling the use of satellite offices and mobile devices.

Considering the central role that data plays in both Japan's Society 5.0 and Connected Industries initiatives, data flows can be expected to grow in both quantity and importance to Japan's economy. Connected Industries, for example, is centered around employing data sharing and utilization to blur the lines between traditionally siloed industries by connecting their various assets, and thus creating new value.[260] The government's vision for Connected Industries, however, goes beyond the transformation of local industries and harbors an aspiration to promote the concept globally by encouraging Japanese firms to cooperate with foreign companies to achieve international standardization. This objective can only be fulfilled if data is allowed to flow freely without being confined to industry-specific or jurisdiction-defined restrictions.

Cross-border and cross-sector data flows are also fundamental to the development of AI and IoT technologies which are repeatedly highlighted in Japan's economic agenda. According to research done by Chuo University and the Japan Center for Economic Research (JECR), full utilization of AI and IoT can boost Japan's economic growth rate by up to 4.1% and thus increase its 2030 GDP estimate by 40%—this can only be realized with the free flow of data.[261]

4.4.   Japan's Supportive Regulatory and Policy Framework

Japan's regulatory and policy framework is overall supportive of and promotes the free flow of information across borders. Japan's 2015 Declaration to be the World's Most Advanced IT Nation identifies the ability of cross-border nature of data flows to create value-add and accelerate the pace of reform and socio-economic development, while amendments to the Personal Information Protection Act

(PIPA), which came into force on 30 May 2017, supports free data flows by permitting the transfer of personal information to third parties outside Japan. More recently, METI and the Ministry of Internal Affairs and Communications (MIC) announced plans to consider models for "data portability", to specifically look at the transfer of personal data—especially medical and financial—to other entities and other countries.[262]

The Japanese government has also adopted the APEC Cross-Border Privacy Rules (CBPR) system.[263] The voluntary accountability-based CBPR system accredits businesses that commit to its regulation standards across a cooperative privacy regulatory framework, with the aim of facilitating data flows and trade, among APEC economies by giving businesses assurance that their data is protected to a similar standard even when it has left the country. In addition to the CBPR, the US and Japan have agreed to Internet principles that emphasize the preservation of an open and interoperable Internet, with a balanced approach to IPR and privacy so as not to impede on the cross-border flow of information.

Japan's newly implemented My Number system enabled government information sharing from January 2017 (on the national level) and July 2017 on the local level; also known as the Social Security and Tax Number System. All residents were issued a 12-digit identification number to streamline administrative procedures and bank account numbers will be added to the My Number system from 2018 (as an optional field).[264]

The Personal Information Protection Commission (PIPC), which was established on 1 January 2016 to oversee the system, will function as the Privacy Commissioner responsible for enforcing the My Number Act from 2018.[265] The PIPC will have centralized data protection authority over all sectors, reforming a previously fragmented data protection regime which gave ministries the power to interpret and enforce data protection law over their respective business sectors in a non-uniform manner. The previous system had given rise to differing data protection requirements creating uncertainties for businesses, especially those whose operations stretched across sectors and jurisdictions.

4.5.   Blockers of Free Data Flows

4.5.1.   Regulatory Ambiguity Slowing Investment

While the amendment to Japan's PIPA supports free data flows by permitting the transfer of personal information to third parties outside Japan, it also states the transfer must adhere to any one of the following requirements:

- that the destination countries must have been deemed as possessing acceptable data protections;

- that the third party also takes similar levels of protection that Japan upholds; or

- that the consent of the person whose data is being transferred has been given.[266]

However, while these requirements provide clarification around PIPA, the PPC has not defined a list of countries with acceptable data provisions (as of January 2017.) **Such regulatory ambiguity has consequences on investment in the market.** According to a study by Fifth Era, 68% of investors believed that government policies to promote open data use would increase their investment in local Japanese Internet businesses.[267] In contrast, regulatory ambiguity reduces investment activity with 71% of Japanese investors surveyed.

4.5.2.   Indirect Data Blockers Stymie Digital Innovation

A more indirect, but potentially problematic, blocker of free data flows lies in healthcare sector regulation, where only doctors who are licensed in Japan are able to practice medicine in Japan, effectively preventing overseas telemedicine providers from tapping the free flow of data to offer their services in Japan.[268] Article 2 of Japan's Medical Practitioners' Act states that: "A person who wishes to become a medical practitioner shall pass the National Examination for Medical Practitioners and receive a license from the Minister of Health, Labor and Welfare."

Enrolment for this exam and other medical-profession related exams (such as for dentists and nurses) also require that the medical practitioners attain the highest Japanese language certification standard known as JLPT N1, and the National Examination for Medical Practitioners is conducted in high level technical Japanese. In anticipation of the upcoming Tokyo Olympics in 2020, Japan eased this regulatory barrier in 2015 to allow five non-Japanese doctors to practice at four hospitals in Tokyo, but on the condition that they can only serve non-Japanese patients. On top of this, Japan also has bilateral agreements with four countries to allow doctors from the US, the UK, France and Singapore to practice in Japan without a Japanese medical license. However, these doctors are only allowed to see patients from their own nationality.[269]

However, these exceptions to the Medical Practitioners' Act are limited in scope and effect, and the Act remains a high regulatory barrier that restricts residents' access to foreign digital healthcare services. Instead of adjusting the supply of foreign healthcare personnel reactively, **loosening sector-specific regulations that indirectly restrict the potential of cross-border data transfers will future-proof the healthcare sector, reducing the need for frequent policy adjustments** by allowing changing demands and needs for overseas doctors and healthcare services to be met through digital technology.

4.6. Sector Case Studies

4.6.1. Healthcare: Making Japan-class Healthcare Globally Accessible with Telemedicine

Japan ranks first among 80 countries according to the International Trade Administration's Health IT Top Market Report, with a health IT market size of about USD4 billion in 2016. Yet it is not without its difficulties.[270] The adoption of IT solutions in Japan's healthcare system was primarily driven by the problems of an uneven distribution of healthcare personnel and an aging population. These problems were addressed by utilizing IT to (1) increase the reach and homecare efficiency of health services through telemedicine, (2) lowering costs, manpower requirements and accelerating administrative processes[271] and (3) achieving an export-standard Health IT service to expand its healthcare market globally to mitigate increased healthcare costs.

Japan's public health insurance scheme, of which participation is mandatory, offers co-payment subsidies where consumers pay 20% or less for government-approved procedures and prescriptions. However, in supporting the country's aging population, this scheme has become an increasing burden on the public healthcare system, with Japan's national medical expenditure increasing at about JPY1 trillion (USD8.3 billion) annually,[272] and forecast to reach 13.5% of its GDP by 2035.[273] A need to manage this escalating cost is driving the country to look to digital healthcare for cost and delivery efficiency—21% of Japanese citizens are aged 65 or older, and this age group is expected to rise in share to 40% of the country's population by 2050.[274]

The government has articulated this through policies such as the **Act on Promotion of Healthcare Policy**,[275] which aims to promote medical care using technology, and the **Healthcare Policy (July 2014)**,[276] which emphasizes the importance of applying ICT to medical care. In addition, the **Act Regarding Anonymized Medical Data to Contribute to R&D in the Medical Field or "Next Generation Medical Infrastructure Act"**, which was enacted on 28 April 2017 (and promulgated on 12 May 2017), established a system that certifies businesses that can reliably and properly anonymize medical data (certified medical data anonymization agencies) to promote the secure use of anonymized healthcare data to develop the sector.[277]

In August 2015, the health ministry announced the removal of regulatory barriers to telemedicine, in a move to spur medical start-ups to offer such services and improve access to medical consultation services.[278] In addition to requiring medical practitioners to be licensed in Japan to operate in Japan (See Blockers of Free Data Flows), Article 20 of the **Japan Medical Practitioner's Act** also states that "No medical practitioner shall provide medical care or issue a medical certificate or prescription without personally performing an examination, nor shall he/she issue a birth certificate or certificate of stillbirth without personally being in attendance at the birth…"

This Act brought into question the legality of telemedicine, and regulatory clarity provided by the health ministry was a major impetus in the development of digital healthcare. One such clinic, Ochanomizu Naika, began offering telemedicine in late 2015 and has seen about 200 patients switch to the service since.

Another example is Tokyo-based Medley, which launched Clinics—a telemedicine platform that enables patients to make appointments with doctors, engage in video-based medical consultations, and make fee payments through either an app or on a web browser—in February 2016. More than 500 medical institutions have since adopted Clinics, and one user, Kagaya Tadashi Clinic notes that 40% of patients that underwent a day surgery requested to subsequently have their progress monitored online.[279] Another user, Obara Clinic, records a repeat rate of almost 100% for patients engaged in online treatment enabled by the Clinics platform.[280]

Nonetheless, while there have been notable developments in digital healthcare since the regulation was revised, there remains a preference among older practitioners for face-to-face consultations, especially for the first meeting.[281] The Japanese government recognizes that more needs to be done to promote adoption and development of telemedicine, and Prime Minister Shinzo Abe has announced that the next medical fee review (effective from April 2018) will cover telemedicine. [282]

Alongside encouraging the adoption of digital healthcare, the government is also looking abroad to address the rising costs of healthcare in Japan. Commercially exporting Japan's best-in-class healthcare services is seen as a solution to fiscal deficits,[283] and the **Japan Vision: Healthcare 2035** policy was drafted with the goal of exporting the country's exemplar healthcare standard globally.[284] The plan encourages the domestic healthcare sector to leverage its advantages in high technological integration, well-regarded Japanese standards of healthcare, and its expertise in healthy longevity, to tap unmet demand in the global market for reliable healthcare services.

To realize this vision, and the government's objective to stimulate the domestic economy through successful overseas expansion, enabling the free and easy flow of exchange of information and data is crucial, and would be severely undermined by restrictions to cross-border data flows.

Sunrise Japan Hospital

In line with Japan Vision: Healthcare 2035's goal of exporting Japan's exemplar healthcare standard globally, Sunrise Japan Hospital (SJH) opened in Phnom Penh in Cambodia in 2016. Cambodia sees about 200,000 of its citizens travelling overseas for medical treatment[285] due to the higher standards of treatment, resources and expertise available elsewhere.[286] SJH sought to fill this gap in the country by bringing in much-needed neurosurgery services from Japan, offering emergency services and propagating its standards and expertise by hiring local Cambodian staff and offering training and certification. Displaying high standards and professionalism would also promote the Japan healthcare brand to raise demand for more of such exports of Japanese-style healthcare to other regions around Cambodia and the world.

To address the issue of language difficulties between Japanese speaking and Khmer staff, the hospital uses a multilingual cloud-based service which allows for patients to input their symptoms, medical history and other supporting information in Khmer into the system. This data is then analyzed and translated into Japanese or English. Working together with Japan's hospitals, SJH in Phnom Penh also uses a remote consultation support system for remote consultation of specialists and doctors located in Japan.

In this case study, Japan-developed medical standards and technologies are shared across borders with SJH's local staff by employing a system that has similarities with the ICT-enabled sharing economy, which has enabled the emergence of new business models including those of Airbnb and Uber, which have disrupted traditional industries. Japan, motivated by both internal and external drivers, is in a unique position to disrupt traditional healthcare delivery, and cross-border data flows will be the enabler to overcoming language and geographical barriers.

Without the ability to transfer data across borders, SJH would not have been able to develop its innovative business model as it would be neither possible for patients in Cambodia to send their health information to healthcare professionals located in Japan, nor for the doctors to offer their advice or diagnosis to their Cambodian patients.

4.6.2. Payments: Going Digital, Going Cashless

Japanese citizens have been able to pay for transport with their smartphones for more than 10 years, and a Deloitte survey in July 2016 found that almost 50% of Japanese smartphone users have used mobile payments in stores. However, despite being a mature market for m- and e-payments, cash is still widely used in Japan and accounts for 70% of all retail payments.[287]

The government has been actively taking steps to reduce the country's cash-dependency with the aim to boost digital payments adoption in time for the 2020 Tokyo Olympics. **Specifically, it has set goals for Japan's larger cities and tourist destinations to fully accept cashless payments by 2020 and for the rate of cashless payments to double from 19% (in 2017) to 40% by 2027.[288]** In line with this, Mitsubishi UFJ Financial Group, Sumitomo Mitsui Financial Group and Mizuho Financial Group will enable the exchange of foreign currency and foreign-issued credit card holders to withdraw cash from 3,000 ATMs from 2018—illustrating the role of cross-border data flows in enabling ATM functionality to be enhanced by increasing the scope of financial services offered.

The government has also announced plans to step up its efforts to subsidize set-up fees for cashless facilities, which is a disproportionately heavier cost burden for SMEs and has been a major blocker to digital payment adoption—the initial set-up cost of credit payment terminals alone would cost a company about JPY100,000 (USD900).

To stimulate digitization of the payments industry, **measures have also been taken to encourage the development of digital currency**. In March 2017, the Cabinet approved an exemption of digital currencies from consumption tax from 1 July 2017, while the Financial Services Agency (FSA) announced that a bill to amend its Banking Act to account for new technology, was effective from 1 April 2017. The amended Act defines digital currencies for the first time and recognizes them as a payment method.[289]

In Japan, digital currency is distinguished from electronic money, which has a specific issuer and can only be used by authorized persons. The amendment also increased financial institutions' maximum ownership in fintech companies, allowing them to acquire up to 50% in a fintech company's voting share.


SBI Ripple Asia

For the government's vision of a cashless society to be actualized, the factors influencing Japan's preference for cash first need to be addressed.

In March 2017, a consortium of 47 Japanese banks partnered with SBI Ripple Asia[290] on a pilot program to explore the effects of applying Ripple's distributed ledger technology (DLT) on interbank money transfers.[291] SBI Ripple Asia's settlement platform, RC Cloud, is a cloud system that not only connects members of the consortium to each other, but also with foreign banks that utilize Ripple's solutions, creating a unified platform for both domestic and cross-border payments. DLT technology is then used to enable real-time transfers between countries and currencies.

The benefits of using Ripple were especially attractive to the local financial services sector, where issues with the domestic Zengin System[292] had driven up the cost of domestic payments. This, according to Ripple, had translated to high domestic settlement costs, estimated at five to ten times more than in the US.[293] By removing the need for a centralized clearing system, Ripple's DLT technology would position cashless payments as a viable substitute to cash.

Following a successful pilot phase,[294] SBI Holdings in December 2017 announced that it had made improvements to the security and fault tolerance of RC Cloud, to create "RC Cloud 2.0" for commercial use in 2018. In addition to a common gateway that enables connection through an open API and bank account number, SBI also has plans to further enhance frictionless settlement by developing common applications that will also allow mobile numbers and QR codes to be used in remittance.[295] The potential of RC Cloud has been recognized by Japan's financial services sector, and the consortium saw its members increase from 47 before the pilot phase to 61 presently, representing about 40% of all Japanese banks.
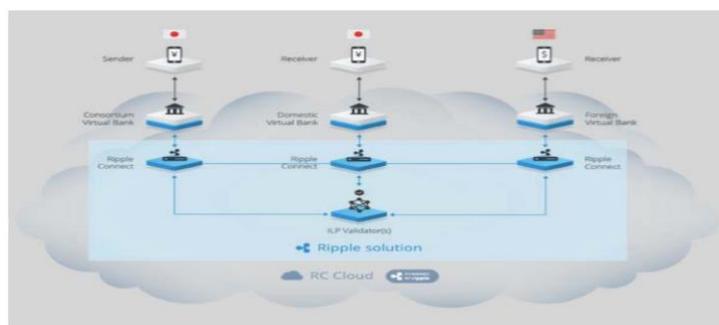
The consortium has since linked up with South Korean banks on a new pilot program for cross-border money transfers. By doing away with intermediaries such as SWIFT, the technology has the potential to reduce international funds transfer costs by 30%[296] and bring the time taken for cross-border payments settlements down, from an average of three days using the SWIFT inter-bank network, to just 10-15 seconds.[297] As Japan's third largest trade partner, a successful implementation of RC Cloud with South Korean banks will translate to essential time and cost savings for businesses across various industries when it is commercially adopted on 31 January 2018.

Cross-border data flows play a large enabling role throughout this case study, from first allowing SBI Holdings to access US start-up Ripple's API and use it to power RC Cloud, to expanding a successful domestic pilot to an international partnership with overseas entities. It is evident that government measures can be supported by an environment that upholds the unrestricted nature of data flows, allowing cutting-edge technology to be used to overcome prevailing inefficiencies in traditional industries.

These recent developments have improved the regulatory environment for fintech innovation, and bode well for the transition to cashless payments. Indeed, a consortium of Japanese banks, led by Mizuho Financial Group and Tokyo Post Bank, is planning to launch a national digital currency termed J Coin.[298] J Coin is intended to function in tandem with the Japanese Yen, rather than substituting it, and is planned to be functional by the 2020 Tokyo Olympics. The consortium estimates that by reducing the handling, transport and audit costs associated with cash, the new digital currency can add JPY10 billion (USD89 million) to the economy.

Benefits from the government's ambitions for widespread digital and cashless payments will extend beyond the traditional banking sector. Policies supporting digitization and unfettered access to a competitively-priced software and tools from global vendors and partners will lower barriers of entry for entrepreneurs and innovators to flourish in Japan's fintech sector. This will spur a **virtuous cycle** of new fintech products and services, increasing competition and consumer choice, which will in turn accelerate Japan's transition towards a cashless economy.

For example, by 2020, 80 Japanese banks (representing 60% of the country's total) will allow developers to access their customers' account information using open APIs,[299] creating opportunities for start-ups and other third-party app developers to help financial services maximize the insights garnered from their datasets, and develop **innovative e-payments apps**.

Japan Net Bank

Digitization offers the banking sector the opportunity to bolster performance by lowering administrative costs by about 25%.[300] Areas that can be easily digitized to save on operational costs include using public cloud to access high processing capacities and scalable infrastructure at low capex.

Established in 2000, Japan Net Bank was the first bank to operate only on the web, leading to reduced operating costs and thus allowing it to offer more competitive terms than conventional banks as well as cheaper money transfer charges.[301] This competitive edge is in part attributable to the 24-hour Internet-only bank hosting its critical information on the public cloud. Leveraging the cloud service provider's data protection and disaster recovery functions allows it to avoid hefty costs of physical redundancy.[302]

In 2016, Japan Net Bank collaborated with "freee",[303] an automated online accounting service hosted on public cloud, to launch an online loan and payment service for its users. freee also adopts other applications, such as Zabbix to monitor its cloud, and Fluentd to keep logs. The companies that created the applications are located—and process data—in different locations globally, demonstrating the extent of collaboration that goes into a cloud service provision, and subsequently the necessity of cross-border data flows for financial companies to leverage the best-suited services hosted on the cloud.

Placing restrictions on data flows would isolate local entities such as Japan Net Bank and freee from advances in the international fintech ecosystem. The impact on national agenda (in this case, increasing cashless payments) would be deeply felt as these restrictions would deprive local enterprises and consumers from enjoying cheaper and newer technologies, rendering digital payments an unattractive alternative to cash for the mass market.

