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China's Digital Silk Road: Implications for India

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PREFACE

The Institute of Chinese Studies, New Delhi, and the Institute of South Asian Studies, National University of Singapore, are delighted to present the proceedings of the symposium on China's Digital Silk Road and its implications for India. The symposium was held in New Delhi, in collaboration with the Konrad-Adenauer-Stiftung and the India International Centre on 25 September 2019.

The objective of the symposium was to fill an important gap in the Indian debate on China's Belt and Road Initiative (BRI). Although the land and maritime components of Chinese President Xi Jinping's BRI have received intense scrutiny in India, the digital dimension of China's ambitious initiative has received very little attention. In an ironic twist, while, officially, India has refused to join the BRI, the Indian industry already has a significant exposure to China's digital industries. The consequences of that digital dependence on China have come into sharp view amidst the growing concerns about India's large trade deficit with China. Adding to India's challenge is the unfolding trade and technology war between the United States and China and its international consequences.

The symposium assessed the emergence of China as a digital power house and its global impact. It also mapped China's digital profile in India and offered a preliminary examination of the policy implications for India. The ICS and ISAS are pleased with the overwhelming response to the symposium. The report and papers presented at the symposium, we believe, will contribute to the Indian discourse on China's Digital Silk Road. We hope to continue this exploration of the impact of China's digital revolution on India by bringing together the industry, academia, strategic community and policy-makers.

Ashok K. Kantha
Director, ICS

C. Raja Mohan
Director, ISAS

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The Institute of Chinese Studies and the Institute of South Asian Studies would like to acknowledge the contributions from Konrad-Adenauer-Stiftung and the India International Centre to the symposium.

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The organisers would also like to thank Mr Hernaikh Singh, Senior Associate Director at ISAS; Mr Rajesh Ghosh, Research Assistant at ICS; and Mr Chan Jia Hao, Research Analyst at ISAS for their editorial contributions to the publication.

INTRODUCTION

Ashok K. Kantha and C. Raja Mohan

This report summarises the discussions at a symposium titled 'China's Digital Silk Road: Implications for India' held in New Delhi on 25 September 2019. The symposium was organised by the Institute of Chinese Studies, Institute of South Asian Studies at the National University of Singapore, Konrad-Adenauer-Stiftung and the India International Centre.

The symposium sought to address a major gap in the Indian discourse on China's Belt and Road Initiative (BRI). Although there has been a vigorous engagement with the BRI, India has not paid enough attention to its digital dimension. The chief objectives of the symposium were to:

1. Assess the emergence of China as a digital powerhouse;
2. Examine the growing global impact of its digital strategy; and
3. Distill the potential implications for India.

The symposium was divided into two sessions. The first session titled 'China's Digital Rise' examined the domestic drivers for China's digital transformation and their geopolitical consequences. It also brought focus upon China's strategy for leadership in the development and use of artificial intelligence (AI) technologies. The second session titled 'Impact on India' mapped out China's participation in India's digital technology sector through investments and India's dependency on China in the hardware sector. It also reflected on the need for India to adopt a selective approach in formulating policies that shape its digital economy.

The papers presented at the symposium as well as the agenda are enclosed with this report. The six papers are:

1. Domestic Drivers of China's Digital Rise by Dr Mareike Ohlberg;
2. China's Techno-utilitarian Experiments with Artificial Intelligence by Mr Dev Lewis;
3. China's Digital Expansion and India by Professor C Raja Mohan and Mr Chan Jia Hao;

4. Mapping China's participation in India's Digital Economy by Mr Santosh Pai and Mr Rajesh Ghosh;
5. Identifying and Offsetting Import Dependence in ICT Markets by Mr Vivan Sharan and Ms Yamini Jindal; and
6. China's Digital Silk Road: Implications for India by Mr Ananth Padmanabhan.

CHINA'S DIGITAL RISE - REPORT

While the idea of a digital silk road has been part of Chinese discourse for some time, it formally appeared in public only during China-European Union forums in 2015 and has been refined since. In a 2019 speech, Chinese President Xi Jinping emphasised on the "need to keep up with the trend of the Fourth Industrial Revolution, jointly seize opportunities created by digital, networked and smart development, [and] explore new technologies and new forms and models of business". China has already signed cooperation agreements with 16 countries for the construction of the Digital Silk Road. Chinese companies' low-cost digital products in sectors, including telecommunication infrastructure, space and satellite services, e-commerce and smart cities, have been welcomed in most parts of the world. China's aims of leveraging its advanced domestic digital economy to expand internationally are not, contrary to what many analysts claim, an unprecedented effort. The rise of modern capitalism in Europe saw states expanding beyond European borders to undertake infrastructure projects that nurtured modern port cities like Singapore, Hong Kong and Mumbai and major infrastructural feats like the Suez Canal and the Panama Canal. And just as European expansion was paralleled by the display of political power, China's international foray is not devoid of strategic ambitions. Even though "Chinese propaganda presents [its] initiatives as being part of promoting a more inclusive globalisation…", the tension between opportunities and risks has animated politics around the world, including in India.

The Communist Party of China (CPC) views digital technology as the next frontier for accelerated economic growth and an opportunity for China to take a decisive lead over Western counterparts. An assessment of the domestic drivers behind China's digital rise reveals that the CPC has tied the success of its policies in the digital realm to its own legitimacy. The CPC hopes to restore China to its perceived "rightful place" as a global

leader in scientific and technological innovation. This raises the stakes involved in success of China's Digital Silk Road on the international stage considerably. China's growing geopolitical rivalry with the United States (US) on which it is heavily dependent for integrated circuit technology also explains the urgency with which it is taking giant strides in bridging the gap in other areas like 5G and Artificial Intelligence.

