



MAKE IN INDIA

CONDUCTIVE POLICY & REGULATORY ENVIRONMENT
TO INCENTIVIZE DATA CENTER INFRASTRUCTURE

May 2016



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ABBREVIATIONS AND ACRONYMS

| Abbreviations / Acronyms | Full Name |
|--------------------------|--|
| ANSI | American National Standards Institute |
| CMA | The Computer Misuse (Amendment) Act |
| DC | Data Centre |
| DOT | The Union Department of Telecom, Union Ministry of Information and Communications Technology |
| DR | Disaster Recovery |
| ETP | Economic Transformation Program |
| ICT | Information Communication Technology |
| ISP Guidelines | Guidelines for the grant of License for Operating Internet Service |
| ISP License Agreement | License Agreement for the Provision of Internet Service |
| ISPAI | Internet Service Providers Association of India |
| IT Act | Information Technology Act 2000 |
| MEA | Middle East and Africa |
| MENA | Middle East & North Africa |
| NDC | National Data Centre |
| NeGP | National Electronic Governance Programme |
| NITC | National IT Council |
| NITA | National Information Technology Agenda |
| NIXI | National Internet Exchange of India |
| NKEA | National Key Economic Area |
| NRI | Network Readiness Index |
| NTP 1999 | The National Telecom Policy of 1999 |
| OSP | Other Service Providers |
| OSP Guidelines | Notification No. 18- 2/2008-CS-I on “Terms and Conditions - Other Service Provider (OSP) Category” dated August 05, 2008 |
| PDPA | Personal Data Protection Act 2010 |
| Revised OSP Guidelines | DOT Notification No. 18-5/2009-CS-I “Amendment to Terms and Conditions for Other Service Providers” dated October 07, 2011 |
| SBA | Singapore Broadcast Authority |
| SDC | State Data Centres |
| Telegraph Act | The Indian Telegraph Act, 1885 |
| TERM | Telecom Enforcement, Recourse and Monitoring |
| TRAI Act | Telecom Regulatory Authority of India Act, 1997 |
| TIA | Telecommunications Industry Association |

EXECUTIVE SUMMARY

India is becoming a robust domestic data consumption market with digital data consumption expected to increase at twice as fast as the worldwide rate from being around 40,000 petabytes in 2010 to 2.3 million petabytes in 2020. The market is expected to see a strong resurgence of growth-related projects across verticals viz., banking, insurance, telecom and government segment and further with the liberalization of the Information Technology market, digital-commerce and social media, the quantitative impact of Datacenter traffic is apparent. The Indian data centre infrastructure market is valued at \$2.2 billion and is poised to be the second largest market for data center infrastructure within the Asia/Pacific region by 2020. The paper estimates that India can grow to an infrastructure hub attracting \$7 Billion or 4.5% of the world's investments by 2020 and there is an urgent need to create appropriate incentives to attract the investments and enable better connectivity, data speed and create more jobs in the country.

The focus on datacenter market is not restricted to the private sector alone, the Governments are also increasingly reliant on IT-intensive services to improve their performance and organize their services to the citizens. The Digital India programme enumerates the enormous projects that the government has planned and which aim at promoting rigorous internet penetration by connecting 1 billion population and efficient delivery of services electronically through mobile. These massive and ambitious targets would equip the Datacenter market further with endless opportunities and will drive increased attention on newer trends such as datacenter virtualization and cloud computing.

India represents a huge business opportunity; it also presents risks and significant barriers to undertake datacenter business in India. Factors such as energy, bandwidth, Red tape, sustainability, risk of natural disasters and water resource have been preventing the market forces to play its due role. India is the least performing of the BRICS economies and is continuing its slide to rank at 83 among 148 economies in terms of leveraging information and communications technologies (ICT) for growth and well being. It takes 12 procedures and almost a month (ranked low in APAC) to register a business in India. In addition, taxes for a typical registered firm amount, on average, to 63% of its profits. It is, therefore, urgent that the government creates the right incentives for businesses to register and contribute their fair share to the provision of public services.

The objective of this paper is to seek clearer policy environment for Datacenter business in India from the regulators/government, for this is what will **promote Trans Border Data Flow** with ease, provide **tax sops/incentives to build the right infrastructure to support DC business and promote confidence** in users without sacrificing expectations of privacy, security, and safety. The budget announcements of 2015 and 2016 promised a reasonable level stability to the technology industry, however there is still a long way to go to harness the true potential.

This paper highlights the various legal, policy and regulatory enablers that are essential to **promote datacenter industry and strengthen India's positioning in the global datacenter market**. The paper **strongly challenges mandatory data localization norms** which would reduce competitiveness and would have a deterring impact on the GDP of the economy and drive away India's extensive ability to attract data centre investments.

In light of the above, this paper calls on policy-makers to put in place a comprehensive strategic and an industry-friendly framework that would enable India as a Data Centre business Hub. In other words, a **minimum regulation and maximum facilitation policy/regulatory framework** are critical to incentivize data centers in the country.



INTRODUCTION

Data Flows: The Unprecedented Growth Story

The data centre infrastructure and services business is a very large emerging business worldwide. However, very few countries have the basic requirements in terms of infrastructure and policies to take advantage of this business and become global hub for data centre. In India, the data economy provides endless opportunities for citizens, businesses, markets, politics, culture, sports and entertainment that take place every day in the world's largest democracy. India has a robust domestic data consumption/market as well as various other enormous positive indicators that will help India advance towards a data-driven economy in near future. The government too has been emphasising in the recent budget upon creating cloud warehouse which will safely store enormous amounts of digital data and has urged the industry to make this happen, as it is a big business opportunity. *This paper supports India's Digital Technology industry and government's Make in India plans.*

The paper also strongly argues that the worst way to grow the market share in this business would be to mandate data localization which can be counterproductive. It would adversely impact investments not only in this sector but will have cascading effect on other sectors too. It would also have a negative impact on local innovation around IT services and cloud-based businesses. The paper also highlights other pitfalls of "jumping into this business" on the basis of the current state of infrastructure and regulations. One of the best-case examples of negative impact of mandated data localization is that of Brazil, which is cited in some detail in this paper. In addition, the paper also argues that an unplanned plunge into this sector may have adverse impact on employment as well as power and other infrastructure. Finally, the paper discusses in detail the changes that need to be brought in the current policy, regulations, technology and infrastructure in order to take advantage of this emerging business.

The paper is divided into four chapters. *Chapter one* discusses the current market size and India's share of it in order to give the reader an idea of how big the market is and how it is expected to grow over the decade. *Chapter two* talks about the Trans Border Data Flows which is key to future growth and encouraging public/private enterprise as well as providing economies of scale and penetration to the NeGP in India. *Chapter three* evaluates the existing conditions that already qualify India to an extent to take advantage of this growing market. *Chapter four* highlights some of the challenges on the way to becoming a preferred centre for data infrastructure hub and the various policy, business, infrastructure and technical pre-conditions that India needs to fulfill in order to take advantage of this business and become a global leader. Finally, *Chapter five* illustrates a comparative snapshot of various global legal and policy frameworks that measure the countries' preparedness to support the growth of data centres. Lastly, *a detailed case study on various factors responsible for fostering the growth of TBDF, data centres and related innovation for Malaysia and Singapore have been provided in Annexure-A of this paper and negative Effects of Data Localization in Brazil have been provided in Annexure-B.*

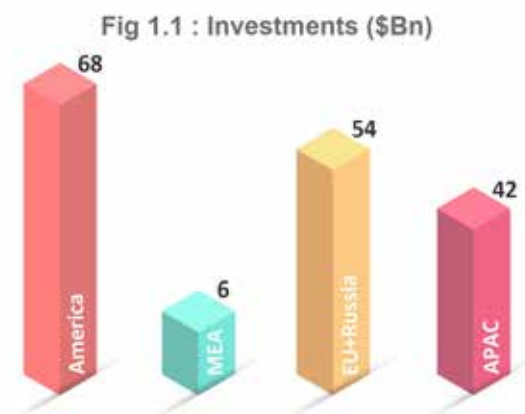
CHAPTER ONE

GLOBAL DATA CENTRE MARKET AND INDIA'S SHARE

1.1 Global Data Centre IT Infrastructure Market by Geography 2015

Data centre IT infrastructure investments globally, including total spending on servers, storage, networking, security and virtualization, reached \$170 billion in 2015¹, a 23% increase over the 2012 levels² and is estimated to reach \$175 billion by 2016 at 2% on an average p.a, much of which will be accounted from Asia Pacific.

Large data centers will lead this expansion with an average annual increase of 8% over the period till 2016-17. Much of this infrastructure will be used to form the backbone of cloud services for both consumer and commercial customers. Cloud computing and Analytics will be the biggest driver of large data center investment globally.



Source: Data centre Dynamics Intelligence 2015

Global data center market is dominated by the Americas with 40% of market share at \$68 billion followed by Europe and Russia together at 32% or \$54Billion. The APAC market is growing rapidly with a 25% market share at \$42 billion³ and lastly, the Middle East and Africa region hold a 3% share with nearly \$6 billion in investments.

Global investments in large datacenter segments are estimated to grow at 8% in 2016 whereas Asia Pacific will be the fastest growing region over the next five years. Today, APAC accounts for a quarter of worldwide data center infrastructure spend at \$42 billion. Regions such as Asia Pacific and Latin America are the ones really fuelling global data center investment levels. China and India stand to exploit the market the most and fuel the growth in APAC⁴. Growth rates in the mature data center markets have slowed down and will remain sluggish⁵, North America (US 3.8%, a point down from 2012) Western Europe (3%, a point up from 2012) and Japan (-0.1, from flat to negative)⁶.

1.2 India's Data Centre Market 2015

Data Centres facilities are of two types: captive (firms setting up centres for their own use) and third-party (hosting/co-location/outsourced). Data centres market in India is seeing a good growth since past few years due to the explosion of data through smartphones, social networking sites, ecommerce companies and Government's initiated projects. In India, the market is dominated by third-party data centre providers like Netmagic (NTT Com), CtrlS and telecom firms like Reliance, Tata Communications etc⁷.

The data centre IT infrastructure investments, including total spending on servers, storage, networking, security and virtualization stood at \$2.2 billion (2015) and is expected to reach \$2.29 billion by the year 2018⁸. Within the Indian IT infrastructure market, server growth reached \$658 million in 2015 a marginal increase over 2014 levels. Enterprise networking and Storage are the biggest segments with revenue reaching \$944 million and \$426 Million in 2015, a 5.5% and

1. <http://www.gartner.com/newsroom/id/3186517>
 2. <http://www.canalys.com/newsroom/data-center-infrastructure-market-will-be-worth-152-billion-2016>
 3. <http://www.cio.in/content/asia-pacific-account-25-global-data-centre-infrastructure-spending-2016>
 4. <http://www.canalys.com/newsroom/data-center-infrastructure-market-will-be-worth-152-billion-2016>
 5. IDC Predictions 2014: Battles for Dominance — and Survival — on the 3rd Platform (Page 5)
 6. In the year 2014
 7. <http://www.datacentermap.com/india/new-delhi/>
 8. http://articles.economictimes.indiatimes.com/2015-05-11/news/62039831_1_infrastructure-market-infrastructure-spending-storage-market

10% growth over 2014 respectively. Data center consolidation and virtualization, cloud and mobility, are the key trends influencing network purchases.

Data Centre IT Infrastructure Growth by Technology

| In Million USD | 2014 | 2015 |
|-----------------------|------|------|
| Servers | 656 | 658 |
| Storage | 382 | 426 |
| Enterprise Networking | 892 | 944 |
| Total | 1929 | 2228 |

Source: Gartner 2015

India's Data Centre Market Share

As per the above figures, India shared around 1.2% to the world data center IT infrastructure and 5.23% in APAC in 2015. As per Gartner, India is the 2nd largest market for data center infrastructure and 2nd fastest growing market in Asia/Pacific after China in 2015⁹.

Fig 1.4 : India has 1.2% share in the Global Market

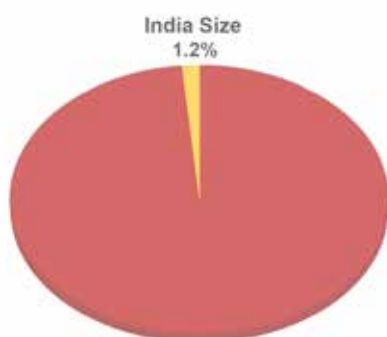
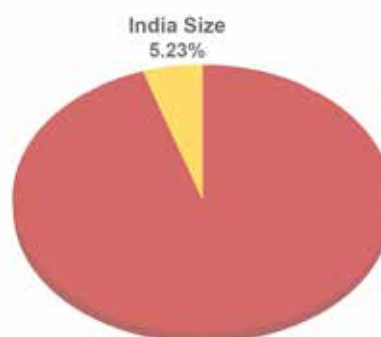


Fig 1.4 : India has 5.23% share in APAC

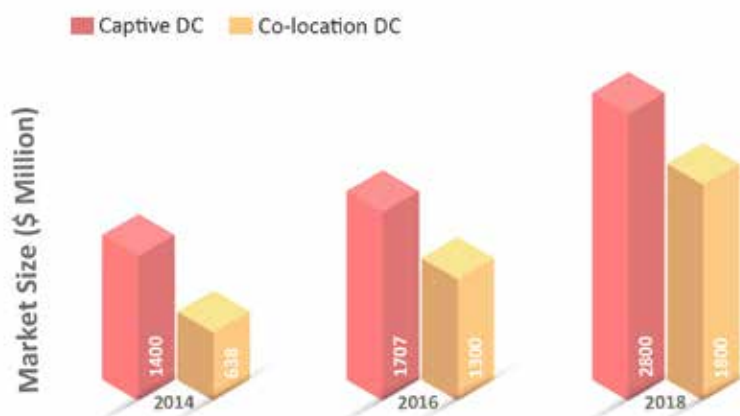


Source: Data centre Dynamics Intelligence 2015

India's Data Centre Hosting and Co-location Market

Co-location denotes the provisioning of a third party space to maintain an end-user's servers and the associated equipment. Growth of data center market in terms of hosting and co-location market is going to experience a consistent growth through 2018. India's data center hosting and co-location market size stood at \$638 million¹⁰ in 2014 and is predicted to reach \$1.3 billion in 2016 and 1.8 billion by 2018 at a CAGR of 21% as per Gartner¹¹. There will be an increased outsourcing of data