5. The Philippines

5.1. Highlights

- Digital economy strategy in the Philippines is driven by the Department of Information and Communications Technology (DICT), who announced the Philippines' Cloud First Policy in early 2017.

- The adoption of cloud is seen as crucial to the national development of core economic services such as finance and banking, as well as enabling the growth of e-commerce, and emerging new services such as in the sharing economy. Cross-border data transfers are a key component of these activities, directly as services and indirectly for administrative support.

- Most of the Philippines' digital economy developments have been made at sectoral levels, both state and private, such as in education and health, and through its leading international revenue earners— remittance, BPO and tourism, including health tourism which is a rapid growth area. It is in these areas that cross-border data flows is most significant.

- The absence of any data localization restrictions is to the advantage of the Philippines in its drive towards cloud computing and growing its digitally-enabled economy. Also helping to drive adoption is the fact that the Philippines is experiencing the highest rates of GDP growth in the region, above 6% annually, and attracting substantial foreign investments into data centers and the BPO business.

- A major constraint to the Philippines' growth is the lack of good infrastructure, by road, by rail and by Internet. The Philippines suffers from some of the lowest broadband penetration rates and highest access prices in the region, although there are signs this may be changing.

5.2. The Digital Economy Position of the Philippines

Digital economy policy has generally been the purview of the Department of Information and Communications Technology (DICT), created in 2016, but taking over the responsibilities of the former Commission on Information and Communications Technology (CICT). The upgrade from being a Commission to a Department of State signifies a growing commitment by the Philippine government to establish digital strategies to promote the economic position of the Philippines.

5.2.1. Philippines Digital Strategy

One of the first acts of the DICT was to reaffirm the **5-Year Philippines Digital Strategy (PDS)** as promulgated by the CICT in 2011.[304] The PDS sets as its priority e-government, although it runs alongside the **E-Government Master Plan (EGMP)**.[305] The PDS is essentially an aspirational document,[306] with the following aims:

- To achieve a digitally empowered, innovative, globally competitive and prosperous society where everyone has reliable, affordable and secure information access in the Philippines.

- To achieve a government that practices accountability and excellence to provide responsive online citizen-centered services.

- To achieve a thriving knowledge economy through public-private partnership.

- To focus on supporting continued growth of the IT-Business Process Outsourcing (IT-BPO) industry and extending the benefits outside Metro Manila and Metro Cebu, so as to fast-track national development and provide opportunities for investment and jobs to other regions in the country.

- Provide a mechanism to enable MSMEs by developing their capacity to use the Internet as a market expansion tool.

- Through PPPs, to encourage investments in research and development and business incubation facilities.
- To focus on enabling other industry sectors in the effective use of ICT for efficiency, innovation and competitiveness.

Although the PDS makes no direct reference to cross-border data flows, by proposing major improvements in the telecommunications infrastructure and supporting reforms in data governance and personal data protection it lays the foundations for the further growth of sectors, such as BPO and cloud service providers which rely heavily on cross-border data flows.

The strategic thrust of the PDS is on "Investing in People", which is intended to embrace all sections of society, including "marginalized communities". To serve this purpose, ICT training will be made widely available. This would include, for example, school leavers looking for work in the BPO sector. The PDS also includes a commitment to review and revise laws and regulations that may impede progress towards an innovative and digital economy.

5.2.2.   DICT's Cloud First Policy 2017

Further to the PDS, a DICT Circular No. 2017–002[307] prescribing the Philippines Government's Cloud First Policy was issued in January 2017. Cloud computing was to be the first option for consideration by the government to reduce the cost of ICT, increase employee productivity and develop citizen online services. All government departments and agencies including National Government Agencies and Government-Owned and Controlled-Corporations (GOCCs), State Universities and Colleges (SUCs) are to proactively consider cloud computing adoption. One of the first deployment models of cloud is the Government Cloud (GovCloud), developed by DICT as an accreditation process for CSPs, to include baseline security assurance requirements needed before being listed on Philippines' GovCloud.

5.2.3.   Bangko Sentral ng Pilipinas (BSP) Regulations on IT Risks in Financial Institutions

Even prior to the DICT initiative, the central bank of the Philippines, Bangko Sentral ng Pilipinas (BSP) granted banks the opportunity to use cloud computing technology when it released a new framework in August 2013 on the use of IT in the banking industry.[308] These steps triggered the initial adoption of cloud computing, opening the door to both new services innovation and extended financial inclusion in the financial sector. In July 2017, for example, Cantilan Bank launched its cloud-based core banking pilot project to provide better financial services for unbanked and underserved population in the southern Philippines. PLDT has also been promoting the use of the cloud by banks through its ePLDT digital enterprise enabler.[309]

5.2.4.   Digital Transformation in Public Education

While there is no "digital economy plan" for the Philippines as such, it has a series of digital projects and initiatives by different sectors of the economy. A good example of state-sponsored digital progress is public education with a strong emphasis upon the availability of up-to-date data.

Box 4: Data Flows and the Digital Transformation of Schools

The role of data flows and up-to-date data, is proving central to ensuring the realization of plans to upgrade schools with digital learning and content resources. Addressing a CIO Conference in Manila on 25 May 2017, the CIO of the Department of Education, made the point that earlier efforts to upgrade the schooling system fell short because "management used three-year old data for programming and budgeting…" [but change was accomplished after] "the agency established a digital transformation framework."[310] In 2011, the Department had implemented a Learner's Information System (LIS) and an Enhanced Basic Education (EBEIS) to improve data collection and provide an online registration platform for students, and "[d]ata from these systems are now being used to produce dashboards for planning and decision making."

The digital transformation framework identifies four key areas—teaching and learning, communication, governance planning and decision making, and process and operations—and includes the use of social media to communicate with schools and staff nationwide. The framework includes a Computerization Programme (DCP), a Learning Resources (LR) portal of over 4,000 learning resources, with plans to digitalize textbooks, planned Learning Action Cells (LAC) within schools to improve teaching methods.

5.2.5. e-Identification and the 2015 Filipino Identification System Act (FilSys)

Another area in which the Philippines aims to achieve data availability and reliability to progress the digital transformation of the economy is with the planned introduction of a national system of electronic identification (e-ID) under the auspices of the Philippine Statistics Authority (PSA). This was further developed with the introduction of the **2015 Filipino Identification System Act (FilSys).**

The purpose of the FilSys is to provide one digital identity to every citizen, enabling them to access all e-government services and a range of private services, such as healthcare, e-commerce, banking and finance, using a single biometric smart card. The objective is digital inclusion, and the aim of the e-ID is to provide sufficient information to know-your-customer (KYC) for secure transactions across the board, for SIM registrations, financial loans and transfers, etc. [311]

The FilSys Bill, passed by the House in September 2017,[312] itemizes 25 data points, from personal ID to data about parents and children to email addresses, social security numbers, even marriage certificate registration numbers. While comprehensive, the Bill has come under criticism for being disproportional and over-reaching.[313] The idea of storing all information on a single national database is clearly a cause for concern, and a mandatory requirement for that information could be at odds with the Data Privacy Act, an issue to be debated by the Senate in early 2018.[314]

5.3. Challenges to Digital Economy Growth

5.3.1. Digital Planning and Planning Reform

The greatest challenge is likely to be in raising the capacity of government to adopt digital technologies and to push through the necessary reforms. **Constant reorganization** and **reshuffling of government departments and personnel changes** amidst managing a challenging **telecommunications duopoly**[315] have slowed the Philippines' planning reform progress.

For example, the DICT was created following a series of rapid reorganizations of departments such as the Department of Science & Technology (DOST), the Department of Transport and Communications (DOTC), and the CICT. Further, the National Telecommunications Commission (NTC, the telecoms regulator) and the government's Telecommunications Office (TELOF) responsible for state-funded networks in under-served areas, were brought under the DICT. Related, frequent personnel changes such as the September 2017 resignation of the head of the DICT, have compounded the problem.[316]

Further, despite the EGMP and the commitment to build countrywide a broadband network connecting government offices, the government sector in general is only slowly adopting and adapting to "going digital". Paperwork still dominates, with work routines in public administrative offices typically taking a very long time to produce outcomes, often months instead of days, and years instead of months.

These frequent changes in structure and personnel, and the **lack of government adoption of ICT**, raises a question mark over how stable and supportive is the governance framework in the Philippines.

5.3.2. The Challenge of Connectivity

There has been a barrage of criticisms from senators of the **low speeds** and **poor coverage** of Internet and broadband networks in the Philippines. For example, a Mobile Networks Update report by OpenSignal[317] found that broadband mobile speeds in the Philippines remain well below both the global 4G average of 16.2Mbps and the global 3G average of 4.4Mbps. A report from Akamai Intelligent Platform went further, claiming the Philippines was among the lowest average Internet connection speeds in the world.[318]

One of the reasons behind this is the **lack of international bandwidth**. Until 2017, only seven international submarine cables landed in the Philippines, offering a lowly 5.45Kbps per capita, for example, compared with Thailand's 6.622Kbps, Malaysia's 15.6Kbps and Singapore's 258.3Kbps.[319] Additional cable investments were announced in 2017, by Globe in the Southeast Asia-United States submarine cable system (SEA-US),[320] and by PLDT in the Asia-Africa-Europe 1 submarine cable system (AAE-1).[321] SEA-US adds a potential 20Tbps and the AAE-1 adds 40Tbps to the international capacity of the Philippines.

The problem is compounded by **periodic power cuts**, which also frequently interrupt Internet communications in many areas that are not equipped with back-up facilities. Table 5 compares the Philippines unfavorably with its ASEAN neighbors. The most dramatic unfavorable comparison is the low percentage of homes with Internet access.

Table 5: Digital Access, Philippines vs. ASEAN

	Philippines	Vietnam	Thailand	Indonesia	Malaysia
Subscriptions per 100 inhabitants					
Fixed broadband	5.4	9.9	10.6	1.8	8.7
Mobile broadband	41.6	47.3	94.7	42	91.7
Households with Internet access	32	25.9	59.8	47.2	76.9

Source: ITU Statistics (2016)

Further, Table 6 shows a disproportionally high price of access to broadband in the Philippines compared with its neighbors.

Table 6: The Price of Digital Access in the Philippines vs. ASEAN

	Price of fixed broadband in $PPP (2015)[322]	Cost of mobile broadband (1GB) as % of GNI per capita (2014)[323]
Philippines	$15.73	6.74%
Vietnam	$1.84	3.52%
Thailand	$5.26	1.21%
Indonesia	$21.51	1.36%
Malaysia	$4.80	1.32%

Source: LKYSPP (2017) A Cloud for Doing Good

5.3.3. National Broadband Network Project and Pipol Konek

This long-standing problem in an archipelago of over 7,000 islands poorly connected by road or by air, is always going to be a challenge. To begin to tackle it and to bring broadband Internet within reach of citizens, schools, hospitals, public institutions and enterprises, the DICT has announced the PHP77.9 billion (USD1.5 billion)[324] **National Broadband Network project.**

This project is intended to mix public assets such as the National Grid network, a broadband network linking government offices, and private investment in broadband, including a PPP element according to the DICT and the PPP Center whereby the private sector would invest in towers and cell sites and lease them to networks. Relatedly, the DICT has also announced plans for a free Wi-Fi project called **Pipol Konek.**[325]

5.4. Data Flows: Emerging Drivers

5.4.1. Regional Trade Activity and ASEAN

Cross-border data flows are associated with any international economic activity, such as the flows of customs and financial documents and payment clearances associated with exports and imports, whether the services and goods in question are digital or not. For example, the physical export of coconut oil and fruit—major exports of the agricultural sector—require bills of lading, cargo manifests and customs clearances which are rapidly moving from paper to digital formats. When the Philippines joins ASEAN's Single Window for customs declaration documents, certificates of origin and phyto-sanitary certificates, these will become fully digitalized for cross-border trade.[326]

5.4.2. Trade in Digital Services

The outstanding driver of these changes in the Philippines is the growth in trade-in-services, the content of which itself is mostly digital. This is reflected in the major structural shift that has taken place over the past decade from agriculture and industry towards the services sector. In 2006, agriculture and industry

accounted for 9% and 50% respectively of the value of output, services accounting for 41%.[327] By 2016, services accounted for 57% of GDP (60% by 2017%)[328] and 47% of GNI (GDP + net overseas income) while industry's share of GDP had fallen to 33%, accounting for only 28% of GNI.[329] The share of GDP accounted for by service imports and exports, predominantly digital, averaged over the first three quarters from 2015 to 2017, 11% and 12% respectively that is over 20% of GDP. [330]

In 2011, the Philippines published the Input-Output Tables for 2006. [331] Data-related industries were confined to "Telecommunications", "Computer and relative activities" and "call center activities" and other sectors that today would be expected to buy-in and generate data-related services hardly register.

The details of the 2012 Input-Output Tables have to await publication, but from national income accounts it is possible to see **both the growth and the transformation of the economy towards services**, including data-related services in sectors such as domestic and international banking and finance, global remittances from overseas workers and investments, BPO (otherwise known in the Philippines as business process management or BPM), and tourism, including health tourism.[332]

For over a decade, these and other services—along with growth sectors such as electronics—have been driving the Philippines' economy to achieve rates of growth exceeding 6% per annum. In current US dollar terms, GDP increased by 150% over the decade to 2016, to over USD300 billion, while GNI per capita rose nearly 120% to USD3,580.[333] The June 2017 Global Economic Prospects report of the World Bank forecasts similar rates of growth up to 2019.[334] Much of this growth involves sectors generating cross-border data flows.

5.5.   Digital Data Flows Constraints

5.5.1. Privacy and Security

The absence of any data localization requirements in the Data Privacy Act of 2012 may be regarded as an incentive for the general development of cloud computing, although the major areas of interest currently, such as government, banks and BPOs, are storing data locally, but the last two are also transferring substantial data overseas and receiving data from overseas.

The Act follows what would be widely regarded as "best practice".[335] Permission is required of data controllers to collect data from data owners, and this includes "personal data" and "personal information"—this seems to refer to what is otherwise referred to as "sensitive data" (for example, in Australia and South Korea) such as health records, financial details, sexuality, religion, etc. On the face of it, this requirement would seem to clash with the range of data to be collected for the new electronic national ID smart card. Personal data collected in a foreign jurisdiction is not subject to these regulations, except that data transferred and stored in the Philippines is covered by the Act.

Data controllers are responsible for the actions of third parties, who may be overseas, and to whom they may transfer the data. Private sector data collection is covered by the concept of a data sharing agreement between the data owner and data controller and is thereby subject to judicial assessment. Data owners have the right to refuse permission for their data to be shared or used for marketing purposes.

Companies collecting data need to appoint a privacy officer, to maintain records of data processing activities, implement physical and technical security measures, and regularly monitor security breaches. They need to provide the National Privacy Commission with an annual report of security breaches, and under certain circumstances notify data owners of security breaches within 72 hours, such as loss of "sensitive" personal information or when real harm is likely. A "risk-based approach" is to be used to determine if and when notifications are made on a case-by-case basis. Companies only need to register with the Commission when they employ more than 250 staff or when the data exceeds (*de minimis*) 1,000 individuals.

The lack of any requirement for personal data to be stored within the Philippines, stands in contrast to Presidential Decree 1718 which was issued in 1980, but no subsequent implementing law or regulations followed up on it.[336]

5.6. Case Studies

5.6.1. Business Process Outsourcing (BPO)

At the forefront of the growth in the services sector have been IT-BPM—the term used by the National Economic and Development Agency (NEDA) for what elsewhere may be called BPO.[337] The Philippines is now placed number two in the top 10 BPO locations, most of which are in India, and the sector covers "contact centers, back office services, data transcription, animation, software development, engineering development and game development…" supported by "the relatively low cost of living, and a workforce which composed mainly of young and educated Filipinos with good spoken English language skills".[338]

The sector now accounts for close on USD25.5 billion, employing 1.4 million people, and was forecast to overtake foreign remittances—which account for around 10% of GDP—by the end of 2017.[339] Of the many BPO sub-sectors, call centers bring in over 60% of revenues as illustrated in Figure 9.

Figure 9: 2014 Revenue Distribution of BPO Sector
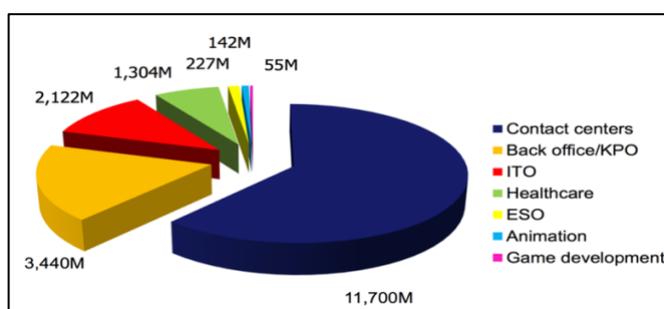
Source: The Philippine IT-BPM Industry Outlook & Prospects (2006–2014)[340]

The BPO sector is also a sector that is moving to the cloud. BPOs are among the early adopters of cloud computing, along with sectors such as retail and SMEs who find the costs affordable.[341] According to DMG consulting, the worldwide adoption of cloud-based call center infrastructures reached 11.1% in 2015 from only 2.2% in 2008, with a further 20% increase during 2016.[342] Table 7 lists the top 10 BPO companies in the Philippines, led by foreign-invested ventures.

Table 7: Top 10 BPOs Firms and Their Revenues in 2015

1. Accenture Inc. (PHP38,088 million)	6. TeleTech Offshore Investments B.V. (PHP6,891 million)
2. Convergys Philippines Services Corporation (PHP22,942 million)	7. IBM Business Services Inc. (PHP6,835 million)
3. JP Morgan Chase Bank Service Center (PHP12,659 million)	8. Sitel Philippines Corp. (PHP6,643 million)
4. Sutherland Global Services Philippines Inc. (PHP9,271 million)	9. TeleTech Customer Care Management Philippines Inc. (PHP5,900 million)
5. Teleperformance (PHP 10,419 million)	10. Telus International Philippines Inc. (PHP5,689 million)

Source: Curran Daily & Associates (2017), The Biggest Players in the Philippine BPO Industry

The outstanding feature of the BPO sector is the crucial role of foreign investment which boosts local employment and global earnings for the Philippines, which has contributed to the Philippines enjoying the region's highest rates of GDP growth. The BPO sector is built upon low-costs and efficient cross-border data flows across all its vertical sectors. Unrestricted cross-border data flows are therefore a critical economic driver of growth.

5.6.2. Remittances and Financial Flows

Remittances are the country's biggest source of foreign exchange income, growing by over 5% annually during 2017, over USD2 billion monthly since the beginning of 2016, remitted by around 12 million Filipinos working overseas, accounting for about 10% of the country's GDP.[346] The flow of remittances in 2016 represents more than double those of 2006.[347] Remittances include cash and non-cash items that flow through both formal (via electronic wire) and informal channels (such as money or goods carried by persons across borders).

