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COVID-19, data localisation and G20: Challenges, opportunities and strategies for India

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COVID-19, Data Localisation and G20:

Challenges, Opportunities and Strategies for India

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October 2020

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List of Abbreviations

4IR	Fourth Industrial Revolution
APEC	Asia Pacific Economic Co-operation
ASCM	Agreement on Subsidies and Countervailing Measures
ASEAN	Association of Southeast Asian Nations
AWS	Amazon Web Services
B20	Business 20
CAGR	Compound Annual Growth Rate
CDPCA	Contagious Disease Prevention and Control Act
CLOUD	Clarifying Lawful Overseas Use of Data
DGCI&S	Directorate of Commercial Intelligence and Statistics
DSS	Decision Support System
EDBP	European Data Protection Board
Edu-tech	Education Technology
EHR	Electronic Health Record
ESDM	Electronics System Design and Manufacturing
EU	European Union
FDI	Foreign Direct Investment
Fin-tech	Financial Technology
FTA	Foreign Trade Agreement
GAFA	Google Inc, Amazon Inc, Facebook Inc and Apple Inc
GDPR	General Data Protection Regulation
GeM	Government e-Marketplace
Health-tech	Health Technology
HHS	Health and Human Services

HIPAA	Health Insurance Portability and Accountability Act
HS	Harmonised System
IT/ITeS	Information Technology/Information Technology-enabled Services
ITA	Information Technology Agreement
MeitY	Ministry of Electronics and Information Technology
MoCI	Ministry of Commerce and Industry
NASSCOM	National Association of Software and Service Companies
NPE	National Policy on Electronics
OCR	Office for Civil Rights
OECD	Organisation for Economic Co-operation and Development
PDP	Personal Data Protection
PIPA	Personal Information Protection Act
RBI	Reserve Bank of India
RCA	Revealed Comparative Advantage
RCEP	Regional Comprehensive Economic Partnership
SME	Small and Medium Enterprises
STEM	Science, Technology, Engineering and Mathematics
TiVA	Trade in Value-Added
UK	United Kingdom
US	United States
USTR	United States Trade Representative
WHO	World Health Organization
WITS	World Integrated Trade Solutions
WTO	World Trade Organization

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Abstract

With a large pool of engineers and scientists, the presence of over 9300 technology-based startups and its strengths in exports of information technology/information technology-enabled services (IT/ITeS), India is uniquely placed to become a global technology and innovation hub. Yet there is a fear that Indian companies may not be able to access and monetise the data generated in the country and there can be national security, governance, and privacy issues. The debate on “data localisation” has gathered momentum in the last five years as India tries to design its own regulations; globally, too, many countries have imposed some form of data localisation measures.

With the onset of the novel coronavirus (COVID-19) pandemic, services like healthcare, retail and education are online and there has been a change in data regulations in several countries to access and share sensitive patient data across borders for research/clinical trials. As the traditional model of trade, consisting of exchange of goods and labour mobility, stands disrupted, cross-border data flows are gaining traction. The Government of India has also actively engaged in data sharing, public-private partnerships and joint research to tackle the pandemic.

This paper, using secondary data and a primary survey, presents the changing perceptions of stakeholders related to data localisation – before and during COVID-19. It assesses India’s strength in manufacturing and exports (goods and services). It analyses how the discussions on data localisation evolved in the G20 and identifies commonalities and differences across G20 countries. It identifies the challenges for India, makes recommendations for the upcoming G20 Saudi Presidency, and looks at how India can leverage on its strengths as it takes over the G20 Presidency in 2022.

Keywords: *data localisation, trade, pandemic, services, technology, G20*

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COVID-19, Data Localisation and G20: Challenges, Opportunities and Strategies for India

Arpita Mukherjee, Soham Sinha, Angana Parashar Sarma
Nibha Bharti and Drishti Vishwanath

1. Introduction

The onset of the novel coronavirus (COVID-19) pandemic has caused dramatic changes in the way the economy operates. While the pandemic, through its demands for anti-contagion policies, has caused a global economic slowdown, it has simultaneously enhanced the pace at which fourth industrial revolution (4IR) technologies are being adopted. As the traditional model of trade, consisting of exchange of goods and labour mobility, stands disrupted, cross-border data flows are gaining traction. There is now a global requirement for tracking and monitoring patient data. Due to the need for social distancing and mandatory stay-at-home orders, services like e-commerce, online consultancies and online education have become essential. As a result of this, great volumes of data are being generated across the world, and there is now a requirement to process and share this data.

Despite the sharp rise in COVID-19 cases since mid-June 2020 and the economic slowdown, India has certain advantages. With a large pool of around 1.5 million engineers and scientists, the presence of over 9300 technology-based startups [National Association of Software and Service Companies (NASSCOM), 2019] and its strengths in services like information technology/information technology-enabled services (IT/ITeS), India is uniquely placed to become a technology and innovation hub. Such a hub can create employment, lead to exports and eventually contribute to growth. Indian firms are providing services to global clients in sub-sectors such as education technology (edu-tech), financial technology (fin-tech) and health technology (health-tech), and a number of global multinationals such as Facebook Inc. and Google Inc. have either invested or shown interest in investing in India. However, to reap the benefits of 4IR, India needs to have clear strategies and policies to harness opportunities related to cross-border data flows in this crucial time of changing geo-political relations.

Cross-border data flows have been one of the key drivers of economic growth in the last decade (Bailey and Parsheera, 2018). As of 2014, free flow of data has contributed to an estimated US\$2.8 trillion to the global economy and this contribution is expected to reach US\$11 trillion by 2025 (Meltzer and Lovelock, 2018). While the merits of data and its contribution to the economy are well-known, global data flows are controlled by a few large multinationals such as Apple Inc., Google LLC, Amazon.com Inc., Facebook Inc., Microsoft Corporation and Alibaba Group Holdings Limited – companies that are mostly based out of the United States (US) or China. As a result of this concentration of data, these countries are major exporters of data while countries such as India are importers of data-related services. However, with a large population of 1.2 billion people, India is one of the largest data generating countries in the world and there is interest from global technology firms to access Indian data.

Given the importance of data, ownership and control of data has been an issue of debate in domestic policymaking and in international forums such as the World Trade Organization (WTO) and G20. As has been underscored by recent events like the Cambridge Analytica case wherein Facebook data was used to influence election results,¹ data can be easily misused. The concerns raised by a number of countries against the Chinese 5G company, Huawei Technologies Company Limited is another example of how data is likely to be misused. Therefore, there is need for some form of data protection and data sharing with trust. While the privacy of individuals and national security need to be protected, governments may require access to data for law enforcement and good governance. Thus, globally there is an on-going debate on ‘access to’ *versus* ‘restrictions on’ data and, in the last five years preceding the COVID-19 outbreak, several countries have imposed some form of data localisation requirements, which can serve to act as a barrier to trade (Kathuria et al., 2019).

The debates on data localisation also extend to the nature of the data – sensitive *versus* non-sensitive data. Data on healthcare, financial services, etc., are generally treated as sensitive data, and many countries, including India, have imposed specific regulations to regulate such data prior to the COVID-19 pandemic. With the outbreak of COVID-19 in December 2019, even developed countries with sophisticated healthcare systems are struggling to cope with the scale, complexities and rapid spread of this disease, which transmits through physical contact with those who may have come in contact with a COVID +ve patient. Thus, the spread of the disease has made it a requirement to track patients, doctors, healthcare workers and other vulnerable groups and their contacts. This requires access to sensitive patient data, which is also used for cross-country research and clinical trials. Hence, the pandemic has generated a requirement for data sharing.

Since early 2020, countries have seen a number of interventions that require relaxation of existing data localisation requirements. Some of these interventions are contact tracing applications; others include initiatives such as the multinational SOLIDARITY trial on clinical therapies sponsored by the World Health Organization (WHO). While the former requires adequate laws to track individuals in COVID-19 environments, the latter requires the management, sharing and processing of sensitive health data from a global database of multinational clinical trials for potential COVID-19 therapies.

In the context of the G20, the importance of data has been discussed since 2016 during the Chinese Presidency, which introduced the Digital Economy Taskforce. Between 2016 and 2018, the taskforce discussed various aspects of the digital economy including innovation, digitalisation and digital inclusion. In 2018, the Business 20 (B20) had recommended that G20 members should commit to not prevent free flow of data across borders and strengthen interoperable data protection standards. The Japanese Presidency in 2019 was the first to specifically discuss the concept of data localisation in detail with an emphasis on facilitating free flow of data (Kathuria et al., 2020). The forthcoming G20 Presidency of Saudi Arabia in

¹ Source: <https://www.theguardian.com/world/2018/jul/26/india-to-investigate-alleged-cambridge-analytica-data-breach-facebook> (last accessed May 23, 2020)

November 2020 is also taking up this topic, and in the light of the on-going pandemic, the G20 Leaders' Statement² published on March 27, 2020, made commitments to fight the pandemic by sharing timely and transparent data in a sensitive sector like health. An extract from the statement is given below:

“We commit to take (sic) all necessary health measures and seek to ensure adequate financing to contain the pandemic and protect people, especially the most vulnerable. We will share timely and transparent information; exchange epidemiological and clinical data; share materials necessary for research and development; and strengthen health systems globally, including through supporting the full implementation of the WHO International Health Regulations (IHR 2005).”

Thus, the pandemic has created a need for accessing sensitive patient data whilst overruling concerns regarding data sharing and privacy across the globe.

India is uniquely placed in the data localisation *versus* data flow debate. With a population of over 1.2 billion people and 627 million Internet users in 2019 (Kantar IMRB, 2019), India is amongst the largest data generating countries. The Government of India acknowledges the critical role and use of data in the development of an economy and, therefore, several measures and policies, such as the Reserve Bank of India (RBI) Payment Directives of 2018, the Draft National E-Commerce Policy of 2019 and the Non-Personal Data Protection Framework 2020, have been initiated to localise and protect data. All of these policies refer to certain restrictions on data flows and some of them also refer to creation of infrastructure/data centres in the country through the development of local manufacturing capabilities.

In global forums, India has demonstrated an unwillingness to participate in talks related to data flows, protection and data localisation. For example, India did not join the WTO plurilateral group on e-commerce and has also refused to sign the “Osaka Track” at the G20 summit held in Osaka, Japan, in 2019, which focused on the concept of “*data free flow with trust*”. While these global efforts were directed towards a framework to securely generate, collect and exchange data, India kept away from such global discussions. However, it continued its efforts to develop a robust domestic data regulatory regime.

As of September 2020, economic growth in India has contracted by 23.9 per cent.³ Therefore, there is a need for the country to leverage on its strengths in knowledge-based manpower and technology to spur economic recovery. India has the potential to develop as a technology and data processing hub and COVID-19 offers unique opportunities in both off-shore services delivery and manufacturing, much of which is yet to be explored. Today, there is need for

² For details see, G20 Leaders Statement available at [https://g20.org/en/media/Documents/G20_Extraordinary%20G20%20Leaders%E2%80%99%20Summit_Statement_EN%20\(3\).pdf](https://g20.org/en/media/Documents/G20_Extraordinary%20G20%20Leaders%E2%80%99%20Summit_Statement_EN%20(3).pdf) (last accessed August 23, 2020)

³ Source: <https://indianexpress.com/article/explained/gdp-contraction-23-9-the-economics-behind-the-math-6578046/> (last accessed September 23, 2020)

more services to be offered online and delivered remotely, which is an opportunity for India. Prior to the COVID-19 pandemic, India was a net importer of technology goods, resulting in a large trade deficit in goods.⁴ However, now for some time, India has been trying to develop its domestic manufacturing capabilities in technology goods and has been able to attract some global firms such as Apple Inc. to set up a manufacturing base in the country. With the onset of COVID-19 from the Wuhan province in China, technology firms from developed economies like the US, European Union (EU) and Japan are looking to relocate their production bases from China and India is a strong contender to be the next manufacturing hub. While developed countries and global firms are actively considering India as a manufacturing destination for electronic goods, in the long run, firms will also look at ease of doing business, regulatory certainty, compliance burden, etc., which includes the ease of data sharing with the home country and other locations, before making a final decision on their investment destinations. India, therefore, needs the right policies and strategies to harness its true potential.

Given this background, the paper (a) presents an overview of the changing perceptions related to data localisation across the globe – before and during COVID-19, (b) assesses India's manufacturing capabilities and trade in digital products and services, (c) highlights India's unique strengths during COVID-19 (d) discusses developments in different international forums, (e) identifies the concerns, commonalities and differences across the G20 countries on data localisation, and (f) makes recommendations to the Indian government for the upcoming G20 Saudi Presidency, providing strategies for India as it takes over the G20 Presidency in 2022.

The layout of the paper is as follows. Section 2 presents the methodology and survey framework. Section 3 presents how policies with respect to data localisation have evolved globally and in India, before and during COVID-19. Section 4 presents India's trade in digital products and services and examines its manufacturing capabilities and export competitiveness in select products used in data centres. Section 5 presents findings from the survey. Section 6 identifies the barriers and challenges in India; Section 7 examines the developments on data localisation in G20 and Section 8 makes recommendations on the way forward to India's Presidency in 2022.

2. Methodology

This paper is based on secondary data and information analysis and a primary survey.

Conventionally, data localisation policies (see Section 3.1) only impose restrictions on the collection, processing, storage and transmission of data. However, in India, data localisation policies (for example, the Draft National E-Commerce Policy of 2019) also talk about the creation of data centres. Since government policies tie in the issue of data protection to the issue of digital infrastructure creation, the secondary data analysis tries to focus on changes in the pattern of India's trade in digital goods and services, value addition in India's exports of

⁴ Source: World Integrated Trade Solution (WITS) Statistics (last accessed July 19, 2020)

digital goods needed for data centres, and India's export competitiveness in select digital goods needed for data centres.

2.1 Secondary Data

To examine India's trade flows and how it has changed over time, data from the WTO, UN Comtrade and the Directorate General of Commercial Intelligence and Statistics (DGCI&S) has been analysed. To assess trade flows and India's competitiveness in data centre equipment, 45 products (see Table A1 in Appendix) have been identified, in consultation with industry experts, at the Harmonised System (HS) 6-digit level out of the 111 products covered under the Information Technology Agreement (ITA)-1 of the WTO.⁵ India signed the ITA-1 in 1996 and committed itself to zero duty on imports for a set of information technology products. Export competitiveness of the select 45 products was calculated using the Balassa (1965) Index of Revealed Comparative Advantage (RCA).

India's domestic and foreign value added in gross exports and gross imports of select equipment required for data servers was computed using the Trade in Value-Added (TiVA) database of the Organisation for Economic Co-operation and Development (OECD). The principal indicators include the domestic value-added content of gross exports/gross imports and foreign value-added content of gross exports for the year 2015.⁶ The industry category selected is D26T27: Computers, Electronic and Electrical Equipment.