Fig 1.5 : Captive Data Center and Hosting & Co-location Market outlook



Source: CII and Gartner

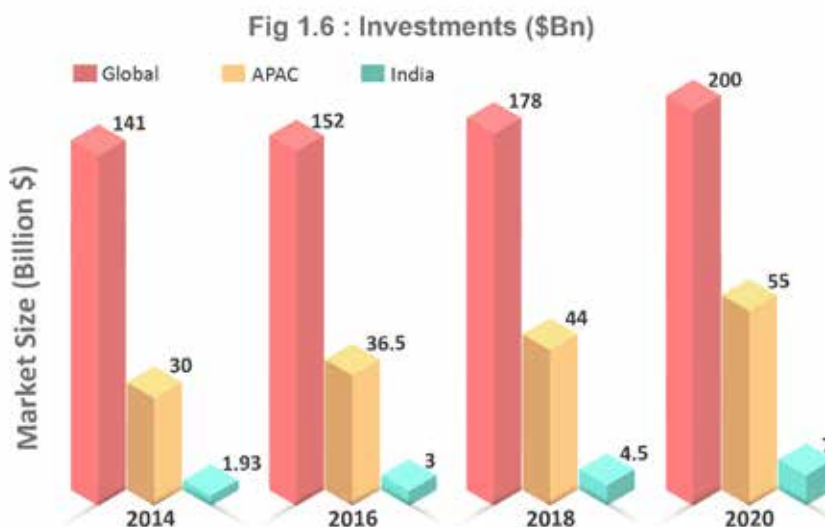
9. <http://www.gartner.com/newsroom/id/2857217>

10. http://articles.economicstimes.indiatimes.com/2014-12-26/news/57420683_1_india-enterprise-business-cloud-storage-data-centers

11. <http://datacenters.lbl.gov/sites/all/files/CII%20Energy%20Efficiency%20in%20Indian%20Data%20Centers-%20Present%20Trends%20and%20Future%20Opportunities.pdf>

center requirements in the forecast period due to demands from BFSI, Social Media, Entertainment, eCommerce and Telecom industry. This 3rd party segment contributed 30% in 2012 to the total data center market and contributes nearly 40-45% at present.

1.3 India Data Centre Market Outlook 2014-2020



Source: Gartner, IDC and Cyber Media Research

India will be a \$4.5 billion data center market by 2018 as per Cyber Media Research¹² and will reach \$7 billion by 2020 at a growth rate of 23% and with the current investment in data center infra business by the various companies this would further enhance India’s market share in the global and APAC markets, thus making India an attractive destination for the datacenter business in the region. As per the current growth rate estimation, India’s share in the global market and APAC could go up to 4.5% and 12% respectively¹³.

Cloud Computing and Virtualization will lead the technology evolution and continue to trigger growth in the data center services market provided there is a seamless movement of data across national borders benefiting both businesses and consumers, enabling them to access the best available technology and services wherever those resources may be located.

12. <http://cmrindia.com/cybermedia-research-india-data-center-services-market-review-2011-india-data-center-services-market-to-grow-at-a-23-cagr-over-the-three-years-to-2012-to-touch-rs-11800-crore/>

13. This estimate is under the business as usual scenario, keeping the economic conditions constant; the estimation could be bigger if the market situation gets conducive.

CHAPTER TWO

TRANS BORDER DATA FLOWS AND DATA CENTRES: KEY TO FUTURE GROWTH

2.1 Trans Border Data Flows: Steady Contribution to Indian economy

With the liberalization of the Indian economy, the Information Technology and Business Process Management (IT-BPM)¹⁴ sector has seen exponential growth in the country-- from a mere 1.2% of the GDP in 1998 to 9.5% in 2015¹⁵. There is also evidence to show that India's leading role in IT-BPM services exports, i.e. trade from data flows, has had a spillover effect. With strong IT-capable human resources, the country's data processing needs are only going to expand with the growth in digital business and the thrust towards e-governance. India's technology and BPM sector (including hardware) has generated US\$ 146 billion¹⁶ in revenue during FY15, growing by 13% over the previous year¹⁷ where the sector earned \$118 billion in revenues. This growth has been largely backed by the export of IT-BPM services with industry driving non-linear growth through platforms, products and automation, leading to 1.2 times increase in revenues and employees since 2009¹⁸.

Worldwide IT-BPM spend was USD 2.3 trillion, growing at 4.6% over 2013-2015, and India holds a massive 55% market share. The industry today is India's largest and most diverse private sector employer, with a direct workforce nearing 3.5 million, and effecting over 10 million indirect jobs.

The IT industry growth is backed by 76% of exports of services and there are several economic effects of Transborder Data Flows (TBDF). As witnessed in India, TBDF provides economic benefits to industries, businesses and organizations that are able to adapt and change their internal practices to take advantage of developments in ICT and emerging technologies. Some of the economic benefits²¹ that have been identified are¹⁹:

- **Economies of Scope:** The ability to centralize functions such as data storage, processing and management to reduce costs and take advantage of specialization within the firm.
- **Increased Trade in Information and Communication Technologies and Services Fuelling Market Growth:** AAs trade in ICT takes place, prices are reduced and the market expands. This increased globalization and economic expansion creates new activities and new companies that are engaged in cross-border trade and investment. As per Mckinsey Global Report²⁰, India has average to high participation across all flows (much of this growth has been in IT service exports including IT consulting, systems integration, call centers, and outsourcing of back-office functions) and ranks as the 30th most connected country overall, up 16 places from 1995.
- **Leveraging global supply chains by outsourcing support functions allows for renewed focus on core business:** Outsourcing tasks that would otherwise need to be done in-house at either lower levels of efficiency or at higher costs enables firms to focus on their core functions. This leads to more effective use of internal resources and accelerated growth.
- **Access to Knowledge:** The growth of knowledge-based industries within the North American economy has elevated the importance of a firm's ability to effectively manage, create and disseminate knowledge within their organization. A firm's ability to successfully control their information holdings is crucial to their success within their market.
- **Medical Data Transfers²¹:** In several cases ease in dataflows can literally save lives of the patients, as some of the data that is transported are used for the purposes well beyond commercial including public health and safety.
- **International Growth Opportunities:** Through the use of TBDF, companies are able to enter foreign markets without necessarily having a physical presence there. This can result in significant cost savings and the ability to enter certain markets that may not have been economically viable if a physical presence was required.

14. Includes IT enabled services for the purposes of this paper.

15. The IT-BPM Sector in India Strategic Review, NASSCOM

16. <http://www.ibef.org/industry/information-technology-india.aspx>

17. NASSCOM Report 2015

18. NASSCOM - India IT-BPM Overview (Available at: <http://www.nasscom.in/indian-itbpo-industry>).

19. Report on the Trilateral Committee on Transborder Data Flows — North American Leaders Summit, Digital Policy Branch (Available at: <https://www.ic.gc.ca/eic/site/ecic-ceac.nsf/eng/gv00548.html>)

20. Global flows in a digital age: How trade, finance, people, and data connect the world economy- McKinsey Global Institute 2014

21. Business Without Borders: The Importance of Cross-Border Data Transfers to Global Prosperity(Page 7)-Whitepaper at Hunton & Williams LLP

- **Increased Productivity:** TBDF allows for multifaceted use of technology. This enables firms to improve their ability to maintain and share knowledge among their employees, which can help increase individual productivity. Improvement in productivity by enabling workers to use their skills effectively contributes to the company's bottom line.
- **Foster Innovation:** The ability to share data across borders, both between and within companies, fuels research and development and brings about additional ways of doing business, while providing new opportunities for emerging business models. Access to customer data allows businesses to analyze the success of past ventures and develop innovative approaches to better address customer needs or internal processes.

In terms of a quantitative analysis of the economic impact of TBDF, it has been estimated that globally 75% of the value added by the Internet and data flow is in traditional industries, in part through increase in productivity²². Therefore, TBDF and domestic dataflows are key to encouraging public/private enterprise as well as providing economies of scale and penetration to the NeGP for citizen-centric services in India.

The onus is on both governments and businesses to facilitate the flow of information data and communication around the world. Both will need to negotiate a range of challenges and risks to data privacy and security that are part and parcel of an increasingly data driven world to avoid misguided policies that could stifle job growth and lead to economic stagnation.

2.2 Government focus on data, data flows and data centres²³

Focus on data and, consequently, dataflow is not restricted to the private sector. Governments are increasingly reliant on IT-intensive services to improve their performance and organize the Government to Citizen (G2C) delivery platforms—including e-forms, public service grievance redressal etc. For example, the National eGovernance Plan (NeGP) has more than 31 Mission Mode Projects²⁴ in its initial years²⁵; the NeGP itself requires several data centres and needs yet more to support the various Business to Citizen (B2C) services.

The Government has a vision of making all services accessible to common man to achieve the citizen centric service delivery goal with three core infrastructural NeGP pillars:

- State Wide Area Network (SWAN)
- State Data Centres (SDCs) and
- Common Service Centres (CSCs)

The State Data Centre scheme has been approved for all States by Government of India with an outlay of Rs. 1623.20 crores (\$266 Million) over a period of 5 years²⁶.

In the United States, between 1998 and 2010, the number of federal data centres jumped from 432 to 2,094. In order to enhance efficacy of e-Governance and reduce costs, countries such as the USA and the UK have defined the Cloud as an integral part of the government's IT strategy²⁷, and are gradually moving towards a paperless government. These countries have realized the value to the economy from potential data flows and the consequent importance of data centres: Cloud First Policy (USA), Integrated Strategy (EU), G-Cloud Strategy (UK), Strategic Direction Paper (Australia) and Smart Cloud Strategy (Japan) are all hallmarks of their respective governments' focus on strengthening data flows and building a robust data centre friendly environment. Common features of these government initiatives include driving *cloud adoption, friendly legal framework, and devising a technology and international collaboration strategy*.

Quantitatively, the impact of cloud computing on data centre traffic is clear. It is important to recognize that most of the Internet traffic since 2008 has originated or terminated in a data centre. According to one of the top-line projections, 69% of data centre traffic in the world will be cloud traffic by 2017²⁸.

22. McKinsey Center for Business and Technology, Perspectives on Digital Business, (Jan 2012)

23. <https://negp.gov.in/images/guidelines.pdf>

24. eGovernance initiatives covering various streams identified and funded by the Central Government for implementation by the various State Governments in India.

25. Rolled out/approved in May 2006.

26. http://www.doitc.rajasthan.gov.in/_layouts/15/Doitc/User/ContentPage.aspx?Id=264&LangID=English

27. The World Bank, Next Generation eGovernment: The Cloud and Beyond, eGovernment Summit; CII-KPMG Cloud Report 2012.

28. Cisco Global Cloud Index: Forecast and Methodology, 2012–2017 (Available at: http://www.cisco.com/c/en/us/solutions/collateral/service-provider/global-cloud-index-gci/Cloud_Index_White_Paper.html)

The Government of India's Cloud initiative – MeghRaj (“GI Cloud”)—was started with this vision: - “To accelerate delivery of e-services provided by the government and to optimize ICT spending of the government hence to support overall vision of NeGP (improved government services to common man)”.

The Government of India has already begun rolling out of the GI Cloud with the launch of Phase-I of the National Cloud²⁹, which introduced the National AppStore and allowed the State Data Centres to be Cloud-enabled.

Under the NeGP, the NIC has established three major data centres, besides the one at its headquarters in New Delhi. These are the National Data Centre (NDC), New Delhi, NDC Pune and NDC Hyderabad. Under the same plan, state governments were expected to establish SDCs to enable e-governance, database management and digitization of governmental information. Several states have created data centres, some with the help of the private sector. So, the data centres have private “State Consultants” and “Data Centre Operators” – primary players include Tata Consultancy Services, Wipro and Sify, with HCL, Reliance and Spanco also playing an important role.

The SDC, Maharashtra, has already moved from first generation data management to having a fully operational cloud earning the distinction of being the first state to do so. The private sector has also kept pace with the government and established data centres across the country, with Mumbai, Hyderabad and Bangalore being the most important locations.

With the rise in e-governance projects and governments relying on a strong digital infrastructure to support its operations, the demand for more secure and sophisticated technologies is definitely going to be explored. According to Government of India's GI Cloud Strategic Direction Paper, the key drivers and potential benefits for GI Cloud will be the following: Optimum utilization of existing infrastructure; rapid deployment and reusability; manageability and maintainability; scalability; efficient service delivery and agility; security; ease of first-time IT solution deployment; reduced effort in managing technology; and increased user mobility.

It is important to note that the GI Cloud³⁰ will not be a standalone private cloud but will consist of several categories such as government-owned and-operated cloud as well as government-shared cloud, owned and operated by the private sector. With managed services provider models³¹ increasingly being used for service delivery to citizens by the Government (G2C), the GI Cloud categories evince the critical role of private sector participation in data management, data flows and data centres in India.

2.3 Effects on Indian Innovations

It should also be kept in mind that the freedom of data flow has been a boon to the innovation landscape in India. Zoho Corp., founded in 1996 in Chennai, Tamil Nadu, operates data centres in California and New Jersey³². Myntra, an eCommerce platform, and redBus, an online bus ticketing company, have also hosted their servers with cloud serviceproviders such as Amazon Web Services³³. Flipkart, one of the largest eCommerce platforms, relied on data centres in Canada for its initial operations³⁴. Fortis Healthcare has migrated from its own corporate data centre to the cloud service provided by Windows Azure, leading to significant cost savings, and it intends to use the cloud for remote healthcare monitoring and remote healthcare delivery (Telemedicine)³⁵.