However, there is a fear that illegal transactions, such as money laundering, will deter international banks from the Philippines due to stricter Anti-Money Laundering/ Counter Terrorist Financing (AML/CTF) requirements. The Philippines remains woefully inadequate in areas such as bank reporting requirements. It has been estimated that over a 52-year period, USD133 billion of funds related to crime, corruption and tax evasion flowed out from the Philippines and USD278 billion was illegally transferred into the Philippines, and that 25% of all imported goods are unreported to customs.[348]

This places a major incentive in the Philippines to digitalize paperwork, use software analytics to identify suspicious international financial transactions, and join international efforts to conform to banking and NBFI best practices. In this regard, the Philippines has established a National Retail Payment System (NRPS) and a National Risk Assessment to counter money laundering or terrorist financing, although bank reporting requirements still have a long way to go. The Philippines has also joined Australia, South Korea, New Zealand, Thailand and Japan in an MoU on the Asia Region Funds Passport (ARFP) during the APEC Finance Ministers' Meeting in 2015 to boost the regional cross-border investment of mutual funds.[349]

In 2017, Ayannah was listed by IDC as one of the top ten fastest growing fintech companies in the Philippines.[355] Notably six of the top 10 companies were involved in the payments space. This highlights the importance of digital payments in, to and from the Philippines, and the growing potential of mobile commerce. The Associate Vice-President of IDC's Financial Insights notes that "Though the country is still at the early stage of fintech adoption compared to other ASEAN neighbors, fintech in the Philippines need to be more aggressive and move swiftly both locally and regionally. IDC Financial Insights expects that 2018 will be a banner year for Asia-Pacific fintech to regionalize—similar to the journeys of Alipay and Grab—and the ones who will be able to achieve scale and ubiquity."

5.6.3. Health Tourism and Telemedicine

Tourism is closely related to data services, such as online reservations and payments for hotels and airlines. In 2016, "tourism direct gross value added" (TDGVA) to GDP reached PHP1,243.5 billion (USD24 billion) or 8.6% of GDP (Figure 10). Inbound tourism by non-Filipinos and Filipinos living permanently overseas was PHP313.6 billion (USD2.6 billion).[356]

Figure 10: Share of Tourism in GDP
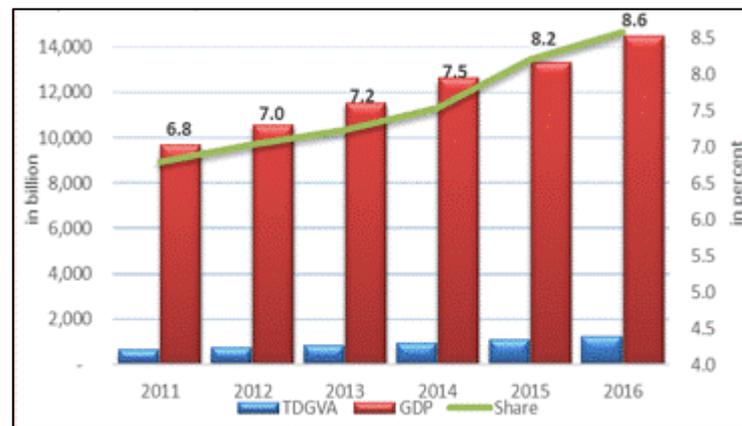
Source: Philippine Statistics Authority [357]

In addition, transport services, some of which are closely related to tourist data, brought in nearly 17% of service export revenues in 2015.[358]

Among the most vibrant sectors of tourism, is health tourism in the Philippines,[359] with on average 100,000 visitors a year, and the Philippines was ranked in 2015 eighth amongst the top 10 health tourism locations globally. 62 hospitals are internationally accredited following a drive to promote medical tourism by the Departments of Tourism, of Health, and by the Department of Trade & Industry—Board of Investment (DTI-BOI). The concept involves a "One Country Package" of places to visit as well as healthcare. By 2014 medical tourism was generating USD145 million.[360]

As a result, both government and the private sector in the Philippines are actively promoting healthcare and health tourism. For example, the Health Research and Development Information Network (HERDIN) has over 40,000 records of health research resources, while the Philippine Health Research Registry (PHRR) is a publicly-available database of ongoing health and health-related researchers from 2011 onwards.[361]

In 2014, the DoH opened a telemedicine system in Boac, Marinduque.[362] The system provides medical consultation and diagnostics through video calls. The telemedicine project is a public-private partnership program of DOH-MIMAROPA with SMC SKY Medical Group in the US. Another satellite-based e-health platform, SATMED, was launched in 2016 by NGO German Doctors.[363] It delivers accessible e-health services to remote communities on the island of Mindanao, enabling German doctors to provide better quality healthcare services when they visit remote villages.

A real-time virtual medical service that connects medical professionals and patients is MyDocNow, a telemedicine service offering everything from video consultations with doctors, comprehensive patient education, remote monitoring from a smartphone device, delivery of prescriptions and medications, lab tests results, and doctor/nurse home visits 24/7 in selected metro areas.[364] MyDocNow has partnered with US-based company Avizia to connect patients to healthcare specialists anywhere in the world. In 2017, through the MyDocNow network, Avizia joined 75 other healthcare organizations to remotely screen 450 pregnant women in the Philippines to identify high-risk pregnancies and to evaluate several thousand children under age five.[365]

Shearwater Health

Shearwater Health is an American company that has gone global in providing healthcare services in the Philippines for its US customers given the shortage of nurses in the US and the high costs of health care in the US. As the company's map of operations shows, the Philippines is a prime location for English speaking medical staff, high accredited hospitals and substantially lower operating costs.[366]

HOW WE PROVIDE A SOLUTION

Shearwater Health brings a unique advantage in the healthcare marketplace due to our Global Healthcare Solutions Model which allows us to partner with and retain the best clinicians in the market.

★ Shearwater Locations
● Shearwater Nurses in U.S. Hospitals
■ Shearwater Outsource Clients
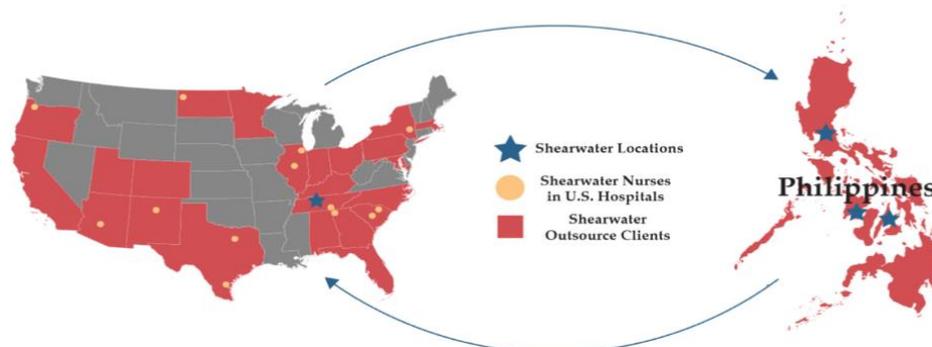
Shearwater uses clinically-certified staff all over the world to meet the needs of healthcare companies in the U.S. We have over 1,700 clinicians in our URAC-accredited facilities in the Philippines that operate in remote teams for our clients. We couple our clinical expertise with Six Sigma business experts and Robotic Process Automation to improve outcomes and lower costs.

Formerly known as HCCA, Shearwater Health, which first invested in the Philippines in 2014 with a facility in Cebu City, opened a Taguig office in 2016. By mid-2017 it employed some 1,500 nurses, pharmacists and physicians. In August 2017 Shearwater Health's CFO and COO met with the Philippines Department of Trade and Industry to commit a USD7 million investment in Iloilo which will raise employee numbers to 3,000).[367] Shearwater Health has two lines of businesses—one for nursing recruitment under HCCA International and another for CPO under HCCA Health Connections. The company has sent over a thousand Filipino nurses to the US since 2000. On the other hand, its outsourcing segment, which accounts for a larger employee base in the Philippines, aims to play the same role as that of nurses overseas without having to leave the country.[368]

On an interesting note, a Shearwater Health blog from 2017 refers to the need to ensure the quality of the data that is generated in the health sector, with specific reference to drug trials, but the point has wider relevance.[369] *The integrity of information, whether about drugs or patients or diagnoses, exchanged across hospitals, clinics and jurisdictions is of paramount importance as the global health industry grows.* Data integrity as well as volume will be a reputational issue for the Philippines, as the discussion above on security and data privacy underscores.

6. Vietnam: Balancing Cybersecurity and the Innovation Economy

6.1. Highlights

- The government of Vietnam plays a key enabling role in driving the digital economy through its (1) National Broadband Plan, (2) promotion of e-commerce, (3) establishing policy on cybersecurity and data protection, and (4) roadmap for the Fourth Industrial Revolution.

- Businesses in Vietnam are leveraging ICTs to better enable business, and participate in cross-border trade. Many companies use cloud computing, social media, e-payments, and smart technologies. Many such technologies are however provided by international providers, which are not hosted in Vietnam, and require the free flow of data into the country to provide their services and tools.

- Vietnam stands to grow its GDP 1% per every 20% spend on ICT, with mobile Internet accounting for 6.2% of GDP and 3.2% of total employment between 2015 and 2020. The government has targeted e-commerce spending to reach USD350 million annually, with B2C revenue rising to USD10 billion and accounting for 5% of all retail spend.

- However, limits on cross-border data flows threaten this growth through negative policies, such as forced data localization, or over onerous and unclear cybersecurity requirements. Forced data localization requirements will lead to a loss of access to international service providers and the ability to reach external markets. Uncertain cybersecurity requirements, particularly those related to data privacy protection, could undermine user and organizational privacy.

- With Vietnam's digital economy still nascent, the government needs to take caution that in its bid to create an enabling and cyber-safe environment, it does not inadvertently restrict and constrain digital economy growth.

6.2. The Digital Economy Position of Vietnam and the Fourth Industrial Revolution

The Vietnamese government has yet to outline specific plans or policies to develop and grow Vietnam's digital economy, although its development of a **Fourth Industrial Revolution roadmap** could be considered a digital economy policy. The Fourth Industrial Revolution, according to the government, will introduce a wave of new technologies "building on the fusion of digital, physical and biological technologies, Internet of Things and artificial intelligence".[370] The steps identified by the Ministry of Information and Communications (MIC) for Vietnam to gear up for the Fourth Industrial Revolution are to:[371]

- Accelerate information infrastructure development;

- Foster information technology application in management;

- Develop value-added information and actively join the global supply chain;

- National-scale modernization to secure inter-regional and inter-sector connectivity and synchronicity;

- Develop policies to fully mobilize resources for infrastructure development;

- Create a favorable legal environment for tech application-development and infrastructure development;

- Prioritize high-quality human resources development investments;

- Conduct technology R&D to produce competitive products and services;

- Improve infrastructure system capacity to meet information exchange needs, ensure information security and national sovereignty in cyberspace; and

- Improve public awareness of the Fourth Industrial Revolution.

The Ministry of Science and Technology (MOST) has been tasked to take responsibility and coordinate with MIC and the Ministry of Education and Training (MOET) to design a roadmap for Vietnam to embrace the Fourth Industrial Revolution. This opens opportunities in cross-border services, where local companies and businesses can benefit from greater access to more advanced digital tools and information, as well as access to new markets to compete directly against multinational corporations.[372]

Apart from its aspirations to embrace the Fourth Industrial Revolution, the government is also guided by economic development plans including **the Socio-Economic Development Strategy (SEDS) 2011–2020**, the **Socio-Economic Development Plan (SEDP) 2016–2020**, and **Economic Reform Plan 2016–2020** where it aims to elevate Vietnam as an industrialized country by 2020. The **E-commerce Development Plan 2011–2015** was crucial for the successful development of the e-commerce sector in Vietnam. In 2015, B2C sales were worth USD4.1 billion (2.8% of total retail sales and consumption services revenue nationwide), and are expected to more than double by 2020 to reach USD10 billion.[373]

6.3. Building Digital Foundations: E-Commerce, E-Services, Infrastructure, Cybersecurity

6.3.1. Supporting E-Commerce Development

To foster its growth in Vietnam, the **E-commerce Development Plan 2016–2020** was approved by the Prime Minister in 2016.[374] Targeting 30% of the population engaging in e-commerce and spending USD350 annually, revenue from B2C commerce is expected to increase to USD10 billion and to account for 5% of total retail spending by 2020. Further, online B2B is expected to account for 30% of total export turnover over the same time frame. Cross-border e-commerce is expected to account for 15% of export turnover.[375]

6.3.2. Enabling E-Citizen Services

Leading by example, the government has identified **e-citizen service targets** for all public services from ministries and central authorities to update their websites with relevant information, allow citizens to download more information, and enable citizens to submit documents online and conduct related transactions by 2016.[376] Additionally, by 2020, 50% of public services related to exports should also allow citizens to pay online, and provide delivery services, with the same offerings provided for by 30% of public services relating to commercial and business activities.[377] Leveraging ICT tools and services offered by online platforms, global e-payments and logistic providers will better enable the government to reach its goals.

6.3.3. Improving Infrastructure and Strengthening Cybersecurity

Apart from the E-commerce Development Plan, the government is also laying the foundation to support the digital economy through its **National Broadband Plan 2020** (for rolling out the necessary infrastructure nationwide),[378] and the **Law on Network Information Security** (to provide, among other things, assurances on the safety and security of cyber-information and protection of personal information).[379]

6.3.4. Further Support Needed

Despite these changes, local industry has still called the government out for a perceived lack of support in growing the digital economy. Leading members of the Viet Nam Private Sector Forum (VPSF), have called out the government for the lack of a digital economy policy and encouraging new digital technology-enabled companies.[380] To prepare Vietnam to better participate in the future digital economy, the

government is also being called on by the head of the VPSF's working group on digital economy to provide more incentives for the software industry and the development of hi-tech zones. [381]

Given that the development of Vietnam's e-service and e-payments capabilities are as focused on cross-border enablement as on domestic enablement, with foreign investment and export income continuing to drive much of the growth of the Vietnamese economy, the VPSF further suggested that the government should improve efforts to create an e-payments infrastructure and encourage use away from cash, as well as to promote e-contracts for electronic transactions.[382]

6.4. Vietnam's Digital Economy Drivers and Opportunities

6.4.1. Smart Business and Going Online

While Vietnam is still at an early stage of its digital economy development, what is apparent is the tremendous potential for industry to embrace the use of Internet and web technologies, such as cross-border e-commerce, social media, cloud computing, and smart technologies. Vietnam's economy is starting to see the benefits from increased technological and Internet adoption across early adopters in different sectors.

Box 5: Examples of early adopters benefiting from Internet adoption

Dai Hoang Braised Fish: In Nhan Hau village in northern Ha Nom province, fishing businesses created a website in 2009 to showcase and promote their braised fish which were prepared for 12–14 hours in traditional earthen pots. As the village was unsuitable for rearing farm animals, the villagers poured their skills into making braised fish using a mix of delicious and aromatic spices. Through the website, other citizens in Vietnam were able to come to know of the fish.[383] Those who tried it ended up coming back for more, where about 1,500 kg of fish is sold each day. Although once one of the poorest villages in the region, the Nhan Hau village is now thriving with those involved in fishing having raised their revenues by 50% since they started the website in 2009.[384]

Smart Cantaloupe: Since December 2015, the Agricultural High-Tech Park of HCM City (AHTP) has been working with Quang Trung Software City and Global CyberSoft Vietnam on a SmartAgri project to improve cantaloupe produce. SmartAgri is an agriculture production management system which employs the use of IoT, big data analytics and cloud computing to help collect and analyze the information about the temperature, moisture, light, and pH automatically through sensors from nursery through to harvest and preservation. The environmental conditions are then standardized for optimal production. Other features include a real-time alert system via SMS, email and alarm and analysis of quantity and quality of production. SmartAgri also aims to create an open ecosystem for farmers, distributors, and buyers to exchange information and experience. The project has seen cantaloupe output rising by up to 10%, with consistent results in terms of both quality and weight.[385]

It thus remains important that as the government continues to foster Vietnam's emerging digital economy its regulations and policies continue to develop an enabling environment without restricting the free movement of data, which may otherwise inadvertently restrict and constrain Vietnam's digital economy growth.

6.4.2. Mobile Internet and Smartphone Adoption

Vietnam's digital economy will be primarily **driven through mobile Internet and smartphone use.** In mid-2017, 46.5% of the Vietnamese population was online, with mobile broadband subscription penetration rates of 46.6%, and 60 million smartphone users. Whilst this does not mean all Vietnamese who go online does so using a mobile broadband subscription,[386] it does imply a heavy concentration of mobile broadband users.

As is the case with most emerging economies, Internet access is not so much "mobile-first" but "mobile-only", where consumers' first (and often, only) contact with the digital economy is via mobile Internet through smartphones. In Vietnam, smartphone access to the Internet has accelerated as mobile broadband and Wi-Fi costs are comparatively much more affordable to traditional PCs and fiber subscriptions.

Vietnam's mobile Internet is forecast to contribute at least USD5.1 billion between 2015 to 2020 to the economy, accounting for 6.2% of the country's GDP, well ahead of other traditional industries such as financial services, construction, or hotels and accommodation.[387] During the same period, mobile Internet

technologies will create an additional 146,000 jobs, contributing 3.2% of total employment.[388] According to the Vietnam Chamber of Commerce and Industry (VCCI) Standing Committee, ICT-related work creates 5–7 relevant jobs, while every 20% increase in ICT investment leads to 1% growth in national GDP.[389]

Mobile Internet in Vietnam is thus rapidly becoming a leading contributor to growth and employment, driving growth through two main channels:

- **increasing labor productivity**, with workers able to produce more goods and services, through more accessible, timely and consistent engagement; and

- **increasing labor force participation rates**, with more people finding jobs in the formal labor market, resulting in higher employment and output.[390]

Additionally, unfettered access to international data also opens avenues for **education opportunities** and **ongoing skills and knowledge acquisition**, from simple online research opportunities to more formal e-learning platforms such as Khan Academy and Coursera, or local platforms such as GiapSchool and Topica.

Box 6: GiapSchool—Promoting free and accessible learning

GiapSchool is an online education platform launched in 2013 to provide free, open online courses for local users.[391] GiapSchool offers users the flexibility to attend courses at their own convenience using their PCs or smartphones anywhere, and at any time. Students are not only able to listen to lectures, but can also interact with other students and lecturers—an important component founder Dr Giap believes is missing in prior e-learning ventures. [392]

GiapSchool appeals to local users as it provides a wide range of courses in the Vietnamese language, as many may not be as comfortable taking such courses from international massive open online courses (MOOCs) offered in English. As GiapSchool is self-funded, it relies heavily on the support and resources from international and local volunteers to help provide international course material which may be translated into Vietnamese, as well as to help teach courses on subjects they are familiar in.