The policy blueprint for China's digital ambitions comprise of a 'top-level policy design' and a unique system of control that links public and private players in the information and communications technology (ICT) sector. The freedom afforded by the "first develop, then regulate" approach and government capital channelled through the Government Guided Funds (GGFs) spurs commercial actors to innovate and swiftly produce market-ready products for a digital ecosystem protected from foreign competition at massive scale. Xi's policy style which involves appointing task specific Leading Small Groups has launched major policy initiatives such as the National Informatization Strategy (2016-2020) that urge China's internet companies to "go out" into the world and support the creation of a "Digital Silk Road" supplemented by the "Made in China 2025" road map and the "Internet Plus" strategy.

China's multi-pronged digital strategy has five distinct goals. The first is its long-term goal of self-reliance. Notwithstanding China's external dependence for core technologies like integrated circuits and semiconductors it is already in the forefront of many technologies like AI and 5G network. The 5G technology is a good illustration where China is the only country that is running ahead of the "2020 5G Development Schedule" proposed by the United Nation's International Telecommunication Union. The second objective is to help Chinese industry players move up the manufacturing industry's value-chain. China intends to establish at least 50 academic and research institutes in AI and through digitalisation hopes to add US$1.8 trillion in cumulative gross domestic product growth by 2030 from the Internet of Things (IoT) alone. Thirdly, digital technologies are viewed as effective tools of social control. In places like Xinjiang, the Chinese state has effectively used big data and AI techniques and established an information technology (IT)-based surveillance state in the name of security measures against terrorists. Fourthly, China seeks to use private sphere innovations to modernise its military capabilities through its strategy of civil military

integration. Civil military integration has been a top-level national strategy since 2014 and is now complemented by initiatives such as the Beidou Satellite Navigation System which is being rolled out across 60 countries as part of the BRI. Fifthly, the CPC seeks to attain international leadership by setting global standards and regulatory norms. It established a "Special Leading Small Group on the Major Project of Standardisation alongside the 'Belt and Road Initiative'" in 2015. In June 2018, China's IoT reference architecture was approved by International Organisation for Standardisation.

China's efforts in AI are an apt illustration of efforts at building a technology ecosystem with Chinese characteristics. China's AI industry has attracted around 60 percent of global AI investments and reports value its more than 1,000 AI companies anywhere between US$23 billion to over US$30 billion. At the end of 2016, there were estimated to be over 1,000 government backed funds aimed at raising an aggregate of RMB5.3 trillion. In the last four years, Chinese companies have employed machine-learning techniques and scaled operations by using unmatched datasets to make breakthrough applications. However, China is yet to make serious breakthroughs in fundamental research of the kind that could help it leap-frog ahead of its Western peers. China's playbook also faces difficult questions related to ethics, governance and privacy. Xi called on China to "develop laws, safety, employment, ethics, and governance of AI from all aspects" and also observed that this would "require deep cooperation with all countries". China has already released two sets of governance principles namely "Beijing AI principles" and Ministry of Science and Technology's "Responsible AI" principles. The unique characteristic of China's conceptualisation of AI principles compared to those in the West is its emphasis on the collective over the individual. Thus, the issue of protecting individual privacy is not as unilateral as is in the West.

IMPACT ON INDIA

The presence of Chinese telecommunication equipment suppliers, Huawei and ZTE, in the Indian digital technology sector has grown in parallel with the rise of private telecommunication operators during the period 2000-2015 with their market share touching 46 per cent in 2016. This was followed by the entry of Chinese mobile phone brands which found

India attractive due to a combination of factors, including a slowdown in China, lack of significant competition in India and government policies that discouraged pure imports in favour of 'phased manufacturing'. As Xiaomi, Vivo, Oppo, OnePlus and Realme increased their market share in India, contract manufacturers such as Foxconn and Winstron followed them to India, along with a slew of their component suppliers. An important reason for this import of the entire value chain is that in the ICT hardware sector India has failed to vertically integrate local manufacturers for a range of supporting hardware equipment. This is in stark contrast to India's IT services companies' performance domestically and internationally, where they have successfully built a niche. As a result, the market for these hardware systems has been ceded to Chinese companies "despite a fair chance at managing technological transitions through a mix of government interventions and private sector agency".

The more recent spurt in the activity of Chinese players in the Indian digital economy has been through venture capital (CV) investments and launch of internet applications. Chinese internet giants such as Alibaba, Tencent and Xiaomi, corporate venture capital funds such as Fosun Capital, and VC funds such as Shunwei, Qiming, Morningside and CDH have made investments of close to US$10 billion through 125 transactions within a short span of four years. In 2018, among the top 100 most downloaded internet applications in India, 44 were launched by Chinese developers. Chinese participation in the Indian internet industry is largely motivated by market potential. With a relatively low per capita income of US$1,700 and internet penetration of 34 percent (2017), there is more headroom available for growth in India than in China. Another distinct motivating factor for Chinese investors is the fact that most of the existing investors in India's digital ecosystem are focussed excessively on the market catering to the English-speaking minority segment among Indian internet users. The much larger Indic language market often denoted by terms such as "Next Billion" or "Bharat" comprising of users preferring to employ more than a dozen languages is largely untapped. The vast pool of IT personnel available in India is yet another motivating factor but is yet to be meaningfully exploited by Chinese companies.