Restricting data flow via data localization requirements would, therefore, hamper the next generation of disruptive start-ups from incubating in India. It would have a damaging effect on the investment climate, leading to trade deficit and impacting national GDP. These opportunities cannot be realized by attempting to achieve them through government mandates, but require market driven opportunities and incentives. A mandate-based approach - in the form of forced data localization - will restrain the free flow of information in a way that will constrain the opportunity for growth.

“Make in India” would remain a dream for many entrepreneurs rather than a reality and it is critical to make India a preferred destination for data flows/centres rather than impose chilling data localization requirements.

29. February 2014, as per DeITY reports

30. As per Department of Electronics & Information Technology, Ministry of Communications & IT, Government of India

31. BSP for Aadhar, Driving License projects across several states.

32. Bernard Lunn, Zoho: The Little Engine That Could (Take on Both Microsoft and Google) (Sep. 18, 2008) available at http://readwrite.com/2008/09/18/zoho_the_little_engine_that_could

33. Amazon Web Services Launches “The Lean Cloud” Program for Start-Ups in Asia Pacific (Apr. 3, 2012) <http://yourstory.com/2012/04/amazon-web-services-launches-the-lean-cloud-program-for-start-ups-in-asia-pacific/>

34. Rebuilding Flipkart's Data Centres (Jun 12, 2014) <http://www.cioandleader.com/cioleaders/cio-transforms/40294/rebuilding-flipkarts-centres>

35. Microsoft is Powering the Cloud Transition in India (Mar. 20 2014) <http://www.microsoft.com/en-in/news/Press/2014/Mar14/MicrosoftsPoweringt.aspx>

CHAPTER THREE

PROMOTING DATA CENTRE INDUSTRY IN INDIA

The data centre industry would be primarily driven by the kind of policy frameworks that governments prepare. With higher real estate and energy costs driving data centres to rural or smaller emerging markets, the policies formulated by the governments of emerging markets are going to play a key role in determining where the opportunity shifts.

We are already witnessing the rise of data centre markets in MENA countries. India and Malaysia, with their strengths in ICT, a growing human resource base in the sector and relatively lower operational costs, could well be the new destinations if they are able to create a rational framework of strong, industry-driven policies and regulations (though locations that offer more cost-effective energy supply and real estate solutions are of immediate interest to data centre operators looking to reduce the costs of day-to-day operations).

Data centre location involves stakeholders making strategic investment and operational decisions about where to locate their data. As per Reports, apart from infrastructure, “a very stable political environment, business-friendly climate with transparent legislation and no ownership limitation”³⁶ are the key factors that will help determine a location of a data centre friendly destination.

As already stated, India will be the 2nd largest investor in the data centre market in the coming years and is predicted to become the 5th largest data centre market in the world by 2050³⁷. Asia’s largest 4 tier data centre, Ctrl S, is located in India. In terms of floor space, CtrlS’ state-of-the-art data centres across Hyderabad, Mumbai and Delhi are spread over combined areas of 340,000sq.ft³⁸. CtrlS plans to build two new data centres in Bengaluru (1 lakh sq ft) and Chennai (20,000 sq ft)³⁹ in a span of 5 years. Multinationals such as Microsoft, Amazon and IBM are also investing heavily on hosting data centres in India which will further add to the capacity.

However, the robust indicators in the IT-BPM sector along with an abundance of real estate and a huge captive and co-location market of data users are not enough to tempt the global industry to move to India as a location of choice for a SE Asia/APAC data centre.

3.1 Drivers

India is recognized as one of the leaders in the ICT/IT-BPM sector globally. The growth of digital business in India is expected to rise substantially in the coming years, thus fuelling the demand for data processing and co-location services. This market is not limited to India but also includes the smaller SAARC countries—Nepal, Bhutan, Sri Lanka and the Maldives. These countries may have limited resources, but their increasing need for data processing, data storage and co-location services mean India can leverage its strategic location to provide them with these services. This would not only reap foreign exchange and trade benefits (apart from investments brought in through the setting up of data centres) but also international diplomatic advantages.

3.1.1 Digital Data Traffic Growth

The size of the digital populations in India presents a huge potential demand for data centre infrastructure. Digital data in India was around 40,000 petabytes in 2010 and this number is projected to shoot up to 2.3 million petabytes by 2020⁴⁰, twice as fast as the worldwide rate.

Annual global data centre IP traffic is 4.1 zettabytes at present and will reach 6.6 zettabytes by the end of 2016. (Zettabyte = 1 million Petabytes).

With 900 million+ mobile connections, 100 million+ active mobile data users and increasing number of connected devices, the amount of consumer and enterprise data will grow exponentially. India had a data centre capacity of 1.3 million sq ft in 2007 and is expected to go up to 6.6 million sq ft by the end of 2016 at a CAGR of 19.8% (excluding the data centres in less than 1000 sft area). Data centre space constructed between 2008 and 2010 was 1.7 million sft > than in last 15 years. The primary drivers of the data centre industry in India would be the availability of abundant real estate and

36. “Data Centres unboxed: A guide to legal issues, trends and risks”; Norton Rose Fullbright.

37. Data centre trends in 2015- 7 technology trends shaping the next generation DC-EXPERTS-December 23, 2014

38. CtrlS Data centres report

39. EconomicTimes

40. http://www.business-standard.com/article/technology/digital-information-in-india-to-grow-60-fold-by-2020-emc-110091000069_1.html

competitive policies, along with ICT-capable human resources, and market factors such as the continuing growth in India's mobile market and internet penetration.

3.1.2 Investments/Job Opportunities

According to the Department of Industrial Policy and Promotion (DIPP), the computer software and hardware sector attracted foreign direct investment (FDI) worth \$13,238.58 million between April 2000 and September 2014⁴¹. The top investors have been Mauritius, USA, Singapore, Netherlands and UK.

The Government of India has played a key role with public funding of a large, well trained pool of engineers and management personnel in Indian IT industry. Its spending on information technology (IT) will reach \$7.2 billion in 2015, a 5% increase over 2014⁴².

While data centre investments, private and public, in India is growing rapidly, cloud is certainly the next big focus. According to a recent survey, cloud services in India are expected to be strong across all cloud segments through 2017. In the period between 2013 and 2017, business-process-as-a-service (BPaaS) is anticipated to grow from \$63.6 million to \$168 million, software-as-a-service (SaaS), from \$174 million to \$552 million; and infrastructure-as-a-service (IaaS), from \$59.2 million to \$156.3 million⁴³.

Various research studies reveal that private cloud in India will help save Indian companies up to 50% of their infrastructure costs⁴⁴ and will also create more than 1 lakh jobs⁴⁵ by 2016-17.

As the world increasingly exploits information technology for innovative services and competitive advantage, trans-border data flow is playing a rapidly expanding role in job creation and preservation and the health and recovery of the broader economy⁴⁶.

3.2 Case of competitor jurisdictions

3.2.1 Malaysia

Malaysia is one of the preferred destinations for Shared Services and Data Centres in the Asia Pacific Region for the various policy/regulatory initiatives it has undertaken⁴⁷. It is projected that the South-East Asian region's data centres will be worth approximately \$10.9 billion. Malaysia aspires to capture this market and increase the data centre space from 0.5 million to 5 million square feet by 2020 and establish itself as the preferred destination for regional investors as well⁴⁸. The Malaysian data centre market is broadly marked by expansion, efficiency and consolidation.

3.2.2 Singapore

Singapore is, perhaps, the most sought after Asia-Pacific data centre market, with all the major global providers either building or looking for projects there. It is the primary hub for an APAC cloud going forward, for its location allows companies to extend the delivery of their services to APAC markets, which are witnessing the highest growth rates globally⁴⁹. All major analyst firms predict explosive growth in the region for cloud services over the next few years. Singapore is also one of the region's leading financial and business centres, with many customers looking to deploy critical business applications there. However, historically, there has been a limited supply of quality enterprise data centre availability, which has led to most major providers looking to build and set up shop to address the growing demand. According to the Singapore Economic Development Board, Singapore is currently home to approximately 50% of South East Asia's data centre capacity.

A detailed case study on various factors responsible for fostering the growth of TBDF, data centres and related innovation for Malaysia and Singapore have been provided in Annexure-A of this paper and negative Effects of Data Localization in Brazil have been provided in Annexure -B.

41. http://dipp.nic.in/English/Publications/SIA_NewsLetter/Annualreport2011/Chapter6.2.iv.pdf

42. <http://indianexpress.com/article/technology/tech-news-technology/indian-govts-it-spending-to-reach-6-88-billion-in-2015-gartner/>

43. <https://www.datacentredynamics.com/conferences/2014/mumbai-2014>

44. <http://www.indiatechonline.com/special-feature.php?id=101>

45. http://articles.economicstimes.indiatimes.com/2015-02-12/news/59083520_1_emc-academic-alliance-emc-india-100-centres

46. <https://gigaom.com/2012/10/27/why-data-centers-have-a-big-impact-on-the-economy/>

47. Offshore Opportunities Amid Economic Turbulence - The AT Kearney Global Services Location Index 2011, <http://www.datacentre.my/preferred-destination-shared-services-data-centreom/>

48. <http://www.datacentre.my/>

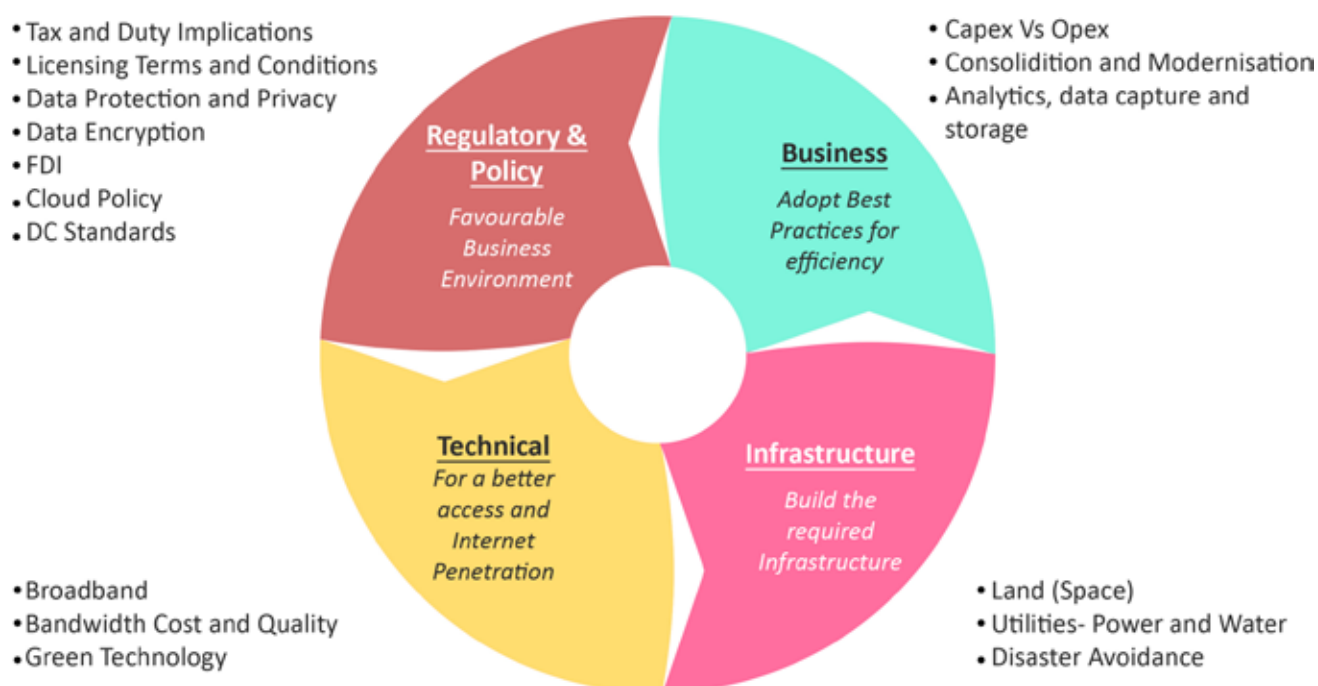
49. <http://www.datacenterknowledge.com/>

CHAPTER FOUR

MAKING INDIA A PREFERRED DESTINATION FOR DATA CENTRE

Generating investment in data centres in India is about developing a regulatory regime that incentivizes private companies to invest in India. If the present regime is not reformed, India will forgo a valuable growth opportunity. In this chapter we make suggestions on how through supportive policies a conducive environment for data centre can be created in India.

Various Regulatory, Business, Infrastructure and Technical needs to facilitate Data Centre Business in India



4.1 Regulatory and Policy Environment

The data centre industry's needs are unique from each other so a conducive regulatory and policy ecosystem that comprehensively addresses such needs with transparency, certainty and assurance is necessary. At present, an investor in the data centre market will not be in a position to invest with certainty or to avail governmental incentives or schemes as the applicability requirements are subject to bureaucratic and regulatory approval.

Indian telecom laws follow a different approach as compared to the International Laws. The challenge is to expand telecom and internet density and introduction of new technology and services. The authorities must devise protocols for third and fourth generation networks which are the need of the hour for ensuring a comprehensive and systemic framework for data centres. Such policy should be driven by a motive to create an enabling environment for private players to enter the data centre market and to meet the growing needs of data management in India. Most importantly, it should be kept in mind that the data centre market is capital and technology-intensive, and with the entry of technology and capital from capable players into the market, spillover onto the Indian economy is almost certain.

4.1.1 Tax and Duty Implications⁵⁰

Data centre incur one-time and recurring taxes that have a significant impact on long-term costs for any data centre. The capital-intensive nature of a data centre attracts relatively high sales taxes and property taxes. Further, electricity tariff, stamp duty charges, import duties on equipment sourced from outside India and multi-jurisdiction tax implications further impact data centre costing.

In the US, many states have passed legislation to provide customized incentives for data centres. These states provide full or partial exemption taxes for various investment types. The exemptions commonly cover computer (or IT) equipm-

50. <http://www.areadevelopment.com/siteSelection/Q1-2014/data-centre-incentives-tax-breaks-primer-272101.shtml>

ent across the board. Construction, mechanical and electrical equipment, cooling systems, power infrastructure, electricity, and backup fuel are all covered to varying degrees by this group of states.