However, while Vietnam's general population has been swift to embrace mobile Internet use for entertainment, news, social media, and so on, its private sector business still lags in terms of digital transformation. Local experts from the Vietnam Private Sector Forum (VPSF) estimated in 2017 that only 1.7% of local businesses were involved in the digital economy and that they contributed less than 5% to GDP.[393] Participants point to a lack of awareness in how to adopt ICT tools to aid traditional businesses, the absence of open Internet platforms for information sharing and matching suppliers and, crucially, affordable, accessible, and fast Internet services.[394]

6.4.3. Digital Content Creation

The digital content industry is another growth area for Vietnam, where the unfettered flow of data allows content creators to reach global scale. The industry encompasses content such as education, entertainment and content for mobile devices, and over 2008-2014 saw revenues increase from USD480 million to USD1.4 billion, with a yearly growth rate of about 20%, attracting over 4,500 enterprises, and creating 70,000 jobs.[395]

One example of the scale and scope of growth that free flow of data could afford Vietnam's digital content industry is the mobile app game, Flappy Bird, developed by Vietnamese developer Dong Nguyen. At the height of the app's popularity, the game was making USD50,000 a day from in-app ads as the game went viral, and was downloaded throughout the world.[396]

6.5.   Vietnam's Regulatory Framework: Not Yet Open

6.5.1.   Data Privacy and Law on Network Information Security

The Law on Network Information Security was passed in November 2015, and came into effect on 1 July 2016. [397] The Law imposes many restrictions and conditions to regulate online activities for the safety and security of cyber-information such as: the protection of personal information in the network environment; protection of information systems and infrastructure; production, trading, and use of civil ciphers; standards and technical regulations on information security; provision of information security services; prevention of spam, computer viruses, and harmful software; and emergency responses.[398]

Importantly, in the absence of a general data privacy law, the Law on Network Information Security provides, amongst other things, contains a definition of personal information and set of articles presenting principles of data privacy protection, regulations on the collection, use, revision, removal of private information along with responsibilities of the government to protect private data. Together with the **Law on E-Transactions**, the **Law on Information Technology**, the **Law on Protection of Consumer Rights**, **Decree 52/2013/NĐ-CP on E-Commerce**, and **Decree 72/2013/NĐ-CP on Management, Provision and Use of Internet Services and Online Information**, the Law on Network Information Security expressly requires consent from the owner of the personal information before processing (includes collecting, editing, utilizing, storing, providing, sharing or spreading) of personal information.[399] Further, the processor of personal information shall be responsible for the security of the said information and should publish the policy of use and protection for the processed information.

Despite setting out to provide greater personal information privacy, the Law on Network Information Security contains a number of conditions on "civil cryptography", such as the need for licenses for businesses which provide civil cryptographic, and network information security, products and services, as well as cooperating with the government to allow access to encrypted information.[400] The lack of clarity on which services would fall under the law, and the extent to which providers need to provide backdoor access could undermine user and organizational privacy in Vietnam.

6.5.2.   Decree 72: Potential Losses from Data Localization

Perhaps the greatest threat to Vietnam's potential to benefit from cross-border data flows comes from **2013's Decree 72/2013/NĐ-CP on Management, Provision and Use of Internet Services and Online Information**. Decree 72 imposes requirements on IT companies (including online social networks, general information websites, mobile telecoms network-based content services and online games services) to establish at least one server inside the country "serving the inspection, storage, and provision of information at the request of competent state management agencies".[401]

In December 2016, the MIC issued **Circular No. 38/2016/TT-BTTTT, one of the implementing circulars of Decree 72**, providing detailed regulations on the cross-border provision of public information. Providers of such content who (a) have more than 1 million visits from Vietnam per month, *or* (b) lease a data center to store digital information in Vietnam to provide services, are required to register a name, address, and contact point with the MIC. They are also required to implement content restrictions related to national and social security.[402]

This could ultimately lead to a loss in ability to access advanced tools and services of international providers if they are restricted to operate in Vietnam. Effectively a form of mandatory data localization, it has been estimated by the Global Commission on Internet Governance that Decree 72 could lead to losses of 0.24% in real GDP in the medium-to long-term.[403] An earlier report estimated that losses could total 1.7% in GDP, 3.1% in domestic investments, and USD1.5 billion in consumer welfare losses.[404]

6.5.3.   Taxing the Digital Economy

While the Vietnamese government has not officially announced a regime on taxation of the digital economy, it has indicated that it is studying the OECD's "BEPS Actions 1 on the Tax Challenges of the Digital Economy" with the intention to develop a set of regulations to tax the income derived from

Vietnam by digital companies.[405] Early businesses targeted include social media, and those from the accommodation and ride sharing sectors.

The Ho Chi Minh City tax authority has also proposed taxing users who earn over USD4,000 a year doing business through Facebook, and sent them letters to file and pay taxes.[406] Similarly, the Ministry of Finance (MOF) has issued official guidance on payment obligations of foreign companies with respect to the commission income earned conducting business in online hotel room booking services in Vietnam.[407] The MOF has also sent an official letter to Uber in Vietnam and the entities delegated by Uber in the Netherlands to declare and pay due taxes on behalf of Uber in the Netherlands.[408]

6.6.   Sector Case studies

6.6.1.   Healthcare: Digitization Enabling Remote Healthcare Services

While healthcare in Vietnam has been improving since the 1960s (following the Vietnam War), it remains a largely underfunded sector, with the government only investing 14% of GDP into health in 2014, according to the World Health Organization (WHO).[409] Hospitals in major cities like Hanoi and Ho Chi Minh are overcrowded, medical equipment is outdated, and staff strength remains low.[410] Further, public hospitals still heavily rely on state budgets to upgrade facilities. Further from the larger cities, the numbers of doctors, healthcare services, and facilities available falls significantly. Vietnamese patients often end up traveling long distances to receive treatment.[411]

The Vietnamese government is now working towards improving healthcare and has approved a national masterplan to develop and modernize the healthcare network.[412] Among other things, the masterplan targets 25 hospital beds, eight physicians, and two pharmacists to be available for every 10,000 people by 2020.[413] The Ministry of Health (MoH) has also announced a national health insurance plan to cover 80% of the population by 2020.[414] Most ambitiously, in 2017 the government announced a VND5 trillion (USD220 million) investment to create a system of electronic medical records to be shared by healthcare providers across all 63 cities and provinces.[415]

Allowing a free flow of data allows health providers to access the latest and most advanced tools, where for example the use of cloud computing helps save on upfront IT investments and allows such businesses to focus on key business aspects. It is within this context that we have seen the emergence of online solutions such as ViCare, which immediately address the need and connect patients who require health information or available and accessible services, with local available practitioners.

ViCare

Launched in early 2016, ViCare was founded by Pham Anh Duc, formerly marketing director of Lazada Vietnam, to address the gap in reliable healthcare information and access to suitable medical facilities or doctors. The Vietnamese-language site is a web and app platform where users can ask questions, share health problems, get answers from medical practitioners, search for medical information, get discounts from listed providers and services, and search the comprehensive database to find doctors and medical facilities near them.

Leveraging cloud services has allowed ViCare to save capital upfront and expand far faster than would have been the case if they had had to invest in on-premise hardware and IT staff. The use of cloud services was vital in ViCare's expansion in terms of increasing the number and type of services it could provide, as well as handling the growing number of visitors to the site. After six months of live use, ViCare listed over 19,000 healthcare facilities, with 20,000 doctors in its database, attracting over 200,000 website visits a month.

Constraining ViCare's use of global cloud services would have limited its ability to provide services quickly and affordably, without investing heavily into local hardware and servers. In addition, it is notable that ViCare's venture capital funding came from companies based in Japan (CyberAgent Ventures) and Singapore (Pix Vine Capital), following initial angel funding. Without quick scalability for success, public awareness and use of ViCare may not have grown at the pace it did, and may have limited the ability of international venture firms to invest into ViCare, or acknowledge its potential expansion opportunities.

6.6.2. Transportation: Faster, Efficient, and Accurate E-commerce Deliveries

The transport industry plays a key role in supporting services such as trade and logistics. With the government aspiring for cross-border e-commerce to grow to account for 15% of export turnover, it needs to ensure that investments into transportation networks remain forthcoming to support the envisioned growth.[416]

Logistics services must therefore keep pace with e-commerce growth to ensure purchases are fulfilled in a timely and efficient manner, where the speed of delivery is important for both customers and merchants. According to Nguyen Hoa Binh, Group-CEO NextTech (formerly PeaceSoft Group) a leading e-commerce, payments, and fulfillment company, the expenses on freight and forwarding, warehousing and logistics in Vietnam amounted to USD25 billion in the first quarter of 2014, or 21% of Vietnam's GDP.[417] Transportation accounts for an average 7.6% of e-commerce value.[418]

The number of freight forwarders in Vietnam has increased in recent years, with hundreds of different companies now supplying such services. Many providers rely on international platforms for payments, route optimization, and communicating more efficiently. However, logistic companies in Vietnam frequently cite the relatively **underdeveloped transport infrastructure** as a major challenge in Vietnam, with warehouses and container freight stations often located far from either ports or manufacturing plants.[419] **Traffic congestion** is another major problem, where the pace of transport infrastructure investments has not kept pace with the growth of industrial parks. In the Northern provinces, infrastructure is even less developed compared with the South, where traffic and port congestion often lead to delays in transporting cargo. This impedes the delivery of imported parts and components among other things, and results in **higher inventory carrying costs** for manufacturers, which may end up eventually raising prices for consumers.[420]

To stand out among such fierce competition, transportation companies are looking for innovative ways to differentiate their services and provide more value-add for users rather than engage in price wars. One such local company is sShip, which is fast gaining an edge through the use of cloud computing, and Google Maps services.

sSHip

sShip is a logistics company which provides shipping and transportation services. sShip relies on the use of global technologies, including Google Maps and cloud technologies, to optimize routes and communication lines between clients.

Using its smartphone app, sShip connects clients with its transportation partners where orders are delivered within 45 mins of being received. In order to facilitate the cash heavy Vietnamese economy, sShip services are cash-on-delivery.

Recognizing the rapidly growing number of mobile Internet users in Vietnam, and the booming e-commerce industry, sShip targets the need for improved transportation of goods by connecting users who wish to transport goods with people with available vehicles. Users who wish to ship an item using sShip's service need only key in their pick-up location and delivery address; sShip will then connect them with its closest available "partner". sShip's partners are comprised of local drivers who use the sShip app to inform them where to pick up and deliver goods, with Google Maps providing the fastest routes to

take. The combined use of Google Maps and cloud services means sShip's partners can work anywhere and anytime on the go as long as they have an Internet connection.

Restricting data flows would immediately cripple sShip's ability to use Google Maps and international cloud technologies which has been the key differentiator for sShip's business.
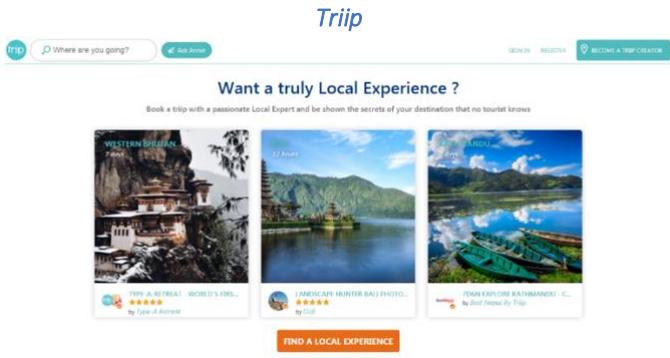
6.6.3. Tourism: Enabling Crowdsourced Travel Planning

In 2016, Vietnam set a number of new records in its tourism sector, welcoming a record 10 million international tourists, 62 million domestic tourists, and earning VND400 trillion (USD17.6 billion).[421] Tourism is one of the fastest-growing sectors in Vietnam despite only taking shape in the early 1990s, and in 2016, contributed 9.1% to GDP, and 7.3% to total employment.[422] Over the same period in 2016, visitor exports generated VND184,811 billion (USD8.3 million), or 4.5% of total exports in the country, while investment in the sector totaled VND121,565 billion (USD5.5 billion), or 9.9% of total investment in country.

Thus, it was little surprise that Vietnam topped the United Nation's World Tourism Organization (UNWTO)'s World Tourism Barometer Index in Asia as the fastest growing tourism destination for the first four months of 2016.[423] Ranked seventh in the world, Vietnam was the only country in Southeast Asia to make the top 10.[424]

Many tourists plan their trips months in advance through online research. Through the free flow of data and information on the Internet, tourists are able to find out more about their destination, reserve and pay for airline tickets, and book local accommodation online.

Recognizing this potential and the wide range and diversity of tourism activities that could be organized in Vietnam, such as cultural tours, backpacking, nature hikes, beaches, outdoor adventures, and photography, Triip was founded upon that idea that such unique activities could be crowdsourced by locals who were experts in their own backyards, and would curate, update and respond to such information in a far more timely and agile fashion than other curated commercial operation.

Triip

Triip is a Vietnamese startup founded in 2013 to match tourists—both international and local—with local "tour guides" who create local itineraries and experiences based on their own ideas. These itineraries are made available on web and app for travelers from around the world to discover, book, enjoy, and review.

Triip allows locals to become Triip Creators and create their own customized tour itineraries to share their passions and local culture with others, earn extra income, and crucially for the local sector, expand consumption into the local economies, and most importantly, generate return visits—something that Vietnam tourism had previously been struggling with. Triip operations used data analytics to improve its returns: both financial and physical return trips from repeat tourists to Vietnam.

Triip began its journey in Vietnam before expanding to Southeast Asia, and is now available in over 600 cities around the world boasting over 6,000 local guides – but its success is only possible if there are no restrictions on the flow of data from host destinations and international audiences. The ability of Triip to connect people from around the world and discover new and exciting experiences is only possible through the use of the Internet and cross-border data flows which enable interested travelers to search for and discover unique tour packages in other parts of the world, and for Triip Creators to be able to post their own itineraries to share with people from all over the world.

7.   Recommendations

Certain features of development stand out across the five economies under review. For example, both non-traditional *and* traditional sectors stand to benefit from digitization of the economy—the emergence of the digital economy—and concomitantly, the enablement of cross-border data flows. Recognizing that these two developments are synergistic and will develop hand-in-hand, the potential losses will amount to billions of dollars *in the short term* if the free flow of data is stymied by restrictive data policies.

Indeed, existing policies that support the development of lead sectoral opportunities in each economy should be strengthened, such as health services and BPOs in the Philippines, where they are major generators of data transfers and of international revenues and of employment.

Second, infrastructural barriers are limiting growth potential in the immediate term, as seen from the exponential data demand growth over the last five years; accelerated progress in technical infrastructure is therefore recommended, and this is true for both enabling mobile access and fixed-line backbone support. (Capacity limitations stand to limit growth potential in the longer term if left unaddressed.)

Third, digital policies are often viewed from a prescriptive or risk-management lens, but regulators need to move from this stance to one which enables the economy, by enabling cross-sectoral compliance and cross-jurisdictional interoperability if they are to move to not limit growth. Current approaches are all too often neither seamless nor coordinated. Thus, for example, Indonesia's proposed e-commerce taxation law has been announced at the same time as a carve out for not taxing e-commerce on social media platforms, creating both loopholes and uncertainty in application.

Indeed, digital economy plans are still all too often siloed. To address this a holistic approach to policy design and regulatory coordination is strongly recommended. Negative examples in the region include Indonesia's, so-called "data localization law", Government Regulation 82, and Vietnam's Decree 72. Positive approaches include the Philippines' Cloud First Policy.

7.1.   Regulatory Principles for Cross-border Data Flows

Governments should therefore base regulations and policies that impact cross-border data flows on the following nine principles:

1.   Regulations and policies should be risk-based rather than prescriptive, so as to enable innovation while ensuring adequate protective measures and regulatory oversight.

2.   Regulations and policies, where necessary, should be targeted to address specific and identified risks, rather than impose blanket data localization restrictions.

3.   Regulations and policies should be technology-neutral and sufficiently flexible to enable application of rules regardless of new technologies or changes in market conditions and business models.

4.   Regulations and policies should be non-discriminatory as to the geographic location of the headquarters of a business.

5.   Regulations and policies should generally be non-discriminatory as to the size of a business.

6.   Regulations and policies should be evidence-based and should clearly describe both the objectives and the underlying principles, preferring light touch regulation to enable competitive markets.

7.   Given the cross-sector aspects of regulating data, governments should reduce opportunities for regulatory silos aligned with ministry authorities and advance cross-sector regulatory frameworks.

8.   Regulations should be developed in a transparent process with input from all stakeholders, addressing innovation in technologies, potential impacts and opportunities.

9.   Privacy laws should be principles-based and aligned with the APEC Privacy Principles to encourage international alignment of data protection laws.

8.   References

[1] McKinsey Digital Globalization: The New Era of Global Flows, www.mckinsey.com/business-functions/digital-mckinsey/our-insights/digital-globalization-the-new-era-of-global-flows

[2] Deloitte Access Economics (2015) SMEs powering Indonesia's success, www2.deloitte.com/id/en/pages/financial-advisory/articles/smes-powering-indonesia-success-report.html

[3] E27 (2016) Indonesia plans to produce 1,000 technopreneurs by 2020 - here's how, https://e27.co/indonesia-plans-to-produce-1000-technopreneurs-by-2020-heres-how-20160415

[4] ITIF (2017) Cross-Border Data Flows: Where Are the Barriers, and What Do They Cost?, www2.itif.org/2017-cross-border-data-flows.pdf?_ga=2.82033430.1239947248.1512963476-1627451021.1503666005

[5] Information Technology Act 2000, http://meity.gov.in/content/information-technology-act-2000

[6] Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules 2011, http://meity.gov.in/content/information-technology-act-2000

[7] Section 4 provides: "No person shall take or cause to be taken out of India any public records without prior approval of the Central Government: provided that no such prior approval shall be required if any public records are taken or sent out of India for any official purpose"; The Public Records Act 1993 (Act No. 69 of 1993) http://lawmin.nic.in/ld/P-ACT/1993/The%20Public%20Records%20Act,%201993.pdf

[8] India's Department of Science and Technology, "National Data Sharing and Accessibility Policy," www.dst.gov.in/sites/default/files/nsdi_gazette_0.pdf

[9] Thomas K. Thomas, "National Security Council Proposes 3-Pronged Plan to Protect Internet Users," The Hindu Business Line, February 13, 2014, www.thehindubusinessline.com/info-tech/national- securitycouncil-proposes-3pronged-plan-to-protectinternet-users/article5685794.ece

[10] USTR, The 2017 National Trade Estimate report.