India is yet to formulate its final position on Huawei's participation in the upcoming 5G rollout. New Delhi is apparently engaged in an internal

policy debate that seeks a balance between its national security interests and considerations of cost and takes into account the views of different stakeholders. The rapid influx of Chinese entities into the Indian digital market has thrown up a number of other challenges which are relatively under-debated. Such challenges can be broadly categorised under the headings of over-dependence and regulatory arbitrage. The advent of Chinese mobile phone companies which have decimated their Indian peers is sometimes touted as a success of the 'Make in India' programme. However, if the same playbook is adopted in other industries, it could lead to excessive dependence on China to meet India's growing consumer demand. A more nuanced approach that builds manufacturing capacity with larger Indian participation needs to be developed. Hardware dependencies in areas of previous technological transitions like automated teller machines and set-top boxes could also be perpetuated in the IoT landscape if urgent steps are not taken to mitigate the underlying causes of hardware dependency. India's experience with technology transitions should be a good starting point for it to plan for all future technology transitions. India should focus on sequencing digital technology transitions with the development of local manufacturing capacities. The emergence of new technologies and the need to set new standards are also opportunities for India to adopt niche domestic ones so as to give domestic manufacturers a competitive edge. In the digital technology product space non-tariff barriers like local language requirements should be explored so as to allow domestic manufacturing of equipment. Tax incentives and non-financial export incentives also need to be explored to move in the direction of import substitution by making Indian hardware production globally competitive.

India's nascent data governance framework is not sufficiently equipped to monitor internet activity in a plethora of languages. Hence, the chances of inappropriate content proliferating the internet through Chinese-controlled applications due to lack of regulatory oversight are real. The recent controversy involving Bytedance's TikTok is a case in point. Another topic of concern is the lack of commitment towards legal compliance on the part of some Chinese companies. In early 2019, cross-border e-commerce companies from China were caught in flagrant violation of Indian customs laws when they built and scaled an entire business model around a loophole that allowed 'gifts' to be imported without payment of customs

duty. It took many months for Indian regulators to catch on and clamp down on such activity. Similar instances of regulatory arbitrage might be attempted in other sectors of the Indian economy that witness a sudden influx of Chinese participation.

There is also a geopolitical dimension to China digital ambitions for India to consider. First, as US-China decoupling intensifies, India will be increasingly pushed to make clear choices between the two. So far, India has been able to balance its relations between the two to secure its economic interest. However, as the distance between the US and China grows wider, India's choices will deeply impact the future growth of its IT and telecommunication sectors. Second, India is also pulled from two different ideological poles on the issue of digital governance. On the one hand, it has often sided with Russia and China in multilateral forums to oppose Western ideals on digital governance, on the other, it has not been welcoming of China's proposed 'cyber sovereignty'. A third challenge rises from China's growing digital presence in India's neighbourhood. Since the mid-20th century, maintaining an upper hand in its neighbourhood has been a major objective of India's foreign policy. However, India seems to have failed to anticipate China's growing footprint in India's neighbourhood digital landscape. For India to continue to maintain its strategic influence, it needs to take a fresh look at its neighbourhood digital diplomacy.

CONCLUSION

The need of the hour is for India to build regulatory resilience that can balance its national interests and ward off risks arising from participation of Chinese stakeholders. In doing so, India should be mindful of creating a regulatory framework that enables the growth of a vibrant and innovative technology ecosystem rather than impede it. Any policy should be guided by three principles. One, India must clearly identify specific problems that need to be addressed rather than coming up with all-encompassing laws such as the current draft of the e-commerce policy. Two, India must take up a risk-based, responsive regulatory approach that reacts to emerging problems rather than taking a safe position by stretching its reach so far that it also hinders innovation. Third, India needs to abide by democratic principles when regulating technology rather that embracing concepts such as "cyber sovereignty" which is championed by China.

DOMESTIC DRIVERS OF CHINA'S DIGITAL RISE[1]

Mareike Ohlberg

INTRODUCTION

China's 'digital rise' and the reach of Chinese information technology (IT) companies into global digital infrastructure have prompted concern and widespread debate in a number of countries, especially in light of the growing geopolitical rivalry between China and the United States. This paper assesses the domestic motivations behind China's digital policies. It argues that the Chinese Party of Communist Party (CPC) has tied Chinese success in the digital realm to the Party's regime security in several ways and that therefore, domestic drivers cannot be clearly separated from China's international technological expansion. This raises the stakes on the international stage, as the CPC has tied the success of its policies in the digital realm to its own legitimacy at home in multiple ways.

For the CPC, the digital age offers a chance to restore China to its perceived "rightful place" in the global order, a major point on which it rests its domestic legitimacy. According to official CPC history, China led the world in scientific and technological innovation for centuries. After Europe's Industrial Revolution, China was semi-colonised, beginning a 'Century of Humiliation' that ended only with the CPC's victory in 1949. Now the CPC hopes to turn the tables and 'leapfrog' ahead.

China enjoys some distinctive structural advantages compared to most other countries in advancing its bold plans to digitize the economy and achieve global technological leadership. Although China still lags in some technologies and is heavily dependent on the United States in areas such as integrated circuits, it is rapidly surging ahead in areas like 5G and Artificial Intelligence (AI). It has also made substantial headway in setting international standards. All of this means that China and its digital ambitions have become a factor that any country will need to take into account when planning for its own digital infrastructure.