One such example is that of Nebraska. It provides an enhanced level of incentives for data centres with a minimum of \$200 million in capital investment and 30 direct jobs. The investment minimum can include construction, equipment, and capitalized software. The minimum jobs are direct or “badged” employees. Contract based jobs are not taken in the calculation. It should be noted that the jobs and capital investment targets must be achieved within seven years for a company to realize and earn the benefits of the incentives. The state has an alternative level of incentives for a lower investment threshold of \$37 million.

India can adopt such data centre-specific tax and duty incentives that will encourage investors to operate here. Where to locate the assets and the people associated with delivering global data content and services is a defining tax consideration — in terms of both direct corporate tax rates and indirect sales taxes. Friendly tax jurisdictions play a big factor in choosing a place for establishing a data centre and complex tax jurisdictions do just the opposite.

Tax incentives for building infrastructure for large data centres and cloud services within the country should be allowed to ensure data security as well as to have a big network of large software products companies within the country. The recent Budget announcement of reducing corporate tax rate and reduction in the tax rate on Royalty and Fees from Technical services is much appreciated which would surely give a lot of boost to the industry. Similarly the eCommerce firms are also expecting implementation of crucial tax incentives for building data centres and cloud services within the country.

4.1.2 Licensing Terms and Conditions

There is no clarity in the definition of Data centre services in India. However, as per the Telecom Policy (NTP) 1999, service providers in India involved in providing services like tele-banking, tele-medicine, tele-education, tele-trading, e-commerce, call center, network operation center and other IT Enabled Services, using telecom resources are termed as “Other Service Providers” (OSP). These Other Service Providers or OSP’s are required to obtain an OSP Registration from DOT. Although the terms and conditions for OSPs have been liberalized twice in 2005 and in 2008⁵¹ and now require only registration, as opposed to licensing, the regime is far from simple. The OSP Guidelines require mandatory registration⁵² of OSPs for every data centre at every location, even if the data centre is a part of the same single network or offering.

As part of the Security Conditions for OSPs prescribed under Chapter V of the OSP Guidelines, OSPs are required to provide the call data records of all the specified calls handled by the system at specified periodicity, as and when required by the security agencies. The term ‘security agencies’ has not been defined, leaving it open to interpretation, which is an impediment for a data centre operator.

DOT and the local TERM Cell granting the registration, reserve the right to modify at any time the terms and conditions of the registration, if, in its opinion, it is necessary or expedient to do so in public interest or in the interest of the security of the State or for the proper conduct of the telegraphs. Precedents with respect to enforcement of these broad conditions (such as in the Blackberry matter⁵³) have resulted in a loss of confidence for industry.

Data centres also need access to broadband through ISPs in order to link-up data centres inter-se or to the outside world. Currently, there appears to be a lack of clarity on data centres being able to receive broadband connectivity without an ISP license or some other telecom license apart from the OSP registration. On one hand the regulation says “OSP may have Internet connectivity from the Authorized Internet Service Provider” and on the other “The company shall take internet connection from the authorized service provider only and it will use internet telephony only to the extent it is permitted by the ISP or authorized service provider” as detailed in clause 1.14 of the licence agreement of “Internet with telephony”. Hence, there needs to be clarity around the voice and VOIP usage and licensing regime as telecos are licensed who pay for revenues earned on usage of spectrum, not separately for voice, Internet and VAS.

While specific categorization such as those for the OSP appears to be the ideal approach for data centres, greater clarity needs to be provided and rigorous telecom-centric conditions need to be relaxed on the registration requirements for Application Services Providers.

51. <http://www.dot.gov.in/sites/default/files/OSP%20registration%201.pdf>

52. The OSP authority for registration is the concerned Telecom Enforcement, Resource and Monitoring Cell where the OSP is situated.

53. <http://indiatoday.intoday.in/story/govt-to-tap-blackberry-messenger-security-privacy/1/183403.html> - 2012

<http://www.dailymail.co.uk/indiahome/indianews/article-2126277/No-secrets-Blackberry-Security-services-intercept-data-government-gets-way-messenger-service.html#ixzz33kduAEqq>

4.1.2.1 *The National Internet Exchange of India Enabler (NIXI)*

NIXI is the first and only neutral internet exchange body in India. The quantum of traffic exchange is presently only 17 Gbps through NIXI. NIXI should be able to connect all operational ISPs, data centres and content providers and facilitate without any mandate a neutral exchange of domestic Internet traffic. This would enable a more efficient use of international bandwidth, saving foreign exchange as otherwise every time traffic from India goes outside the country, the cost of bandwidth goes up as it involves paying for bandwidth to international service providers. It also improves the Quality of Services for the customers of member ISPs because if the content sits at the (local) exchange, users can access them much faster, by avoiding multiple international hops and thus reducing latency. The development of NIXI would therefore be beneficial for the development of more efficient traffic routing at the local level to route all national traffic through it voluntarily.

4.1.3 *Government/Law Enforcement Demand for Private Data*

The citizen or user of data and his/her privacy concerns are of primary importance to any service provider. The ability of law enforcement agencies to collect and analyze personal and electronic data has been relatively limited to traditional wiretapping of telecommunications lines or efforts to bug or confiscate personal computers or business network servers. But now, the simultaneous centralization and fragmentation of data represented by data centres present a new set of opportunities and challenges for law enforcement.

Indian law enforcement access provisions, at present, suffer from no or limited Parliamentary oversight and procedural safeguards to protect the privacy rights of the person in question and data acquired through such interceptions. The Privacy Bill-- yet to be passed by Parliament, which seeks to address issues pertaining to privacy compliance and provide confidence to companies looking to do business in India, also carves out several broadly worded exceptions that are susceptible to misuse or misinterpretation by the country's diverse law enforcement agencies. Add to this the factor of political influence within the state governments, and the regime is unpalatable for any serious, long-term data centre player.

While there is an obligation for service providers to release data for law enforcement, they are also accountable to their consumers under various jurisdictions for maintaining privacy. This requires a mature and accountability based law enforcement access system. Apart from stable and rigid law enforcement access provisions, there is an impending need to provide for judicial oversight on law enforcement access. There is a need to reform the legal framework for law enforcement access that will in turn leave room for innovation, privacy, and long-term investment in the data centre industry in India.

However, the Supreme Court's decision of striking down⁵⁴ Section 66A of the IT Act to protect and preserve Freedom of Expression was a shot in the arm for the Internet Industry, and more such regulatory freedom awaits to give the industry the necessary confidence.

4.1.3.1 *Data Protection and Privacy*

India does not have any specific restrictions on the transfer of data offshore or strong data privacy laws. However, national security laws, regulations and guidelines specific to certain industries, in particular financial institutions and telecommunications, operate to prevent the disclosure or transfer of particular types of data.

Therefore, the uncertainty in data protection laws is a challenge faced by potentially interested investors. In 2011, India enacted the Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules 2011, to implement parts of the Information Technology (Amendment) Act 2008. The 2011 Rules cover a subset of personal data (referred to as sensitive personal data, but, unhelpfully, the meaning of this term differs from that used in the Data Protection Directive⁵⁵) and lay down security practices and procedures that must be followed by organizations dealing with them. The 2011 Rules are broad in scope but ambiguously drafted and their impact on the outsourcing sector is as yet unclear.

In India, for protection of sensitive personal data and information on individuals, the general laws are provided in the IT Act's Section 43A. The Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data) Rules 2011 ("IT Rules") set out the reasonable security practices and procedures that must be implemented to protect sensitive personal data, while providing unlimited liability for any breaches. But the IT Rules have incorporated

54. www.iamai.in/PCov_Detail.aspx?nid=3564&NMonth=3&NYear

55. The Data Protection Directive (officially Directive 95/46/EC on the protection of individuals with regard to the processing of personal data and on the free movement of such data) is a European Union directive adopted in 1995 which regulates the processing of personal data within the European Union. It is an important component of EU privacy and human rights.

a significant hurdle in the free flow of data. Rule 7 provides for data flow from India to another jurisdiction provided that such transfer is necessary for the performance of the lawful contract between the data collector and the data provider or whether the latter has consented to such transfer. Also, Rule 5 provides that consent is to be obtained in writing through letter or fax or email, which seems to imply that even a webpage with a standard agreement detailing the terms and conditions and an “I Agree” button would not be consent under the Rules.

Moreover, such a “consent” hurdle in off shoring of data may bring reciprocal actions from other jurisdictions. The proposed New York Consumer and Worker Protection Act requires that no business transfer “personal information to or with any nonaffiliated third parties which are located outside the United States ... without ... prior written consent...”⁵⁶.

Sector-wise, various sector-specific regulators require banks and securities markets intermediaries to maintain confidentiality of client data, including personal data. These sector-specific regulators include the RBI (banking sector regulator) and the SEBI (securities markets regulator). These regulations apply in addition to the IT Rules.

4.1.4 Data Encryption

Privacy is directly proportional to the security deployed to secure data, i.e. encryption and other techniques. India, at present, lacks a uniform and credible encryption policy. The Information Technology (Amendment) Act, 2008, provides for encryption under Section 84A. However, there are no details on the kinds of encryption that can be used to protect data. Most other countries allow the usage of strong encryption standards ranging from 128 bits to 256 bits or more to ensure the security of sensitive information exchanged via the Internet and other networks. DoT, however, in the Guidelines for the grant of License for Operating Internet Service (ISP Guidelines) and the License Agreement for the Provision of Internet Service (ISP License Agreement) laid down that 40-bit encryption would not require permission for using the ISP services.

Encryption standards across sectoral regulators also differ greatly, each having their own prescribed standards:

In banking: *“All transactions must be authenticated using a user ID and password. SSL/128 bit encryption must be used as the minimum level of security. As and when the regulatory framework is in place, all such transactions should be digitally certified by one of the licensed Certification Authorities.”*⁵⁷

In trade: *“Microprocessor based SMART cards, Dynamic Password (Secure ID Tokens), 64 bit/128 bit encryption”*⁵⁸

Further, as per the ISP License Scheme, encryption of more than 40 bits would require approval of DoT along with certain other mandatory obligations and conditions. These include, inter alia, inspection and testing of installations, which may include sharing of drawings and literature of installed equipment, right to inspect the site, monitoring facilities etc. These also include the requirement to turn over encryption keys or coding in a readable format.

In order to attract top data centres to India, it is imperative that industry-recognized enterprise grade encryption services are permitted to protect data. Imposition of requirements relating to handing over of encryption keys or coding in the readable format or any such conditions would deter large number of legitimate encryption services from being provided to citizens in India. This would not, however, impact the use of encryption for illegitimate or unlawful purposes considering the universal availability of such tools and the very nature of the internet. In sum, this would mean that while Indian citizens’ data or institutional data would be deprived of requisite protection through encryption and be vulnerable, miscreants using encryption technologies for illegal or illegitimate purposes would not be checked.

Reports have showed that more than 76% of the data centre traffic remains within the data centre itself and only 17% moves from data centre to user. Therefore, the potential risk of non-state actors using these facilities and the consequent restrictions on encryption have to be balanced appropriately within the legal regime dealing with encryption in India.

4.1.5 FDI Policy

The data centre market has tremendous opportunities in India. Hosting data centres in the country will help Indian companies, government and entrepreneurs. The global Data centre market is expected to grow to a \$200 billion market by 2020 and the Indian market is expected to grow at a CAGR of 23% to \$7 billion by 2020. India already hosts the highest

56. New York Consumer and Worker Protection Act, Sect. 4, 2013-2014 Regular Sessions NY Senate Bill S2992-2013 (Jan. 28, 2013).

57. Report on Internet Banking’ by The Reserve Bank of India: 22 June 2001

58. Internet Trading guidelines issued by Securities & Exchange Board of India: 31 January 2000

number of SMEs in the world, at 50 million⁵⁹. Further, India has over 1,500 co-operative banks, most of which use IT infrastructure for their services. Considering these strengths, competition is getting fierce and many IT giants and e-commerce foreign companies are all set to invest millions in the multi-billion Indian market to set up local data centres by the end of 2015. With more and more investors looking to step into the market, just opening up 100% FDI in telecom sector is not sufficient and will not be able to attract the needed \$10 billion as the government expects⁶⁰.

Additional measures—like allowing investments in network roll out, efficient spectrum management and allocation and clear spectrum pricing and MVNO policy—must be adopted to help the TSPs to offset the debt burden they are pressured with and for significant increase in FDI inflow. This will set the right roadmap for data centre service providers to boost investors' confidence and attract more companies. In addition, the Government will need to define how such services will be taxed. Existing regulators such as the Reserve Bank of India (RBI) or Telecom Regulatory Authority of India (TRAI), Insurance Regulatory Development Authority (IRDA), and Securities Exchange Board of India (SEBI) will have to be directed to develop guidelines keeping in mind how the industry can potentially benefit the ecosystem.

4.1.6 Cloud Policy

Cloud technology's cost effectiveness and elasticity are two important factors that are driving more and more companies and SMEs to enter and utilize cloud-based applications. Majority of IT is running in the cloud or on SaaS (software-as-a-service) technologies, but over the next four years CIOs in India expect this number to increase to 67%, as per Gartner and that the Indian companies will adopt new cloud services much faster than anticipated.

The Government of India which has already launched Phase-I of the National Cloud which introduced the National App-Store and allowed State Data Centres to be Cloud-enabled is much appreciated. As stated earlier, under the NeGP, the NIC has established three major data centres in Delhi, Pune and Hyderabad. However, India does not have a separate legislation which deals with cloud computing to combat the legal issues pertaining to privacy and confidentiality as in countries like USA, UK, Australia and Japan. Several other European countries too have realized the value of Cloud, and value to the economy from transborder data flows and have implemented strategic Cloud policies in their respective countries. These countries therefore have a robust data-centre friendly environment with continuous focus of the governments's on further strengthening data flows. Similarly India desperately needs government initiatives to drive cloud adoption, friendly legal framework, a strong devising technology and a good international collaboration strategy with a separate *cloud computing law to govern cyberspace*.