[11] Ministry of Electronic and Information Technology (MeitY) (2017) Guidelines for Government Departments on Contractual Terms Related to Cloud Services, http://meity.gov.in/writereaddata/files/Guidelines-Contractual_Terms.pdf

[12] Stephen Mathias and Naqeeb Ahmed Kazia, "Collection, Storage and Transfer of Data in India," Lexology, February 8, 2017, www.lexology.com/library/detail.aspx?g=00e56cb6-b0ea-46b7-ab1b- 1d52de3646d0; "India Companies (Accounts) Rules 2014" (to be published in the Gazette of India, Government of India Ministry of Corporate Affairs, New Delhi, March 2014), http://perry4law.org/clii/wp-content/uploads/2014/03/Companies-Accounts-Rules-2014.pdf

[13] Government Regulation No. 82 of 2012 regarding Provisions of Electronic Systems and Transactions (GR82)

[14] Law No. 11 of 2008 regarding Electronic Information and Transactions (EIT Law) as amended by Law No. 19 of 2016 regarding the Amendment of EIT Law (EIT Law Amendment)

[15] Minister of Communications & Informatics Regulation No. 20 of 2016 regarding the Protection of Personal Data in an Electronic System. This regulation implements one of the provisions of Government Regulation No. 82 of 2012

[16] Minister of Communications & Informatics Regulation No. 20 of 2016 regarding the Protection of Personal Data in an Electronic System defines electronic system organizers as every person, state official, business entity and or society who provides, manages and/or operates an electronic system individually or jointly to use for their purposes or the purposes of another party.

[17] Regulation by the Financial Services Authority No.38/POJK.03/2016 on implementation of risk management in the use of information technology by commercial banks

[18] Regulation by the Financial Services Authority No.69/POJK.05/2016 on business operations of insurance companies, Syariah insurance companies, re-insurance companies and Syariah re-insurance companies

[19] Bank Indonesia Regulation No.19/10/PADG/2017 on the National Payment Gateway

[20] Personal Information Protection Commission, Japan (2016) Amended Act on the Protection of Personal Information, www.ppc.go.jp/files/pdf/Act_on_the_Protection_of_Personal_Information.pdf

[21] Resolution No. 2115 of 2015 - Amendments in the Manual of Regulations for Banks and Manual of Regulations for Non-Bank Financial Institutions on the guidelines on outsourcing

[22] European Centre for International Political Economy (ECIPE) M. F. Ferracane (2017) Restrictions on Cross-Border Data Flows: A Taxonomy, http://ecipe.org/app/uploads/2017/11/Restrictions-on-cross-border-data-flows-a-taxonomy-final1.pdf p. 23

[23] VNNIC (2013) Decree No. 72/2013/ND-CP on Management, Provision and Use of Internet Services and Online Information, https://vnnic.vn/sites/default/files/vanban/Decree%20No72-2013-ND-CP.PDF

[24] Circular No. 38/2016/TT-BTTTT is one of the implementing circulars of Decree 72

[25] Baker & McKenzie (2017) MIC to Require Select Offshore Service Providers of Online Content to Comply with Local Content Restrictions, www.bakermckenzie.com/en/insight/publications/2017/03/mic-to-require-select-offshore-service-providers/

[26] EU-Japan Center for Industrial Cooperation (2017) How Digital Trade Can Support Business: Towards an Open and Fair Business Environment, www.eu-japan.eu/sites/default/files/imce/seminars/2017-03-20-CeBIT/20170320-cebitreport.pdf

[27] X. Hoa (2017) Vietnam lays out plans for Fourth Industrial Revolution, https://e.vnexpress.net/news/business/vietnam-lays-out-plans-for-fourth-industrial-revolution-3580861.html

[28] Imarticus Learning and NASSCOM (2017) Analytics Employment Landscape in India, https://imarticus.org/wp-content/uploads/2017/04/Industry-Report-Analytics-2017.pdf

[29] ITIF (2015) Cross-Border Data Flows Enable Growth in All Industries, www2.itif.org/2015-cross-border-data-flows.pdf

[30] Make in India Towards Smart Manufacturing: Industry 4.O and India, www.makeinindia.com/article/-/v/towards-smart-manufacturing-industry-4-0-and-india

[31] IBEF (2017) Healthcare in India, www.ibef.org/download/Healthcare-January-2017.pdf

[32] Eric Quincieu (2015) Agriculture, Natural Resources, and Environment Sector Assessment, www.adb.org/sites/default/files/publication/177036/ino-paper-08-2015.pdf

[33] Jeffrey Bahar (2017) E-commerce in Indonesia, slide 11 www.slideshare.net/jeffreybahar/jeffrey-bahar-spire-workshop-day-2-03-may2017-at-gates-bali?ref=https://aseanup.com/insights-trends-e-commerce-indonesia/

[34] Alibaba Cloud (n.d.) Tokopedia Case Study, www.alibabacloud.com/customers/tokopedia

[35] Ministry of Health, Labor and Welfare (2015) Japan Vision: Health Care 2035, www.mhlw.go.jp/seisakunitsuite/bunya/hokabunya/shakaihoshou/hokenriyou2035/future/en/

[36] Japan aims to achieve a fiscal surplus by FY 2020.

[37] PYMNTS.com (2017) Japanese Smartphone Users Warming Up To Digital Payments, www.pymnts.com/news/mobile-payments/2017/japan-smartphone-users-mobile-pay/

[38] The Government of Japan (2017) Drive Innovation and Trade, www.japan.go.jp/abenomics/innovation/index.html

[39] BraveNewCoin.com (2017) Bitcoin regulation overhaul in Japan, https://bravenewcoin.com/news/bitcoin-regulation-overhaul-in-japan/

[40] ASEAN Briefing (2017) Business process Outsourcing in The Philippines, www.aseanbriefing.com/news/2017/04/17/business-process-outsourcing-philippines.html

[41] Inquirer.Net (2016) IT-BPO Industry Grows as Second Largest Source of Income for PH, http://business.inquirer.net/209531/bpo-industry-grows-second-largest-source-income-ph

[42] Inquirer.Net (2017) OFW remittances up 5.5% to $2.3B in May, http://business.inquirer.net/233394/ofw-remittances-5-5-2-3b-may

[43] Ayannah, www.ayannah.com/services/

[44] eHealth PH, www.ehealth.ph/index.php/about-ehealth

[45] WHO (2017) Viet Nam, www.who.int/countries/vnm/en/

[46] Export.gov (2017) Vietnam – Healthcare, www.export.gov/article?id=Vietnam-Healthcare

[47] PwC (2014) The Vietnamese healthcare industry: moving to next level, www.pwc.com/vn/en/advisory/deals/assets/the-vietnamese-healthcare-industry-moving-to-next-level-pwc-vietnam-en.pdf

[48] Hanoi Times (2015) E-commerce makes great contribution to Vietnam's growth, http://hanoitimes.com.vn/economy/2015/09/81e097fa/e-commerce-makes-great-contribution-to-vietnam-s-growth/

[49] World Travel & Tourism Council (2017) Travel & Tourism, Economic Impact 2017 Vietnam, www.wttc.org/-/media/files/reports/economic-impact-research/countries-2017/vietnam2017.pdf

[50] Mckinsey&Company (2016) Unlocking Indonesia's Digital Opportunity, www.mckinsey.com/indonesia/our-insights/unlocking-indonesias-digital-opportunity

[51] According to statistics from the Prime Minister's Official Residence, 92.5% of all diseased people want a job, and 65.1% of women want to continue working while raising children. Council for the Realization of Work Style Reform (2017) The Action Plan for the Realization of Work Style Reform, www.kantei.go.jp/jp/singi/hatarakikata/pdf/The_Action_Plan_for_the_Realization_of_Work_Style_Reform.pdf

[52] Hodaka Nakanishi (2016) Economic Impact of Telework in Japan, http://worldcomp-proceedings.com/proc/p2016/EEE3704.pdf

[53] Up from 4% in 2015. The Wall Street Journal (2015, Japan Saying Sayonara to Long Hours at the Office, www.wsj.com/articles/japan-saying-sayonara-to-long-hours-at-the-office-1448511351

[54] Voice of Vietnam (2017) Growing a digital economy in Vietnam, http://english.vov.vn/economy/growing-a-digital-economy-in-vietnam-355757.vov

[55] Government of India (2015) Digital India, www.mygov.in/group/digital-india/

[56] MeitY (2013) Government of India's GI Cloud (MeghRaj) Strategic Direction Paper, http://meity.gov.in/writereaddata/files/GI-Cloud%20Strategic%20Direction%20Report%281%29_0.pdf

[57] Reserve Bank of India (2016) Withdrawal of Legal Tender Status for 500 and 1000 Notes: RBI Notice, https://rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=38520

[58] Government of India (2017) IndiaStack, http://indiastack.org/about/

[59] Government of India (2014) Make in India, www.makeinindia.com/about

[60] Government of India (2016) Aadhaar Card, www.aadhar-card.com/

[61] Big data analytics, blockchain, Internet of Things (IoT), and artificial intelligence (AI).

[62] Deloitte (2015) Digital India: Unleashing Prosperity, www2.deloitte.com/content/dam/Deloitte/in/Documents/technology-media-telecommunications/in-tmt-tele-tech-2015-noexp.pdf

[63] McKinsey Digital Globalization: The New Era of Global Flows, www.mckinsey.com/business-functions/digital-mckinsey/our-insights/digital-globalization-the-new-era-of-global-flows

[64] Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules 2011, http://meity.gov.in/content/information-technology-act-2000

[65] Nicholson (2011) New Indian Privacy and Data Security Rules, www.sourcingspeak.com/2011/06/new-indian-privacy-and-data-security-rules--ambiguity-creates-uncertainty.html

[66] ITIF (2017) Cross-Border Data Flows: Where Are the Barriers, and What Do They Cost?, www2.itif.org/2017-cross-border-data-flows.pdf?_ga=2.82033430.1239947248.1512963476-1627451021.1503666005

[67] IBEF (2017) About Indian Economy Growth Rate & Statistics, www.ibef.org/economy/indian-economy-overview

[68] Government of India (2015) Digital India, www.mygov.in/group/digital-india/

[69] Morgan Stanley (2017) India's Digital Future, www.morganstanley.com/ideas/digital-india

[70] MeitY (2016) IoT Policy Document, http://meity.gov.in/sites/upload_files/dit/files/Draft-IoT-Policy%20(1).pdf

[71] CISCO (2015) Opportunities for India in the Digital Economy, www.cisco.com/c/en_in/about/thought-leadership/opp-digital-economy.html

[72] NASSCOM (2017) The IT-BPM Industry in India 2017: Strategic Review, http://nasscom.in/knowledge-center/publications/it-bpm-industry-india-2017-strategic-review

[73] Deloitte (2015) Digital India: Unleashing Prosperity, www2.deloitte.com/content/dam/Deloitte/in/Documents/technology-media-telecommunications/in-tmt-tele-tech-2015-noexp.pdf

[74] Deloitte Digital India: Unleashing Prosperity, www2.deloitte.com/content/dam/Deloitte/in/Documents/technology-media-telecommunications/in-tmt-tele-tech-2015-noexp.pdf

[75] Private investment is investment regarding Internet related technologies.

[76] Public expenditure is the Internet spending by the government for consumption and investment.

[77] Private consumption is the online purchase of goods and services by individuals.

[78] Trade balance refers to exports and imports of goods, services, Internet equipment, B2B, and B2C.

[79] BCG & IAMAI (2015) India@Digital Bharat. Creating a $200 Billion Internet Economy, https://timedotcom.files.wordpress.com/2015/04/file180687.pdf

[80] IAMAI & IMRB (2016) Internet in India, http://bestmediainfo.com/wp-content/uploads/2017/03/Internet-in-India-2016.pdf

[81] ICRIER (2017) Estimating the Value of New Generation Internet Based Applications in India, www.communicationstoday.co.in/images/reports/20170717-ICRIER-report-Estimating-the-impact-of-new-generation-apps-in-india.pdf

[82] ICRIER (2017) Estimating the Value of New Generation Internet Based Applications in India, www.communicationstoday.co.in/images/reports/20170717-ICRIER-report-Estimating-the-impact-of-new-generation-apps-in-india.pdf

[83] In 2017, MeitY and Google announced a partnership to make digital payments safer as well as impart digital skills training to artisans. This partnership will support the launch of 'Digital Payments Security Alliance' in collaboration with the Data Security Council of India.

[84] BCG & IAMAI (2015) India@Digital Bharat. Creating a $200 Billion Internet Economy, https://timedotcom.files.wordpress.com/2015/04/file180687.pdf

[85] The Center for Internet and Society, Big Data in Governance in India: Case Studies, https://cis-india.org/internet-governance/files/big-data-compilation.pdf

[86] Government of India (2014) Make in India, www.makeinindia.com/about

[87] MeitY (2013) Government of India's GI Cloud (MeghRaj) Strategic Direction Paper, http://meity.gov.in/writereaddata/files/GI-Cloud%20Strategic%20Direction%20Report%281%29_0.pdf

[88] UNCTAD (2017) Information Economy report, http://unctad.org/en/PublicationsLibrary/ier2017_en.pdf

[89] MeitY (2017) White Paper of the Committee of Experts on a Data Protection Framework for India

[90] European Commission (2017) EU-India trade negotiations, http://ec.europa.eu/trade/policy/countries-and-regions/countries/india/; DSCI (2017) Transborder Data Flow: Regulating Transborder Data Flows, www.dsci.in/content/transborder-dataflow/overview-timeline-activities

[91] IAMAI (2016) Conducive Policy and Regulatory Environment to Incentivize Data Center Infrastructure, www.iamai.in/sites/default/files/position_papers/make-in-india.pdf

[92] Information Technology & Innovation Foundation (ITIF) Nigel Cory (2017) Cross-border Data Flows: Where Are the Barriers, and What Do They Cost? www2.itif.org/2017-cross-border-data-flows.pdf

[93] McKinsey Global Institute (2016) Digital Globalization: The New Era of Global Flows, www.mckinsey.com/business-functions/digital-mckinsey/our-insights/digital-globalization-the-new-era-of-global-flows

[94] McKinsey Global Institute (2016) Digital Globalization: The New Era of Global Flows, www.mckinsey.com/business-functions/digital-mckinsey/our-insights/digital-globalization-the-new-era-of-global-flows

[95] Financial Express Editorial (2016) Cash in on data flows, www.financialexpress.com/opinion/editorial-cash-in-on-data-flows/217278/

[96] The study combines data regulations, such as full/partial data localization; consent for collection, storage, and dissemination of personal data; and user rights of review of stored information, and estimates the industry impact by calculating data intensity of downstream sectors, such as telecommunications and information services. The study develops a weighted index to compare the severity of data regulation barriers in the country. On a scale of 0-6, India scores 2.36.

[97] CIGI (2016) Tracing the Economic Impact of Regulations on the Free Flow of Data and Data Localization, www.cigionline.org/sites/default/files/gcig_no30web_2.pdf

[98] ECIPE (2014) The Costs of Data Localization: Friendly Fire on Economic Recovery, www.ecipe.org/app/uploads/2014/12/OCC32014__1.pdf

[99] Expressed as actual economic losses by the citizens

[100] Statista (2017) www.statista.com/statistics/251631/number-of-digital-buyers-in-india/, www.statista.com/statistics/251666/number-of-digital-buyers-worldwide/

[101] Editorial (2017) Big Data Insights: The game changer for Indian E-commerce, https://tech.economictimes.indiatimes.com/news/technology/big-data-insights-the-game-changer-for-indian-e-commerce/60083471

[102] MeitY (2017) Justice Krishna to head expert group on Data Protection Framework for India, http://pib.nic.in/newsite/PrintRelease.aspx?relid=169420; MeitY (2017) White Paper of the Committee of Experts on a Data Protection Framework for India, http://meity.gov.in/white-paper-data-protection-framework-india-public-comments-invited; TRAI (2017) Consultation Paper on Privacy, Security and Ownership of the Data in the Telecom Sector, www.trai.gov.in/sites/default/files/Consultation_Paper%20_on_Privacy_Security_ownership_of_data_09082017.pdf

[103] Information Technology Act 2000, http://meity.gov.in/content/information-technology-act-2000

[104] Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules 2011, http://meity.gov.in/content/information-technology-act-2000

[105] Economic Times Editorial (2017) Big Data Insights: The game changer for Indian E-commerce, www.cigionline.org/sites/default/files/gcig_no30web_2.pdf

[106] Nicholson (2011) New Indian Privacy and Data Security Rules, www.sourcingspeak.com/2011/06/new-indian-privacy-and-data-security-rules-ambiguity-creates-uncertainty.html

[107] Department of Science and Technology (DST) (2012) National Data Sharing and Accessibility Policy, www.dst.gov.in/sites/default/files/nsdi_gazette_0.pdf

[108] The Hindu Business Line Editorial (2014) Thomas K. Thomas National Security Council Proposes 3-Pronged Plan to Protect Internet Users, www.thehindubusinessline.com/info-tech/national-securitycouncil-proposes-3pronged-plan-to-protectinternet-users/article5685794.ece

[109] Bureau of Economic and Business Affairs (2017) 2017 Investment Climate Statements, www.state.gov/e/eb/rls/othr/ics/2017/sca/270017.htm

[110] Lexology (2017) Stephen Mathias and Naqeeb Ahmed Kazia Collection, Storage and Transfer of Data in India, www.lexology.com/library/detail.aspx?g=00e56cb6-b0ea-46b7-ab1b-1d52de3646d0; India Companies (Accounts) Rules (2014) http://perry4law.org/clii/wp-content/uploads/2014/03/Companies-Accounts-Rules-2014.pdf

[111] MeitY (2017) Guidelines for Government Departments on Contractual Terms Related to Cloud Services, http://meity.gov.in/writereaddata/files/Guidelines-Contractual_Terms.pdf

[112] World Economic Forum (2016) By 2025, Internet of things applications could have $11 trillion impact, www3.weforum.org/docs/GITR2016/WEF_GITR_Chapter1.2_2016.pdf

[113] Editorial (2016) Cross-Border Data Flows Debate Hits India as TRAI Issues Paper on Cloud Services, https://thewire.in/42300/cross-border-data-flows-debate-hits-india-as-trai-issues-paper-on-cloud-services/

[114] Economic Survey (2015-2016) Services Sector Chapter 7, http://indiabudget.nic.in/budget2016-2017/es2015-16/echapvol2-07.pdf

[115] Northwestern Journal of International Law & Business (2014) Data Protection in India: The Legislation of Self-Regulation, http://lawblogs.northwestern.edu/njilb/wp-content/uploads/2015/03/JDCL_Directo-Final-Read_3.9.15.pdf

[116] Financial Express (2016) Indian business process management industry eyes $50 bn revenue by 2020, www.financialexpress.com/economy/indian-bpm-industry-eyes-50-billion-revenue-by-2020/387315/; India Brand Equity Foundation (IBEF) (2017) IT & ITeS, www.ibef.org/download/IT-and-ITeS-July-2017.pdf

[117] Nasscom (2017) Perspective 2025: Shaping the Digital Revolution, www.nasscom.in/knowledge-center/publications/perspective-2025-shaping-digital-revolution