2.2 Primary Survey

The primary survey, covering in-depth interviews with 60 stakeholders (see Table 2.1), was conducted in three phases between May 2018 and June 2020. Interviews with key informants were conducted using semi-structured questionnaires. The time periods have been selected to see changes in policies and understand the perceptions of respondents before and during COVID-19. The survey covered global and Indian multinationals and Indian startups. Companies were selected from sectors such as e-commerce, healthcare technology, logistics/express delivery services, IT/ITeS and finance. A mix of both established firms and new entrants were interviewed. Multinational firms were selected from G20 member countries such as the US, EU member states, United Kingdom (UK), Republic of Korea and Japan.

Table 2.1: Sampling Framework

Stakeholders	Numbers
Companies	30
Industry Associations	10
Policy Makers	10
Academics, Experts and Lawyers	10
Total	60

⁵ The ITA-1 was signed by India in 1997; the agreement includes a list of products in which India is obliged by commitments in the WTO to offer zero duty to trading partners.

⁶ The latest data available in the TiVA database is for the year 2015.

- The first phase of the survey was conducted between May and July 2018, after RBI introduced the directive,⁷ DPSS.CO.OD No. 2785/06.08.005/2017-2018, on April 6, 2018, regarding “storage of payment system data”. This directive required that all data related to payments have to be stored in systems only in India. Interviews were conducted with online payment companies, credit card companies, software companies and banks operating in the financial sector and/or have outsourcing centres in India.
- The second set of interviews was conducted after the release of the Draft National E-Commerce Policy of 2019. The interviews were conducted between March and June 2019 with software companies, electronic equipment manufacturers, engineering companies, e-commerce companies, data analytics firms, courier companies and off-shoring companies.
- The third and final set of interviews was conducted between May 2020-June 2020 during the COVID-19 pandemic. The targets for this round of the survey were health-tech companies, e-commerce companies, foreign digital goods manufacturing, IT services and data analytics companies.

Interviews in the first two phases were conducted in person and over telephone calls. Interviews in the third phase were conducted through telephone and video conferencing facilities. Forty per cent of stakeholders were repeated between the second and final phase of the interviews to understand changes in perceptions. The aim of the primary survey is to (a) understand perceptions about data localisation, policies related to data localisation and how this perception has changed overtime (b) examine the impact of data localisation on select sectors (c) identify issues and barriers faced in developing India as a technology hub, including issues related to infrastructure and regulations (d) examine the views of stakeholders on the right policy with a focus on how India can develop domestic manufacturing capabilities and enhance exports of digital goods and services and (e) understand the views of stakeholders on what India’s position in international forums should be.

3. Before and During COVID-19: Data Localisation Globally and in India

3.1 Before COVID-19 Data Localisation: Globally

In the past few years preceding COVID-19, many developed and developing countries have implemented some form of data localisation measures. For example, the Clarifying Lawful Overseas Use of Data (CLOUD) Act, 2018, in the US requires trans-border access to communications data in criminal law enforcement investigations. In the EU, the General Data Protection Regulation (GDPR), implemented in 2018, aims to give control to individuals (data subjects) over their personal data, and allows conditional flow of personal data without local storage requirement. The GDPR applies to all companies processing and holding

⁷ For details, see Storage of Payment System Data available at <http://rbidocs.rbi.org.in/rdocs/notification/PDFs/153PAYMENTEC233862ECC4424893C558DB75B3E2B.C.PDF> (last accessed July 19, 2020)

personal data of subjects residing in the EU, regardless of the company's location.⁸ The regulation (Article 5.1-2) outlines seven protection and accountability principles namely (a) lawfulness, fairness and transparency (b) purpose limitation (c) data minimisation (d) accuracy (e) storage limitation (f) integrity and confidentiality and (f) accountability. The GDPR is viewed as one of the most comprehensive data protection policies in recent times, and has acted as a reference for G20 countries such as Brazil, which has passed its data protection law-Lei Geral de Protecao de Dados (LGPD) in 2018 to unify over 40 statutes that govern personal data (both online and offline).⁹ As of June 2019, around 1 in 3 businesses across the world were found to be GDPR compliant (Capgemini Research Institute, 2019).

The United States Trade Representative (USTR) reported¹⁰ that close to 11 major countries have imposed localisation requirements on the flow of both sensitive and non-sensitive data such as geo-location data, health data and service suppliers' data. For example, the Republic of Korea restricted the export of geo-location data, which acts as a barrier for international suppliers that incorporate services such as traffic updates and navigation into their products. Australia's My Health Records Act of 2012 restricted the storage of all identifiable electronic health records (EHR) to local data centres only. China's Cyber security Law of 2016 (implemented in 2017) prohibited or severely restricted routine cross-border transfers of information, including a broad range of information falling into the undefined category of being "important". The law also imposed requirements on companies, which operate "critical information infrastructure." China's 2012 Cloud Computing Policy prohibited foreign companies from directly providing cloud computing services to customers in China, and required that foreign service suppliers partner with a Chinese company and turn over their technology, intellectual property and brands to that partner in order to enter the market. In addition, in 2019, China issued a guideline that required cloud service operators to submit their platforms for a government assessment.¹¹

3.2 During COVID-19 Data Localisation: Globally

With the onset of the COVID-19 pandemic, countries have started taking steps to stop the rapid transmission of the disease. Since the disease spreads through personal contact, it has become essential to build contact tracing applications, which requires sharing of citizens' data and monitoring their whereabouts/locations, which may be at the cost of their privacy. At the same time, a number of outpatient services such as primary care physician visits, specialist visits, etc., are being offered through tele-health services, generating a lot of data and information that need analysis.

G20 countries such as Republic of Korea, US and Australia have facilitated data sharing through additional provisions or amendments in their policies in the domain of data

⁸ Source: <https://eugdpr.org/the-regulation/gdpr-faqs/> (last accessed June 3, 2019)

⁹ Source: <https://gdpr.eu/gdpr-vs-lgpd/> (last accessed October 1, 2020)

¹⁰ Source: <https://ustr.gov/about-us/policy-offices/press-office/fact-sheets/2019/march/fact-sheet-2019-national-trade-estimate> (last accessed June 12, 2019)

¹¹ Source: <https://www.newamerica.org/cybersecurity-initiative/digichina/blog/translation-chinas-new-security-reviews-cloud-services/> (last accessed October 1, 2020)

localisation, pandemic/disaster management and health. (see Table 3. 1 for a comparison across select G20 countries).

Table 3.1: Policies to Allow Data Sharing during COVID-19 Across Select G20 Countries

Country	Data Localisation Policy	Pandemic/Disaster Management Policy	Health Policy
Republic of Korea	✓	✓	✗
Australia	✓	✓	✓
United States	✗	✗	✓
European Union	✓	✗	✗
Indonesia	✗	✓	✓
India	✗	✗	✗

Source: Compiled from various government sources

In the Republic of Korea, The Personal Information Protection Act (PIPA), 2011, banned the collection, use, and disclosure of personal data without prior informed consent of the individuals whose data are involved prior to the pandemic. However, during COVID-19, amendments were made to the Contagious Disease Prevention and Control Act (CDPCA) of 2009 and authority was granted under the said Act to override certain provisions of the PIPA and other privacy laws. The said amendments allowed sharing of seven categories of data, which included sharing of sensitive data such as geo-location data, personal identification information and prescription and other medical records, among others (Park et al., 2020).

In the US, the onset of the pandemic led to almost all outpatient clinical establishments offering services via tele-health. Health care providers in the US are subject to data privacy laws laid out in the Health Insurance Portability and Accountability Act (HIPAA) of 1996. However, as these providers seek to communicate with patients, and provide tele-health services through remote communication technologies, these technologies and the manner in which they are used may not fully comply with the requirements of HIPAA Rules. As a result of this new necessity for seamless tele-health services, the Office for Civil Rights (OCR) at the Department of Health and Human Services (HHS) on March 30, 2020, issued a notification¹² under which it decided “*to not impose penalties for noncompliance with the HIPAA Rules in connection with the good faith provision of telehealth using non-public facing audio or video communication products during the COVID-19 nationwide public health emergency.*”

In Australia, while the My Health Records Act of 2012 prohibited any kind of sharing of health data (Kathuria et al., 2019), the COVID Safe Privacy Policy of 2020¹³ facilitates the operation of Australia’s contact tracing app, and has provisions that allow COVID +ve

¹² For details, see Notification of Enforcement Discretion for Telehealth Remote Communications During the COVID-19 Nationwide Public Health Emergency, available at <https://www.hhs.gov/hipaa/for-professionals/special-topics/emergency-preparedness/notification-enforcement-discretion-telehealth/index.html> (last accessed July 18, 2020)

¹³ For details, see <https://covidsafe.gov.au/privacy-policy.html> (last accessed September 29, 2020)

patients to share their health data with public health officials for effective contact tracing. Under this policy, patients are also allowed to share geo-location data so that officials can identify COVID hotspots in the country.

In the EU, the European Data Protection Board (EDBP), in the wake of the pandemic, emphasised that the “*GDPR and Directive 2002/58/EC (the “ePrivacy Directive”)* both contain specific rules allowing for the use of anonymous or personal data to support public authorities and other actors at national and EU levels in monitoring and containing the spread of SARS-CoV-2 virus”, and reiterated that data and technology can leverage the effectiveness of public health measures.¹⁴

These changing localisation policies indicate a shift towards more liberal policies to manage the pandemic. The pandemic has also led to increased partnerships between the government and private sector in areas like data analytics, online application development, online platforms, etc., which have created new opportunities for small businesses across the world to participate in technology initiatives, scale up quickly and compete against more established firms.¹⁵

As a result of this more favourable stance towards data sharing, countries across the world have been able to take a number of initiatives to tackle the pandemic by implementing contract tracing applications, participating in global clinical trials, collaborating with researchers to study the impact of the pandemic and implementing large scale telemedicine services in relevant healthcare settings. Some of these initiatives are listed in Box 3.1.

¹⁴ For details, see Guidelines 04/2020 on the use of location data and contact tracing tools in the context of the COVID-19 outbreak available at https://edpb.europa.eu/sites/edpb/files/files/file1/edpb_guidelines_20200420_contact_tracing_covid_with_a_mnex_en.pdf (last accessed August 23, 2020)

¹⁵ For details, see <https://ustr.gov/about-us/policy-offices/press-office/fact-sheets/2020/march/fact-sheet-2020-national-trade-estimate-strong-binding-rules-advance-digital-trade> (last accessed August 23, 2020)

Box 3.1: Key Initiatives to Address COVID-19 Pandemic: Examples of Some Countries

- **Contact Tracing Applications** - While a number of countries such as the US, Sweden and Finland are only doing limited contact tracing, countries such as the Republic of Korea, Australia, Canada and China are engaging in comprehensive contact tracing, which means that all individuals in the country are being tracked. In fact, the Republic of Korea's entire response to the pandemic is rooted in its successful contact tracing strategies.
- **Expanding Telemedicine Services** - Telemedicine has emerged as a critical tool in providing medical care to patients, while reducing the risk of transmission of COVID-19 among other patients, clinicians, etc. The adoption of telemedicine has grown in early adopter markets such as China, Singapore and Australia (Bain and Company, 2020). Countries such as Japan and Indonesia have seen entry of new players in the telemedicine market. In the US, all outpatient services across major health systems are only being offered through telemedicine. In fact, insurance companies and the federal government are adequately reimbursing providers for offering telemedicine services.
- **Global Clinical Trials** - Pharmaceutical companies and research organisations across the globe are running cross-border clinical trials to develop vaccines/treatments to combat SARS-CoV-2 pandemic. For example, AstraZeneca PLC in collaboration with the University of Oxford, UK, has tied up with Serum Institute of India Private Limited, to develop a vaccine by the end of the year 2021, which has begun human trials in Australia. Gilead Sciences, Inc. (US) is running its global trial in 84 locations across the world to test the efficacy of its drug Remdesivir.

Source: Compiled from <https://healthadvancesblog.com/2020/05/08/how-covid-19-is-accelerating-telemedicine-adoption-in-asia-pacific/>; <https://www.who.int/news-room/feature-stories/detail/tracking-covid-19-contact-tracing-in-the-digital-age>; <https://theprint.in/health/oxfords-new-covid-vaccine-begins-human-trials-in-partnership-with-serum-institute-of-india/498548/> (last accessed October 1, 2020)

While it is now a need to share data, the evolving policy landscape for data protection has also led to concerns regarding breach of data privacy and misuse. For example, the EDPB in its Guidelines 04/2020 on the use of Location Data and Contact Tracing Tools in the context of the COVID-19 Outbreak has cautioned that “*data and technology used to fight COVID-19 should be used to empower, rather than to control, stigmatise, or repress individuals*”. In China, the government agencies have also issued additional cybersecurity and personal information protection notices (such as the Notice on Ensuring Personal Information Protection and Utilisation of Big Data to Support Joint efforts for COVID-19 Prevention and Control) as a step towards protecting personal information.¹⁶ In the US, the Coronavirus Containment Corps Act, 2020 includes plans to prevent the misuse of individuals' data by ensuring automatic deletion of data, prohibition of data sharing within and with the federal government (with the exception of the Centers for Disease Control and Prevention (CDC) and Indian Health Service).¹⁷

¹⁶ Source: <https://www.reedsmith.com/en/perspectives/2020/03/data-privacy-issues-in-connection-with-the-covid-19-outbreak> (last accessed October 1, 2020)

¹⁷ Source: <https://www.warren.senate.gov/imo/media/doc/One%20Pager-Coronavirus%20Containment%20Act1.pdf> (last accessed October 1, 2020)

3.3 Before COVID-19 Data Localisation: India

In 2015, the Indian government, with the Ministry of Electronics and Information Technology (MeitY) as the nodal ministry, launched the “Digital India” initiative. The policy, based on three key vision areas, namely, (a) digital infrastructure as a core utility to every citizen (b) governance and services on demand and (c) digital empowerment of citizens, aims to “transform India into a digitally empowered society and knowledge economy.”¹⁸

Apart from the Digital India campaign, the government also came up with a number of policies to encourage domestic electronic goods/digital products manufacturing, support domestic firms and create data infrastructure within the country. These policies encompass (a) how data is required to be stored, managed and protected in India, i.e., the issue of data localisation, and (b) manufacturing of products that store data. For example, the RBI directive released on April 6, 2018, made it mandatory for all direct data related to payments to be stored physically in India without a provision for data mirroring.