[1]*This paper is based on Kristin Shi-Kupfer and Mareike Ohlberg, China's Digital Rise: Challenges for Europe. MERICS Papers on China, no. 7, April 2019, available online at https://www.merics.org/sites/default/files/2019-04/MPOC_ No.7_ChinasDigitalRise_web_final.pdf.*

THE MAKING OF CHINA'S DIGITAL POLICIES

To achieve macro-economic and social re-engineering, the CPC, under President Xi Jinping, is building on two distinctive aspects of its political economy: 'top-level policy design' (顶层设计) and a unique system of control that links both public and private players in the information and communications technology (ICT) sector. Beijing channels massive amounts of capital through state guidance funds into emerging technologies. In line with the unofficial slogan "First develop, then regulate," the government enables commercial actors to innovate and swiftly produce market-ready products for a digital ecosystem protected from foreign competition.

The digital sector has been a major beneficiary of Xi's policy style, which relies on task specific Leading Small Groups to quickly implement decisions made by the top leadership in sectors that are considered a priority. Multiple major policy initiatives have been pushed through by China's leaders in rapid succession: the National Informatization Strategy (2016-2020) calls upon China's internet companies to "go out" into the world and support the creation of a "Digital Silk Road". The "Made in China 2025" roadmap and "Internet Plus" were launched in 2015 to drive domestic industrial and digital innovation.

On the ground, a unique party-state-private nexus in the ICT sector underpins China's digital policies. It can be hard-to-impossible to track the web of party influence, state control mechanisms and international linkages that surrounds China's sprawling ecosystem of innovative startups, venture capital funds, local and provincial governments – and the military.

The CPC has nurtured the home-grown IT champions Baidu, Alibaba and Tencent (known collectively as 'BAT') by blocking foreign competitors from the domestic market. The party-state has allowed these companies to list on overseas' stockmarkets in order to access foreign capital and to expand their business into other markets. At the same time, the CPC deploys fairly effective mechanisms to control and steer these internationally networked companies. In the case of ZTE and Huawei, the two major Chinese telecommunication equipment manufacturing companies, party-state co-optation in the form of government funding and preferential procurement has been particularly evident.

GOALS AND MOTIVATIONS

China's digital strategy combines economic targets with broader normative and security goals. In their push for rapid technological advances, China's leaders are driven by the need to generate new economic growth through industrial upgrading and boosting innovative business models as well as by strengthening technological self-reliance, fostering effective governance and control, and extending China's global influence by expanding the use of Chinese products for digital infrastructure, telecommunications and e-commerce. Linked to all these targets are plans to shape global standards and norms so that, going forward, they will work in favor of Chinese products and new technologies. Last but not least, China's digital expansion also has a distinct military dimension.

Increasing Self-reliance

As the rules on the international stage that have allowed the CPC to let Chinese companies go out while shielding them from competition at home are changing, the existential nature of China's current dependency on foreign-made core technologies is increasingly becoming an issue of national debate. Last year, a temporary ban by the United States (US) on exports to the Chinese information technology (IT) conglomerate ZTE forced the company to halt major business operations. While Huawei has fared nominally better, it has also been heavily affected after being put on the US entity list. All these developments have spurred China's leaders to redouble their efforts.

In many regards, China still has a way to go to achieve self-reliance in high-tech. For instance, several Chinese semiconductors experts have criticised the nation's existing funding and research and development strategies in the sector as pushing too fast for commercialised outcomes. China has, however, made substantial headway in developing the new communications standard 5G. It is the only country that is ahead of the "2020 5G Development Schedule" proposed by the United Nation's International Telecommunication Union.

Upgrading China's Economy

One major motivation underpinning China's digital policies is to ensure continued economic growth. The CPC's legitimacy rests heavily on

economic performance; stagnating or even declining growth poses a serious risk to its grip on power. All-encompassing digitalisation is considered essential for the ambitious economic modernization agenda that aims at upgrading China from the "workshop of the world" into a high-tech leader with globally attractive innovative products and services, and modernised manufacturing processes.

China's leadership needs to create new, sustainable growth engines to avoid its rise to superpower status being derailed by an economic downturn or social instability. Digitalisation is considered crucial for creating a more innovation-driven, competition-based and high-value added economy. The government pursues this goal by pushing for an upgrade of traditional manufacturing industries, by boosting and regulating the digital service sector, and by striving for greater technological self-reliance in high-tech industries.

China is investing heavily in different areas of technological innovation: For instance, training new talent is a prioritized sphere of action. In AI, China intends to establish at least 50 academic and research institutes by 2020. China's government hopes to gain substantial economic benefits by pushing digital innovation within and beyond its borders: for instance, it is estimated that products and developments for the Internet of Things (IoT) alone could add up to US$1.8 trillion in cumulative gross domestic product growth for China by 2030. In an era of slower economic growth, failing to move up the value chain is a major risk for the CPC.

Enhancing Societal Controls

China's government wants to use digital technology for effective governance and control over both companies and citizens. Two goals are considered crucial: shielding critical infrastructure and data from foreign access and establishing control mechanisms based on big data analysis to monitor economic and societal actors and enforce their compliance. One such project that has dominated headlines over the past few years is the effort to build a social credit system. While this system is not in place nationwide yet, but rather consists of many different pilots, it shows the CPC's ambition in using new technologies for societal controls.

Especially the restive region of Xinjiang currently already serves as a worrying example where China's quest for societal control may lead to – huge amounts of data are being collected in the northwestern autonomous region. There, Beijing has established an IT-based surveillance state in the name of security measures against terrorists. By trying to contain the Uighur Muslim community, the Chinese authorities have also created a testing ground for AI applications: Algorithms, for example, for facial recognition tools, can be enhanced by feeding them the large amounts of data gathered in video and other surveillance measures.

Shaping Global Norms and Standards

China's long-term goal is to change the global landscape of technological competition by defining and exporting their own standards for all emerging industries, thereby ensuring that Chinese products and services are not obstructed by standards set by another country.