[118] Imarticus Learning and NASSCOM (2017) Analytics Employment Landscape in India, https://imarticus.org/wp-content/uploads/2017/04/Industry-Report-Analytics-2017.pdf

[119] ITIF (2015) Cross-Border Data Flows Enable Growth in All Industries, www2.itif.org/2015-cross-border-data-flows.pdf

[120] Market Equations (2017) About Market Equations, www.marketequations.com/about-us.html

[121] Market Equations (2017) Data Analytics Case Study, www.marketequations.com/case-study/demand-sales-forecasting.html

[122] Market Equations (2017) Data Analytics Case Study, www.marketequations.com/case-study/demand-sales-forecasting.html

[123] Market Equations (20170 Case Study Demand Forecasting, www.marketequations.com/case-study/inventory-stock-order-management-services.html

[124] IBEF (2017) Manufacturing Sector in India, www.ibef.org/industry/manufacturing-sector-india.aspx

[125] McKinsey&Company (2015) The Internet of Things: Mapping the Value Beyond the Hype, www.mckinsey.com/business-functions/digital-mckinsey/our-insights/the-internet-of-things-the-value-of-digitizing-the-physical-world

[126] IBEF (2017) Manufacturing Sector in India, www.ibef.org/industry/manufacturing-sector-india.aspx

[127] Make in India Towards Smart Manufacturing: Industry 4.O and India, www.makeinindia.com/article/-/v/towards-smart-manufacturing-industry-4-0-and-india

[128] Overview WIPRO, www.wipro.com/about-us

[129] IDC Manufacturing Insights (2015) Innovative Use Cases for the Adoption of Internet of Things in India Manufacturing, www.wipro.com/documents/insights/innovative-use-cases-for-the-adoption-of-internet-of-things.pdf

[130] KPMG & NASSCCOM (2016) Fintech in India: A Global Growth Story, https://assets.kpmg.com/content/dam/kpmg/pdf/2016/06/Fintech-new.pdf

[131] PWC (2017) Fintech Trends Report, www.pwc.in/assets/pdfs/publications/2017/Fintech-india-report-2017.pdf

[132] Reserve Bank of India (2016) Withdrawal of Legal Tender Status for 500 and 1000 Notes: RBI Notice, https://rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=38520

[133] Quartz India (2017) Charted: Indians are using mobile wallets more but for smaller purchases, https://qz.com/988833/charted-indians-are-using-mobile-wallets-more-but-spending-less-money-through-them/

[134] Knowledge@Wharton (2017) Mobile Money in India: Does Digitalization Follow Demonetization?, http://knowledge.wharton.upenn.edu/article/mobile-money-india-digitalization-follow-demonetization/

[135] The Economic Times (2017) SBI to use blockchain for smart contracts and KYC by next month, https://economictimes.indiatimes.com/industry/banking/finance/banking/sbi-to-use-blockchain-for-smart-contracts-and-kyc-by-next-month/articleshow/61715860.cms

[136] Government of India (2017) IndiaStack, http://indiastack.org/about/

[137] Delhi School of Internet Marketing (2015) Case Study: Paytm, Journey from Mobile Recharge to E-Commerce Market, http://dsim.in/blog/2015/05/08/case-study-paytm-journey-from-mobile-recharge-to-e-commerce-market/

[138] The Economic Times (2015) How Alibaba is helping Paytm grow from being a start-up to a large company, https://economictimes.indiatimes.com/small-biz/start-ups/how-alibaba-is-helping-paytm-grow-from-being-a-start-up-to-a-large-company/articleshow/48549412.cms

[139] Zuber Ahmad (2016) Paytm Strikes Deal with Alibaba's Cloud Computing Platform AliCloud, https://thetechportal.com/2016/01/29/paytm-strikes-a-deal-with-alibabas-cloud-computing-platform-alicloud/

[140] Paytm (2017) About Paytm, https://paytm.com/about-us/

[141] NDTV (2017) How Paytm Build A Payment Network: E-Wallet Company Now A Case Study At Harvard Business School, www.ndtv.com/education/paytm-now-a-case-study-at-harvard-business-school-1654248

[142] The Economic Times (2017) Paytm gets RBI approval for payments bank, https://economictimes.indiatimes.com/small-biz/money/paytm-gets-rbi-approval-for-payments-bank/articleshow/56316531.cms

[143] The Economic Times (2017) Mumbai Metro One, Paytm launches, https://retail.economictimes.indiatimes.com/news/e-commerce/e-tailing/mumbai-metro-one-paytm-launches/61681427

[144] ICRIER (2017) Estimating the Value of New Generation Internet Based Applications in India, www.communicationstoday.co.in/images/reports/20170717-ICRIER-report-Estimating-the-impact-of-new-generation-apps-in-india.pdf

[145] Paytm (2017) About Paytm, https://paytm.com/about-us/

[146] Swissnex India (2016) Fintech in India, www.swissnexindia.org/wp-content/uploads/sites/5/2016/10/Fintech-Report-2016.pdf

[147] Editorial (2017) What Other Markets Can Learn from India's Emerging Fintech Sector, www.emarketer.com/Article/What-Other-Markets-Learn-Indias-Emerging-Fintech-Sector/1015919

[148] The Economic Times (2015) How Alibaba is helping Paytm grow from being a start-up to a large company, https://economictimes.indiatimes.com/small-biz/start-ups/how-alibaba-is-helping-paytm-grow-from-being-a-start-up-to-a-large-company/articleshow/48549412.cms

[149] IBEF (2017) Healthcare in India, www.ibef.org/download/Healthcare-January-2017.pdf

[150] Government of India (2016) National eHealth Authority (NeHA), www.nhp.gov.in/national_eHealth_authority_neha_mtl

[151] Government of India (2016) Electronic Health Record Standards for India Helpdesk, www.nhp.gov.in/ehr-standards-helpdesk_ms

[152] ASSOCHAM (2016) Telemedicine market in India may cross $32 mn by 2020: Study, www.assocham.org/newsdetail.php?id=5728

[153] IBEF (2017) Healthcare in India, www.ibef.org/download/Healthcare-January-2017.pdf

[154] Deloitte (2015) Digital India: Unleashing Prosperity, www2.deloitte.com/content/dam/Deloitte/in/Documents/technology-media-telecommunications/in-tmt-tele-tech-2015-noexp.pdf

[155] IES Management College Indian Medical Tourism: Opportunities & Challenges, http://vslir.iimahd.ernet.in:8080/xmlui/bitstream/handle/11718/14129/CMHS-IC-15-063.pdf?sequence=1&isAllowed=y

[156] IBEF (2017) Healthcare in India, www.ibef.org/download/Healthcare-January-2017.pdf

[157] IES Management College Indian Medical Tourism: Opportunities & Challenges, http://vslir.iimahd.ernet.in:8080/xmlui/bitstream/handle/11718/14129/CMHS-IC-15-063.pdf?sequence=1&isAllowed=y

[158] Heealthy (2017) Heealthy Company Website, https://heealthy.com

[159] ACCA (2017) Towards Better Patient Outcomes and Staying Well: The Promise of Cloud Computing for the Healthcare Industry, http://asiacloudcomputing.org/research/2017-research/healthcare2017

[160] ACCA (2017) Towards Better Patient Outcomes and Staying Well: The Promise of Cloud Computing for the Healthcare Industry, http://asiacloudcomputing.org/research/2017-research/healthcare2017

[161] Ministry of Communication and Information Technology (2016) Digital Economy of Indonesia, www.cicc.or.jp/japanese/kouenkai/pdf_ppt/pastfile/h28/161026-03id.pdf. The benchmark for the largest digital economy is USD130 billion in online transactions in 2020.

[162] Presidential Regulation No. 74 of 2017 on Roadmap for the National Electronic Commerce System for 2017-2019

[163] Presidential Decree No. 96 of 2014 on Indonesia Broadband Plan 2014-2019

[164] McKinsey&Company (2016) Unlocking Indonesia's Digital Opportunity, www.mckinsey.com/~/media/McKinsey%20Offices/Indonesia/PDFs/Unlocking-Indonesias-digital-opportunity.ashx p. 15

[165] Deloitte Access Economics (2015) SMEs powering Indonesia's success, www2.deloitte.com/id/en/pages/financial-advisory/articles/smes-powering-indonesia-success-report.html p. 3

[166] Deloitte Access Economics (2015) SMEs powering Indonesia's success, www2.deloitte.com/id/en/pages/financial-advisory/articles/smes-powering-indonesia-success-report.html p. 1

[167] Mckinsey & Company (2016) Unlocking Indonesia's Digital Opportunity, www.mckinsey.com/indonesia/our-insights/unlocking-indonesias-digital-opportunity

[168] Government Regulation No. 82 of 2012 regarding Provisions of Electronic Systems and Transactions (GR82)

[169] Minister of Communications & Informatics Regulation No. 20 of 2016 regarding the Protection of Personal Data in an Electronic System. This regulation implements one of the provisions of Government Regulation No. 82 of 2012

[170] ECIPE (2014) The Costs of Data Localization: Friendly Fire on Economic Recovery, http://ecipe.org//app/uploads/2014/12/OCC32014__1.pdf

[171] Jeffrey Bahar (2017) E-commerce in Indonesia, slide 11 www.slideshare.net/jeffreybahar/jeffrey-bahar-spire-workshop-day-2-03-may2017-at-gates-bali?ref=https://aseanup.com/insights-trends-e-commerce-indonesia/

[172] Mobile World Live (2016) Indonesia's smartphone penetration hits 47%, www.mobileworldlive.com/asia/asia-news/indonesias-smartphone-penetration-hits-47/

[173] Ministry of Communication and Information Technology (2015), Teknologi akses jaringan yang digunakan pada transaksi e-commerce untuk pembeli perorangan tahun 2015, https://statistik.kominfo.go.id/site/data?idtree=430&iddoc=1461&data-data_page=2

[174] sp ecommerce (2016) Indonesia 9 eCommerce facts, www.specommerce.com.s3.amazonaws.com/dl/fs/161102_fs_indonesia.pdf

[175] U.S. Embassy & Consulates in Indonesia (2016) Trade and Indonesia's Emerging Digital Economy, Gadjah Mada University, Yogyakarta, https://id.usembassy.gov/remarks-ambassador-blake-trade-indonesias-emerging-digital-economy-gadjah-mada-university-yogyakarta/

[176] Hugh Harsono (2016) Indonesia will be Asia's next biggest e-commerce market, https://techcrunch.com/2016/07/29/indonesia-will-be-asias-next-biggest-e-commerce-market/

[177] Presidential Regulation No. 74 of 2017 on Roadmap for the National Electronic Commerce System for 2017-2019

[178] Jeffrey Bahar (2017) E-commerce in Indonesia, slide 11 www.slideshare.net/jeffreybahar/jeffrey-bahar-spire-workshop-day-2-03-may2017-at-gates-bali?ref=https://aseanup.com/insights-trends-e-commerce-indonesia/

[179] Education and human resources; funding; tax; consumer protection; cybersecurity; communication infrastructure; and logistics.

[180] Ardi Wirdana (2017) Business cries foul over plan for Indonesia e-commerce tax, https://asia.nikkei.com/Business/Companies/Business-cries-foul-over-plans-for-Indonesia-e-commerce-tax

[181] Salesforce (n.d.) Salesforce makes it easier for Southeast Asia's favourite online shopping mall to sign up new retailers, www.salesforce.com/ap/customers/stories/lazada.jsp

[182] Unicorns refer to companies with a valuation of USD1 billion and above.

[183] Ministry of Communication and Information Technology (2017) Matchmaking Startup Nasional & Venture Capitals Amerika Syarikat Untuk Dorong Next Indonesia Unicorn, www.kominfo.go.id/content/detail/10828/siaran-pers-no-185hmkominfo102017-tanggal-5-oktober-2017-tentang-pertemuan-antara-pemerintah-indonesia-startup-nasional-dan-venture-capitals-amerika-serikat/0/siaran_pers

[184] Akamai (2017) Akamai's Q1 2017 report, www.akamai.com/us/en/multimedia/documents/state-of-the-internet/q1-2017-state-of-the-internet-connectivity-report.pdf

[185] Presidential Decree No. 96 of 2014 on Indonesia Broadband Plan 2014-2019

[186] Leighton Cosseboom (2014) Indonesian government launches high-speed internet initiative, www.techinasia.com/indonesia-high-speed-internet-2014-2019-broadband-plan

[187] Ministry for Economic Affairs (2015) Indonesia Broadband Plan: Lessons Learned, www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Documents/Events/2015/Sep-WABA/Presentations/Indonesia%20Broadband%20Plan%20(ITU%20Jakarta,%20090915).pdf

[188] Badan Pusat Statistik (BPS-Statistics Indonesia) (2017) Statistik Indonesia: Statistical Yearbook of Indonesia 2017, www.bps.go.id/publication/2017/07/26/b598fa587f5112432533a656/statistik-indonesia-2017.html

[189] GSMA (2016) Advancing Digital Societies in Asia, http://trpc.biz/gsma-advancing-digital-societies-in-asia/

[190] Ministry of Communication and Information Technology (2017) Dimulainya Penataan Ulang Pita Frekuensi Radio 2.1 GHz untuk Keperluan Penyelenggaraan Jaringan Bergerak Seluler, https://kominfo.go.id/index.php/content/detail/11576/siaran-pers-no-232hmkominfo112017-tentang-dimulainya-penataan-ulang-pita-frekuensi-radio-21-ghz-untuk-keperluan-penyelenggaraan-jaringan-bergerak-seluler/0/siaran_pers

[191] Ministry of Communication and Information Technology (2017) Penetapan Pemenang Seleksi Pengguna Pita Frekuensi Radio 2.3 GHz Tahun 2017 Untuk Keperluan Penyelenggaraan Jaringan Bergerak Seluler https://kominfo.go.id/content/detail/11091/siaran-pers-no197hmkominfo102017-tentang-penetapan-pemenang-seleksi-pengguna-pita-frekuensi-radio-23-ghz-tahun-2017-untuk-keperluan-penyelenggaraan-jaringan-bergerak-seluler/0/siaran_pers

[192] The Verge (2015) Alphabet's Project Loon partnering with Indonesia telecoms for air balloon Wi-Fi test, www.theverge.com/2015/10/28/9631728/alphabet-google-project-loon-indonesia-wifi-internet-access

[193] Particularly Android phones from Chinese manufacturers. Tabita Diela (2017) Chinese brands have invaded Indonesia's fast-growing smartphone market, http://jakartaglobe.id/business/aggressive-chinese-vendors-dominate-indonesias-smartphone-market/

[194] While Figure 4 represents only three of the mobile network operators (Telkomsel, Indosat and XL Axiata), combined they constitute almost 90% of Indonesia's mobile market.[194] As such, the growth in data traffic of these three operators is representative of the Indonesian market. See Business Monitor International (2018) Market Overview - Indonesia - Q1 2018, Indonesia Telecommunications Report

[195] Alexa (2017) Top Sites in Indonesia, www.alexa.com/topsites/countries/ID

[196] Ministry of Communication and Information Technology (2014) Aktivitas utama dalam mengakses internet pada tahun 2014, https://statistik.kominfo.go.id/site/data?idtree=424&iddoc=1466&data-data_page=4

[197] We Are Social and Hootsuite (2017) Digital in 2017: Global Overview, www.slideshare.net/wearesocialsg/digital-in-2017-global-overview p. 47

[198] eMarketer (2016) In Indonesia, Facebook Remains the Most Popular Social Site, www.emarketer.com/Article/Indonesia-Facebook-Remains-Most-Popular-Social-Site/1014126

[199] Ardi Wirdana (2017) Business cries foul over plan for Indonesia e-commerce tax, https://asia.nikkei.com/Business/Companies/Business-cries-foul-over-plans-for-Indonesia-e-commerce-tax

[200] Mckinsey&Company (2016) Unlocking Indonesia's Digital Opportunity, www.mckinsey.com/indonesia/our-insights/unlocking-indonesias-digital-opportunity

[201] Mckinsey&Company (2016) Unlocking Indonesia's Digital Opportunity, www.mckinsey.com/indonesia/our-insights/unlocking-indonesias-digital-opportunity

[202] Mckinsey&Company (2016) Unlocking Indonesia's Digital Opportunity, www.mckinsey.com/indonesia/our-insights/unlocking-indonesias-digital-opportunity

[203] Judith Balea (2015) How Kalibrr is disrupting the recruitment industry, www.techinasia.com/kalibrr-philippines-online-recruitment

[204] Mckinsey&Company (2016) Unlocking Indonesia's Digital Opportunity, www.mckinsey.com/indonesia/our-insights/unlocking-indonesias-digital-opportunity

[205] ECIPE (2014) The Costs of Data Localization: Friendly Fire on Economic Recovery, http://ecipe.org/app/uploads/2014/12/OCC32014__1.pdf

[206] Government Regulation No. 82 of 2012 regarding Provisions of Electronic Systems and Transactions (GR82)

[207] Law No. 11 of 2008 regarding Electronic Information and Transactions (EIT Law) as amended by Law No. 19 of 2016 regarding the Amendment of EIT Law (EIT Law Amendment)

[208] Minister of Communications & Informatics Regulation No. 20 of 2016 regarding the Protection of Personal Data in an Electronic System. This regulation implements one of the provisions of Government Regulation No. 82 of 2012

[209] Government Regulation No. 82 of 2012 regarding Provisions of Electronic Systems and Transactions (GR82) Article 17(2)

[210] For example, in the UK and Australia. See UK Government (2014) Government Security Classifications, www.gov.uk/government/uploads/system/uploads/attachment_data/file/251480/Government-Security-Classifications-April-2014.pdf, and Australian Government (2014) Information security management guidelines, Australian Government security classification system, www.protectivesecurity.gov.au/informationsecurity/Pages/AustralianGovernmentSecurityClassificationSystem.aspx

[211] US ASEAN Business Council (2017) Meeting on GR82 with Indonesia ICT Minister Rudiantara, www.usasean.org/sites/default/files/uploads/countries/indonesia/gr82_meeting_notes.pdf; Indotelk (2017) No need to build data center in Indonesia, www.indotelko.com/kanal?c=ev&it=build-data-center

[212] Minister of Communications & Informatics Regulation No. 20 of 2016 regarding the Protection of Personal Data in an Electronic System. This regulation implements one of the provisions of Government Regulation No. 82 of 2012

[213] Regulation by the Financial Services Authority No.38/POJK.03/2016 on implementation of risk management in the use of information technology by commercial banks

[214] Regulation by the Financial Services Authority No.69/POJK.05/2016 on business operations of insurance companies, Syariah insurance companies, re-insurance companies and Syariah re-insurance companies

[215] Bank Indonesia Regulation No.19/10/PADG/2017 on the National Payment Gateway

[216] Index Mundi (2017) Palm Oil Production by Country in 1000MT, www.indexmundi.com/agriculture/?commodity=palm-oil

[217] Eric Quincieu (2015) Agriculture, Natural Resources, and Environment Sector Assessment, www.adb.org/sites/default/files/publication/177036/ino-paper-08-2015.pdf

[218] Eric Quincieu (2015) Agriculture, Natural Resources, and Environment Sector Assessment, www.adb.org/sites/default/files/publication/177036/ino-paper-08-2015.pdf

[219] 8villages (2017) 8villages, http://8villages.com/; Enricko Lukman (2014) 8villages now works with telcos to offer free tips to farmers in Indonesia, www.techinasia.com/8villages-works-telcos-offer-free-tips-farmers-indonesia; Aditya Hadi Pratama (2017) [Update] Collection of Startup and Agricultural Applications in Indonesia, https://id.techinasia.com/kumpulan-emstartupem-dan-aplikasi-pertanian-di-indonesia

[220] As aquaculture becomes more widespread in Indonesia an estimated 80% of production comes from family-scale operations.