4.1.7 Data Centre Standards

The Telecommunications Industry Association (TIA) is a trade association accredited by ANSI (American National Standards Institute) which specifies the requirement of DC standards and design. It published ANSI/TIA-942 in 2005 which specifies Telecom Infrastructure Standard for Data Centres. TIA-942 has been amended twice since then on the basis of the change in technological ecosystem. TIA-942 Data Centre Standards describes the requirements for the data centre infrastructure in a thorough, quantifiable manner under four levels (called tiers) of data centres. The Tier 1 data centres basic installation of computer systems. The most stringent level is a Tier 4 data centre, which is designed to host mission critical computer systems, with fully redundant subsystems and compartmentalized security zones controlled by biometric access controls methods.

Countries like Germany and Mexico have defined their independent DC standards and tiers, which also provide tier certifications. In India too the government needs to adopt independent DC standards which will specify the minimum quality and safety requirement/provisions to minimize chances of any disruption.

4.2 Infrastructure Challenges

India does not have sufficient infrastructure to support its burgeoning population or to make use of its economic potential. With a layered bureaucracy and a complicated regulatory mechanism, India stands at 155 out of 189 countries in starting a business, from 164 last year and its ranking for dealing with construction permits also moved up one spot to 183. In segments such as protecting minority investors, registering property, trading across borders, enforcing contracts and resolving insolvency, India's rankings remained the same as last year. While India's road density - 0.66 km of highway per square kilometre of land – is similar to other economies (and higher than China and Brazil), the quality of all-weather roads continues to plague the transport sector. The data centers need huge space capacity as well as power and cooling provisions.

59. http://www.business-standard.com/article/companies/nearly-50-mn-smes-are-here-to-tap-kerry-agiasotis-114081801078_1.html

60. Telecom Sector Needs More Than FDI- WallStreetJournal July 2013

4.2.1 Land/Space

The data centre market in India is growing at 23% CAGR with more and more MNCs looking for storing data within the country. The growing data centre market in India will require real estate players to build out sufficient capacity to meet the needs. Due to power challenges in many states, real estate players focus more in few developed cities putting pressure on the space availability. As stated earlier, data centre space constructed between 2008 and 2010 has been more than the data centres constructed in last decade which puts a lot of pressure on the space availability.

4.2.2 Power/Energy Cost

Unsurprisingly, cost is one of the most critical factors that affect the adoption, use and purchase of data centres and data centre services. India has been ranked 2nd in terms of high risk data centre locations as per the Cushman and Wakefield Data Centre Risk Index 2012. Data centres are capital-intensive projects that use thousands of computers and lots of power/energy. While building a data centre in the US costs \$43 million on an average with a monthly operating cost of \$510,000, building a similar facility in Brazil would cost \$61 million and \$950,000 monthly to operate⁶¹.

Energy costs consist 75% of the costs of operating a data centre⁶², hence, power requirements for the sector continue to rise. The survey from Data centre Dynamics showed a massive increase in energy usage in 2012 of 63.3% globally to 38 gigawatts (GW)⁶³ with a further 17% increase in 2013. India's infrastructural troubles run deep – some estimates state that almost a quarter of the population has unmet energy needs. With the growth in demand and the government importing energy-generation resources to meet this demand, costs have jumped.

On the other hand for a business to apply and get electricity connection it takes 67 days on an average and has to go through seven different procedures, as against 3 in Japan. In India to store diesel for 48 hours an additional license is required, which adds to the difficulties of the companies. Hence, there should be various policy measures to smoothen these situations. Energy duty tax should be exempted to benefit the industry in a situation where many outsourcing companies like Netmagic are experimenting with renewable energy for bundling or part-powering their units. The green data centres need to be brought in place. Tulip Telecom, a green, energy-efficient and cloud-ready data centre that was built by IBM in just nine months is a clear example that this is not a hindrance with green technology in place. This is a general case where India should reap the benefits of heavy reduction in World Global Crude prices and build favorable strategic storages.

4.2.3 Water/Cooling Issues

The enormous volume of water is required to cool high-density server farms, which is making water management a growing priority for data centre operators. A 15-megawatt data centre can use up to 360,000 gallons of water a day and as the scale increases data centre operators have to depend heavily on water supply.

Nalco developed an onsite mobile unit with all ancillary piping, pumps, controls and tankage to support the main technology components of an ultra filtration program followed by reverse osmosis for a data centre facility in Bangalore which reduced water consumption by 164,250,000 liters annually. Similar examples from Local and International arena⁶⁴ can all be taken as the guiding percepts in this regard.

4.2.4 Disaster Avoidance

Strategies related to disaster avoidance are gaining prominence with heightened awareness of possible failures among business enterprises in the context of both man-made and natural disasters. In the coming period, planning for all the possible disasters will continue to grow as a top priority for organizations prompting enterprises to lay special emphasis while choosing the locations, building designs and standards. Data centre trends will change due to this newfound focus on disaster avoidance. Hence disaster recovery technology needs to be provisioned to take care of the unforeseen. For instance, NTT Communications Company, India's leading Managed Hosting and Cloud Service Provider, with 8 carrier-neutral, state-of-the-art data centres across the country is the first to launch Disaster Recovery-as-a-Service (DRaaS) and software-defined storage.

61. Loretta Chao & Paulo Trevisani, Brazil Legislators Bear Down on Internet Bill, WALL STREET JOURNAL, (Nov. 13, 2013), <http://online.wsj.com/news/articles/SB10001424052702304868404579194290325348688>

62. Rachel A. Dines, Build or Buy? The Economics of Data Centre Facilities, Forrester, June 27, 2011 (updated July 29, 2011), available at <http://www.io.com/wp-content/uploads/2013/04/build-or-buy.pdf>

63. <http://www.wallstreetandtech.com/infrastructure/spending-on-data-centres-is-growing-rapidly---survey/d/d-id/1267108?>

64. A multi-million dollar water treatment plant was built by Microsoft to support its data centre in Washington, Google is recycling waste water to cool the thousands of servers housed in the facility in Atlanta, and Facebook refined its cooling plans with very less water consumption in Oregon

India can also create a special zone for promoting DC builds with additional tax SOPs. The zones could include the suitable remote locations where businesses could be encouraged to set up DCs. This will not only solve the purpose of making the DCs safety provisioned but will also lead to economic development in that region.

As per the National eGovernance Plan (NeGP), for the State Data Centres (SDC) it has been identified that for each State a Disaster Recovery Plan has been created through the use of the DR Handbook and DR Strategy documents of the government. These DR Strategy guidelines⁶⁵ are aimed to assist the formulation of a DR Plan and DR Implementation methodology of each State as per their dynamics.

4.3 Business Challenges

4.3.1 Capex Vs Opex

Data centre decisions are based primarily on the Opex and the Capex factors. In addition to the servers, network switches, storage and other computing resources, a data centre requires capital-intensive infrastructure to ensure continued operation from cooling systems to remove excess heat from the equipment in the facility to disaster readiness technology. All this adds up to the total cost of hosting a data centre. Businesses need to adopt best practices to decide between Capex and Opex to keep the TCO under control.

Capex Vs Opex is important from two perspectives:

- a) To manage the capex and opex to keep the TCO (total cost of ownership) low and not incur additional unnecessary expenses (Shifting to or hosting DCs in low cost areas) this point has been argued for the need of providing Tax sops by government and creating DC (promote certain regions as DC HUB or SEZs or DC Parks) as mentioned in the earlier sections.*
- b) The second approach is to choose between adopting a traditional data centre (buying land, construction etc) or shifting to cloud data centre as it is utterly important for CIOs and businesses to fully understand the true costs and risk associated between building a DC vs Colocate whichever makes sense.*

4.3.2 Consolidation and Modernization

Existing data centres must become more agile while controlling costs and keeping up with the trends to stay competitive. Data centre modernization and consolidation initiative involves customizing data centre strategies according to business goals, regulatory requirements and skills availability. Those business that assess the trends save more than 10% of their annual operational costs⁶⁶.

4.3.3 Data Analytics

Data analytics gives a valuable meaning to entire gamut of digital data stored in the data centres. According to an industry report by NASSCOM the analytics market in India could be more than double from the current \$1 billion to \$2.3 billion by the end of 2017-18 as against the global market reaching \$25 billion this year as per Crisil⁶⁷.

IDC Digital Universe report predicts that we'll reach 40 zettabytes (data traffic) by 2020, a 50-fold growth from the beginning of 2010. Advancements in the IT world such as cloud, social media, mobile are placing greater demands on data centre. Social media, E-commerce and mobile internet has seen a tremendous uptake in last few years, hence Indian companies needs to accelerate investments in technology and services to better understand the data they possess.

In 2012, the Obama administration officially announced the Big Data Research and Development Initiative. Now, there is more than \$200 million invested into big data research projects in the US.

4.4 Technical Challenges

4.4.1 Broadband

India ranks 122 in the world for Fixed Broadband Penetration, with only 1.1 in every 100 inhabitants having access to fixed broadband. On Internet usage, India had 243 Million internet users in June 2014, with 19% penetration mostly due to wireless broadband. Internet penetration reached 371 million as on December 2015⁶⁸.

65. https://negp.gov.in/pdfs/State%20DataCentreDisaster_RecoveryStrategyDocument.pdf

66. <https://www.gartner.com/doc/2702519/data-centre-modernization-consolidation-key>

67. <http://www.crisil.com/global-offshoring/gra-nasscom.html>

68. IAMA - BCG report "India@Digital.Bharat"

For India, the difficulty in providing absolute broadband access is its territorial expanse and the consequent challenges, which are shared neither by Singapore and Malaysia, nor by other South-East Asian countries. India has the lowest average internet speed in APAC and has also one of the expensive data costs, both of which impact the broadband penetration. A very few 3G and 4G spectrum available for commercial use which is impeding the technological growth and innovation which makes India lag behind US and China by several years.

Although, the National Optic Fiber Network and programmes like the NeGP hold out hope. The span of this optic fiber network—deployed to connect each of the 2,50,000 gram panchayats—should translate into ability for data centre providers to establish themselves at almost any location within the country.

4.4.2 Bandwidth Cost and Quality

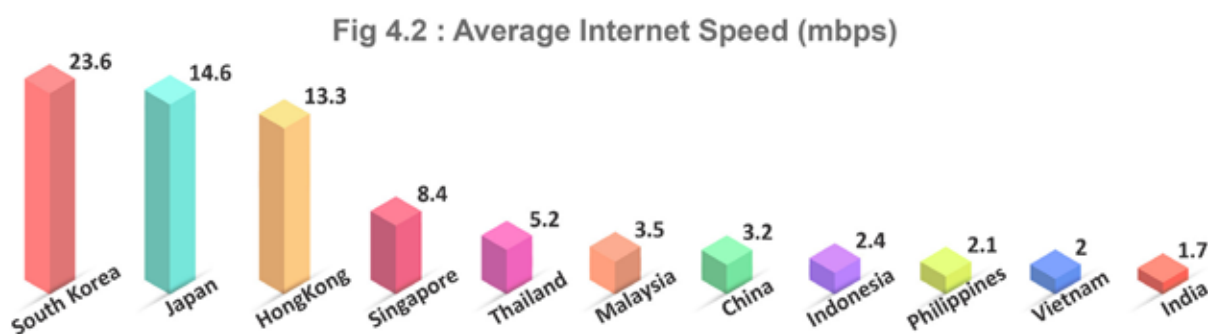
India can never be a favourable destination for data centre if cost of Internet bandwidth is too high amongst the peers. Considering the lifeline of the data centre industry, this is a huge impediment. Though bandwidth costs have reduced in recent years, it is still higher than most countries. The IAMAI Mobile Internet report 2014 stated that the average monthly mobile bill for users has increased by 13% to Rs.439⁶⁹. In rural India only a few can access the internet in more than Rs 100 a month.

According to the International Telecommunication Union the cost of an entry-level broadband plan in India is equivalent to 5.5% of an Indian’s per capita income. In comparison, a similar plan accounts for 0.5-0.8 % of per capita income in countries such as Singapore, the US and the UK. India also falls behind countries such as Sri Lanka (2.9%) and Malaysia (3.2%). As a result, several Indian portals find it cheaper to host their applications in the US, despite over 90 % of their user base being in India.

Singapore ensures that very good quality of bandwidth is available through its telecom companies, at competitive rates, which is why it has more data centre capacity than India.

Cost: Due to highly conducive environment, the cost of bandwidth in Singapore is 2nd lowest in APAC. Similar measures are required to encourage BFSI, eCommerce and content service providers to host content in the data centre situated within India or build captives. Our current model is faulty which raises the bandwidth cost.

Speed: The average low speed (1.7mbps)⁷⁰ in India is less than half the global average (4mbps) and lowest in amongst 14 countries in APAC in 2014-15. Only 2.8 % of our internet population⁷¹ connect to a speed as per the specified rate by the regulatory body and around 89% connect at less than 256 Kbps which is way below the permissible limit.



Source: AKAMAI

As per the regulation on “Quality of Service standards for Broadband Services” issued by TRAI in 2006, a subscriber should get minimum 80% of the subscribed broadband connection speed from the ISP (service provider) to the user but in reality the case is quite miserable where sometimes the speed is as low as 10% of the limit. There should be transparency in the data speed capacity and appropriate investment in the BTS (Base Transceiver System).

India’s average internet speed in 2015 has improved to 2.3mbps, however the average internet speed continues to be one of the slowest among countries in the Asia Pacific region.

69. <http://www.iamai.in>

70. <http://blogs.wsj.com/indiarealtime/2014/06/30/chart-indias-internet-speed-is-the-slowest-in-asia/>

<http://gadgets.ndtv.com/internet/news/average-internet-speed-in-india-up-21-percent-to-13mbps-akamai-396427>

71. <http://forbesindia.com/printcontent/35537>

The following table marks a few parameters on which India lags behind Singapore on hosting data centres.