China has made headway in shaping international standards for emerging technologies, securing leadership positions in several international standard setting bodies. In 2015, the CPC leadership established a "Special Leading Small Group on the Major Project of Standardization, alongside the Belt and Road Initiative (标准联通"一带一路"专项领导 小组), to coordinate the efforts. The key priorities include speeding up the promotion of China's homegrown standards, focusing on "international economic corridors" (Northern China, Mongolia and Russia) and promoting joint research and recognition labs with countries alongside the BRI.

After failing to gain majority support in the International Organization for Standardization (ISO) for an alternative wi-fi standard in 2011, China today is a leader in the international standardisation of blockchain technology, IoT and 5G. In June 2018, China's IoT Reference Architecture (ISO/IEC 30141) was approved by the ISO members. Beijing managed to secure key positions in three main international standard setting bodies, ISO, the International Electrotechnical Commission and the International Telecommunications Union.

This dimension of China's digital expansion not only affects technical standards but also broader international norms and what the CPC refers to as its "discursive power." For instance, it has tried to promote its own

concept of "Internet sovereignty", which basically means that each country should be allowed to censor and restrict the internet within its own national borders.

Fostering Civil-Military Integration

Finally, China's digital rise is not merely a civilian affair. Civil military integration (CMI, 军民融合) has been a top-level national strategy since 2014 that acts as the link between China's efforts to become a "science and technology superpower" (科技强国) and its plan to build a strong military that can fight and win wars by 2049. CMI is achieved by mandating and coordinating greater information and resource sharing between military and civilian institutions. Beijing seeks to leverage private sector high-tech innovation to strive for dominance in emerging dual-use technologies, advance its cyber warfare capabilities, weaponise AI and achieve quantum supremacy.

The Chinese military shares the goal to gain greater control of digital infrastructure, which it needs to strengthen its command and control capabilities: with this objective, it has been laying down undersea fiber-optic cables since the 1990s, including in the South China Sea. The People's Liberation Army is also set to benefit from the planned extension of the national Beidou Satellite Navigation System's coverage to over 60 countries along the Belt and Road, a step forward for promoting China's alternative to US Global Positioning System.

CONCLUSION: CHINA'S DIGITAL POLICIES REQUIRE A UNIFIED RESPONSE

While China's digital policies are by no means perfect and the country continues to depend on foreign technologies in key areas such as semiconductors, its ambitions should not be underestimated. Especially as the rivalry between the US and China intensifies, other countries around the world risk being caught in between the two and being forced to choose. In this context, it is important to understand that the CPC has tied its own grip on power to its ability to lead in digital innovation by making it a new economic growth engine, by using new technologies to enhance its control over Chinese society and by strengthening the country's relative power on

the international stage. Despite the pushback China has received on its digital protectionism, the country is unlikely to open its markets to foreign competitors.

Facing China's digital rise means that other countries will need to seek greater alignment with each other in pushing back jointly against China's subsidized industrial policy and its emphasis on indigenous innovation that fosters digital protectionism. Countries will need to work with like-minded partners towards agreements on privacy, data localization and cyber standards, as well as free and safe data flows. Vigilance, unity and leverage will be needed to prevail in a digital world that is increasingly shaped by China.

CHINA'S TECHNO-UTILITARIAN EXPERIMENTS WITH ARTIFICIAL INTELLIGENCE

Dev Lewis

INTRODUCTION

Any article talking about China's journey with artificial intelligence (AI) has to begin with the board game Go; more specifically, the face-off between Lee Sedol, winner of 18 world titles and widely considered to be the greatest player of the past decade, and Google's DeepMind-AI-powered Alpha Go. In a now landmark match, Alpha Go did not just trounce Lee Sedol 4-1, it displayed uniquely inventive tactical abilities, in a match that was watched by over 200 million people worldwide (Deep Mind 2017). Go, a highly strategic game with more than 2,500 years of history in China and the East Asian region, has served as an essential game for intellectuals and thinkers in Chinese bureaucracy for centuries and plays a central role in military and strategic planning in China today. DeepMind's victory over Lee Sedol and then later over Chinese champion Ke Jie captured the minds of people all over the world, especially East Asia. In China, it lit the ignition of the Chinese combustion engine that has since stayed in 6th gear, driving an ambition to first catch up to and then surpass all others as the world's leading AI power.

According to the Tsinghua University Technology Policy and Research Institute's China AI Report (中国人工智能发展报告), the size of China's AI industry in 2017 was estimated to be RMB23 billion (Policy Research Centre 2018). More recent reports have claimed that the Chinese market has surpassed RMB30 billion (Deloitte 2018).

However, it is very difficult to accurately make such assessments because AI itself is a catch-all term for a number of different technologies and appliances,[2] not to mention the difficulties in accessing data. An illustration

[2]*According to the three-year AI implementation plan issued by the National Development and Reform Council, AI is: basic research in fields such as deep learning, the development of basic software and hardware such as chips and sensors, and applied research in areas like computer vision and cybersecurity.*

of the disparity: the Tsinghua AI report counts 1,011 AI companies in China, while the Beijing Municipal Commission of Economy and Information Technology in its White Paper "Beijing AI Industry Development White Paper" (北京人工智能产业发展白皮书) counts 4,000 AI companies, with Beijing alone home to 1,070. It is reasonable to settle on a number closer to the former, as efforts by the China Money Network3 and think-tank, Iyiou, counted 1,122 companies and 922 companies respectively (Iyiou 2018). For context, the number of AI companies globally is estimated to be anywhere between 3,465 and 4,925 (China Money Network 2018).