[221] Oxford Business Group (2016) Indonesia Looks to Tap Agriculture's Tech Potential, www.oxfordbusinessgroup.com/news/indonesia-looks-tap-agriculture's-tech-potential

[222] Digital News Asia (2017) Indonesia Moves to Support Scale in Growth of Digital Economy, www.digitalnewsasia.com/digital-economy/indonesia-moves-support-scale-growth-digital-economy

[223] CI-Agriculture (2017) About HARA, http://ci-agriculture.com/about

[224] Dattabot Big Data Analytics (2017) Data Based Smart Farming, www.youtube.com/watch?v=UgOo8olTRes

[225] GE (n.d.) Dattabot and GE Digital Work to Secure the Future of Agriculture in Indonesia, www.ge.com/digital/sites/default/files/Dattabot-GE-Predix-case-study.pdf

[226] GE (n.d.) Dattabot and GE Digital Work to Secure the Future of Agriculture in Indonesia, www.ge.com/digital/sites/default/files/Dattabot-GE-Predix-case-study.pdf

[227] eMarketeer (2016) Retail Ecommerce Sales in Southeast Asia: Opportunities and Challenges for Six Key Markets, www.emarketer.com/Report/Retail-Ecommerce-Sales-Southeast-Asia-Opportunities-Challenges-Six-Key-Markets/2001880

[228] Deloitte Access Economics (2015) UKM Pemicu Kemajuan Indonesia, www2.deloitte.com/id/en/pages/financial-advisory/articles/smes-powering-indonesia-success-report.html

[229] Danny Asling (2017) 6 Ways to Use Big Data in Ecommerce, http://dataconomy.com/2017/07/6-ways-use-big-data-ecommerce/

[230] TRPC (2017) Connectivity, Innovation and Growth: Fostering an Open Internet in Asia, http://trpc.biz/wp-content/uploads/FosteringanOpenInternetinAsia_2017_v1.2.pdf

[231] Nadine Freischlad (2016) Tokopedia says it hit the 1 million merchants mark, www.techinasia.com/tokopedia-hit-1-million-merchants-mark; Dola Samata (2017) Meet Indonesia's Jack Ma who is building an e-commerce platform minus the discounts and COD, https://yourstory.com/2017/11/tokopedia-indonesia/

[232] iPrice (2017) The Map of E-Commerce Indonesia, https://iprice.co.id/insights/mapofecommerce/en/

[233] Alibaba Cloud (n.d.) Tokopedia Case Study, www.alibabacloud.com/customers/tokopedia

[234] Nutanix (2017) Nutanix Enterprise Cloud OS Fuels Tokopedia's Rapid Growth in Indonesia, www.nutanix.com/press-releases/2017/10/16/nutanix-enterprise-cloud-os-fuels-tokopedias-rapid-growth-indonesia-2/

[235] RevX (2017) Success Stories, www.revx.io/resources/success-stories

[236] Asian Development Bank Institute (ADBInstitute) D. Elms and M. H. Nguyen (2017) Trans-Pacific Partnership Rules for Digital Trade in Asia, www.adb.org/publications/trans-pacific-partnership-rules-digital-trade-asia p. 7

237 Cushman & Wakefield (2016) The Data Centre Risk Index, www.cushmanwakefield.com/en/research-and-insight/2016/data-centre-risk-index-2016
238 Leviathan Security Group (2015) Quantifying the Cost of Forced Localization,
https://static1.squarespace.com/static/556340ece4b0869396f21099/t/559dad76e4b0899d97726a8b/1436396918881/Quantifying+the+Cost+of+Forced+Localization.pdf
239 BMWi (2016) Monitoring Report: Digital Economy 2016, www.bmwi.de/Redaktion/EN/Publikationen/monitoring-report-digital-economy-
2016.pdf?__blob=publicationFile&v=2
240 OECD (2017) Digital Economy Outlook 2017, www.oecd.org/governance/oecd-digital-economy-outlook-2017-9789264276284-en.htm
241 Japan is ranked 10th out of 176 countries in the International Telecommunications Union (ITU)'s ICT Development Index 2017. ITU (2017) ICT Development Index 2017,
www.itu.int/net4/ITU-D/idi/2017/index.html
242 Council on Foreign Relations (2017) Abenomics and the Japanese Economy, www.cfr.org/backgrounder/abenomics-and-japanese-economy
243 The Prime Minister's Official Residence (2015) Declaration to be the World's Most Advanced IT Nation, http://japan.kantei.go.jp/policy/it/2015/20150630_full.pdf
244 MIC (2016) Key Points of the 2016 White Paper on Information and Communications in Japan, www.soumu.go.jp/johotsusintokei/whitepaper/eng/WP2016/key-points.pdf
245 Yano ICT (2016) FinTech の更なる急拡大を後押しする注目動向, www.yanoict.com/カテゴリから探す/情報サービスソリューション/12112.html
246 Yano ICT (2016) Sharing Economy Market in Japan: Key Research Findings 2016, www.yanoresearch.com/press/pdf/1560.pdf
247 METI (2017) 新産業構造ビジョン, www.meti.go.jp/press/2017/05/20170530007/20170530007-2.pdf
248 METI (2017) Connected Industries, www.meti.go.jp/english/policy/mono_info_service/connected_industries/index.html
249 Japan Chemical Daily (2017) METI Releases Outline of New Industrial Structure Vision, www.japanchemicaldaily.com/2017/05/23/meti-releases-outline-of-new-industrial-
structure-vision/
250 EU-Japan Center for Industrial Cooperation (2017) How Digital Trade Can Support Business: Towards an Open and Fair Business Environment, www.eu-
japan.eu/sites/default/files/imce/seminars/2017-03-20-CeBIT/20170320-cebitreport.pdf
251 The Growth Strategy 2017 was approved by the Cabinet on 9 June 2017. Prime Minister's Office (2017) 2017 Growth Strategy, www.mofa.go.jp/files/000272312.pdf
252 METI (2017) Society5.0・Connected Industries を実現する「新産業構造ビジョン」, www.meti.go.jp/press/2017/05/20170530007/20170530007-1.pdf
253 USD2.5 billion. Note that this value only takes into consideration B2B and B2C transactions.
254 UNCTAD (2017) Information Economy Report 2017: Digitalization, Trade and Development, http://unctad.org/en/PublicationsLibrary/ier2017_en.pdf
255 Japanese consumers spent on Chinese products, and Japan is the top source of imports for Chinese e-commerce giant Alibaba's Tmall platform. JingDaily (2017) China's
Online Shoppers Maintain Strong Demand for Cross-Border E-Commerce, https://jingdaily.com/tmalls-cross-border-e-commerce-sales-grow-by-30-in-china/
256 Gartner (2017) Gartner Announces Survey Results on Cloud Computing in Japan, www.gartner.co.jp/press/html/pr20170404-01.html
257 According to statistics from the Prime Minister's Official Residence, 92.5% of all diseased people want a job, and 65.1% of women want to continue working while raising
children. Council for the Realization of Work Style Reform (2017) The Action Plan for the Realization of Work Style Reform,
www.kantei.go.jp/jp/singi/hatarakikata/pdf/The_Action_Plan_for_the_Realization_of_Work_Style_Reform.pdf
258 Hodaka Nakanishi (2016) Economic Impact of Telework in Japan, http://worldcomp-proceedings.com/proc/p2016/EEE3704.pdf
259 Up from 4% in 2015. The Wall Street Journal (2015, Japan Saying Sayonara to Long Hours at the Office, www.wsj.com/articles/japan-saying-sayonara-to-long-hours-at-the-
office-1448511351
260 METI (2017) Connected Industries, www.meti.go.jp/english/policy/mono_info_service/connected_industries/index.html
261 The Japan Institute for Labour Policy and Training (2017) 厚生労働省「IoT・ビッグデータ・AI 等が雇用・労働に与える影響に関する研究会」報告書,
www.jil.go.jp/kokunai/blt/backnumber/2017/0809/054-056.pdf
262 MIC (2017) データポータビリティに関する調査検討会の開催, www.soumu.go.jp/menu_news/s-news/01tsushin01_02000237.html
263 Four other economies (Canada, South Korea the US and Mexico) have signed. More, including Australia, the Philippines and Singapore are expected to follow.
264 Hitachi (2016) Future Outlook for Japan's ID Number System, www.hitachi.com/rev/pdf/2016/r2016_01_102.pdf
265 Mondaq (2016) Japan Amends Personal Information Protection Act And Reorganizes Specific Personal Information Protection Commission,
www.mondaq.com/x/485822/Data+Protection+Privacy/Japan+Amends+Personal+Information+Protection+Act+And+Reorganizes+Specific+Personal+Information+Protection+
Commission
266 PIPC (2016) Amended Act on the Protection of Personal Information (Tentative Translation),
www.ppc.go.jp/files/pdf/Act_on_the_Protection_of_Personal_Information.pdf
267 Fifth Era (2016) The Impact of Internet Regulation on Investment,
https://static1.squarespace.com/static/5481bc79e4b01c4bf3ceed80/t/56f192c240261d4703566506/1458672343753/201603+Fifth+Er+Report+-
+The+Impact+of+Internet+Regulation+on+Investment.pdf
268 DLA Piper LLP (2015) IMED: telemedicine and the law, www.lexology.com/library/detail.aspx?g=c8172f96-5c4c-4e71-b9a5-3cf380a69f72
269 The Japan Times (2015) Tokyo hospitals to add five foreign doctors for expats, www.japantimes.co.jp/news/2015/07/19/national/science-health/tokyo-hospitals-add-five-
foreign-doctors-expats/#.WfGtpmhL9nJ
270 International Trade Administration (2016) 2016 Top Markets Report Health IT Country Case Study, www.trade.gov/topmarkets/pdf/health_it_japan.pdf
271 The Japan Times (2016) Digital health care services just around corner, www.japantimes.co.jp/news/2016/08/07/business/tech/digital-health-care-services-just-around-
corner/#.WSeS79KGPb0
272 Fujitsu (2015) ICT Trends in Japan's Healthcare Policy, www.fujitsu.com/global/documents/about/resources/publications/fstj/archives/vol51-3/paper02.pdf
273 McKinsey (2009) Improving Japan's health care system, www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/improving-japans-health-care-
system
274 McKinsey (2009) Improving Japan's health care system, www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/improving-japans-health-care-
system
275 The House of Representatives, Japan (2014) 健康・医療戦略推進法案, www.shugiin.go.jp/internet/itdb_gian.nsf/html/gian/honbun/houan/g18605021.htm
276 The Prime Minister's Official Residence (2014) The Healthcare Policy, www.kantei.go.jp/jp/singi/kenkouiryou/en/pdf/policy.pdf
277 The House of Representatives, Japan (2014), 医療分野の研究開発に資するための匿名加工医療情報に関する法律,
www.shugiin.go.jp/internet/itdb_gian.nsf/html/gian/honbun/houan/g19305053.htm
278 The Japan Times (2016) Medical industry signals interest in telemedicine, www.japantimes.co.jp/news/2016/03/16/national/social-issues/medical-industry-signals-
interest-telemedicine/#.WfC2RDwwTDc
279 Clinics by Medley (2017) 日帰り手術の経過観察とオンライン診療の相性は抜群！患者の生活に配慮するからこそ今後も積極的に取り組んでいきたい,
https://clinics.medley.life/business/case07.html
280 Clinics by Medley (2017) オンライン診療のリピート率ほぼ100%を実現！地域医療の可能性を広げるためにもオンライン診療の活用は欠かせない,
https://clinics.medley.life/business/case17.html
281 The Japan Times (2017) Once skeptical Japan embraces telemedicine as regulatory hurdles fall, www.japantimes.co.jp/news/2017/08/30/national/science-
health/skeptical-japan-embraces-telemedicine-regulatory-hurdles-fall/#.WfC9PTwwTDc
282 The Japan Times (2017) Once skeptical Japan embraces telemedicine as regulatory hurdles fall, www.japantimes.co.jp/news/2017/08/30/national/science-
health/skeptical-japan-embraces-telemedicine-regulatory-hurdles-fall/#.WfC9PTwwTDc
283 Japan aims to achieve a fiscal surplus by FY 2020.
284 Ministry of Health, Labor and Welfare (2015) Japan Vision: Health Care 2035,
www.mhlw.go.jp/seisakunitsuite/bunya/hokabunya/shakaihoshou/hokeniryou2035/future/en/
285 NEC (2016) Infrastructure at Sunrise Japan Hospital Phnom Penh, Cambodia, www.nec.com/en/global/about/vision/case/10.html
286 The Cambodia Daily (2009) Poor Health Care Facilities Push People Abroad, www.cambodiadaily.com/archives/poor-health-care-facilities-push-people-abroad-93135/
287 PYMNTS.com (2017) Japanese Smartphone Users Warming Up To Digital Payments, www.pymnts.com/news/mobile-payments/2017/japan-smartphone-users-mobile-pay/
288 The Government of Japan (2017) Drive Innovation and Trade, www.japan.go.jp/abenomics/innovation/index.html
289 BraveNewCoin.com (2017) Bitcoin regulation overhaul in Japan, https://bravenewcoin.com/news/bitcoin-regulation-overhaul-in-japan/
290 SBI Ripple Asia was established in May 2016 as a joint venture between San Francisco-based Ripple Labs and Japanese financial services company SBI Holdings in a 40%-
60% ownership structure. www.sbigroup.co.jp/news/2016/0519_10302.html
291 Ripple (2017) Forty Seven Japanese Banks Move Towards Commercial Phase Using Ripple, https://ripple.com/insights/forty-seven-japanese-banks-move-towards-
commercial-phase-using-ripple/
292 Zengin - Net operates Japan's dominant domestic payment clearing system. www.zengin-net.jp/zengin_net/zengin_system/
293 CoinDesk (2017) 47 Banks Complete DLT Cloud Pilot With Ripple Tech, www.coindesk.com/47-banks-blockchain-complete-dlt-cloud-pilot-ripple-tech/
294 SBI Holdings (2017) Announcing the Successful Completion of RC Cloud Pilot By Japan Bank Consortium – Moving into the Commercial Phase,
www.sbigroup.co.jp/english/news/pdf/2017/0302_a_en.pdf
295 SBI Holdings (2017) 内外為替一元化コンソーシアムにおける「RC クラウド 2.0」構築完了のお知らせ
～セキュリティ・耐障害性を強化した商用版ソリューションを実現～, www.sbigroup.co.jp/news/2017/1206_10906.html
296 Bitsonline (2017) Japanese and South Korean Banks Join for Ripple Pilot Program, www.bitsonline.com/japanese-korean-ripple-pilot/

297 Financial Times (2017) Ripple cryptocurrency surges as Japanese groups agree to use it, www.ft.com/content/2f595696-ecb4-11e7-bd17-521324c81e23

298 Financial Times (2017) Japan's big banks plan digital currency launch, www.ft.com/content/ca0b3892-a201-11e7-9e4f-7f5e6a7c98a2?mhq5j=e7

299 Nikkei Asian Review (2017) Japan looks to double cashless payments in 10 years, https://asia.nikkei.com/Politics-Economy/Policy-Politics/Japan-looks-to-double-cashless-payments-in-10-years

300 McKinsey (2014) The rise of the digital bank, www.mckinsey.com/business-functions/digital-mckinsey/our-insights/the-rise-of-the-digital-bank

301 Web-Japan (2001) Online Banking Arrives in Japan: Lower Costs May Attract Customers, http://web-japan.org/trends00/honbun/tj010109.html

302 CodeChannels.com (2016) Japan Net Bank Leverages AWS for Business-Critical Operations, www.codechannels.com/video/Amazon/amazon/japan-net-bank-leverages-aws-for-business-critical-operations

303 JFTtoday.com (2016) The first lending service in Japan, Japan Net Bank and freee collaborate and provide online loan service, http://jftoday.com/The+first+lending+service+in+Japan,+Japan+Net+Bank+and+freee+collaborate+and+provide+online+loan+service/

304 DICT (2016) Philippines Digital Strategy, http://dict.gov.ph/wp-content/uploads/2014/06/philippine-digital-strategy-2011-2015.pdf Note: the shift of date of the PDS shifted from 2015 to 2016.

305 EGMP (2016) E-Government Master Plan, http://i.gov.ph/wp-content/uploads/2016/06/eGovMasterPlan_Final-Version.pdf

306 DICT (2016) Philippines Digital Strategy, http://dict.gov.ph/wp-content/uploads/2014/06/philippine-digital-strategy-2011-2015.pdf

307 iGov Philippines (2017) Department Circular: Cloud First Policy, http://i.gov.ph/policies/signed/department-circular-cloud-first-policy/

308 Inquirer.Net (2013) BSP Allows Banks to use Cloud Computing Technology, http://business.inquirer.net/139581/bsp-allows-banks-to-use-cloud-computing-technology

309 Philstar Global (2017) ePLDT pitches cloud technology to banks, www.philstar.com/business/2017/03/19/1682384/epldt-pitches-cloud-technology-banks

310 MISAsia (2017) How DepEd is digitalizing Philippines' education sector, www.mis-asia.com/mgmt/careers/how-deped-is-digitalising-philippines-education-sector/

311 ITU (2016) Review of National Identity Programs, www.itu.int/en/ITU-T/focusgroups/dfs/Documents/09_2016/Review%20of%20National%20Identity%20Programs.pdf

312 Inquirer.Net (2017) House passes bill mandating nat'l ID, http://newsinfo.inquirer.net/929071/philippine-news-updates-house-of-representatives-national-id-system-hb-6221-filipino-identification-system

313 Embedded Security News (2017) Philippines – Data privacy and the proposed national ID system, http://embeddedsecuritynews.com/2017/09/philippines-data-privacy-and-the-proposed-national-id-system/

314 Rappler (2017) Senate to pass national ID system bill by early 2018, www.rappler.com/nation/190328-senate-national-id-system-bill-early-2018

315 J. Ure, ed. (1996) Telecommunications in Asia: Policy, Planning and Development, HKU Press

316 PhilStar (2017) DICT chief Rodolfo Salalima resigns www.philstar.com/headlines/2017/09/21/1741368/dict-chief-rodolfo-salalima-resigns

317 OpenSignal (2017) Mobile Networks Update: Philippines (September 2017) https://opensignal.com/reports/2017/09/philippines/mobile-networks-update

318 Philstar Global (2017) Philippines has lowest internet speed, report says, www.philstar.com/headlines/2017/05/22/1702506/philippines-has-lowest-internet-speed-report-says

319 ISOC (2015) Unleashing the Potential of the Internet for ASEAN Economies, www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Documents/Events/2015/June-GSMA-ITU/ISOC_ASEAN_Digital_Economy_Report_Full_s.pdf

320 Inquirer.Net (2017) A new submarine cable system: What it means for PH, http://business.inquirer.net/235755/new-submarine-cable-system-means-ph

321 PLDT (2017) PLDT set to open new international cable system for PH link to three continents, www.pldt.com/news-center/article/2017/10/12/pldt-set-to-open-new-international-cable-system-for-ph-link-to-three-continents.WfLVaohx3IU

322 Price of Fixed Broadband in $PPP per Mbps, 2015 (Source: Telegeography: www.telegeography.com/ for $PPP and Akamai as of 4Q2015 for average internet speed).