Subsequently, the Draft National E-commerce Policy¹⁹ was introduced on February 23, 2019. The policy is based on six key pillars – the critical role of data, infrastructure development, e-commerce marketplaces, regulatory issues, stimulating domestic digital economy and export promotion through e-commerce. The draft policy acknowledges the role of data as a critical factor in enabling economic growth and emphasises the creation and development of physical infrastructure “on soil” for managing various types of data. Hence, the policy proposes the grant of infrastructure status to data centres, server farms, towers and tower stations, equipment, etc., which would (a) allow easier access to credit and finance and (b) facilitate last mile connectivity across rural and urban areas. Thus, while the draft policy talks about restrictions on sharing of cross-border data, it also talks about the creation of digital infrastructure including data centres in the country. Therefore, the discussions related to data localisation in India cover concerns about both data protection and manufacturing of digital products [such as Electronic Systems Design and Manufacturing (ESDM) products].

India is yet to have a comprehensive regulation on data privacy and protection. The Draft Personal Data Protection (PDP) of 2018 lays down localisation requirements for the storage and handling of both sensitive and critical personal data. However, as of July 2020, the bill was still pending in the Parliament. Since the PDP 2018 bill only covers provisions related to personal data, the MeitY in 2019 set up a committee of experts to draft a framework for handling non-personal data. The committee released its draft report titled ‘Report by the Committee of Experts on Non-Personal Data Governance Framework’²⁰ on July 13, 2020.

¹⁸ Source: <https://digitalindia.gov.in/content/introduction> (last accessed June 24, 2019)

¹⁹ For details, see Draft National E-Commerce Policy, pp.9, available at https://dipp.gov.in/sites/default/files/DraftNational_e-commerce_Policy_23February2019.pdf (last accessed July 11, 2019)

²⁰ Source: https://static.mygov.in/rest/s3fs-public/mygov_159453381955063671.pdf (last accessed October 10, 2020)

In order to support the manufacturing of digital products, MeitY released the National Policy on Electronics (NPE) 2019.²¹ The core aim of the policy is to develop India as a hub to develop and manufacture ESDM products by (a) increasing domestic value addition and by reducing dependence on import of electronic goods (b) integrating India with global value chains to boost Indian ESDM exports (c) developing capacities for manufacturing in all sub-sectors of electronics (d) introducing new fiscal incentives or augmenting existing incentives for electronics manufacturing (e) promoting research and development (R&D) for electronic products and (f) incentivising the establishment of production bases for the manufacture of components.

In addition to support domestic manufacturing, the Indian government has also initiated measures to restrict imports through tariff restrictions (such as an increase in smart phone tariffs) and by imposing labelling and other non-tariff measures.²²

Apart from the above, the Indian government opposed the “Osaka Track” at the G20 Japan Presidency in 2019, and expressed its position favouring a more stringent form of on-soil data localisation (for details see Section 7). However, this position has altered with the onset of the pandemic. The next section discusses developments in India since the onset of the COVID-19 pandemic. While it is known that COVID-19 began in December 2019, restrictions related to COVID-19 in India were only introduced in March 2020. Therefore, this paper makes note of developments in India since March 2020.

3.4 During COVID-19 Data Localisation: India

Two key things happened following the outbreak of COVID-19 in India. In light of the looming public health crisis, India went into an immediate lockdown on March 23, 2020, and from May 5, 2020, altercations between Chinese and Indian troops led to increased geopolitical tensions between the two nations. In order to tackle the above situations, several measures were taken by the government, which are explored in this section.

The outbreak of the pandemic made it necessary for citizens to share health information with the government and allow the government to share and process such data. However, unlike some of the countries discussed in Section 3.2, India does not have a comprehensive pandemic Act and the existing Epidemic Diseases Act of 1897 is outdated. While Section 2 of the Act allows state governments to take appropriate measures to control the outbreak of a disease, the Act is not advanced enough to tackle a pandemic in the modern age. As a result, the pandemic is being managed under the ambit of the 2019 National Disaster Management Plan of the Disaster Management Act, 2005. The National Disaster Management Plan mentions health emergencies but there are no specific provisions or policies in the Act to handle a pandemic. Despite the regulatory gaps, three key things with regards to data have

²¹ For details, see National Policy on Electronics 2019 available at https://meity.gov.in/writereaddata/files/eGazette_Notification_NPE%202019_dated%2025022019.pdf (last accessed July 18, 2020)

²² For details, see <https://dgft.gov.in/sites/default/files/Notification%20No.%205%20dated%2007.05.2019%20English.pdf> (last accessed June 11, 2019)

happened in India since the onset of the pandemic – the launch of the “*Aarogya Setu*” mobile application, India’s participation in various clinical trial databases and enhanced government-private partnerships to address the pandemic (see Box 3.2). Thus, even though India earlier supported rigid policies of data localisation, the country is now actively sharing sensitive health data with global partners and collaborating with the private sector to address the pandemic.

Box 3.2: Key Practices during COVID-19 in India

- **Aarogya Setu Mobile Application** - The government launched the *Aarogya Setu* mobile application on April 2, 2020. This application facilitates contact tracing of persons affected with COVID-19, informs persons at-risk of precautions to be taken, and allows health departments to take effective actions to mitigate the spread of the pandemic and enhance their preparedness. As of date, the application has been successful in identifying COVID-19 hotspots and has been downloaded by close to a million people in India. The data generated by this application is collected and processed in real time to alert patients and policy makers to take necessary precautions and allocate necessary resources accordingly. Since this application collects confidential personal data on health and location, some experts have raised concerns about consumer protection, privacy and security in the absence of a framework to protect such data, and about the accuracy of the technology itself (see, O’Neil, 2020). In response to such concerns and to promote security, the source code of the application was made public.
- **Global Clinical Trials** - India is participating with the WHO’s SOLIDARITY trial and, as of July 2020, close to 26 trials from India have been listed on various global trial platforms such as clinical trials. As a result of this participation, India is able to (a) share data on potential COVID-19 therapies emerging from India and (b) gain access to similar data from trials being conducted in other countries. This entire trial and its success depends on the successful exchange of sensitive patient data.
- **Enhanced Government, Academic and Private Partnerships** - Several partnerships are developing decision support systems (DSS) and other applications (apps) to supplement data from contact tracing apps; academics and researchers are regularly processing COVID-19 data to either study the effect of COVID-related policies or COVID-19 itself. Researchers are also using data from open-source software such as github to build predictive models to predict the future spread of the disease and its effect on the economy.

Source: Compiled from <https://www.mygov.in/aarogya-setu-app/>; <https://www.lexology.com/library/detail.aspx?g=f54419a1-4823-404c-92f3-c5e4f193b733>; <https://health.economictimes.indiatimes.com/news/pharma/india-to-soon-participate-in-who-solidarity-trial-for-developing-potential-covid-19-drugs-govt/74855919> (last accessed October 1, 2020)

The public health crisis caused by COVID-19 has led India to engage in data sharing and other such collaborations for the purposes of research and development. However, the altercations at the Sino-Indian border, led the Ministry of Commerce and Industry (MoCI) to

restrict imports from China. The MoCI, on June 23, 2020, has imposed a requirement²³ for sellers on the Government e-Marketplace (GeM) to declare the country of origin while registering all new products. Sellers, who had already uploaded their products before the introduction of this new policy, are being reminded regularly to update the country of origin, with a warning that their products would be removed from GeM if they fail to update.²⁴ While this has been imposed strictly for products selling on GeM, private e-commerce companies such as Flipkart Internet Private Limited and Amazon.com Inc. have also been informed of the requirement. In addition to this, the Prime Minister has also called for India to become “*atma-nirbhar*” or “*self-reliant*”. Thus, capitalising on the goals identified in the Draft National E-Commerce Policy and the NPE 2019, this goal of “self-reliance” has called upon India to become a manufacturing and export hub for the production of ESDM and other digital goods.²⁵

4. Manufacturing, Trade and Investment

This section presents trends and developments in manufacturing digital products in India, India’s trade in digital goods and services, its export competitiveness and its integration in global value chains.

4.1 Manufacturing of ESDM Products and/or Digital Goods

There has been an increase in the production of electronic goods in India, although there is no official data source to show the projected growth and/or targets. According to one study, the industry is expected to grow at a compound annual growth rate (CAGR) of 9.2 per cent and reach a production value of US\$104 billion by the end of 2020 [India Brand Equity Foundation (IBEF), 2015] from a value of US\$32.7 billion in 2013. The Indian semiconductor industry is expected to grow at a CAGR of around 10 per cent to reach a market value of US\$32.25 billion in 2025.²⁶ Since 100 per cent foreign direct investment (FDI) is allowed, most forecasts expect improvements in domestic manufacturing capabilities. Recently, the computer hardware and software sector attracted the second highest FDI inflow. The sector attracted approved FDI inflows worth US\$7.67 billion in the financial year (FY) 2019-20, which is an increase from US\$6.41 billion in the FY 2018-19.²⁷ In addition, global brands such as Apple Inc. and Samsung have also announced their intention to make significant investments in India.

²³ For details, see <https://pib.gov.in/PressReleasePage.aspx?PRID=1633511> (last accessed August 22, 2020)

²⁴ Source: https://dipp.gov.in/sites/default/files/pn3_2020.pdf (last accessed October 5, 2020)

²⁵ Source: <https://eandt.theiet.org/content/articles/2020/08/view-from-india-electronics-sector-seizes-crisis-opportunity-for-economic-growth/> (last accessed September 22, 2020)

²⁶ Source: https://www.business-standard.com/article/news-ani/huge-growth-of-usd-32-35-bn-by-2025-for-indian-semiconductor-market-report-118022801265_1.html (last accessed August 23, 2020)

²⁷ For details, see Fact Sheet on Foreign Direct Investment (FDI) April 2000 to March 2020, available at https://dipp.gov.in/sites/default/files/FDI_Factsheet_March20_28May_2020.pdf (last accessed August 23, 2020)

4.2 Trade in Goods and Services

In 2019, global trade in goods and services were US\$18.89 trillion and US\$6.03 trillion respectively. India's share in global exports and imports of goods was 1.7 per cent and 2.5 per cent, with the rank of 18 and 10, respectively (WTO, 2020). The exports of products covered under ITA-1 increased from US\$549 billion in 1996 to US\$1653 billion in 2015. In the same year, India ranked 19th in exports of ITA-1 products globally, with a share of 0.1 per cent. In imports of ITA-1 products, India ranked 10th with share of 2 per cent of global imports (WTO, 2017). Thus, after signing ITA-1, India's negative trade balance seems to have increased, raising concerns that India has not been able to develop its domestic manufacturing capacity or be a part of global value chains. The recent increase in tariffs on certain electronic products has been an attempt to promote domestic manufacturing in line with the "Make in India" initiative.

One key beneficiary of zero duty imports was the Indian computer services industry; the industry has been experiencing a boom since 1996 as costs of computing and telecommunications equipment fell. Today, India has a positive trade balance in services, with the trade balance increasing from US\$12.6 trillion in 2009 to US\$35.6 trillion in 2019. In commercial services, India's global share in exports and imports was 3.5 per cent and 3.1 per cent, with the rank of 8 and 10, respectively in 2019 (WTO, 2020). According to the WTO, a major part of India's positive trade balance in services can be attributed to the high net exports in the sub-sector "telecommunications, computer and information services", where India ranked 2nd in 2019 after the EU. Among the top 10 exporters, India had an overall share of 42.8 per cent in 2019, with an annual increase in exports from 2018 by 12 per cent. Within telecommunication services exports, India ranked 5th globally and, within computer and information services, India ranked 2nd in 2019. This was ahead of China, which ranked 8th in telecommunication services and 3rd in computer and information services respectively.²⁸ India is also among the top exporters of financial and business services. In 2019, India ranked 9th and 5th respectively in global exports of financial and business services.

Focusing on India's strength in services, the country holds the first rank in A.T. Kearney's Global Services Location Index²⁹ (GSLI) every year, since the inception of the GSLI in 2004 (Kearney, 2019). The GSLI ranks 50 countries based on their potential and fit to deliver business services to global companies.³⁰ India is the world's largest provider of information technology-business process management (IT-BPM) services, with the IT-BPM sector being valued at US\$177 billion in the financial year 2019 (NASSCOM, 2020). While IT services have been approaching the US\$100 billion mark (growing at a rate of 6.7 per cent), BPM has

²⁸ Source: Compiled from World Trade Statistics Review 2019, WTO, available at https://www.wto.org/english/res_e/statistics_e/wts2019_e/wts2019_e.pdf (last accessed July 13, 2020)

²⁹ The GSLI identifies locations that can best provide information technology (IT), business process outsourcing (BPO), and voice services based on countries' financial attractiveness, people skills, availability, and business environment.

³⁰ Source: <https://www.prnewswire.com/news-releases/at-kearneys-2019-global-services-location-index-gsli-resonates-with-digital-change-300867002.html> (last accessed September 28, 2020)

been growing at a rate of over 8 per cent between 2019 and 2020. The report also highlights that India is expected to rapidly adopt, and grow in nine digital technology areas including three foundational technologies; Big data and analytics, cloud computing, and cybersecurity and six advanced technologies - artificial intelligence, internet of things, 3D printing, robotics, blockchain and immersive media.

With the outbreak of COVID-19, exports of certain services such as travel and tourism, and goods-related services such as freight, transport and manufacturing services have been adversely impacted. However, India is a major importer of these services. For example, in 2019, India ranked 13th among the top global importers of goods-related services with a share of 0.8 per cent. On the other hand, trade in services such as telecommunications, computer and information services have seen an increasing trend owing to demand for off-shoring, online and online delivery of services. This is an area of India's strength, which needs policy attention as the country focuses on reviving growth and exports. As more and more services are delivered online globally, data will play a key role in international trade.

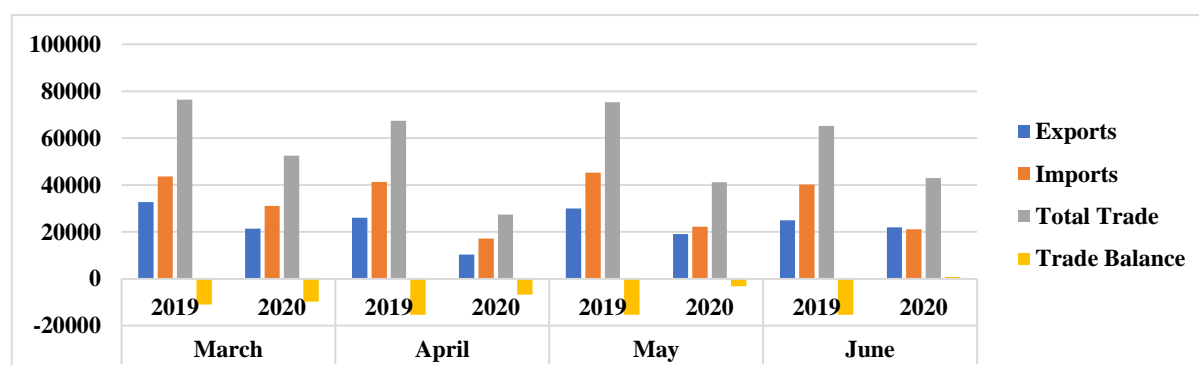
In fact, trade in goods has declined due to sudden lockdowns, protectionism, etc. With COVID-19, on April 8, 2020, the WTO projected a reduction in world trade by 13-32 per cent in 2020 due to disruptions in supply chains. On June 22, 2020, WTO pointed out that the volume of merchandise trade shrank by 3 per cent year-on-year in the first quarter of 2020. Initial estimates for the second quarter indicated a year-on-year drop of around 18.5 per cent.³¹ Thus, there will be a reduction in exports of goods. Travel bans and visa restrictions are likely to adversely affect the mobility of high-skilled labour, but data flows are likely to increase due to fast adoption of 4IR by all countries. India, with its strength in IT/ITeS services, can not only enhance its exports but become a global data analytics and processing hub.