High Cost of Bandwidth Analysis

| Parameters | India | Singapore |
|--------------------------------------|--|---|
| Infra | Cable-landing station charges have increasingly become a significant portion of the total bandwidth charges which is imposed on the consumers. ⁷² | Cable landing station charges in Singapore is much reasonable. Hence, there are 15 submarine cable systems landed in a tiny island like Singapore making it a hub of submarine networks ⁷³ , with a total potential bandwidth capacity of 56.1 Tbps as of June 2010 compared to 10 in India ⁷⁴ . |
| Expensive Fibre | <p>Geography of the internet depends on submarine cables to get from one place to another⁷⁵. The fibre network could solve the issue, but it is again a very heavy investment and returns are slow.</p> <p>A subsea cable link between the Puri coastline and Port Blair was rejected on grounds of “capital cost escalation”⁷⁶.</p> <p>ROW entry cost and barrier has added to the fibre cost.</p> | <p>Singapore has adopted some of the best practices to reduce the broadband cost in alignment with S Korea and Japan.</p> <p>In global countries OFC projects have taken 6-10 years to be completed with private sector participation.</p> |
| New Technology | Construction of a terrestrial cable linking Asia to Europe has helped Singapore and China reduce its bandwidth costs. | To increase competition, broadband operators in Singapore allowed providing services using any technology, including DSL, Terrestrial, cable modem, optical fiber, power lines, satellite and any of the wireless technologies available. |
| Spectrum Price | India’s spectrum pricing on an average is 25 times costlier than the Countries viz., US, France, Singapore, Germany, Spain and Sweden, and in quality it is well below the global average and even APAC average ⁷⁷ . | Singapore spectrum prices are 24 times less expensive than in India. This is because regulation of spectrum in Singapore was light-handed and affordably priced in order to encourage innovation and new services. |
| Spectrum Allocation | India’s spectrum usage is eight times more intense than in the UK, Hong Kong, Singapore, Malaysia and Pakistan ⁷⁸ . | The average spectrum per operator in Singapore is 22 MHz with far better services, against India’s average of 5.5 MHz. |
| Regulatory and Policy hurdles | <p>India needs a better Data Privacy, Security, IPR and Broadband policy. India’s networked readiness profile⁷⁹ remains hindered by the quality of its political, regulatory, and business environment (91st) and its lack of digital infrastructure (119th), which is reflected in low individual usage (121st) and wide gaps in education participation that limits the creation of a wide skill base (101st).</p> <p>India Score in the Regulatory and Policy framework is ranked at 19th amongst 24 countries that contribute 80% to world ICT market⁸⁰.</p> | <p>Singapore is the most sought after data centre market in APAC with all the major global providers either building or looking for projects there. According to the Singapore Economic Development Board, Singapore is currently home to approximately 50% of South East Asia’s data centre capacity and that is because Singapore has a better regulatory and policy environment making it not only stronger in ICT but also number one nation in ease of doing any business.</p> <p>Singapore, in the Regulatory and Policy framework, is ranked at 10th amongst 24 countries that contribute 80% to world ICT market.</p> |

72. http://articles.economictimes.indiatimes.com/2013-03-31/news/38163288_1_isps-doug-madory-providers/2

73. <http://submarinenetworks.com/stations/asia/singapore/cls-in-singapore>

74. <http://submarinenetworks.com/stations/asia/india>

75. In the current model, the signal goes to the 3G towers, then it goes to the underground cable overseas and again comes back via the same route. http://articles.economictimes.indiatimes.com/2013-03-31/news/38163288_1_isps-doug-madory-providers/2

76. http://articles.economictimes.indiatimes.com/2014-06-05/news/50358927_1_tcil-subsea-telecom-commission

77. http://articles.economictimes.indiatimes.com/2012-05-22/news/31814404_1_mhz-band-spectrum-price-india-s-2g

78. http://www.business-standard.com/article/opinion/shyam-ponappa-a-rational-spectrum-allocation-policy-109070200030_1.html

79. World Economic Forum report 2014 http://www3.weforum.org/docs/GITR/2014/GITR_Chapter1.1_2014.pdf

80. http://cloudscorecard.bsa.org/2012/assets/PDFs/BSA_GlobalCloudScorecard.pdf

4.4.3 Green Technology

Green data centres are the modern day data centres that can keep the emissions low. The carbon emissions are generated by even a search on Google or a post on Facebook. For India it plays a more important role when it suffers majorly from energy and water crisis. Energy efficient data centres or green networking and IT gear can positively affect data centre's environmental impact and cost of operation. Most big data centres could slash their greenhouse gas emissions by 88%⁸¹ by switching to efficient, off-the-shelf equipment and improved energy management. The processors in most server farms perform computations at just 3 to 5% of their maximum capacity. Server virtualization, consolidation and better software can increase utilization to greater than 30 %, and in some cases to be as high as 80%.

Moreover, there should be governments initiative to promote green technology enabled DCs. The Green DC Standard in Singapore helped organizations establish systems and processes necessary to improve the energy efficiency of their DCs with a recognized framework as well as a logical and consistent methodology. This standard is modeled after the ISO 50001 standard on energy management but is specifically tailored to meet the needs of DCs in Singapore. The standard adopts the Plan-Do-Check-Act (PDCA) methodology which forms the basis for many established management standards, which have successfully stimulated substantial, continual efficiency improvements within organizations around the world⁸².

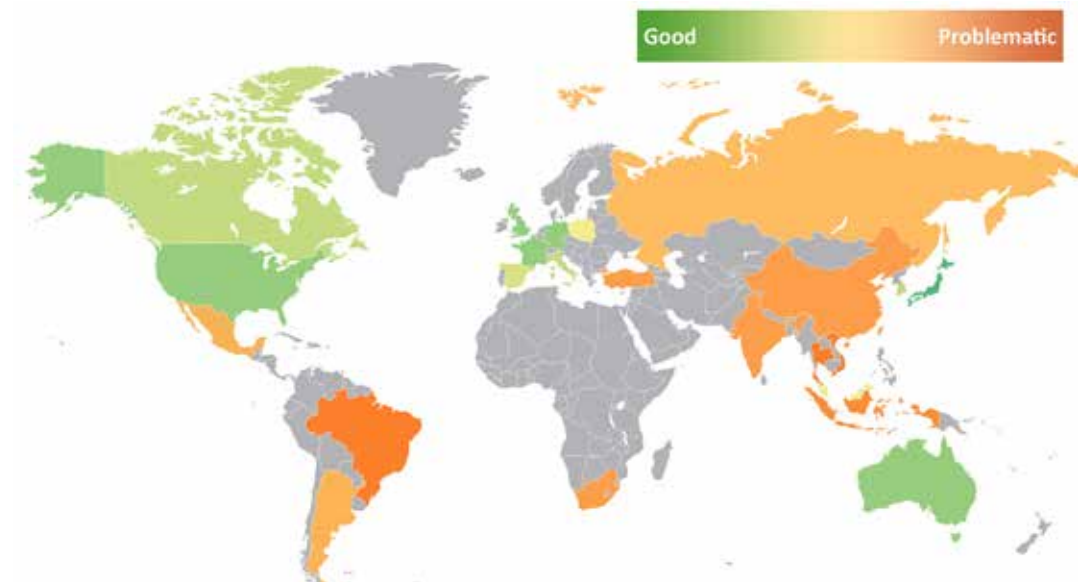
81. <http://timesofindia.indiatimes.com/tech/it-services/How-data-centres-can-go-green/articleshow/21192115.cms>

82. <http://www.ida.gov.sg/Collaboration-and-Initiatives/Initiatives/Store/Green-Data-Centre-Standard>

CHAPTER FIVE

GLOBAL LEGAL AND POLICY FRAMEWORK - A COMPARATIVE SNAPSHOT⁸³

There is a broad range of laws and regulations that are relevant to data centre services in various countries. Several countries are developing their laws, regulations and policies in a way which will facilitate such services. The map shows the overall policy environment and the following table provides a snapshot of the legal and policy robustness under nine categories/parameters that measure the country's preparedness to support the growth of data centres.



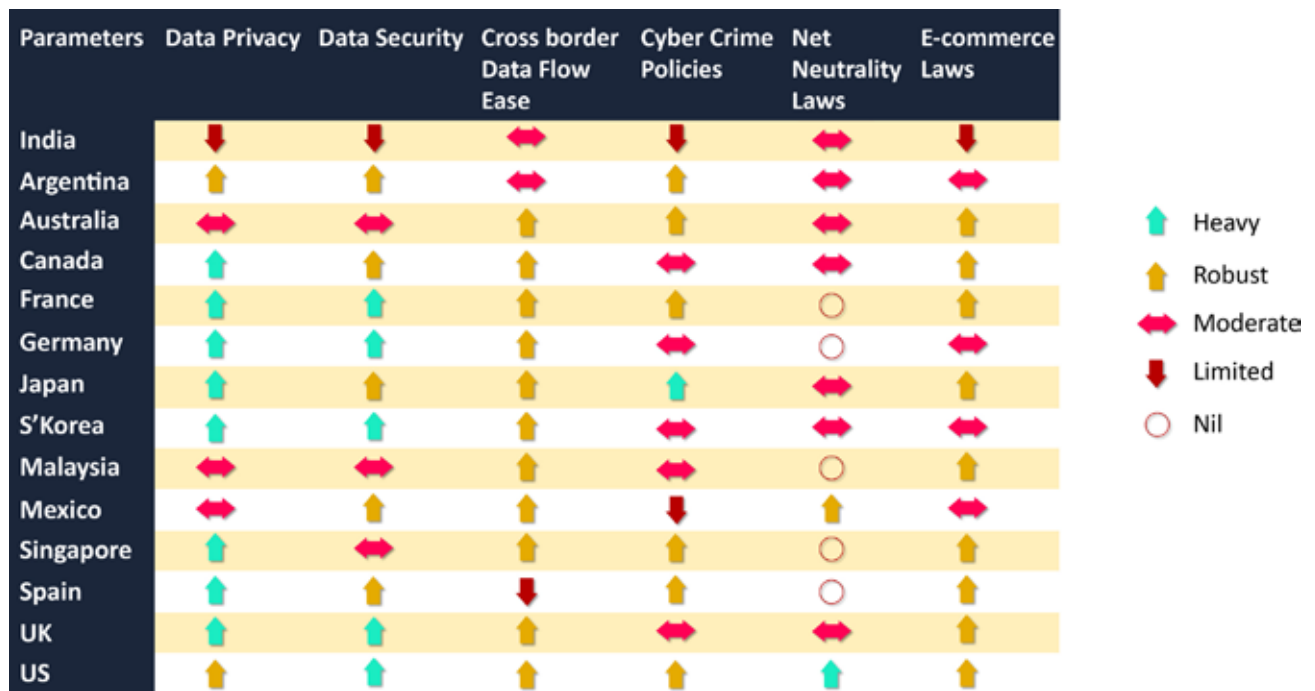
The United States has about 20 sector specific or medium specific national privacy or data security laws and hundreds of such laws among its 50 states. California alone has more than 25 laws. Japan and South Korea remain the most cloud-ready Asia Pacific nations and score well across the board in infrastructure, government, legal and business framework. Spain and Germany too have some of the world's toughest data privacy yardsticks. Countries that adopted new laws and policies recently which enabled them to improve their user confidence in cloud and exploit the economies of scale are the following:

- **Singapore:** Adopted a new privacy law that balances user protections and continued innovation. The law protects all personal data ten years after a person's death.
- **Malaysia:** Made the biggest gains due to a range of changes in cybercrime and intellectual property laws and improvements in efforts to improve digital trade. Hence, Malaysia crossed the mark to come under the more developed economies category from those still striving toward "cloud readiness."
- **Brazil:** Approved cybercrime legislation in November 2012
- **Central and South American countries:** Peru, Uruguay, Costa Rica and Mexico have inculcated data privacy laws in the past few years to comply with the EU Data Protection Directive to further open trade businesses.
- **Canada and Russia:** Made a range of improvements to their Intellectual property protections in line with key international agreements
- **Australia:** Privacy Act was last amended by the Privacy Amendment (Enhancing Privacy Protection) Act 2012, which came in to force on 12 March 2014. The amendments have significantly strengthened the powers in investigations (including own motion investigations). For the first time, the country introduced fines for a serious breach or repeated breaches of the privacy principles.
- **Australia, Canada, Japan and Korea:** Have comprehensive privacy regimes without any onerous registration requirements for cross border trade. The Personal Information Protection Act (PIPA) of Korea, which came into force on 30 September 2011, is one of the strictest data protection regimes in the world.
- **Mexico:** The Mexican economy is one of the most open economies in the world which has signed the highest number of double taxation agreements (27), necessary for e-commerce growth.

83. BSA Global Cloud Computing Scorecard, <http://unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=613>

- **USA:** The US has the world's most well developed and documented laws regarding encryption.

Snapshot of the legal and policy robustness across nations



Source: BSA Cloud Computing Scorecard 2013

SUMMARY

India is the least performing of the BRICS economies and ranks at 55 among 140 economies. The reason can be traced to, primarily, difficulties in improving historical limitations and keeping up with other emerging economies in several aspects. Overall, India's networked readiness profile⁸⁴ remains hindered by the quality of its political, regulatory, and business environment (91st) and its lack of digital infrastructure (119th), which is reflected in low individual usage (121st) and wide gaps in education participation that limits the creation of a wide skill base (101st). As the data needs of governments and companies grow, TBDF and data centres need to be developed into a reliable source of storage and functionality.

Strong privacy, security, surveillance and law enforcement rules and standards should be adopted rather limiting the borders of cyberspace and breaking apart the World Wide Web. India should review its own laws post Ed Snowden's revelation and lead the world in setting out rules for the protection of data of all people, regardless of citizenship. The outsourcing industry has brought opportunity to many Indians and has created millions of jobs. The industry depends on the free flow of data across the world—from tax returns to legal documents. If countries shut down this free flow, it will harm economic growth across the world.

Hence, India instead of following a restrictive approach, should focus her energies on the key regulatory changes and fiscal incentives highlighted in this Paper, which, we believe, would not only encourage Indian companies to host data centres but also attract the global IT and data companies to invest in India—thereby truly developing the 'Make in India' vision shared by the Hon'ble Prime Minister in his Independence Day Speech⁸⁵ for IT-BPM services as well as TBDF.