323 Cost of mobile broadband (1GB) as % of GNI per capita (2014): International Telecommunications Union, www.itu.int/en/Pages/default.aspx

324 Rappler (2017) 'Faster, cheaper' Internet via DICT's national broadband plan, www.rappler.com/business/163808-national-broadband-plan-dict-salalima

325 Manila Times (2017). DICT launches 'Pipol Konek' in Tarlac www.manilatimes.net/dict-launches-pipol-konek-tarlac/332908/

326 ASW (2017) What is the ASEAN Single Window, http://asw.asean.org/

327 2006 Input-Output Accounts of the Philippines, https://psa.gov.ph/sites/default/files/NSCB%202006_IO%20%281%29_0.pdf

328 PSA (2017) The Philippines in Figures 2017, https://psa.gov.ph/sites/default/files/PIF_2017.pdf

329 PSA (2017) The Philippines in Figures 2017, https://psa.gov.ph/sites/default/files/PIF_2017.pdf

330 PSA (2017) National Accounts https://psa.gov.ph/content/national-accounts

331 https://psa.gov.ph/content/input-output-survey-philippine-business-and-industry-iospbi-primer

332 Export.gov (2017) Philippines-Information and Communications Technology, www.export.gov/article?id=Philippines-Information-and-Communications-Technology

333 The World Bank, https://data.worldbank.org/country/philippines

334 OKR, Global Economic Prospects (2017) A Fragile Recovery, https://openknowledge.worldbank.org/handle/10986/26800

335 Hunton & Williams (2016) Final Rules for the Data Privacy Act Published in the Philippines, www.huntonprivacyblog.com/2016/09/13/final-rules-data-privacy-act-published-philippines/

336 Baker & McKenzie (2015) The Latest Developments in Cross-border Data Transfer, https://iapp.org/media/presentations/15Asia/APF15_Latest_Developments_PPT.pdf

337 NEDA (2015) The Philippine Services Sector and APEC, www.neda.gov.ph/wp-content/uploads/2015/11/APEC-primer-on-services_comp4.pdf

338 ASEAN Briefing (2017) Business process Outsourcing in The Philippines, www.aseanbriefing.com/news/2017/04/17/business-process-outsourcing-philippines.html

339 Inquirer.Net (2016) IT-BPO Industry Grows as Second Largest Source of Income for PH, http://business.inquirer.net/209531/bpo-industry-grows-second-largest-source-income-ph

340 IBPAP (2015) The Philippine IT-BPM Industry Outlook & Prospects (2006-2014), http://industry.gov.ph/wp-content/uploads/2015/08/IT-BPM-Industry-Roadmap_Raymond-Lacdao_IBPAP_8.6.2015.pdf

341 Press Reader (2015) PH's Cloud Computing Readiness Steadily Improving-CISCO, www.pressreader.com/philippines/manila-bulletin/20150209/282252368952160

342 DMG Consulting (2017) 2016-2017 Cloud-Based Contact Center Infrastructure Market Report, www.dmgconsult.com/research-reports-2016-2017-cloud-based-contact-center-infrastructure-market-report/

343 Global Brainforce, www.globalbrainforce.com/

344 eGlobalMD Web Services and Solutions, http://eglobalmd.com/

345 www.topseos.com/profile/eglobalmd/

346 Inquirer.Net (2017) OFW remittances up 5.5% to $2.3B in May, http://business.inquirer.net/233394/ofw-remittances-5-5-2-3b-may

347 CAU Asia Focus (2008) Federal Reserve Bank of San Francisco, www.frbsf.org/banking/files/Asia_Focus_Jan_08.pdf

348 Tax Justice Network (2014) GFI: $410bn illicit flows in or out of Philippines from 1960-2011, www.taxjustice.net/2014/02/03/us410-5-billion-illegal-money-flowed-philippines-1960-2011-finds-new-gfi-study/

349 GMA News Online (2015) PHL joins APEC initiative on cross-border mutual funds www.gmanetwork.com/news/money/economy/536510/phl-joins-apec-initiative-on-cross-border-mutual-funds/story/

350 Crunchbase, https://crunchbase.com/organization/ayannah

351 Ayannah, www.ayannah.com/services/

352 Deal Street Asia (2017), www.dealstreetasia.com/stories/exclusive-ph-based-ayannahs-next-funding-round-upsized-to-5m-65347/

353 Fintech Ranking (2016) Bif Data and Online Scoring: Fintech and Beyond, http://fintechranking.com/2016/03/17/big-data-and-online-scoring-fint   ech-and-beyond/

354 Google Developers (2017) Google Developers Blog: Introducing the 5th class of Launchpad Accelerator! https://developers.googleblog.com/2017/11/introducing-5th-class-of-launchpad.html

355 Ayannah (2017)IDC Financial Insights : 10 fast-growing fintechs in the Philippines, www.ayannah.com/news/2017/9/15/idc-financial-insights-10-fast-growing-fintechs-in-the-philippines

356 PSA (2017) Contribution of Tourism to the Economy is 8.6 Percent in 2016, www.psa.gov.ph/content/contribution-tourism-economy-86-percent-2016

357 PSA (2017) Contribution of Tourism to the Economy is 8.6 Percent in 2016, www.psa.gov.ph/content/contribution-tourism-economy-86-percent-2016

358 www.nscb.gov.ph/sna/default.asp

359 Medical Tourism Philippines (2017), www.discovermedicaltourism.com/philippines/

360 Manila Times (2016) PH ranks 8th in world as 'Medical Tourism' Destination, www.manilatimes.net/ph-ranks-8th-in-world-as-medical-tourism-destination/262013/

361 eHealth PH, www.ehealth.ph/index.php/about-ehealth

362 Philstar Global (2014) DOH opens 'telemedicine' system in Marinduque', www.philstar.com/nation/2014/11/29/1396883/doh-opens-telemedicine-system-marinduque

363 Business Wire (2016) SES Enhances Quality of Healthcare in the Philippines Through SATMED E-Health Platform, www.businesswire.com/news/home/20160722005135/en/SES-Enhances-Quality-Healthcare-Philippines-SATMED-E-Health

364 Avizia (2016) Telemedicine service "MyDocNow" launches in Philippines, www.avizia.com/blog/mydocnow-telemedicine-service-launches-philippines

365 Avizia (2017) Avizia Powers MyDocNow Medical Mission in Rural Philippines, www.avizia.com/resources/mydocnow-philippines-medical-mission

366 Health-Tourism, Medical Tourism in The Philippines, www.health-tourism.com/medical-tourism-philippines/

367 BusinessWorld (2017) US health outsourcing firm to expand in Iloilo, http://bworldonline.com/us-health-outsourcing-firm-expand-iloilo/

368 BusinessWorld (2016) Shearwater Health to boost staff to 2,000 with second Philippine office, www.bworldonline.com/content.php?section=Corporate&title=shearwater-health-to-boost-staff-to-2000-with-second-philippine-office&id=132541

[369] Shearwater Health blog (2017) Improving Data Accuracy and Reducing Delays in Clinical Trials with Lean Six Sigma, http://swhealth.com/improving-data-accuracy-reducing-delays-clinical-trials-lean-six-sigma

[370] X. Hoa (2017) Vietnam lays out plans for Fourth Industrial Revolution, https://e.vnexpress.net/news/business/vietnam-lays-out-plans-for-fourth-industrial-revolution-3580861.html

[371] VietnamNet (2017) What Vietnam should do to catch up with 4th industrial revolution, http://english.vietnamnet.vn/fms/science-it/175975/what-vietnam-should-do-to-catch-up-with-4th-industrial-revolution.html

[372] VietNam News (2017) What does Industry 4.0 hold for Việt Nam?, http://vietnamnews.vn/economy/381220/what-does-industry-40-hold-for-viet-nam.html

[373] VietNam News (2016) E-commerce sales surge 37% to $4 billion in 2015, http://vietnamnews.vn/economy/295560/e-commerce-sales-surge-37-to-4-billion-in-2015.html

[374] VietnamNet (2016) E-commerce development master plan approved, http://english.vietnamnet.vn/fms/business/161914/e-commerce-development-master-plan-approved.html

[375] Hanoi Times (2015) E-commerce makes great contribution to Vietnam's growth, http://hanoitimes.com.vn/economy/2015/09/81e097fa/e-commerce-makes-great-contribution-to-vietnam-s-growth/

[376] VietnamNet (2016) VN Government sets targets for e-commerce in 2016-2020, http://english.vietnamnet.vn/fms/business/162619/vn-government-sets-targets-for-e-commerce-in-2016-2020.html

[377] VietnamNet (2016) VN Government sets targets for e-commerce in 2016-2020, http://english.vietnamnet.vn/fms/business/162619/vn-government-sets-targets-for-e-commerce-in-2016-2020.html

[378] The National Broadband Plan targets increasing nationwide fixed broadband penetration to 40% by 2020, where at least 60% of fixed subscribers will have a minimum downstream connection speed of 25Mbps, and at least 95% of residential areas will have 3G/4G coverage at average downstream speeds of 4Mbps in urban locations and 2Mbps in rural areas. TeleGeography (2016) Vietnam's PM approves broadband development programme, www.telegeography.com/products/commsupdate/articles/2016/01/25/vietnams-pm-approves-broadband-development-programme/

[379] MIC (2016) Law on Network Information Security, http://english.mic.gov.vn/Upload/VanBan/Law-on-Network-Information-Security-16-05-30.pdf

[380] VietNam News (2017) VN needs policies to boost digital economy: experts, http://vietnamnews.vn/economy/380970/vn-needs-policies-to-boost-digital-economy-experts.html

[381] VietNam News (2017) VN needs policies to boost digital economy: experts, http://vietnamnews.vn/economy/380970/vn-needs-policies-to-boost-digital-economy-experts.html

[382] VietNam News (2017) VN needs policies to boost digital economy: experts, http://vietnamnews.vn/economy/380970/vn-needs-policies-to-boost-digital-economy-experts.html

[383] Bao Anh Vietnam (2016) Dai Hoang Braised Fish, https://vietnam.vnanet.vn/english/dai-hoang-braised-fish/208557.html

[384] Vietnam Economic Times (2015) Innovation economy urgently needed, http://vneconomictimes.com/article/vietnam-today/innovation-economy-urgently-needed

[385] VietNam News (2016) Using IT in agriculture is imperative: seminar, http://vietnamnews.vn/society/299163/using-it-in-agriculture-is-imperative-seminar.html

[386] Users may have more than one mobile broadband subscription, share subscriptions, or access the Internet through public Wi-Fi facilities, cyber cafes etc.

[387] O. Salmon (2016) The economic and social benefits of mobile internet technology in Vietnam, www.slideshare.net/hatienminh/20160726-google-vietnam-launch-presentation-english1

[388] O. Salmon (2016) The economic and social benefits of mobile internet technology in Vietnam, www.slideshare.net/hatienminh/20160726-google-vietnam-launch-presentation-english1

[389] Nhan Dan (2015) Report provides details on Vietnam's digital economy potential, http://en.nhandan.com.vn/business/economy/item/3406702-report-provides-details-on-vietnam%E2%80%99s-digital-economy-potential.html

[390] Oxford Economics (2016) One million opportunities: The impact of mobile internet on the economy of Southeast Asia, www.oxfordeconomics.com/recent-releases/one-million-opportunities-the-impact-of-mobile-internet-on-the-economy-of-south-east-asia

[391] GiapSchool, http://giapschool.com/

[392] TRPC (2015) Going Digital: The Status and Future Potential of Internet-Based Economies in Asia, http://trpc.biz/wp-content/uploads/TRPC_GoingDigital_Whitepaper20150605.pdf

[393] Voice of Vietnam (2017) Growing a digital economy in Vietnam, http://english.vov.vn/economy/growing-a-digital-economy-in-vietnam-355757.vov

[394] Voice of Vietnam (2017) Growing a digital economy in Vietnam, http://english.vov.vn/economy/growing-a-digital-economy-in-vietnam-355757.vov

[395] VietNam News (2016) Digital economy the future of VN development, http://vietnamnews.vn/economy/348457/digital-economy-the-future-for-vn-development.html

[396] The Verge (2014) Indie smash hit 'Flappy Bird' racks up $50K per day in ad revenue, www.theverge.com/2014/2/5/5383708/flappy-bird-revenue-50-k-per-day-dong-nguyen-interview

[397] National Assembly (2015) Law on Network Information Security, http://english.mic.gov.vn/Upload/VanBan/Law-on-Network-Information-Security-16-05-30.pdf

[398] Tilleke & Gibbins (2016) New Law on Cyber Security in Vietnam, www.tilleke.com/resources/new-law-cyber-security-vietnam

[399] Rouse (2016) New Law on Cyber Information Security and its impact on data privacy in Vietnam, www.rouse.com/magazine/news/new-law-on-cyber-information-security-and-its-impact-on-data-privacy-in-vietnam/

[400] M. Gray (2016) The Trouble with Vietnam's Cyber Security Law, https://thediplomat.com/2016/10/the-trouble-with-vietnams-cyber-security-law/

[401] VNNIC (2013) Decree No. 72/2013/ND-CP, https://vnnic.vn/sites/default/files/vanban/Decree%20No72-2013-ND-CP.PDF

[402] Baker & McKenzie (2017) MIC to Require Select Offshore Service Providers of Online Content to Comply with Local Content Restrictions, www.bakermckenzie.com/en/insight/publications/2017/03/mic-to-require-select-offshore-service-providers/

[403] M. Bauer, M. Ferracane, E, van der Marel (2016) Tracing the Economic Impact of Regulations on the Free Flow of Data and Data Localization, Global Commission on Internet Governance, Paper Series: No. 30 – May 2016, www.cigionline.org/sites/default/files/gcig_no30web_2.pdf

[404] M. Bauer et. al (2014) The Costs of Data Localization: Friendly Fire on Economic Recovery, ECIPE Occasional Paper, No.3/2014, http://ecipe.org/app/uploads/2014/12/OCC32014__1.pdf

[405] KPMG (2017) Vietnam Taxation in Digital Economy, https://home.kpmg.com/content/dam/kpmg/xx/pdf/2017/06/tnf-vietnam-jun9-2017.pdf

[406] Vietnam Investment Review (2017) Ho Chi Minh City tries to tax Facebook sellers, www.vir.com.vn/ho-chi-minh-city-tries-to-tax-facebook-sellers.html

[407] VietnamNet (2017) Unknown Quantities, http://english.vietnamnet.vn/fms/business/186035/unknown-quantities.html

[408] KPMG (2017) Vietnam Taxation in Digital Economy, https://home.kpmg.com/content/dam/kpmg/xx/pdf/2017/06/tnf-vietnam-jun9-2017.pdf

[409] WHO (2017) Viet Nam, www.who.int/countries/vnm/en/

[410] Export.gov (2017) Vietnam – Healthcare, www.export.gov/article?id=Vietnam-Healthcare

[411] PwC (2014) The Vietnamese healthcare industry: moving to next level, www.pwc.com/vn/en/advisory/deals/assets/the-vietnamese-healthcare-industry-moving-to-next-level-pwc-vietnam-en.pdf

[412] PwC (2014) The Vietnamese healthcare industry: moving to next level, www.pwc.com/vn/en/advisory/deals/assets/the-vietnamese-healthcare-industry-moving-to-next-level-pwc-vietnam-en.pdf

[413] Export.gov (2017) Vietnam – Healthcare, www.export.gov/article?id=Vietnam-Healthcare

[414] Talk Vietnam (2015) Vietnam accelerates universal health insurance, www.talkvietnam.org/2015/03/vietnam-accelerates-universal-health-insurance/

[415] VnExpress (2017)
Vietnam to digitize medical records for all citizens, https://e.vnexpress.net/news/news/vietnam-to-digitize-medical-records-for-all-citizens-3539220.html

[416] Hanoi Times (2015) E-commerce makes great contribution to Vietnam's growth, http://hanoitimes.com.vn/economy/2015/09/81e097fa/e-commerce-makes-great-contribution-to-vietnam-s-growth/

[417] VietnamNet (2015) Transport costs in Vietnam highest in the world, http://english.vietnamnet.vn/fms/business/144041/transport-costs-in-vietnam-highest-in-the-world.html

[418] VietnamNet (2015) Transport costs in Vietnam highest in the world, http://english.vietnamnet.vn/fms/business/144041/transport-costs-in-vietnam-highest-in-the-world.html

[419] HKTDC (2015) Vietnam's Logistics Market: Overcoming the Challenges, http://economists-pick-research.hktdc.com/business-news/article/Research-Articles/Vietnam-s-Logistics-Market-Overcoming-the-Challenges/rp/en/1/1X000000/1X0A12CI.htm

[420] HKTDC (2015) Vietnam's Logistics Market: Overcoming the Challenges, http://economists-pick-research.hktdc.com/business-news/article/Research-Articles/Vietnam-s-Logistics-Market-Overcoming-the-Challenges/rp/en/1/1X000000/1X0A12CI.htm

[421] VietnamNet (2016) Vietnam's tourism hits growth records in 2016, http://english.vietnamnet.vn/fms/travel/169988/vietnam-s-tourism-hits-growth-records-in-2016.html

[422] World Travel & Tourism Council (2017) Travel & Tourism, Economic Impact 2017 Vietnam, www.wttc.org/-/media/files/reports/economic-impact-research/countries-2017/vietnam2017.pdf

[423] Travel Wire Asia (2017) Vietnam tops UN's list of fastest growing tourism destinations in Asia, http://travelwireasia.com/2017/09/vietnam-tops-uns-list-of-asias-fastest-growing-tourism-destination

[424] VN Express (2017) Vietnam named among world's fastest growing travel destinations , https://e.vnexpress.net/news/travel-life/travel/vietnam-named-among-world-s-fastest-growing-travel-destinations-3607125.html