AI development is regularly framed as an arms race, which, although misleading because it ignores the significance of cross-border exchanges of talent and investment, does convey the very real sense of competition between countries to lead in this domain. There is a very real historical geopolitical dimension to this, as the Communist Party of China (CPC) believes it has been kept at arm's length by Western countries from access to the latest technology. Weaning off dependence on Western-built technology is as much a political and security imperative as it is an economic one. For China, AI is seen as a strategic technology that will help it achieve its core national economic, social, political, and military objectives, which will see the country transition to a developed, prosperous economy with the Party at the helm (New America 2018). This was outlined as such when the State Council of China – the premier policy body – issued the "Next Generation AI Development Plan" in July 2017, which unambiguously called for China to become the number one global source of AI innovation by 2030.

The document notes China's recognition that ever since the first industrial revolution it has consistently played catch-up to the West, particularly the US, lagging in patents, talent, and scientific research. In AI, China wants to make the leapfrog to be a trailblazer. In the context of AI this means: breakthroughs in fundamental research, building a commercial ecosystem, cultivating and attracting the best talent, and setting global standards and norms. Prior to this plan, Chinese companies such as Baidu and Alibaba had already placed their bets on AI, while previous government plans had made references to AI.

[3]*Using the definition "private companies with a core focus on AI technology".*

This State Council's plan sought to develop a "whole-of-nation-approach", creating an incentive structure for all stakeholders – entrepreneurs, students, scientists, investors, policy makers, and government bodies – to leverage China's strengths, better understand the technology and craft appropriate legal frameworks, grow the talent pool of AI engineers, and develop indigenous innovation that will enable this leapfrog (Kania 2017). Fast forward to nearly two years, how big is China's AI industry in commercial terms?

Given these numbers it is not surprising to see that China makes up a significant share of global funding in AI. China received 60 per cent of global investments in AI between 2013 and 2018, according to the Tsinghua report, while a CB Insights report attributes 48 percent of worldwide AI investments in 2017 to China (CB Insight Research 2018). That a lot of the investment took place in the past two years is reflected in the fact that 81 percent of the companies are between angel, seed and Series A rounds, as per the China Money Network report cited above. According to the Tsinghua report the growth in the AI industry is expected to peak at 75 percent in 2018 and eventually decline to 40 percent by 2020 (Tsinghua University Policy Research 2018). For context: The State Council is aiming for China's "core AI industry" to reach RMB10 trillion, the amount the sector needs to grow 25 times between 2018 and 2030 (Ibid).

ECOSYSTEM BUILDING WITH CHINESE CHARACTERISTICS

The Chinese technological ecosystem is distinctive in a number of ways, but the role and influence of the Chinese government arguably sets it apart. It is able to develop and implement visions with the same control as the lead conductor of a complicated orchestra. Lee Kaifu notes in his new book, *AI Superpowers: US and China*, that in China the government sets the tone by putting AI at the front and centre of the agenda, which subsequently energises and drives the entire ecosystem, including local governments, entrepreneurs, students, and universities alike (Kai-Fu 2018).

The central government has issued a number of plans and strategy documents that have acted as a call to action for provincial-level governments. At least 15 of China's 31 provinces have issues AI development plans of their own. On the surface, these plans are very much in line with the Chinese tradition

of Leninist central planning. Rogier Creemers, an authority on Chinese techno-legal issues, described the next generation AI plan as "Santa's list of desiderata and objectives, but with little insight into how these should be achieved other than by throwing money at the problem" (Creemer 2018). One clue is the audience it is meant for, that is, not people sitting in India or Germany, but party and government officials at all levels of the central and provincial governments. Matt Sheehan of MacroPolo explains: "The hope is that if local officials cough up a sufficient number of these gifts – factories adopting smart robots, new research centers pursuing natural language processing, autonomous agricultural drone demonstration projects – they will eventually add up to the plan's headline goal: global leadership in AI" (Sheehan 2018).

One phenomenon that captures this approach is the government-backed fund of funds known as Government Guidance Funds (GGF). At the end of 2016, there were estimated to be over 1,000 of these funds, set up largely at the provincial and city level, aiming to raise subsidiary funds with an aggregate fundraising total of RMB 5.3 trillion (China Money Network 2017). While not aimed exclusively at spurring innovation in technology, a large number of these funds are aimed at areas such as big data, high-tech manufacturing, chipsets, etc. (Ibid). However, there is very little evidence or any publicly available impact assessments on whether these GGFs are an efficient use of State capital and are able to spur innovation, or whether this public capital is simply crowding out private investors rather than creating an additionality effect. China has been attempting to build up a commercially viable indigenous semiconductor industry for many decades, a sector notorious for its extremely high market-entry barriers and high-risk capital investment, and some of the largest GGFs are especially prominent here, such as Guangdong Integrated Circuit Industrial Investment Fund, Shanghai Integrated Circuits Industry Investment Fund (RMB50 billion), and China State-Owned Assets Venture Investment Fund (RMB200 billion), which is an investor in Cambricon, a unicorn chipset manufacturer. Time will tell as to how successful these state-led efforts are at growing the ecosystem and spurring innovation. So far, no GGF has made a successful exit.

Yet, if this top-down approach to building the ecosystem may lean more towards waste rather than innovation and efficiency, or stifle market

competition, China's approach towards adopting technology, which Kaifu Lee classifies as techno-utilitarian, may serve to give China a competitive advantage compared to Western countries in developing AI. This is already visible with the speed with which the government has moved to adopt AI in government services as outlined above. This can also be extended to Chinese consumers, who are known to be quick adopters of new technologies, for instance, digital payments or bike sharing, with concerns about privacy a much lower priority. Can this lead to a first mover advantage in AI?