In the past few months, India faced a decline in exports and imports, both due to the COVID-19 related lockdown and due to geo-political tensions with China. Compared to March-June 2019, exports from India and imports to India have declined considerably between March and June 2020 (see Figure 4.1). Between March 2020 and June 2020, imports of goods from the world to India fell by 51.70 per cent and exports of goods during the same period fell by 33.04 per cent. As a result of this sharp decline in imports, India's trade deficit which stood at US\$11,001.30 million at the beginning of the pandemic (March 2020) ended up going to a surplus of US\$793.17 million in June 2020. Disaggregated data by product categories are not available in the public domain for the year 2020, which makes it difficult to understand how the digital sector has been affected by the pandemic.

³¹ Source: https://www.wto.org/english/news_e/pres20_e/pr858_e.pdf (last accessed August 23, 2020)

Figure 4.1: India's Trade in Goods: March-June 2019 versus March-June 2020

(In US\$ million)



Source: Compiled from the Directorate General of Commercial Intelligence and Statistics, Ministry of Commerce and Industry. Available at <http://dgciskol.gov.in/QuickEstimateArchive.aspx> (last accessed July 13, 2020)

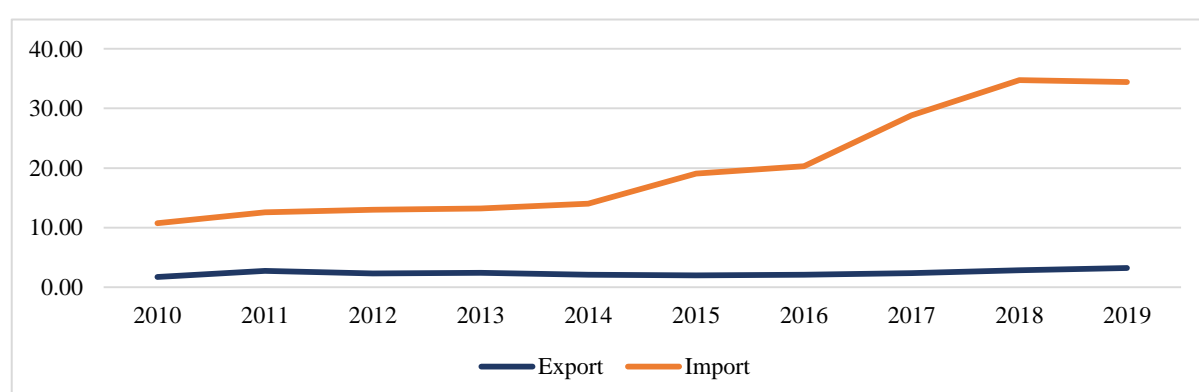
Since many government policies focus on local manufacturing of digital goods and on-soil data localisation through the creation of data centre servers and cloud infrastructure, etc., the next section tries to examine India's trade in the equipment required to build, run and maintain data centres.

4.3 Trade in Select Equipment Required for Data Centres

Using a sample of 45 ITA-1 products at the Harmonised System (HS) 6-digit level, it can be seen that India has a large negative trade balance in equipment for data centres (see Figure 4.2), and the gap seems to increase over time. While exports of select equipment have increased from US\$1.70 billion in 2010 to US\$3.23 billion in 2019, imports during the same period have increased from US\$10.73 billion to US\$34.41 billion. In other words, while exports have grown at a CAGR of 7.39 per cent, imports during the same period have grown at a CAGR of 13.82 per cent.

Figure 4.2: India's Trade in Select Equipment Required for Data Centres (2010-2019)

(In US\$ billion)



Source: UNComtrade Statistics, available at <https://comtrade.un.org/data/> (last accessed June 27, 2020)

4.3.1 India's Trade in Select Equipment Required for Data Centres: By Country

In 2017, the top 5 and top 10 export partners had a share of 63.63 per cent and 78.10 per cent respectively in India's exports of select equipment required for data centres (see Table 4.1 (a)). This share has fallen to 50.52 per cent and 71.02 per cent in 2019. It is worth noting that the share of exports to China and Hong Kong has increased.

Table 4.1 (a): Top 10 Export Markets for India in Select Equipment for Data Centres (2017 and 2019)

2017			2019		
Rank	Country	Export Share (%)	Rank	Country	Export Share (%)
1	United Arab Emirates	31.23	1	United States	16.59
2	United States	10.61	2	China	13.04
3	China	10.11	3	Netherlands	7.10
4	Russian Federation	6.98	4	United Arab Emirates	6.90
5	Netherlands	4.70	5	Hong Kong	6.89
6	Hong Kong	3.89	6	Singapore	5.12
7	Germany	3.23	7	France	4.86
8	South Africa	2.97	8	Germany	4.24
9	Turkey	2.36	9	Vietnam	3.60
10	Singapore	2.02	10	Indonesia	2.65
	Top 5 Share	63.63		Top 5 Share	50.52
	Top 10 Share	78.10		Top 10 Share	71.02

Source: UNComtrade Statistics, available at <https://comtrade.un.org/data/> (last accessed July 18, 2020)

In terms of countries from which India imports, in 2017, the top 5 and top 10 import partners had a share of 82.08 per cent and 91.94 per cent, respectively (see Table 4.1 (b)). This share has since increased to 83.46 per cent and 93.50 per cent in 2019. The share of imports from China has decreased from 63.64 per cent in 2017 to 40.47 per cent in 2019 but the share of imports from Hong Kong has shown a significant increase.

Table 4.1 (b): Top 10 Countries from which India Imports Select Equipment for Data Centres (2017 and 2019)

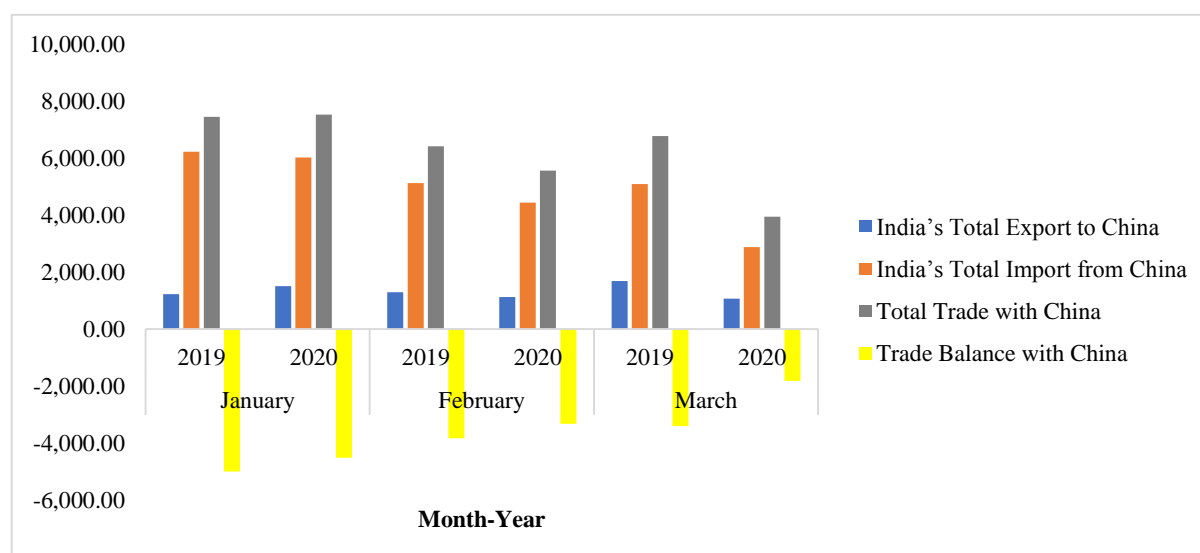
2017			2019		
Rank	Country	Import Share (%)	Rank	Country	Import Share (%)
1	China	63.64	1	China	40.47
2	Korea, Republic of	7.46	2	Hong Kong	22.02
3	Singapore	5.16	3	Singapore	9.08
4	Hong Kong	3.02	4	Viet Nam	6.27
5	United States	2.80	5	Korea, Republic of	5.62
6	Vietnam	2.74	6	USA	3.62
7	Malaysia	2.38	7	Taiwan	2.09
8	Mexico	1.76	8	Malaysia	1.89
9	Taiwan	1.58	9	Mexico	1.24
10	Japan	1.41	10	Japan	1.20
	Top 5 Share	82.08		Top 5 Share	83.46
	Top 10 Share	91.94		Top 10 Share	93.50

Source: UNComtrade Statistics, available at <https://comtrade.un.org/data/> (last accessed July 18, 2020)

Overall, India is still heavily dependent on China for trade in digital products for data centres and digital infrastructure creation. While disaggregated data is not available, overall trade data shows that trade between India and China has declined drastically since the outbreak of COVID-19 (see Figure 4.3) due to disruptions in supply chains and geo-political tensions. Between January 2020 and March 2020,³² exports of goods from India to China have declined by 29.24 per cent and imports from China during the same time period have declined by 16.90 per cent. In addition, China's share in total exports from India fell from 5.83 per cent in January 2020 to 4.96 per cent in March 2020, while its share in Indian imports fell from 14.64 per cent to 9.25 per cent. As a result, India's trade deficit with China decreased from US\$4517.48 million to US\$1816.04 million during the same period. Disaggregated data by market and product is needed to do further analysis on whether trade is routed through a third country.

Figure 4.3: India-China Trade in Goods: January-March 2019 versus January-March 2020

(In US\$ million)



Source: Extracted from Export Import Bank Monthly, DGFT. Available at <https://commerce-app.gov.in/meidb/default.asp> (last accessed July 13, 2020).

4.3.2 India's Trade in Equipment Required for Data Centres: By Products

Out of the 45 products, Table A2 and Table A3 in Appendix present the top 10 products exported and imported by India respectively in 2017 and 2019. In 2019, the top three products exported by India include 'telephones for cellular networks/for other wireless network' (HS-851712), 'static converters' (HS-850440) and 'machines for the reception, conversion & transmission/regeneration of voice' (HS-851762). The top three products imported during the same period include 'parts of telephone sets, including telephones for cellular networks/for other wireless networks' (HS-851770), 'electronic integrated circuits,

³² While we use data for March-May 2020 in Section 4.2, we use data for January-March 2020 in this section. This is because while India went into a lockdown in March 2020, China went into a lockdown in January.

processors & controllers' (HS-854231) and 'portable automatic data processing machines, weighing not more than 10 kg, consisting of a least a central processing unit, a keyboard & a display' (HS-847130). India's trade is fairly concentrated in both exports and imports with the share of the top 10 items of exports being 93.15 per cent and that of the top 10 imported items being 84.03 per cent in 2019. If the government wants to reduce import dependence, it is important to focus on the domestic manufacturing of these items.

4.3.3 India's Export Competitiveness in Goods required for Data Centres

The RCAs based on the 45 product lines (see Table 4.2) show that in 2010, 2017 and 2019, India enjoyed comparative advantage in 3 of the exported products out of the 45 product categories considered. In all the years, India enjoyed export competitiveness in 'electrical capacitors, fixed, designed for use in 50/60Hz circuits & having a reactive power handling capacity of not <0.5 kvar (power capacitors)' (HS-853210), and 'fixed electrical capacitors, other than those of 8532.10, dielectric of paper/plastics' (HS-853225).

Comparing the export competitiveness of the 45 selected items (see Table 4.2) with India's top 10 exported items for building data centres (as shown in Table A2 in Appendix), it can be seen that India has a significant comparative advantage in the export of 'electrical capacitors, fixed, designed for use in 50/60Hz circuits & having a reactive power handling capacity of not <0.5 kvar (power capacitors)' (HS-853210), for both 2010 and 2019. However, this product is not among the top 10 products exported from India in either of the years. Thus, there is potential for the Indian government to support an increase in the manufacture of products in which the country has a comparative advantage. In addition, there is need for more primary survey-based studies to understand the reasons for low competitiveness of the products listed in Table 4.2 and how domestic competitiveness can be enhanced. This will help government to come up with the right policies to support the sector.

Table 4.2: Revealed Comparative Advantage³³ of India's Select Exports of Equipment for Data Centres (2010, 2017 and 2019)

HS-Code	Product Name	RCAs		
		2010	2017	2019
847130	Portable automatic data processing machines, weighing not more than 10 kg, consisting of a least a central processing unit, a keyboard & a display	0.02	0.02	0.03
847141	Other automatic data processing machines: Comprising in the same housing at least a central processing unit & an input & output unit, whether/not combined	0.11	0.08	0.05
847149	Other automatic data processing machines, presented in the form of systems.	0.02	0.01	0.02
847150	Processing units other than those of sub-heading 8471.41/8471.49, whether/not containing in the same housing one/two of the following types of unit: storage units, input units, output units	0.06	0.02	0.03
847160	Input/output units, whether/not containing storage units in the same housing	0.34	0.05	0.09
847170	Storage units	0.12	0.02	0.03
847180	Other units of automatic data processing machines, excluding 8471.50, 8471.60, and 8471.70.	0.07	0.01	0.01
847190	Magnetic/optical readers, machines for transcribing data onto data media in coded form & machines for processing such data, n.e.s.	0.33	0.04	0.05
847321	Parts & accessories (excl. covers, carrying cases & the like) suit. for use solely/principally with the electronic calculating machines of 8470.10/8470.21/8470.29	0.00	0.01	0.10
847329	Parts & accessories (excl. covers, carrying cases & the like) suit. for use solely/principally with the machines of 84.70 other than for those headings incl. in 8473.21	0.42	0.06	0.06
847330	Parts & accessories of the machines of heading 84.71	0.07	0.05	0.04
847350	Parts & accessories equally suitable for use with machines of two/more of the headings 84.69 to 84.72	0.32	0.03	0.44
850440	Static converters	0.55	0.57	0.69
850450	Inductors, n.e.s. (excl. for cathode ray tubes)	0.14	0.08	0.09
851711	Line telephone sets with cordless handsets	2.15	0.17	0.20
851712	Telephones for cellular networks/for other wireless networks, other than line telephone sets with cordless handsets	0.79	0.04	0.21
851718	Other telephone sets, incl. telephones for cellular networks/for other wireless networks, other than 8517.11 & 8517.12	0.29	0.16	0.13
851761	Base stations for transmission/reception of voice, images/other data, incl. apparatus for communication in a wired/wireless network (such as a local/wide area network)	0.00	0.10	0.06
851762	Machines for the reception, conversion & transmission/regeneration of voice, images/other data, incl. switching & routing apparatus	0.03	0.19	0.23
851769	Communication Apparatus (excluding telephone sets or base stations); machines for the transmission or reception of voice, images or other data (including wired/wireless networks), n.e.c. in item no. 8517.6	0.70	0.64	0.50

³³ Revealed Comparative Advantage is calculated as of country *i* for product *j* is often measured by the product's share in the country's exports in relation to its share in world trade: $RCA_{ij} = (x_{ij}/X_{it}) / (x_{wj}/X_{wt})$ where x_{ij} and x_{wj} are the values of country *i*'s exports of product *j* and world exports of product *j* and where X_{it} and X_{wt} refer to the country's total exports and world total exports. A value of less than unity implies that the country has a revealed comparative disadvantage in the product. Similarly, if the index exceeds unity, the country is said to have a revealed comparative advantage in the product.