84. World Economic Forum report http://www3.weforum.org/docs/GITR/2014/GITR_Chapter1.1_2014.pdf

85. August 15, 2014.

ANNEXURE - A

PROMOTING DATA CENTRES AND TBDF

I. Case Study on Singapore⁸⁶

Overview of Singapore⁸⁹⁷

Singapore is, perhaps, the most sought after Asia-Pacific data centre market, with all the major global providers either building or looking for projects there. It is the primary hub for an APAC cloud going forward, for its location allows companies to extend the delivery of their services to APAC markets, which are witnessing the highest growth rates globally⁸⁸. All major analyst firms predict explosive growth in the region for cloud services over the next few years. Singapore is also one of the region's leading financial and business centres, with many customers looking to deploy critical business applications there. However, historically, there has been a limited supply of quality enterprise data centre availability, which has led to most major providers looking to build and set up shop to address the growing demand. According to the Singapore Economic Development Board, Singapore is currently home to approximately 50% of South East Asia's data centre capacity.

Safe Haven for Business: The Ease of Doing Business Index ranks Singapore 1 out of 189 economies in terms of doing business in an economy. Singapore has continued to improve in indices where it had been found lagging – it has made substantial improvements in the ease of acquiring and registering property; it now takes no more than 5.5 days to register property. Singapore has further increased access to credit, with the index showing a jump of eight places.

Similarly, Singapore ranks high as far as investor protections go – the country's legal framework is strong and substantially well placed to protect its investors against self-dealing.

Strategic Location: Singapore has long been recognized as an ideal site for trade and commerce. The city-state continues to benefit from being located at the crossroads of the largest economies of Asia Pacific; within navigable and flying distance are Japan, South Korea, China and Malaysia. Its locational importance is further accentuated by the fact that developing economies such as Vietnam and Indonesia are neighbours, along with a resource-rich Myanmar that is increasingly going to rely on Singapore for technical and financial support.

Cloud computing's elimination of boundaries dictating where services must be delivered also means that companies can now set their sights on building data centre operations outside Singapore, but use its relationship with the country to divest risk (specially for operations in neighboring countries such as Vietnam, Laos, Cambodia).

Policy and Regulatory Framework

Data Protection and Privacy: Singapore enacted a new Personal Data Protection Act 2012 (No. 26 of 2012) on October 15, 2012 (Act). The Singapore PDPA has strengthened the country's overall economic competitiveness, and enhanced its status as a trusted hub for global data management and data processing services. The law has provided greater clarity on the rules and the liability for businesses hosting personal data in Singapore.

It has complemented Singapore's existing strengths, such as geographical location, reliability and advanced telecommunications infrastructure, creating a conducive environment for the fast-growing global data management and data processing industries. A few relevant features of the PDPA are mentioned below⁸⁹:

Transfer/export of data: Transfer of personal data out of Singapore is allowed, provided that the transfer is made in accordance with the requirements of the Act to ensure that a comparable standard of protection (as set out in the Act) is accorded to personal data that is to be transferred overseas.

Licensing: There are no registration requirements relating to data centres under the Act.

86. Reference to Singapore is with respect to infrastructure and TBDF also given the fact that Singapore (apart from Srilanka) are our competitors for SE Asia Region Data Centre location.

87. Ka Vin Wong, the managing director for CSF Asia, an ASEAN data centre provider based in Malaysia, says "Singapore has an incredibly rich network. The Singapore government made this decision about 15 years ago to deregulate the entire telecommunications industry, and it was the best thing since sliced bread. It was a time when lots of fiber was going all over the region, and when Singapore deregulated it became the connecting home for the South Asia sector," Wong says. "Because of that, Singapore is highly connected. Singapore Island itself is a data centre."

88. <http://www.datacentreknowledge.com/>

89. <http://www.iab.nl/wp-content/uploads/2014/02/Data-Protection-Full.pdf>

Consent/Notice: Organizations may only collect, use, or disclose personal data where they obtain consent from the individual prior to the collection, use, or disclosure of the personal data; in specific circumstances prescribed in the Act there is deemed consent by the individual to the collection, use, or disclosure of the personal data. An organization may also apply to be exempted from any requirement prescribed under the Act in respect of any transfer of personal data out of Singapore. An exemption may be granted on such conditions as the Commission may require.

Data Security/Encryption: Similar to India, organizations have an obligation to protect personal data in its possession or under its control by making reasonable security arrangements to prevent unauthorized access, collection, use, disclosure, copying, modification, disposal or similar risks. The Act does not lay out any specific security measures to be adopted and implemented.

Each organization is required to appoint one or more data protection officers to be responsible for ensuring the organization's compliance with the Act. The contact details of at least one of these data protection officers must be published.

Breach Notification to Regulators: At present, there are no specific legislative requirements for data users to notify authorities regarding data protection breaches in Singapore. Aggrieved parties may either make a complaint to the Commission, or may take out a private action in civil proceedings. The Commission may also conduct investigations on its own motion.

Enforcement: Enforcement of the Act is carried out by the Commission. The powers of the Commission include giving directions to: stop collection, use or disclosure of personal data in contravention of the Act; destroy personal data collected in contravention of the Act; provide or refuse access to or correction of personal data, and/or; pay a penalty not exceeding \$1 million. These directions may be registered with the Singapore District Courts so that they may have the force and effect of an order of court. Directions or decisions given are subject to reconsideration by the Commission, upon written application by any aggrieved party.

Directions, decisions or reconsiderations of the Commission may also be subject to appeal to a Data Protection Appeal Committee, unless the direction or decision to be appealed is the subject of an application for reconsideration, in which case such appeal would be deemed withdrawn.

Law Enforcement Access: Unlike the Indian regime, the Act itself does not contain any regressive provisions that allow law enforcement to access data. While Section 50 and Ninth Schedule of the Act do provide some powers to the Commissioner and the Investigative Agencies (which include Singapore Police, Immigration and the like), these powers are contextual and inherently contain several checks and balances.

By way of illustration, (taking Google and Facebook Transparency Reports as a measure), Singapore only sent 755 LEA requests to Google from July – December 2013⁹⁰; for Facebook, there were 141⁹¹ requests for the same period.

Government Incentives/Support: The government of Singapore has followed a strong culture of encouraging the development of ICT capabilities in the city-state. Its policies are characterized by a collaborative relationship between the government and the private players. The government has undertaken a plan for a state-wide fiber-based broadband network known as the Next Generation Broadband Network. This is to further reach out to citizens who might lack stable access to internet, thereby boosting domestic consumption for data centres as well.

With the privatization of SingTel, Singapore's equivalent of BSNL, the government is aiming to collaborate again with private players to deliver a private cloud infrastructure for the government and provide public cloud services.

The iDa or the Information Technology Development Authority is the primary regulator of the sector in the city-state. However, what is significant is that the subcommittee on IT Standards (IT Standards Committee or ITSC) has consistently preferred to issue guidelines and set standards in consultation with the industry and only through consensus.

Singapore's Data Centre boom is indicated from the number of projects already established and the future projects planned⁹².

90. Suddenly increased during 2nd half of 2013, earlier half-yearly period (January – June 2013) only had ~150 requests.

91. <https://govtrequests.facebook.com/country/Singapore/2013-H2/>

92. <http://www.datacentreknowledge.com/>

While cloud services have been attractive, concerns about the consistency of the service performance due to the potential impact of network latency and location of the data have inhibited the uptake for anything that was a critical workload. This was the reason IBM chose a location in Singapore to establish a cloud data centre. SoftLayer leases sizeable space from Digital Realty in Singapore. Going even further up the stack, Salesforce.com located a data centre there to accommodate strong adoption of Salesforce CRM and Force.com platform. Marc Benioff, chairman and CEO, Salesforce.com. said, “Our new Singapore data centre represents continued investment in our global real-time infrastructure to accelerate customer success with cloud computing worldwide.”

There’s also Savvis, BT and NTT Communications, which has a strong foothold in Singapore and surrounding regions. IO announced a partnership to bring modules to Singapore. T5 Data Centres, which has facilities in Atlanta, Dallas and Los Angeles, is also looking at Singapore for a wholesale play.

II. Case Study on Malaysia

Overview of Malaysia

Malaysia is one of the preferred destinations for Shared Services and Data Centres in the Asia Pacific Region for the various policy/regulatory initiatives it has undertaken⁹³. It is projected that the South-East Asian region’s data centres will be worth approximately \$10.9 billion. Malaysia aspires to capture this market and increase the data centre space from 0.5 million to 5 million square feet by 2020 and establish itself as the desired destination for regional investors as well⁹⁴. The Malaysian data centre market is broadly marked by expansion, efficiency and consolidation.

The following table highlights some of the country’s policies and the targets.

| Policy | Targets |
|---|---|
| NITA | Development of human resources, ICT infrastructure and applications necessary for the ICT industry |
| Malaysian Information, Communications and Multimedia Services 886 (MyICMS 886) | <p>Development of 8 core service areas, 8 core infrastructure areas and 6 “growth areas” that are recognized as necessary for the ICT sector.</p> <p><u>Service Areas</u> High Speed Broadband, 3G and beyond, mobile TV, Digital Multimedia Broadcasting, Digital Home, Short Range Communications, Internet Telephony and other internet-based communication systems and universal service provision</p> <p><u>Infrastructure Areas</u> Multiservice convergence networks, 3G cellular networks, satellite networks, IPv6, home internet adoption, information & network security, competence development and product manufacturing/design</p> <p><u>Growth Areas</u> Content Development, ICT Education, Digital Multimedia, communication devices, embedded components and foreign ventures</p> |
| National Broadband Plan | Part of MyICMS, aims to achieve higher broadband and optic fibre penetration |
| National Cyber-security Policy | Aimed at ensuring the data and physical security of the core sectors of the country such as defence, banking and finance |
| Third Outline Perspective Plan | Aimed at developing an ICT-capable labour force and a tertiary sector that is sufficiently compatible with Information Technology |

Safe Haven for Business: Malaysia has consistently been ranked as one of the most business-friendly countries in the Ease of Doing Business index⁹⁵. For example, starting a business in Malaysia takes only three days; besides, the country generates a surplus of electricity that ensures that an energy-intensive industry like data centres is assured of a constant supply of electricity.

Further, the country continues to be a safe haven for business because of an assured availability of land, Malaysia has the second fastest process for registering property in Asia. It is a multi-party democracy; with one political alliance in

93. Offshore Opportunities Amid Economic Turbulence - The AT Kearney Global Services Location Index 2011, <http://www.datacentre.my/preferred-destination-shared-services-data-centre>

94. <http://www.datacentre.my/>

95. “Ease of Doing Business”, World Bank and International Finance Corporation, the index measures business regulations of each country on key parameters and ranks countries according to such results. The rankings are available at: <http://www.doingbusiness.org/rankings>

government since 1973. Political stability has ensured consistency in terms of policies, fiscal and non-fiscal incentives for businesses and improved law-and-order situation.

Strategic Location: Malaysia is centrally located, surrounded by the largest Asian economies, including Japan, South Korea, China and India. Further, Malaysia has, over the years, sought to project itself as a country complimenting its closest economies – Singapore and Hong Kong. As a result, companies can choose to locate their operations in either Singapore or Hong Kong while operating their data centres in Malaysia.

Policy and Regulatory Framework: Data Protection Law in Malaysia

Overall, Malaysia's policy and regulatory charter for data services/centres is one of minimum regulation. The country's first comprehensive personal data protection legislation, the Personal Data Protection Act 2010 (PDPA), came into force recently⁹⁶. Though there are no provisions that specifically address the issue of online privacy (including cookies and location data), any electronic processing of personal data in Malaysia will be subject to the PDPA, and the Commissioner may issue further guidance. The law applies only to the processing of personal data in commercial transactions (in effect, transactions in the private sector, with the exception of credit reporting agency businesses).

The law imposes a number of generally applicable principles. Of relevance from a data collection perspective is the notice and consent principle. In addition, the Act also establishes principles of non-disclosure (confidentiality), security safeguards, retention limitations, and data integrity and access and correction rights.

Treatment of transfer/export of data: PDPA permits transfer of personal data to outside jurisdictions if the said jurisdiction has been specified by the minister. No such restriction holds where the data subject has given consent for transfer; the transfer is necessary for the performance of a contract between the data subject and the data user and similar globally equitable exceptions⁹⁷.

Data Security/Encryption: The current Malaysian legal framework does not seek to impose any fetters or restrictions on data security or encryption. Data users under PDPA have an obligation to take 'practical' steps to protect personal data and in doing so shall develop and implement a security policy. The Commissioner may also, from time to time, set security standards, which the data user must comply with, and the data user is required to ensure that its data processors also comply with these security standards. No such security standard has been published by the Commissioner⁹⁸.

Breach Notifications to Regulators: There is no requirement under the PDPA for data users to notify authorities regarding data protection breaches in Malaysia.

Enforcement: Under the PDPA, the Commissioner is empowered to implement/enforce the personal data protection laws and to monitor/supervise compliance. Some provisions of the PDPA and the Personal Data Protection Regulations 2013 (Regulations) empower the Commissioner to inspect the data system (which includes a data centre) at any time.

Violation of the PDPA and certain provisions of the Regulations attract criminal liability. The penalties include the imposition of fines or a term of imprisonment, or both. Directors, CEOs, managers or other similar officers will have joint and several liability for non-compliance by the body corporate, subject to a due diligence defence. Apart from criminal liability, there is no express right under the PDPA allowing aggrieved data subjects to pursue a civil claim against data users for breaches of the PDPA.

Apart from the above, Malaysia does not seek any specific licensing requirements for the establishment of data centres or prescribe any restrictions/conditions for foreign investment for data centre services.

Law Enforcement Access: Taking Google and Facebook Transparency Reports as a measure, Google - 2; Facebook - 16⁹⁹

Government Incentives/Support: The primary driver of a dynamic and industry-friendly IT policy in Malaysia has been the National IT Council (NITC) chaired by the Prime Minister. The NITC not only creates policies and plans for the development of ICT in Malaysia, but has been involved in constantly improving its human resource pool, with skills applicable

96. 15 November 2013.