Ultimately this brings the discussion to the fundamental questions of how societies approach AI and the values it wants to build into the technology, which are informed more by the socio-political DNA of a culture than by the technology itself.

GOVERNANCE AND PRIVACY: IDEAS AND APPROACHES

Discussions about ethics, societal impact, future of work, and governing algorithms are increasingly becoming a part of the global AI discourse. These are difficult futuristic questions with no easy answer and China is not different in this case. This comes from the highest office.

At World AI Conference in Shanghai in 2018, Chinese President Xi Jinping raised the need to "develop laws, safety, employment, ethics, and governance of AI from all aspects" and noted that this would "require deep cooperation with all countries" (The Paper 2018). Jeffrey Ding, a researcher at the Future Humanity Institute in Oxford, notes that the world needs to shift its attention from whether China is having these discussions to what the substance of the discussions are.

This year, China joined a sprawling body of governance principles on AI with two different sets: the Beijing Academy of Artificial Intelligence Beijing AI Principles, and MOST the Beijing AI principles. This can be seen as a crystallisation effort among universities, companies and the government.

On the surface, there is very little "uniquely Chinese" about these documents compared to a growing global body of ethical AI principles by government and academia. How relevant they are will be seen in enforcement and so far, there is very little clarity on how companies will take them on board.

In China, questions about ethics, unlike in most democracies, are not framed around the individual but instead the collective. In an interview with this author, Rogier Creemers explains: "China does not share those concerns [of the West] because its 'OS' [operating software] is not built on the state as the facilitator of the individual good, which lies at the heart of the liberal democratic idea of the State and citizenship….So the question about algorithms in China is very likely not going to be about whether they violate anyone's specific individual rights or not, but rather, whether or not they contribute to the solution of the identified socio-economic problems. This is where the question of fairness might get a look in: not from an identity or class-based perspective, but more from a classically Leninist approach" (Lewis 2017).

China too is looking both inwards and outwards for values and a philosophical framework to approach AI. Professor He Huaihong, a professor of Chinese philosophy at Peking University, has argued that China needs to rebuild its social ethics based on Confucian values in the face of rapid changes and developments in Chinese society (Ding 2018). Baidu became the first Chinese company to join the partnership on AI while other companies are increasing their efforts to engage with leading American and European research institutes.

The question is how to balance the need to innovate with the need to protect personal data. A commentary published by the People's Daily captured the dilemma as such: "The updating and iteration of technology is an important force pushing forward societal progress, and people should not 'give up eating for fear of choking' because of privacy issues, but the development of artificial intelligence also cannot come at the cost of sacrificing privacy" (Caiyinghao 2017).

Nearly four years on from the Alpha Go victory, China's AI industry has gone through various stages. Following two years of hype fueled by easy availability of investment the market has begun to consolidate and cool down, partly also a result of external geopolitical tension. While Chinese companies have proved themselves highly adept at taking today's machine learning techniques and scaling them through applications and access to unmatched data sets questions remains whether breakthrough in fundamental research can take place in China. The ecosystem is being

created to cultivate a globally competitive talent pool and a commercial environment. The trillion-dollar question is if Chinese researchers are able to make breakthroughs in fundamental research in new methods of machine learning and understanding human intelligence that would enable China to leapfrog to the front of the pack as a global AI leader.

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CHINA'S DIGITAL EXPANSION AND INDIA

C. Raja Mohan and Chan Jia Hao

INTRODUCTION

China's ambitious BRI continues to draw worldwide attention from policy makers, business communities and academic researchers. It has acquired unprecedented salience as the personal initiative of Xi. The apparatus of the Communist Party of China (CPC) has injected the BRI with great political, economic and strategic significance. Sceptics might point to the fact that Xi's recent predecessors too had come up with their own pet political projects and initiatives that did not survive their tenure at the top. President Jiang Zemin's 'Three Represents' and President Hu Jintao's 'Harmonious Society' readily come to mind. While Xi's 'China Dream' might be comparable to those big ideas of his predecessors, the BRI must be seen not just as a personal commitment of the leader, but also the expression of the unfolding transformations in the Chinese economy. Even though the BRI may not be tied to Xi's fate, it is tied to the trajectory of Chinese capitalism in the coming decades.

The BRI, as an international initiative, was preceded by massive Chinese investments in internal connectivity and the modernisation of China's domestic infrastructure relating to transport, communication and energy. Jiang's 'West Region Development Strategy', unveiled at the end of 1990s, emphasised the importance of connecting China's underdeveloped far western regions to the economic heartland in the east. As China began to connect these regions, it also chose to extend that infrastructure to the neighbouring regions in South, Southwestern, Central and inner Asian regions. The construction and connection of large number of ports in the eastern seaboard and their growing weight in the global maritime connectivity, China developed the capability to develop port and related infrastructure elsewhere in the world. The late 1990s also saw China actively encourage export of capital under the 'out' strategy. Much of

the port construction in other countries as well as the development of infrastructure in third countries preceded Xi's 2013 initiative. The Gwadar port and the energy pipelines from Central Asia, the China-Pakistan Economic Corridor (CPEC), the Hambantota port in Sri Lanka and the China-Burma Irrawaddy Corridor all date well before announcement of the BRI.