HS-Code	Product Name	RCAs		
		2010	2017	2019
851770	Parts of telephone sets, incl. telephones for cellular networks/for other wireless networks; other apparatus for the transmission/reception of voice, images/other data, incl. apparatus for communication in a wired/wireless network	0.14	0.10	0.10
853210	Electrical capacitors, fixed, designed for use in 50/60Hz circuits & having a reactive power handling capacity of not <0.5 kvar (power capacitors)	2.95	2.90	2.86
853221	Fixed electrical capacitors, other than those of 8532.10, tantalum	0.00	0.00	0.00
853222	Fixed electrical capacitors, other than those of 8532.10, aluminium electrolytic	0.00	0.00	0.01
853223	Fixed electrical capacitors, other than those of 8532.10, ceramic dielectric, single layer	0.03	0.03	0.06
853224	Fixed electrical capacitors, other than those of 8532.10, ceramic dielectric, multilayer	0.00	0.00	0.01
853225	Fixed electrical capacitors, other than those of 8532.10, dielectric of paper/plastics	1.39	2.31	2.22
853229	Fixed electrical capacitors, n.e.s. in 85.32	0.23	0.14	0.25
853230	Variable/adjustable (pre-set) electrical capacitors	0.90	0.23	0.28
853290	Parts of the electrical capacitors of 85.32	0.34	0.34	0.53
853310	Fixed carbon electrical resistors, composition/film types	0.62	1.31	1.07
853321	Fixed electrical resistors (excl. fixed carbon resistors, composition/film types), for a power handling capacity not >20W	0.12	0.06	0.06
853329	Fixed electrical resistors (excl. fixed carbon resistors, composition/film types), n.e.s. in 85.33	0.19	0.15	0.11
853331	Wire wound variable electrical resistors, incl. rheostats & potentiometers (excl. heating resistors), for a power handling capacity not >20W	0.33	0.24	0.18
853339	Wire wound variable electrical resistors, incl. rheostats & potentiometers (excl. heating resistors), n.e.s. in 85.33	0.21	0.33	0.46
853340	Electrical resistors (excl. heating resistors, light dependent resistors), n.e.s. in 85.33	0.27	0.22	0.23
853390	Parts of the electrical resistors of 85.33	0.10	0.06	0.11
853650	Switches other than isolating switches & make-&-break switches, for a voltage not >1000V	0.26	0.27	0.27
853669	Plugs & sockets for a voltage not >1000V	0.12	0.13	0.13
853690	Electrical apparatus for switching/protecting electrical circuits/for making connections to/in electrical circuits, n.e.s. in 85.36, for a voltage not >1000V	0.37	0.32	0.36
854231	Electronic integrated circuits, processors & controllers, whether/not combined with memories, converters, logic circuits, amplifiers, clock & timing circuits/other circuits	0.01	0.00	0.01
854232	Electronic integrated circuits, memories	0.01	0.00	0.00
854233	Electronic integrated circuits, amplifiers	0.00	0.00	0.00
854239	Other electronic integrated circuits, other than Amplifiers/memories/processors & controllers	0.00	0.01	0.04
854290	Parts of electronic integrated circuits	0.03	0.01	0.01

Source: Calculated using data from WITS

Note: The sub-categories in which India enjoys comparative advantage have been highlighted.

4.4 India's Value-Added in Trade of Select Equipment Required for Data Centres

The domestic and foreign value-added content of gross exports and gross imports have been calculated for the computers, electronic and electrical equipment industry (based on industrial classification ISIC Revision 4), which includes products that are required for data centres. The data has been calculated for the latest year available, i.e., 2015, and is presented in Table 4.3. The three indicators are defined as follows:

- **Domestic Value-Added Content of Gross-Exports:** It shows the amount of domestic value-addition that has gone into the production supply chain of a certain product category for a certain exporting country (a forward linkage).
- **Domestic Value-Added Content of Gross-Imports:** It shows the amount of domestic value-addition that has been incorporated while importing a certain product category for a certain importing country.
- **Foreign Value-Added Content of Gross-Exports:** It shows the amount of foreign value-addition that has gone into the production supply chain of a certain product category for a certain exporting country (a backward linkage).

Table 4.3: Value-Added in Trade of Select Equipment Required for Data Centres - 2015

(In US\$ million)

Indicators	Value	Gross Exports /Imports	Share (%)
Domestic Value-Added Content of Gross-Exports	3168.9	12347.4	25.66
Domestic Value-Added Content of Gross-Imports	152.7	37353.2	0.41
Foreign Value-Added Content of Gross-Exports	4474.9	12347.4	36.24

Source: Extracted from OECD TiVA Database

Table 4.3 shows that in 2015, in India, the domestic value-addition is lower as compared to foreign value-addition in gross exports for the computer, electronic and electrical equipment industry. This shows that India has lower domestic production capabilities in these products and most of the items required for producing export items are imported. The share of domestic value-addition in gross-imports is very low (0.41 per cent), indicating that India's exports of intermediate products in this category are low. Some of the reasons for this are presented in Section 6 as challenges.

The next section focuses on the primary survey.

5. Findings from the Primary Survey

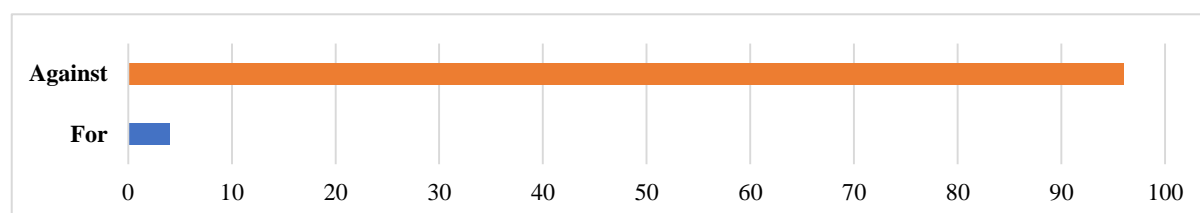
The aim of the primary survey was to (a) understand the overall changes in perception on data localisation across stakeholders (b) see how different types of companies and sectors are

affected and/or are likely to be affected due to data localisation measures and (c) identify issues and barriers arising due to data localisation (Section 6). While the survey was conducted in three phases, the views and perceptions of the stakeholders towards data localisation in a pre-COVID-19 scenario and during COVID-19 remain largely unchanged.

5.1 Perception and Impact of Data Localisation and Data Localisation Policies

Most stakeholders agree on the need for data governance for national security and consumer privacy, but 96 per cent (see Figure 5.1) are against rigid on-soil data localisation measures. Such measures are not only difficult to implement in a situation such as the one that exists now due to the COVID-19 pandemic, but are also likely to negatively affect software services exports and restrict innovation. Firms from Japan, the EU and the US pointed out that they prefer countries that allow data sharing with some form of data security. In fact, many countries are seeking regulatory transparency, clarity and predictability in data sharing and data security through trade agreements to ensure that their firms have a stable operating environment in foreign markets. Easier cross-border data flows have been a key Indian demand in its trade negotiations in the past. Stakeholders feel that rigid data localisation regulations may act as a threat to future investments in sectors like financial services or healthcare technologies.

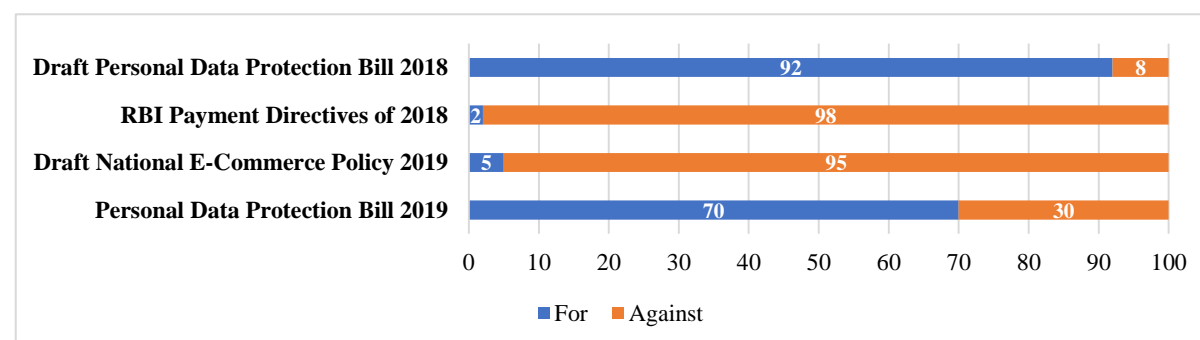
Figure 5.1: Overall Stance on On-Soil Data Localisation



Source: Primary Survey

Figure 5.2 presents the viewpoints of the survey participants on individual data protection/localisation policies of Indian government entities.

Figure 5.2: Stakeholder Perceptions about different Data Localisation Policies



Source: Primary Survey

As shown in Figure 5.2, many stakeholders support the Draft Personal Data Protection Bill, 2018. However, some have raised concerns over the new provisions in the 2019 Personal Data Protection Bill, which restricts cross-border transfer and processing of both sensitive personal data and critical personal data. Stakeholders also raised concerns about the fact that under the new provisions in the bill, the government is empowered to compel organisations to produce data for policy-making purposes. Stakeholders pointed out that many Indian companies are global and have made investments in technology, inducing monetisation of data. Companies have worked hard to grow, and policies should not be anti-growth or adversely affect business models and operations.

While most survey participants favour an overarching regulation, only 10 per cent want sector-specific data localisation requirements/regulations. Their view is that sector-specific regulations may have to be relaxed as has happened in the case of patient data during the pandemic. Hence, India should first have a strong overarching regulation, which allows the sharing of data with trust.

In terms of the RBI directive (DPSS.CO.OD No. 2785/06.08.005/2017-2018) on “*Storage of Payment System Data*”, stakeholders agreed that RBI, being the central bank of the country, should have “unfettered access to payment data”, and in this regard, companies are willing to share data; however, they would like to have data mirroring and were unhappy with the restriction that the data has to be stored “only in India”. Cross-border data sharing is needed for many purposes, for example, companies need financial data on global firms for off-shoring services and data sharing is needed for detection of cross-border financial frauds with minimum delay.

Different types of companies seem to be affected differently by data localisation requirements. For example, a company with a data storage facility in India and serving only the Indian market (for example, some Indian e-commerce companies or foreign companies that have invested in data storage infrastructure in India) will gain. However, Indian IT/ITeS companies, which provide off-shore services in sensitive sectors like financial services to global banks and financial institutions, will be adversely affected as their clients are now worried about outsourcing such services to India. The survey participants pointed out that in the off-shore business model of IT, a company off-shoring its work to India has its primary business outside India. Forcing localisation requirements on such companies to store data only in India would simply cause such businesses to outsource their operations to another country with less stringent data localisation requirements.

Most survey participants are of the view that home grown e-commerce, health-tech and edu-tech firms will not benefit from data localisation requirements if they want to expand globally or cater to the international market. Sometimes, their venture capitalists/funders may impose requirements of global expansion for funding and they will then face difficulties. Interestingly, a number of global multinational technology companies have their data storage facilities in India. They will not have major issues in adhering to data localisation requirements. Further, they often offer value-added/better services and, therefore, may gain from it due to consumer preference and loyalty. Further, in recent years, there have been a

series of partnerships between Indian firms and firms from countries such as the US. The localisation policy will strengthen global partners while Indian firms will face difficulties in expanding globally. One, therefore, needs to examine the costs and benefits of the policy against India's aim to be self-reliant.

Financial companies and data analytics firms expressed discontent with data localisation in India, especially with respect to the RBI directive on payment storage. They specifically objected to not being allowed data mirroring. According to them, it may cause delays in ensuring global safety in data flows and will affect their existing business models. Due to this directive, they now have to invest in duplicating physical infrastructure and compromise in other areas like development of new financial products, which could have led to digital financial inclusion of small and medium enterprises (SMEs).

Some Indian startups are happy with a data localisation policy. They need to apply analytics to customer, product, transactional, account, service, and social data; and need to access data to create better insights but have been facing issues in getting access. They opined that if the government gives them access to data, they could improve their business as data can be monetised. For example, one startup working with a state government on driving licences shared the data of the drivers with a marketplace-based mobility company that was trying to enrol drivers on the payment of a fee. Given that there is no data protection regulation, this is an example of how government data can also be monetised by private companies. However, startups who want to expand globally and go into deep research, technologies, and patents, said that the policy is restrictive. In India, startups have greatly benefited from the cross-border flow of data. For example, Myntra Designs Private Limited and RedBus (Ibibo Group Private Limited) have hosted their data servers with global providers such as Amazon Web Services (AWS) that allowed them to innovate and deliver enhanced analytics. Fortis Healthcare Limited, in a bid to save costs, relocated their data centre abroad (Microsoft Azure) while Flipkart Internet Private Limited (recently acquired by Wal-Mart Stores Inc.), during its early days, relied on Canadian servers for operations. Another home-grown ecommerce giant, Snapdeal Private Limited, leveraged AWS for its infrastructure in its earlier days and later moved to setting up their own data centre.

Companies in sectors such as express delivery services and healthcare (i.e., hospital chains) that do not have IT as a core part of their business operations said that they will be at a direct disadvantage due to rigid policies. Express delivery services companies pointed out that commitments to deliver within a certain date and/or time cannot be made to customers unless e-commerce companies and/or the express delivery companies in their network have control over inventory globally. Indian express delivery companies pointed out that being a part of the network of global e-commerce companies has led to a 40 per cent increase in their business-to-consumer (B2C) sales and a 20 per cent increase in their business-to-business (B2B) sales. Given that logistics costs in India are high, duplicating infrastructure will add to their costs.