97. Other exceptions include: The data user has taken all reasonable steps and exercised all due diligence to ensure that the personal data will not be processed in a manner which, if that place were Malaysia, would contravene the PDPA; and the transfer is necessary to protect the data subject's vital interests.

98. As on 28 January 2014.

99. <https://govtrequests.facebook.com/country/Malaysia/2013-H2/>

to the ICT industry and the production of locally compatible applications that are necessary for the development of the sector in general.

Besides the NITA, the NITC has aimed at expanding and improving its broadband connectivity under the National Broadband Plan. Under Malaysia's Economic Transformation Program (ETP), as part of the Communications and Content Infrastructure, plans by the National Key Economic Area (NKEA) to lay a 500Gbps cable to Hong Kong and Japan are underway.

The Entry Point Project seeks to aid the data centre market achieve sufficient capacity through the adoption of relevant supply-driven policies to promote growth, besides constantly investing in the development of appropriate infrastructure. An indicative list of the Malaysian IT policies/schemes is given in Annexure – A.

Infrastructure: In terms of infrastructure too, Malaysia is a leader among the Asian economies. The country's highway network is spread over 1, 820 kilometres, besides a federal road network of more than 18, 000 kilometres. The highways link major cities and growth centres to seaports and airports; the Trans-Asia Rail Link is also being developed, which will link the country with other ASEAN countries and end in Kunming in China.

Malaysia has generally been ranked as one of the more risk-ready and combative countries as far as natural disasters are concerned. It has also not seen any severe natural disasters in the past decade and has consistently been ranked in the lower rung of the World Risk Report¹⁰⁰. Even in terms of ICT infrastructure, Malaysia is a leading government – with the Network Readiness Index (NRI) ranking of 29 out of 142 countries and 8 in the Asian Pacific economies (even ahead of China).

Local eco system enablers: Apart from the gamut of government policies and incentives, Malaysia's IT services and hardware production industry has been consistently growing. The increase in broadband penetration and a burgeoning IT-capable population is definitely going to reap benefits for the data centre industry in Malaysia, which is poised for exponential growth¹⁰¹.

In summary, Malaysia's 'minimum regulation and maximum facilitation' policy/regulatory framework has been instrumental in the phenomenal increase in data centres in the country. The fledgling regulation in Malaysia (PDPA) has, so far, been comprehensively implemented in an industry-friendly manner. Although the presence of criminal penalties for simple breaches and lack of clarity on a variety of issues may be a concern going forward, the current ecosystem under which the government functions seems to be driving Malaysia's ability to attract data centre investments.

100. World Risk Report 2012 <http://www.ehs.unu.edu/file/get/10487.pdf>

101. The following are few of the Data Centre facilities located in Malaysia, many more are still on the horizon:

AIMS Data Centre, Penang Cybercity; Basis Bay, Selangor; CRF Computer Recovery Facility, Selangor; CSF Group, Cyberjaya; FREENET, Cyberjaya; HDC, Selangor; HeiTech, Selangor; JARING, Kuala Lumpur; Maxis, Kuala Lumpur; MyTelehaus, Cyberjaya; NTT MSC, Cyberjaya; SAFEHOUSE, i-Tech Network Solutions, Kuala Lumpur; SKALI, Cyberjaya.

ANNEXURE - B

NEGATIVE EFFECTS OF MANDATORY LOCALIZATION

I. Proposed Data Localization policies in India

1. The National Security Council of India has proposed in 2014 that all email service providers may be mandated to host servers for their India operations in India. All data generated from within India should be hosted in these India-based servers and this would make them subject to Indian laws as per an internal NSC note¹⁰².
2. The National Security Advisor has asked the Department of Telecom to look at the possibility of making it mandatory for all telecom and Internet companies to route local data through NIXI. Although, the foreign email service providers are not required to connect to NIXI as they are governed by Laws of their respective countries. "Indian entities and India registered content providers should host content within India. Foreign companies should similarly host content belonging to Indian users within India," - NSC.
3. In addition to this, the NSC said that the Government must facilitate the establishment of an Indian email service that would compete with foreign players to wean users from companies that do not conform to the requirements of India's security.

However these are only recommendations at this point and may not gain traction.

4. During the election campaign last year BJP leaders stated publicly that data localization might be a necessary means to force foreign Internet companies to comply with local law and to respect Indian cultural norms. Although, there would not be any mandate norms and companies such as Google, Facebook will only be encouraged to set up servers in India¹⁰³.
5. Even the internet companies in India (ISPAI) have urged the Government to ask American Web sites to set up local servers¹⁰⁴.

II. Case Study on Brazil

Mandated Data localization norms may have a deleterious effect on the innovation landscape of a nation. In light of the powers granted to the Brazilian Executive by the Marco Civil da Internet to enforce data localization, Brazilian experts have argued that such requirements would retard domestic innovation and industry. Marilia Marciel, a digital policy expert at Fundação Getulio Vargas in Rio de Janeiro, observes, "Even Brazilian companies prefer to host their data outside of Brazil."¹⁰⁵ Brasscom, the Brazilian Association of Information Technology and Communication Companies, argues that such obligations would "hurt the country's ability to create, innovate, create jobs and collect taxes from the proper use of the Internet"¹⁰⁶.

Increased data localization requirements would do little to benefit economic development in the host country. Data centres are capital-intensive projects that use thousands of computers and tens of humans. Brazil is the most expensive country in the Western Hemisphere in which to build data centres. While building a data centre in the US costs \$43 million on an average with a monthly operating cost of \$510,000, building a similar facility in Brazil would cost \$61 million and \$950,000 monthly to operate¹⁰⁷.

The author of the original Marco Civil da Internet, Prof. Ronaldo Lemos, warns that data localization requirements could scare away foreign companies that want to do business in Brazil¹⁰⁸.

102. National Security Council proposes 3-pronged plan to protect Internet users, HinduBusinessLine Feb 13th 2014

103. BJP plans to lure Facebook, Google, Yahoo if it comes to power- Economic Times April 2014

104. Indian Net firms want Google, Facebook to go 'local' HinduBusiness Line June 2013

105. Esteban Israel & Alonso Soto, Brazil's Anti-spying Internet Push Could Backfire, Industry Says, REUTERS (Oct. 2, 2013), <http://www.reuters.com/article/2013/10/02/us-brazil-internet-idUSBRE9910F120131002>

106. BRASSCOM Analisa Marco Civil, RISK REPORT (Oct. 30 2013), <http://www.decisionreport.com.br/publique/cgi/cgilua.exe/sys/start.htm?infolid=15079&sid=42>

107. Loretta Chao & Paulo Trevisani, Brazil Legislators Bear Down on Internet Bill, WALL STREET JOURNAL, (Nov. 13, 2013), <http://online.wsj.com/news/articles/SB10001424052702304868404579194290325348688>

108. See supra note 35.

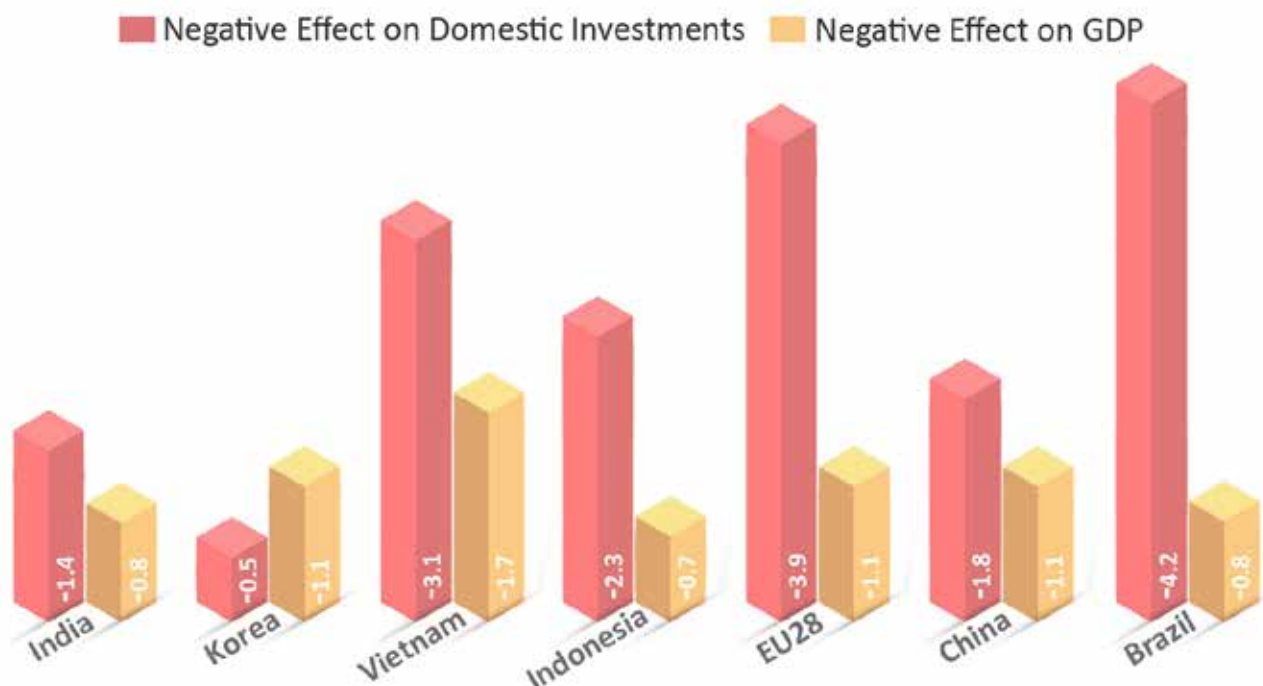
Implication of Mandatory Data Localization¹⁰⁹

Mandatory Localization of data to secure communications has limited efficiency: Many elements come into play by communicating with others through a network. Despite measures to localize data, many factors (protocols, types of equipment involved) can fail the security test along the path and expose communications to external surveillance.

Impact on GDP, innovation and entrepreneurship: Mandatory data localization requirements could increase costs for companies, which might be imposed on consumers. Higher cost barriers might also discourage SMEs to innovate and operate in those countries. Most Internet companies are relying on the Internet’s global scale and interoperability. An economy-wide data localization requirement (or discriminatory barriers to that effect) would substantially increase the GDP loss if they are enforced. GDP loss to Brazil is estimated at -0.8%¹¹⁰. The impact on domestic investments is also considerable at -4.2%. The ECIPE economists report suggests that even conservative estimates are sufficient to eradicate all post-crisis economic recovery, benefits from all their currently negotiated trade agreements, or may even cause social unrest in some countries.

From India’s perspective, it has also been estimated that imposition of data localization requirements would contract the national GDP¹¹¹ by 0.1% to 0.8% and negatively impact the investment climate, bringing down net investment into the country by nearly 2%. This would also reduce the monthly income of the average Indian worker by 11%¹¹².

Fig 8.1 : Impact of mandatory data localization on investments and GDP for various countries



Source: ECIPE

Impact on consumer choice: Forced localization might reduce consumers’ choice and ability to locate their data in other countries that are seeking for better privacy protections, risks of censorship/monitoring at home, better quality of service etc.

On national email systems: Centralized national services (e.g. cloud, email) are likely as vulnerable to foreign surveillance as using an international service provider. Instead, there should be a multiplicity of both vibrant local markets and vibrant international service providers who can provide secure e-mail services thus offering more choice to consumers/users.

109. http://www.intgovforum.org/cms/wks2014/index.php/proposal/view_public/112

110. <http://www.ecipe.org/>

111. http://www.ecipe.org/app/uploads/2014/12/OCC32014__1.pdf

112. Matthias Bauer et al., The Costs of Data Localization: Friendly Fire on Economic Recovery, ECIPE Occasional Paper, No. 3/2014

A lot of the Internet's value comes from its global nature, connecting people and business across different places.

Instead of localization of data, focus should be on encrypted communications; using technology to limit the particular number of people that access the data. In other words, it should not be limiting the area, but rather the entities accessing the data. Email server-to-server encryption was given as one such example.

The point was also made that cryptographic solutions may interfere with some national laws related to the right to information or public requirements that government should have access to everything that the bureaucrats do.

Whether we focus on encryption or localization much comes down to users' practices. Tools exist, but many people aren't using them. Many individuals are voluntarily signing up for geo-tracking tools, providing very sensitive data about themselves to different companies in different jurisdictions.

Hence, any gains stemming from data localization are too small to outweigh losses in terms of welfare and output in the general economy.





About IMAI

The Internet and Mobile Association of India [IMAI] is a young and vibrant association with ambitions of representing the entire gamut of digital businesses in India. It was established in 2004 by the leading online publishers, and in the last 12 years has come to effectively address the challenges facing the digital and online industry including mobile content and services, online publishing, mobile advertising, online advertising, ecommerce and mobile & digital payments among others. Twelve years after its establishment, the association is still the only professional industry body representing the online and mobile VAS industry in India. The association is registered under the Societies Act and is a recognized charity in Maharashtra. With a membership of 250 plus Indian and MNC companies, and with offices in Delhi, Mumbai and Bengaluru, the association is well placed to work towards charting a growth path for the digital industry in India

About PLR Chambers

PLR Chambers is a law firm headquartered in Delhi with offices in Mumbai, Kolkata, Bangalore, Hyderabad and Ahmedabad focussing on matters of Public Policy, Law and Regulation. The firm has extensive experience in legislative drafting, framing policy, international trade, as well as legal advice and representation on behalf of private sector and industry associations before government and regulators at the federal and state level in sectors including IT, telecom, information security, retail, e-commerce, internet, defence, nuclear, public procurement, renewable energy, environmental law, food and agriculture law, pharmaceuticals and medical device law and white collar crime. The firm is regularly appointed by various departments of the Government of India and multilateral agencies for drafting legislations and regulations and is often called upon to provide expert evidence before parliamentary standing committees.

In recognition of its work, PLR Chambers has won accolades for its work as the 'Best Firm – Policy & Regulation' (2014 & 2015) at the India Business Law Journal Awards, the 'Policy & Regulation Law Firm of the Year' by Legal Era Awards 2016 and the 'Startups Firm of the Year' by IDEX Legal Awards 2016.