Companies from countries such as Japan, Taiwan, EU member states and the Republic of Korea, in sectors like electronics, pointed out that they wanted to set up manufacturing

facilities in India. However, since manufacturing is now automated and data-driven, global firms would like to have the freedom to share cross-border data for business development, efficiency improvement and product design. They also think that a rigid data localisation policy would affect the abilities of firms, for example Indian and Japanese firms, to jointly explore third country markets like Africa. India generates a lot of data through government initiatives like *Aadhaar*, which can be used for direct benefit transfer and governance. These can be a learning experience for developing countries in regions like Africa. However, such cross-country initiatives will require cross-border data flows. The most recent example of such an initiative is data sharing for COVID-19 vaccines and clinical trials. Without data security, such data can be misused while rigid data localisation will prevent data sharing.

There can be different types of data – sensitive and non-sensitive. While the Draft E-Commerce Policy of 2019 seems to try to control non-sensitive data, healthcare service providers pointed out that there is a need to protect and safeguard patient data. At the same time, in a pandemic situation, no country can forcefully implement on-soil data localisation. In a normal situation, decisions on where to store data is an internal matter of the healthcare service providers, and in fact, most hospitals in India, based on budget and management decisions, store their data in their own data centres or on clouds of companies such as AWS and Microsoft Azure. Since health data is critical, none of the hospitals interviewed stored their data abroad. However, poor data infrastructure at hospitals make secure storage of data a challenge. In India, there is a huge issue in generating patient health history and some technology companies have recently entered into partnerships with hospitals to generate and store that history.

Future demand for data processing and analysis will be both from export markets and within India. For example, the survey found that as the Indian government is focusing on technologies such as artificial intelligence and machine learning, huge amounts of data will be generated in India, which would in turn allow for more in-depth data analytics. However, there is need for partnerships among academic and research organisations, government, and private sector for robust data analytics. Access to data is meaningless unless it is analysed properly. There is need for more analysis of government data for evidence-based policymaking and such data should be made available as a public good. Around 50 per cent of stakeholders opined that policies should be based on the goals of digitally inclusive growth, good governance, national security, consumer protection and making India self-reliant. In an age of globalisation, one cannot be self-reliant without exports and without leveraging export competitiveness. Import restrictions may not lead to production efficiency and enhanced export competitiveness; it can instead lead to inefficiencies and higher costs of doing business. In such a scenario, even Indian multinationals will invest in technology abroad rather than in India. The slowdown in economic growth and consumer demand has taken away the attractiveness of India as a high growth market. In this scenario, companies need policy support to make India an attractive off-shoring destination.

5.2 *Financial Viability of Data Localisation and Role of Government*

Data centres are capital intensive. To run a data centre, a company has to bear significant costs, and, therefore, companies should ideally have the budget to run and maintain such data centres effectively and efficiently. Apart from the initial cost of infrastructure, which includes cost of land and equipment purchase, there is maintenance cost along with cost of power, building permits and taxes, network connection, etc. The survey found that it costs close to INR 3.5 crore to create a data centre for a company with close to 100 employees. For a larger company, a self-built data centre could cost somewhere between US\$10-25 million per year. To reduce this cost, many SMEs store their data in a cloud or third-party run data centre. Multiplicity of infrastructure is an unviable business proposition, especially in a country like India, where a majority of the businesses are SMEs.

Data centres need uninterrupted power supply. Since this is not available, there is need for additional investment in power back-up infrastructure. The cost of power in India is much higher than in countries like China; so, the overall cost for businesses increases. Data centres have to have resources to regularly maintain their hardware, replace obsolete equipment, etc., which many SMEs find difficult unless there are targeted schemes to reduce input costs.

Government in countries like China that have stringent data localisation rules spend a lot on digital initiatives and input costs are low. If India wants to have similar policies, there has to be at least a five-fold increase in government spending on digital infrastructure.

5.3 *Impact on Trade Balance*

Around 90 per cent of the survey participants pointed out that since India is not a hardware manufacturer and most of the equipment for data centres are covered under India's zero duty commitments in ITA-I, stringent on-soil data localisation will lead to a rise in the already large negative trade balance (see Figure 4.2), at least in the first five years. Given that most imports are from China, on-soil data localisation measures without an increase in India's domestic manufacturing capabilities may lead to a surge in imports of these products from China, either directly or re-routed through Hong Kong or other countries (for example, Vietnam), which will increase the costs of business operations. The secondary analysis presented in Section 4 confirmed that India seems to have four key issues – huge dependence on China for digital products trade, lack of competitiveness in a wide range of products for data centres, a failure to export the products in which the country can be competitive, and lower domestic value-addition as compared to foreign value-addition in gross exports for products that are needed to create a data centre/data processing hub. Overall, India is yet to become a part of the global production network. Further, due to the recent geo-political tensions with China, supply chains have been disrupted, and imports are restricted. Relocating supply chains to India may take some time. Companies from countries/markets such as Japan, the US and EU member states pointed out that while they want to diversify their supply chain and reduce dependence on China post-COVID-19, they are worried about investing in a country that does not allow data sharing with trust or is not willing to sign trade agreements on data flows.

5.4 Future Relationship with China

India's trade with China has deteriorated sharply between April 2020 and September 2020, primarily due to geo-political tensions. The future is uncertain as the geo-political tensions continue. In the electronics sector, India is heavily dependent on Chinese suppliers for raw materials, intermediate goods and final products. Electronic goods account for 32 per cent of India's overall imports from China, which meets 40 per cent of India's total imports of electronic goods, including consumer electronics, industrial electronics, computer and IT hardware, mobile phones, etc. Between April 2019 and February 2020, total imports of electronic goods stood at INR 3.59 trillion. Of this, imports from China stood at INR 1.42 trillion or 40 per cent of the total imports of such goods.³⁴ Specifically, India imported 98 per cent of parts used in electronic integrated circuits and micro assemblies from China.³⁵ While some experts believe that India will receive investment from global companies moving out of China,³⁶ others fear that delay in the supply of components and other setbacks could see a production impact worth INR 6,000 crore during March and April 2020 due to the disruption in the supply chain [also see Federation of Indian Chamber Commerce and Industry (FICCI), 2020].

5.5 Impact on Job Creation

The Draft National E-Commerce Policy states that:

“Many aspects of business activity will get automated and there will be increased use of artificial intelligence. It is hence vital that we retain control of data to ensure job creation within India. Cloud computing should become an economic activity in India and data analytics in the era of industry 4.0 should become a major job creator.”

Data centres require highly skilled and specialised professionals. The survey participants pointed out that for running data centres, only a couple of employees may need to be present for round-the-clock monitoring. Some low to mid-skilled jobs may be created during the construction of the data centre but after that, only a handful of high-skilled and quality jobs will be created. Therefore, a data centre cannot create huge employment. Manufacturing of equipment for data centres and of electronics goods will require a high-skilled workforce that can be supported through the right policy incentives like special economic zones (SEZs) policies or technology park policies rather than restrictive policies. This can create employment, but manufacturing is becoming increasingly automated. Therefore, the bulk of employment will be created in off-shoring data analytics, product development, and data

³⁴ Source : https://www.business-standard.com/article/economy-policy/india-can-source-electronic-goods-from-markets-other-than-china-wtc-120062201614_1.html (last accessed July 13, 2020)

³⁵ Source : <https://globalprimenews.com/2020/06/22/india-can-enhance-electronic-goods-imports-from-singapore-usa-malaysia-taiwan/> (last accessed July 13, 2020)

³⁶ Source: <https://telecom.economictimes.indiatimes.com/news/esc-reviewing-ict-export-forecast-of-usd-155-bn-for-2020-21-amid-covid-19-pandemic/75796881> (last accessed July 13, 2020)

processing. India has the potential to become a global technology hub/off-shoring centre, which in turn will lead to quality job creation as has been the case in the IT/ITeS sector. In IT/ITeS sector, India is a supplier of skilled workforce globally.

5.6 Infrastructure Readiness

The survey participants pointed out that, while discussing the costs and benefits of data localisation, it is also relevant to keep in mind the reality of India's current data centre capabilities. In the absence of external pressures, an entity's decision on its location could be based on several factors such as proximity to consumers, climate, availability of the required infrastructure, cost of electricity, tax structure, links with core backbone networks and political risks (also see Azmeh and Foster, 2016). Firms locate infrastructure across countries to reduce risk related to pandemics and other disasters. For instance, during the recent COVID-19, countries like India went for a sudden lockdown, without keeping IT/ITeS/technology as part of the essential services.

Ninety per cent of survey participants pointed out that as of June 2020, India did not have the regulatory framework, investment by government and the ability to create its own infrastructure at globally competitive costs to become a data centre hub. Low internet connectivity, slow broadband speeds and unpredictability in the availability of power supply make it a rather unattractive destination to set up a physical data centre. Thus, instead of forcing companies towards on-soil data localisation requirements, 96 per cent of the survey participants opined that India should engage in data sharing partnerships with countries and invest in the skills needed to implement 4IR technologies.

The Draft National E-Commerce Policy 2019 has allowed a period of three years to adjust to data storage requirements and this is also the timeline in place to build the requisite infrastructure for data centres. Around 95 per cent of the survey participants strongly disagree with this time frame. They feel that three years with the current Digital India budget is not enough to build state-of-the-art data centres. Building data centres requires manufacturing capabilities, requisite physical infrastructure and, even with the promised availability of easier credit and finance, it is simply not possible to build such a large-scale data centre infrastructure in a period of just three years. If such policies are implemented, the government should increase its spending manifold and policies should have clearly defined targets, a plan to achieve the targets and a robust monitoring process.

The next section presents the issues with regards to data localisation in India.

6. Challenges for India

The discussions in the previous section highlights the fact that India is yet to be a part of the global value chains for data centres; cost of data infrastructure is high and data security and privacy regulations are evolving. Globally, rigid data localisation conditions are being relaxed in the context of the pandemic, which has thrown up the need for data sharing with

trust. This section focuses on the barriers that have hampered or are likely to hamper India's ability to harness its potential as a data processing and innovation hub.

- **Increasing Geo-political Tensions** – Since the onset of the pandemic, several countries have experienced tensions with China. While some countries have just blamed China's handling of the COVID-19 virus which emerged in Wuhan, others have commissioned detailed studies and put a monetary value on the adverse impact of China's role in failing to contain the virus. The India-China border tensions led a series of reactions from the Indian government including a ban on Chinese mobile applications and mandating the declaration of the origin of products being sold on e-commerce platforms. India imposed restrictions on foreign investment from China. India is heavily dependent on China for imports of ESDM products and some of these restrictions have been a concern for businesses as it takes time to relocate supply chains. Geo-political tensions between India and China has led to the disruption of supply chains, which is in addition to the disruption due to the pandemic. With the a majority of the board of directors of many firms/investors from Association of South East Asian Nations (ASEAN) being Chinese, the survey found that restrictions on FDI inflows from China may also adversely impact their ability to bring in investment into India. Indian startups are worried that they may not be able to get funding from China.
- **Monopolisation of Data** – Many global experts and governments are of the view that data is monopolised by certain large technology companies – Google Inc, Amazon Inc, Facebook Inc and Apple Inc (popularly known as GAFA). GAFA's control, ownership and power over data are questioned from the angles of taxation, anti-competitive practices, etc. Monopolisation of data can (a) hinder innovation and (b) prevent economies from engaging in global best practices such as evidence-based policymaking and realising social gains to the economy from such policymaking (see Jones and Tonetti, 2020).
- **Regulatory Gaps related to Data Protection** –Some survey participants pointed out that the lack of a comprehensive data protection policy is a major regulatory gap while others considered it to be a challenge to the long-term ease of doing business. It may be beneficial for some companies in the short run to not have a comprehensive data protection and privacy policy but in the long run, all companies opined that there is need for such a policy as lack of policy leads to non-transparency, accountability issues and business uncertainties, which ultimately affect the ease of doing business.
- **Piecemeal Regulations and Policy Uncertainty**—Since 2018, India has been trying to develop a regulatory regime for data protection; however, they have so far failed to put out a clear policy. A number of ad-hoc policies from different regulatory bodies and ministries have emerged and, apart from creating confusion for businesses, they have created a lot of uncertainty. The government has also tried to revise provisions in existing bills as a result of which these bills have got delayed in the parliament. For

example, revisions in the Draft Data Protection Bill 2019, which grants the government unrestricted access to non-personal or anonymised data held by data fiduciaries, have led to concerns amongst stakeholders. Concerns have also been raised about potential for abuse; reduced transparency and accountability and failure to protect intellectual property (see USTR, 2020).

Apart from this, there have been several piecemeal attempts at regulation, which are not always aligned with each other. Many companies pointed out that some of these draft regulations do not consider India's export advantages and strengths in off-shoring. Ninety per cent of the survey participants said that the government should not be the sole custodian of data generated in India. They argued that any policy that proposes data cannot be stored, processed or shared with third parties even with the consent of the customer should be re-examined. They also suggest that policies may be aligned with global best practices such as the EU's GDPR and Asia Pacific Economic Co-operation (APEC) Privacy Principles or regulations imposed by countries such as Japan. While many of these markets are importers of data, they have carefully designed their regulations so that these are not unnecessary barriers to trade and investment.

- **Limited Pre-Consultation and Stakeholders' Engagement** – In developed countries, governments hold extensive consultations with stakeholders before initiating policies. In India, there was no consultation on the RBI directive on storage of payment data and even the Draft National E-Commerce policy 2019 was formulated without active stakeholder engagement and clear understanding of different viewpoints. By contrast, the Justice Srikrishna Committee on data protection did go through an extensive consultation process, according to the survey participants. Thus, there is no uniformity across government departments in their consultation processes. The lack of consultations and discussions creates an uncertain investment environment, reduces the ease of doing business and increases compliance costs. The inability to implement the Draft National E-Commerce Policy 2019 and the feedback it received from within the government ministries/departments and stakeholders show that policies need to be cautiously designed, based on research and interactions. While such policies are often shelved, they create concerns among investors and companies off-shoring to or investing in India. A majority of the survey participants (70 per cent) also mentioned that policies are mostly defensive in nature rather than being offensive, without a comprehensive analysis of India's competitiveness and export interests.
- **Increased Focus on Promoting Manufacturing through WTO Non-Compliant and Protectionist Measures** – India is a key member of the WTO and has in the past shown support for a multilateral rule-based trading system. However, of late, India seems to have taken measures that are not compliant with WTO rules or its own commitments. For example, in November 2019, India lost the case (DS-541) against the US with respect to a number of export-linked subsidies provided through the

Foreign Trade Policy and cluster-based policies like SEZs, which had been availed by technology firms. The National Policy on Electronics 2019 aimed to “*position India as a global hub for Electronics System Design and Manufacturing (ESDM) by encouraging and driving capabilities in the country for developing core components, including chipsets, and creating an enabling environment for the industry to compete globally.*” The policy also refers to extending incentives to promote export-led growth but fails to recognise that export-linked incentives are prohibited under the WTO’s Agreement on Subsidies and Countervailing Measures (ASCM). While the policy aims to develop India as a manufacturing hub and some global companies are relocating their manufacturing to India, survey participants pointed out that such policies need to be strengthened by targets and supporting incentives to reduce logistics costs and cost of services used in manufacturing. As the electronics and technology sector is highly automated, subsidies in services will help reduce production costs and such subsidies are WTO compliant. Unlike ASEAN and East Asian countries, India is yet to design innovative and smart subsidies (Mukherjee and Sarma, 2020).

- **High Cost of Creating Infrastructure** – As has been underscored by the survey, creating the infrastructure to run a data centre is costly; and doing it on a national scale is going to be costlier. As of date, the Government of India has pledged a certain amount of money in its annual budgets towards the Digital India and other affiliated initiatives, but the spending has varied across years and is much lower than that of countries like China and Germany. For example, in FY 2017-18, the government allocated INR 16727.6 million (US\$³⁷227.3 million) for the Digital India programme, of which only INR 14515.9 million (197.2 million) was actually spent.³⁸ In 2018-19 and 2019-20, the allocations were increased to INR 33528.1 million (US\$455.5 million) and INR 35617.6 million (US\$484 million) respectively and MeitY spent INR 30300 million (US\$412.2 million) and INR 37506.0 million (US\$ 509.6 million) respectively. Yet, the quality of digital infrastructure in terms of connectivity, access, etc., needs further improvement. China has announced that it intends to spend US\$1.4 trillion on a digital infrastructure public spending program in 2020. Germany has allocated more than US\$176 billion in areas such as digital infrastructure and transportation in 2020 upto 2023.³⁹ A more nuanced cross-country comparison across G20 countries is limited by outdated data on investment infrastructure, the latest cross-country available data is for the year 2015 (see OECD, 2017)

The survey confirmed that in India, there is a significant shortage of digital infrastructure: the government needs to address multidimensional problems including

³⁷ 1dollar = 73.595 rupees is used as per RBI exchange rate for August, 2020 (for more details, see <https://www.ceicdata.com/en/india/foreign-exchange-rate-reserve-bank-of-india>, last accessed October 1, 2020)

³⁸ For details see, Expenditure Budget available at https://www.indiabudget.gov.in/previous_union_budget.php (last accessed August 23, 2020)

³⁹ Source: <https://www.bloombergquint.com/global-economics/germany-lifts-growth-outlook-pushes-investment-to-keep-its-edge> (last accessed August 23, 2020)

power supply, access, costs, and quality of infrastructure for on-soil data localisation to be implemented. From a private sector perspective, infrastructure should be carefully planned so that costs are low, and risks are mitigated. Huge investment in fragmented infrastructure or duplication of infrastructure may pull out investment from other areas.

- **Limited Government Data for Research** – Ninety-five per cent of survey participants pointed out that there is a dearth of official data in India for research and innovation. For example, there is no data in the public domain that could help analyse the utilisation of free trade agreements, FDI inflows into India by country and by sectors/sub-sectors, trade in services by sub-sectors or data on exports of public sector enterprises *vis-à-vis* private firms. Further, many hospitals, medical centres and schools do not have access to basic computing facilities; hence, data cannot be generated. There is no data on e-commerce trade or on utilisation of different government schemes and programmes. In many states, the schemes are not monitored or evaluated by using robust technology. Without data, informed policymaking is difficult, if not impossible. India has an outdated data collection process, even for government surveys on core issues like employment. There are no consumer surveys. The data is often presented in PDF format and have to be manually extracted to excel or other formats to do any analysis. With initiatives such as *Aadhaar* and the *Ayushman Bharat Yojana*, a huge amount of data is generated by the government, which can be used for research. However, it is also important to first use technology to collect, collate, and share data while ensuring at the same time that such data is not misused.
- **Defensive Position in Trade Agreements/International Forums** – India has taken a defensive position in trade agreements with respect to data flows, data sharing and data localisation by not contributing to the debate and staying out of the discussions. For example, it did not join the plurilateral group on e-commerce in the WTO, and did not sign the “Osaka Track” under the Japan G20 Presidency. India has tried to align itself with Saudi Arabia and Indonesia in most of these forums but with the signing of the Regional Comprehensive Economic Partnership (RCEP) agreement, the position of Indonesia may change. With the on-going pandemic, the current Saudi Presidency needs to take a leadership role in cross-border R&D for development of vaccines/clinical trials, etc. Today, data flows are a key issue in all trade agreements and international forums such as the G20, Indo-Pacific or East Asia Summit. With a defensive position, it will not only be difficult for India to sign trade agreements with the EU or the US, it will also be difficult for the country to drive agendas in forums like the G20 and the Indo-Pacific. With current geo-political tensions with China, India needs the support of countries such as the US, Japan and Australia and regions such as the EU. Further, China is under pressure to open its market to global technology firms.

The topic of data localisation has evolved in the G20 only in the last 5 years. While the Japan Presidency focused on sharing data with trust and use of data for societal benefits, under the current 2020 Saudi Arabia Presidency, the digital economy taskforce is discussing five broad topic areas – measuring the digital economy, artificial intelligence, smart cities, security issues in the digital economy and the flow of data with trust. While these are important topics, there is very little focus as to how these issues pertain to or will help tackle the issue of COVID-19 and its adverse impact on the global economy. Thus, globally, there is an absence of a clear direction on global data sharing and collaboration, which is impeding both inclusive growth and sustainable development. The next section details developments with regards to data localisation in the G20.

7. Developments on Data Localisation in G20

While technology has been a topic of discussion in the G20 for a while, data protection has gained visibility in recent years. Comprehensive discussions on data protection have taken place only since the Hangzhou (China) Summit in 2016, where the first digital economy document – the G20 Digital Economy Development and Cooperation Initiative – was launched. The aim of this initiative was to address the digital divide, enhance flow of information for economic growth, and ensure privacy and personal data protection amongst other measures to spur the development of a digital economy. The latest development on this front was when Japan launched the “Osaka Track”, a key theme discussed in the Ministerial Meeting on Trade and Digital Economy, in order to standardise rules governing the global movement of data.⁴⁰

As mentioned earlier, the Osaka Track, given the concerns surrounding misuse and protection of data, introduced the idea of “ free flow of data with trust”. While 14 G20 countries have data localisation measures in place; which vary in the type of data, scope of applicability and eventual enforcement as per their legislative frameworks (Kathuria et al., 2019), majority of these countries were in favour of the rules introduced in the Osaka Track. G20 countries such as India, South Africa and Indonesia opposed the Osaka Track resolution on the grounds that it could undermine multilateral talks on e-commerce taking place under the WTO Work Program on Electronic Commerce; and it is important to preserve the policy space of developing countries with regards to data governance since policy is evolving.⁴¹ Specifically, they pointed out that the Osaka Track

“undermines the multilateral principles of consensus-based decisions in global trade negotiations and denies policy space for digital-industrialisation in developing countries”⁴²

⁴⁰ Source: https://www.mofa.go.jp/policy/economy/g20_summit/osaka19/pdf/documents/en/Ministerial_Statement_on_Trade_and_Digital_Economy.pdf (last accessed September 22, 2020)

⁴¹ Source: <https://dig.watch/updates/g20-osaka-track-raises-controversy> (last accessed September 9, 2020)

⁴² Source: <https://gdpr.report/news/2019/07/02/japan-announces/> (last accessed May 11, 2020)

However, in light of the pandemic, all the three countries mentioned above have taken steps that are in line with rules laid down in the Osaka Track. In fact, the forthcoming G20 Presidency of Saudi Arabia in November 2020 is also taking up this topic, and as a pre-cursor to the summit and in the light of the on-going pandemic, the G20 Leaders' Statement,⁴³ published on March 27, 2020, made commitments to fight the pandemic by sharing timely and transparent data in a sensitive sector like health. It is also worth noting that Saudi Arabia was one of the 17 countries to sign the "Osaka Declaration on the Digital Economy". Thus, the digital economy taskforce (especially due to the pandemic) is expected to heavily emphasise the need for data sharing and free flow of data with trust.

8. G20 Saudi Presidency, India's Position and the Way Forward

The above discussions show that the COVID-19 pandemic has created a need for data sharing with trust and Saudi Arabia, which is hosting the G20 Presidency, has aligned itself to the broad objective of data sharing with trust along with other G20 members. In G20, countries have to build consensus to take any agenda forward. There is a broad consensus across G20 members on data sharing with trust.

As India takes over the G20 Presidency in 2022, it will join the "troika" soon and will be a part of it for the next three years. While India has kept itself away for any discussions on data in international forums by not joining the WTO's e-commerce plurilateral discussions or by not signing the Osaka Track in G20, survey participants opined that India needs to have a strategy on data in which it can build consensus.

The next Presidency in 2021 will be held in Italy and being an EU member country, Italy is expected to push the idea of data sharing based on the EU's GDPR. Thus, among the G20 members, EU, Italy and Germany will have the same views. The UK, despite its withdrawal from the EU, is GDPR compliant. Japan, Australia and a number of other countries are in favour of data sharing with trust. As discussed earlier, around 1 in 3 businesses across the world which are exporting/plan to grow and export are GDPR compliant/want to be GDPR compliant. Thus, a GDPR type of data protection framework may be acceptable to B20 and G20. The US, given that it hosts the world's largest technology firms, is in favour of free flow of data. However, the US companies are GDPR compliant. China has a rigid data localisation policy. India has somewhat aligned with China in the past through its different domestic policy initiatives like the Draft National E-commerce Policy 2019. Due to geo-political tensions between the two countries, India today cannot align itself with China's policies on data localisation. All these factors must be considered while discussing India's strategies and options.

As of now, 17 G20 members support the idea of data sharing with trust, apart from India, Indonesia and South Africa. While South Africa's position on the matter is unclear, Indonesia

⁴³ For details see, G20 Leaders Statement available at [https://g20.org/en/media/Documents/G20_Extraordinary%20G20%20Leaders%E2%80%99%20Summit_Statement_EN%20\(3\).pdf](https://g20.org/en/media/Documents/G20_Extraordinary%20G20%20Leaders%E2%80%99%20Summit_Statement_EN%20(3).pdf) (last accessed September 23, 2020)

might sign the RCEP agreement as early as November 2020, which will have a chapter on e-commerce and provision for data sharing. Thus, Indonesia may change its position with regards to data localisation for its own Presidency in 2023. It is likely that Indonesia would have undertaken commitments for data sharing under its trade agreements by 2023. Thus, given the on-going pandemic and the likely positions to be taken by the other G20 countries in the 2021 and 2023 Presidency, India must carefully evaluate its strengths, address its weaknesses and subsequently develop a strategy for its own Presidency in 2022.

India's should leverage on its strengths; India has a comparative advantage and export surplus in trade in IT/ITeS services and is among the top countries in terms of application development and number of startups. Many Indian companies are exploring global markets in technology while a number of global firms are entering the Indian market. In addition, India is one of the largest producers of science, technology, engineering and mathematics (STEM) graduates. Many technology companies, especially in English speaking countries, have Indians in their senior management and workforce. A number of companies are planning to relocate from China, and India can be an alternative destination. The Indian government has focused on skill development and training to meet the manpower requirements of 4IR not only in India but also globally. These strengths need to be showcased in G20 to get more investment, which India needs for inclusive growth and to become a knowledge hub.

To develop India as a hub for data processing and innovation, and gain from participating in international forums such as the G20, there is a need for a more holistic policy approach that (a) links domestic policies and priorities across different government agencies, (b) is based on extensive research and consultation, and (c) focuses on ensuring self-reliance through inclusive growth, investment and job creation. India needs to focus on continued investment in digital infrastructure and have comprehensive a data protection regulation in line with global best practices such as GDPR, which allows sharing of data with trust. Concerns related to monopolies can be addressed through anti-competitive regulations.

The COVID-19 pandemic has not only fast-tracked the adoption of 4IR technologies, but has also showed the need for cross-border data sharing to manage the spread of the pandemic. India can be a global off-shoring and data processing hub in these difficult times. However, in order to do this seamlessly, India needs to address and resolve its infrastructure barriers and develop a robust and comprehensive data protection policy. Thus, there is need for domestic reforms to complement its positions in different international forums.

To recover from the current economic slowdown, India needs to embrace 4IR rapidly. It is important to attract investment and capital in digital infrastructure for societal benefits and inclusive growth. Partnerships between government, academia and the private sector will play a key role in the adoption of 4IR. Since government funding is limited, it needs to play the role of a facilitator as it had done earlier for the IT/ITeS sector, so that the private sector is willing to invest and startups can get funding and grow. The government also needs to streamline its process of data collection, collation and sharing so that there is access to data for research. In some areas such as consumer profiling, there are data gaps. Instead of relying on the private sector to share data that they can monetise, data can be generated through pan-

India surveys that can be made accessible to Indian startups. There are also data gaps in many areas and policies appear to be based mostly on the perception of certain groups. For example, there is no data on domestic and international trade in e-commerce. It is important for the government to either set up an institutional mechanism for data collection through authorities like DGCI&S or add some modules in existing industry surveys that provide estimates of adoption of 4IR by industry, especially SMEs, and the gaps and issues. With an increasing number of services being online and industry being automated, the government can provide the right kind of support and incentives to technology industries by incentivising services that are inputs into those industries. It can work with academic institutes, think tanks, international organisations, and industry to collect and collate data, which can be used for research and policy-making; it can collaborate with global technology companies and encourage them to invest in India and align domestic policies with the country's strengths and export competitiveness.

As has been seen in Section 4, India's export competitiveness and value addition are low for goods and equipment required to create data centres. There is a need for in-depth survey-based study to explore the reasons for low competitiveness and value addition and how this can be improved. This is integral to India's dream of becoming "*aatma-nirbhar*" or self-reliant. The idea of self-reliance is rooted in boosting manufacturing; and if India wants to be a part of the global value chain, value addition in the country should increase. This will require targeted interventions based on needs and requirements of domestic firms and higher tariffs and/or import restrictions on intermediate goods or parts may not be the right intervention.

Our survey showed that companies may be willing to relocate their value chains to reduce risks, especially after the outbreak of COVID-19 pandemic in China, but the process takes around five years. The survey also confirmed that the decision of global firms to relocate to India is contingent upon a number of factors, which range from ease of doing business in the country, a transparent and predictable policy regime to the depth of the liberalisation and commitments under trade agreements. They pointed out that a transparent policy regime and low regulatory compliance burden are some of the key reasons for the successful relocation and subsequent setting up of a business supply chain. However, given the weakening of the WTO and the surrounding uncertainty of the global order, businesses, in addition to policy transparency, are also interested in the commitment countries are willing to undertake under bilateral and regional trade agreements. Business want secure investments; therefore, of late, the decision to relocate is also becoming contingent upon trade agreements and tariff commitments.

Along with domestic policies, given the current geo-political situation and the COVID-19 pandemic, there is a need for collaboration and co-operation among countries, and G20 offers an excellent platform for such collaboration. It is important for India to develop a domestic consensus and have a flexible position on issues of importance to the country in forums such as the G20 as it prepares for its Presidency in 2022. The survey found that there are a number of areas where India and other G20 countries can work together. These are given below:

- **Collaborations on Data Sharing** – There is a need to do joint research and share information to address the pandemic and, in this context, data sharing with trust is important. India may build consensus with like-minded countries like the UK, the US, Japan, Australia and the EU with whom it may have, or may sign trade agreements in the near future. There is scope for cross-border collaborations in data generation and analysis. India can partner with countries like Japan to explore developing country markets in Africa. Since data will be a core part of future trade agreements, it is important to strategically use the G20 as a platform to build consensus on issues that affect developing countries like India as well as explore how there can be more collaborations with developed countries for more balanced trade in data flows where emerging data generating countries like India can enhance exports as it did in the IT/ITeS sector.
- **Joint Approach towards Data Protection** – While data sharing is important, G20 countries have to work together to have a model framework that prevents data misuse or breach of national security and consumer privacy. In the past, India had struggled to sign ‘Safe Harbor Privacy Principles’ with the EU but, if there is a model framework that can be incorporated into domestic regulations, it may be easier for India to enter into agreements with regions such as the EU. Most survey participants believe that a GDPR kind of framework should be proposed in G20 as a model framework and a similar framework for data privacy and security may be implemented in India. This is mainly because since the implementation of the GDPR in 2018, all Indian companies operating or looking to operate in the EU markets have taken steps to become GDPR compliant. As mentioned earlier many global firms are GDPR compliant. Therefore, to ease/reduce regulatory compliance burden for the industry and ensure actual ease of doing business, instead of a completely new regulation, India may align its data protection requirements to that of the EU’s GDPR. However, at the same time, some flexibility may be given to countries like India to customise the framework according to their own domestic priorities. Similarly, with the strong economic and strategic partnership with Japan, India may agree to Japan’s proposal of sharing data with trust. According to survey participants, India may participate actively in the G20 discussions and try to bring forth its concerns in a constructive way.
- **Focus on Priorities of Developing Countries** – The issue of data flows in G20 is largely driven by a developed country agenda and hence, it ignores some of the requirements and concerns of developing countries. Developing countries in G20 such as Indonesia, South Africa, Argentina and Brazil along with India suffer from a digital divide and face regulatory and infrastructural barriers. Startups from these countries need financing and this can be an area for collaboration. India may play an active role in bringing forward the concerns of developing countries and suggest ways and means to address them. India may propose joint startup hubs and support startup visas. Issues such as data monopoly and the need for greater investment in developing countries in digital infrastructure, and a robust framework for information and data sharing with developing countries can be part of the discussions. Hence, India can try to build

consensus on these issues and develop a collaborative framework, enable information sharing and enhance government, academic and private partnerships across countries.

- **Aligning its Position in Different International Forums** – India needs to align its position in G20 with other trade forums. To have a more proactive approach, there should be a comprehensive domestic regulation on data protection, which should be aligned with global best practices and India's export interests. This regulation should allow India to access third country data and promote data sharing with trust. India needs to have more detailed studies and discussion on how it can contribute to the Digital Economy Taskforce and other digital initiatives of G20.

In conclusion, the COVID-19 pandemic has emphasised the importance of data and it has also established that data-related services such as e-commerce, edu-tech, health-tech, etc., are gradually becoming the new normal. Globally, all countries have aligned their policies to this new normal and are actively engaging in best practices and adopting regulatory frameworks. Large amount of data is being generated due to the adoption of technology and will continue to be generated in the future. Data in itself is not valuable unless it can be processed and analysed in a structured format. Cross-border data and information sharing is sometimes needed as has been illustrated by COVID-19. India, too, must align itself to the new normal, frame its domestic regulations accordingly and take a proactive stand in international forums. By doing so, India can realise the benefits of digital trade and accomplish its vision of becoming a data processing hub and knowledge-based economy.

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Appendix A

Table A1: Select Equipment Required for Data Centres (at HS-6-digit level)

HS-Code	Product Name
847130	Portable automatic data processing machines, weighing not more than 10 kg, consisting of at least a central processing unit, a keyboard & a display
847141	Other automatic data processing machines: Comprising in the same housing at least a central processing unit & an input & output unit, whether/not combined
847149	Other automatic data processing machines, presented in the form of systems.
847150	Processing units other than those of sub-heading 8471.41/8471.49, whether/not containing in the same housing one/two of the following types of units: storage units, input units, output units
847160	Input/output units, whether/not containing storage units in the same housing
847170	Storage units
847180	Other units of automatic data processing machines, excluded 8471.50, 8471.60, and 8471.70.
847190	Magnetic/optical readers, machines for transcribing data onto data media in coded form & machines for processing such data, n.e.s.
847321	Parts & accessories (excl. covers, carrying cases & the like) suit. for use solely/principally with the electronic calculating machines of 8470.10/8470.21/8470.29
847329	Parts & accessories (excl. covers, carrying cases & the like) suit. for use solely/principally with the machines of 84.70 other than for those headings incl. in 8473.21
847330	Parts & accessories of the machines of heading 84.71
847350	Parts & accessories equally suitable for use with machines of two/more of the headings 84.69 to 84.72
850440	Static converters
850450	Inductors, n.e.s. (excl. for cathode ray tubes)
851711	Line telephone sets with cordless handsets
851712	Telephones for cellular networks/for other wireless networks, other than line telephone sets with cordless handsets
851718	Other telephone sets, incl. telephones for cellular networks/for other wireless networks, other than 8517.11 & 8517.12
851761	Base stations for transmission/reception of voice, images/other data, incl. apparatus for communication in a wired/wireless network (such as a local/wide area network)
851762	Machines for the reception, conversion & transmission/regeneration of voice, images/other data, incl. switching & routing apparatus
851770	Parts of telephone sets, incl. telephones for cellular networks/for other wireless networks; other apparatus for the transmission/reception of voice, images/other data, incl. apparatus for communication in a wired/wireless network
853210	Electrical capacitors, fixed, designed for use in 50/60Hz circuits & having a reactive power handling capacity of not <0.5 kvar (power capacitors)

HS-Code	Product Name
853221	Fixed electrical capacitors, other than those of 8532.10, tantalum
853222	Fixed electrical capacitors, other than those of 8532.10, aluminium electrolytic
853223	Fixed electrical capacitors, other than those of 8532.10, ceramic dielectric, single layer
853224	Fixed electrical capacitors, other than those of 8532.10, ceramic dielectric, multilayer
853225	Fixed electrical capacitors, other than those of 8532.10, dielectric of paper/plastics
853229	Fixed electrical capacitors, n.e.s. in 85.32
853230	Variable/adjustable (pre-set) electrical capacitors
853290	Parts of the electrical capacitors of 85.32
853310	Fixed carbon electrical resistors, composition/film types
853321	Fixed electrical resistors (excl. fixed carbon resistors, composition/film types), for a power handling capacity not >20W
853329	Fixed electrical resistors (excl. fixed carbon resistors, composition/film types), n.e.s. in 85.33
853331	Wire wound variable electrical resistors, incl. rheostats & potentiometers (excl. heating resistors), for a power handling capacity not >20W
853339	Wire wound variable electrical resistors, incl. rheostats & potentiometers (excl. heating resistors), n.e.s. in 85.33
853340	Electrical resistors (excl. heating resistors, light dependent resistors), n.e.s. in 85.33
853390	Parts of the electrical resistors of 85.33
853650	Switches other than isolating switches & make-&-break switches, for a voltage not >1000V
853669	Plugs & sockets for a voltage not >1000V
853690	Electrical apparatus for switching/protecting electrical circuits,/for making connections to/in electrical circuits, n.e.s. in 85.36, for a voltage not >1000V
854231	Electronic integrated circuits, processors & controllers, whether/not combined with memories, converters, logic circuits, amplifiers, clock & timing circuits,/other circuits
854232	Electronic integrated circuits, memories
854233	Electronic integrated circuits, amplifiers
854239	Other electronic integrated circuits, other than amplifiers/memories/processors & controllers
854290	Parts of electronic integrated circuits
851769	Communication Apparatus (excluding telephone sets or base stations); machines for the transmission or reception of voice, images or other data (including wired/wireless networks), n.e.c. in item no. 8517.6

Source: WITS and UNComtrade Trade Statistics, available at
<http://wits.worldbank.org/WITS/WITS/AdvanceQuery/RawTradeData/QueryDefinition.aspx?Page=RawTradeData> and
<https://comtrade.un.org/data/> (last accessed May 28, 2019)

Table A2: Top 10 Products Exported from India: 2017 and 2019

2017				2019			
Rank	HS-Code	Commodity	Export Share (%)	Rank	HS-Code	Commodity	Export Share (%)
1	850440	Static Converters	22.29	1	851712	Telephones for Cellular Networks/for Other Wireless Networks, Other than Line Telephone Sets with Cordless Handsets	51.29
2	851762	Machines For The Reception, Conversion And Transmission or Regeneration of Voice, Images or Other Data, Including Switch	16.96	2	850440	Static Converters	17.86
3	851770	Parts of Cellular Phones and Radio Trunking Terminals	14.92	3	851762	Machines for the Reception, Conversion & Transmission/Regeneration of Voice, Images/Other Data, incl. Switching & Routing Apparatus	7.77
4	853690	Other Apparatus Of Heading 8536	8.82	4	853690	Electrical Apparatus for Switching/Protecting Electrical Circuits,/for Making Connections to/in Electrical Circuits, n.e.s. in 85.36, for a voltage not >1000V	4.46
5	851712	Telephones for Cellular Networks or for Other Wireless Networks	5.54	5	851770	Parts of Telephone Sets, incl. TELEPHONES for Cellular Networks/for Other Wireless Networks; Other Apparatus for the Transmission/Reception of Voice, Images/Other Data, incl. Apparatus for Communication in a Wired/Wireless Network	4.42
6	847330	Parts And Accessors of Machines of Heading No.8471	4.97	6	854239	Other Electronic Integrated Circuits, other than Amplifiers/Memories/Processors & controllers	2.04
7	853650	Other Switches	4.01	7	847330	Parts & Accessories of the Machines of Heading 84.71	1.62
8	851769	Other: Apparatus for Transmission or Reception of Voice, Images or other Data, including Apparatus for Communication in a Wired or Wireless Network	3.32	8	853650	Other Switches	1.49
9	853225	Other Fixed Capacitors Dielectric of Paper/Plastics	2.73	9	854231	Electronic Integrated Circuits, Processors & Controllers, whether/not Combined with Memories, Converters, Logic Circuits, Amplifiers, Clock & Timing Circuits,/Other Circuits	1.39
10	847130	Portable Digital Automatic Data Processing Machines, Weighing <10kg Consisting a Central Processing Unit, A Keyboard And A Display	2.11	10	853225	Fixed Electrical Capacitors, other than those of 8532.10, Dielectric of Paper/Plastics	0.82
	Top 5 Share		68.54		Top 5 Share		85.80
	Top 10 Share		85.68		Top 10 Share		93.15

Source: WITS and UNComtrade Trade Statistics, available at <http://wits.worldbank.org/WITS/WITS/AdvanceQuery/RawTradeData/QueryDefinition.aspx?Page=RawTradeData> and <https://comtrade.un.org/data/> (last accessed August 28, 2020)

Table A3: Top 10 Products Imported by India: 2017 and 2019

2017				2019			
Rank	HS-Code	Commodity	Import Share (%)	Rank	HS-Code	Commodity	Import Share (%)
1	851770	Parts of telephone sets, incl. telephones for cellular networks/for other wireless networks; other apparatus for the transmission/reception of voice, images/other data, incl. apparatus for communication in a wired/wireless network	34.98	1	851770	Parts of telephone sets, incl. telephones for cellular networks/for other wireless networks; other apparatus for the transmission/reception of voice, images/other data, incl. apparatus for communication in a wired/wireless network	23.15
2	851762	Machines for the reception, conversion & transmission/regeneration of voice, images/other data, incl. switching & routing apparatus	11.04	2	854231	Electronic integrated circuits, processors & controllers, whether/not combined with memories, converters, logic circuits, amplifiers, clock & timing circuits, other circuits	15.06
3	851712	Telephones for cellular networks/for other wireless networks, other than line telephone sets with cordless handsets	10.56	3	847130	Machines for portable automatic data processing machines, weighing not more than 10 kg, consisting of a least a central processing unit, a keyboard & a display	10.17
4	847130	Portable automatic data processing machines, weighing not more than 10 kg, consisting of a least a central processing unit, a keyboard & a display	8.69	4	851762	Machines for the reception, conversion & transmission/regeneration of voice, images/other data, incl. switching & routing apparatus	9.82
5	847150	Processing units other than those of sub-heading 8471.41/8471.49, whether/not containing in the same housing one/two of the following types of unit : storage units, input units, output units	4.36	5	854239	Other electronic integrated circuits, other than amplifiers/memories/processors & controllers	6.84
6	851769	Communication apparatus (excluding telephone sets or base stations); machines for the transmission or reception of voice, images or other data (including wired/wireless networks), n.e.c. in item no. 8517.6	4.24	6	847150	Processing units other than those of sub-heading 8471.41/8471.49, whether/not containing in the same housing one/two of the following types of unit : storage units, input units, output units	5.17
7	847330	Parts & accessories of the machines of heading 84.71	3.83	7	854232	Electronic integrated circuits, memories	4.14
8	850440	Static converters	3.56	8	847330	Parts & accessories of the machines of heading 84.71	3.79
9	854239	Other electronic integrated circuits, other than amplifiers/memories/processors & controllers	3.19	9	850440	Static converters	3.15
10	854231	Electronic integrated circuits, processors & controllers, whether/not combined with memories, converters, logic circuits, amplifiers, clock & timing circuits/other circuits	2.91	10	851769	Communication apparatus (excluding telephone sets or base stations); machines for the transmission or reception of voice, images or other data (including wired/wireless networks), n.e.c. in item no. 8517.6	2.72
	Top 5 Share		69.63		Top 5 Share		65.05
	Top 10 Share		87.36		Top 10 Share		84.03

Source: WITS and UNComtrade Trade Statistics, available at <http://wits.worldbank.org/WITS/WITS/AdvanceQuery/RawTradeData/QueryDefinition.aspx?Page=RawTradeData> and <https://comtrade.un.org/data/> (last accessed August 28, 2020)

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