Like the BRI, the Digital Silk Road too must be viewed as the external reflection of the digitalisation of Chinese economy, the rise of major technology companies like Huawei, Ali Baba and Tencent, among others, a rapidly developing economy, the deep penetration of the internet and the massive investments in the research and development relating to new technologies such as artificial intelligence, big data analytics, robotics, quantum computing, nano sciences, new materials and space technology. The impact of the Digital Silk Road is likely to be as consequential as that of the BRI's overland industrial belt and the Maritime Silk Road. Other papers in this symposium have looked at the domestic factors that led to China's digital rise. This paper focuses on the external aspects. The following sections look at the historic antecedents to the Digital Silk Road, the scope and structure of the initiative, and the Digital Silk Road's geopolitical implications for India.

CONNECTIVITY, TECHNOLOGY AND POWER

As the CPC and Chinese state agencies whip up the propaganda on the BRI, there is a growing temptation in the analytical community to treat it as something historically unique and hugely transformative (Macaes 2018).To be sure, the scale of the BRI is indeed unprecedented, thanks to the kind of resources, financial and political, that the Chinese state can bring to bear. Its future and long-term consequences will be necessarily dependent on the sustainability of Chinese capitalism and its ability to reconcile the deepening contradictions with other economic powers in the international system. It is important to note at this stage that the BRI has many antecedents, most notably from the Western experience in the last few centuries. The rise of Europe and the birth of modern capitalism

saw the colonial powers embark on maritime connectivity to areas in the non-Western world that would provide raw material as well as markets for industrial goods. Many port cities in the east that we are familiar with today – from Aden to Hong Kong and Bombay to Singapore and Shanghai – were the products of European expansion. The colonial era also saw the development of massive infrastructure projects like the Suez Canal and the Panama Canal that transformed traditional geography. And as the European powers gained large territories, developing connectivity and infrastructure within them were necessary for administrative, security and economic reasons. In large sized entities like the United States (US) and Russia, the 19th century saw the dramatic internal expansion of rail and road connectivity as the states extended their territorial control. In America, the expansion was to the South (Rio Grande) and the West (the Pacific Coast); Czarist Russia raced to the Caucasus and Amu Darya in the South and the Pacific coast in the far west. The consolidation of the British Empire in India saw road and rail projects that integrated the region and its heartland to the frontiers.

China, of course, had its own history of ambitious infrastructure projects like the Grand Canal and its renovation through the centuries. In the modern period, Chinese nationalists saw infrastructure and connectivity as critical for uniting and modernising the nation. If Indian nationalists saw Subcontinent's railways as the facilitator of British hegemony, the Chinese nationalists saw the absence of railways as one of the sources of backwardness. For the first president of the Republic of China, Sun Yat Sen, the development of railways was a passion. His vision for railways within and beyond China is being fulfilled by his communist successors. India is also familiar with communist China's infrastructure building in Xinjiang and Tibet in the 1950s, its road building in Nepal in the 1960s and the Karakoram highway to Pakistan in the 1970s.

New Delhi opposed many of these Chinese initiatives over the decades. Its opposition culminated in the strong critique of the BRI in 2017 and since. However, Delhi seemed to ignore the digital dimension of China's connectivity initiatives. Even more interesting, India opened its market

for deep digital penetration by Chinese companies. Before we discuss the implications of that interdependence, we need to recognise the dimension of power politics associated with the BRI and the Digital Silk Road. Chinese propaganda presents these initiatives as being part of promoting a more inclusive globalisation and enhancing the development opportunities for the non-western world. It is worth recalling that many of the connectivity initiatives in the colonial era too presented as part of the civilising mission in the east. That they contributed to the modernisation of the developing world does not take away from the fact that it was driven by the commercial interests of the Western capital and the imperial imperative for political consolidation and control.

The tension between the opportunities (economic development and social modernisation) and risks (power and dominance) generated by foreign investment in infrastructure continue to animate the politics of the non-Western world. China's BRI has not been able to escape that tension in the developing world. Even more interesting is the fact that many developed countries feel threatened by the BRI, especially the Digital Silk Road. The Anglo-Saxon powers as well as the Europeans and Japanese are either competing with or pushing back against the BRI and the Digital Silk Road (Shi-Kupfer and Ohlberg 2019). How the tension between development and dominance gets mediated could vary in time and space. But there is no denying the relationship between strategic influence and infrastructure development beyond borders. As a recent American report notes, "history is filled with examples of states using foreign infrastructure to access territory, harvest resources, shape government policy, dominate technology, and undercut their competitors" (Hillman 2019). The report offers a broad framework to understand the avenues of influence across all stages in the development of infrastructure in foreign lands by major powers (Figure 1).

Figure 1: Avenues of influence for foreign developers

Stage	Finance	Design and Construction	Ownership and Operation
Strategic Objectives	Win political concessions	Set standards	Collect intelligence
	Reward supporters	Transfer technology	Restrict access
	Set standards	Collect intelligence	Adapt to disruptions
	Access resources		Monopolise skills and technologies
	Control operations		

Source: Jonathan Hillman, Influence and Infrastructure: The Strategic Stakes of Foreign Projects (Washington: CSIS, January 2019)

Economists argue that the Digital Silk Road, much like the BRI, is driven by the Chinese capital's imperatives of expansion beyond borders. The criticism of China's Digital Silk Road has begun to gain ground in the last couple of years, but Beijing appears to be playing by the same book that guided the Western powers. American historian Daniel Headrik has written about the role of technology in advancing European imperial ambitions in the past. And his study of the spread of global telecommunication in the 19th and early 20th centuries reveals the strong connection between technology, power, and the ability to shape the global norms and enforce technical standards (Headrik 1981). It should not be a surprise therefore that China would like to use its growing national capabilities in the digital arena to exercise leadership in the emerging fourth industrial revolution, capture the markets around the world, use it to buttress its own political power in the international arena, defend the CPC rule in China, and export the "Chinese model" of political and social organisation to the rest of the world.

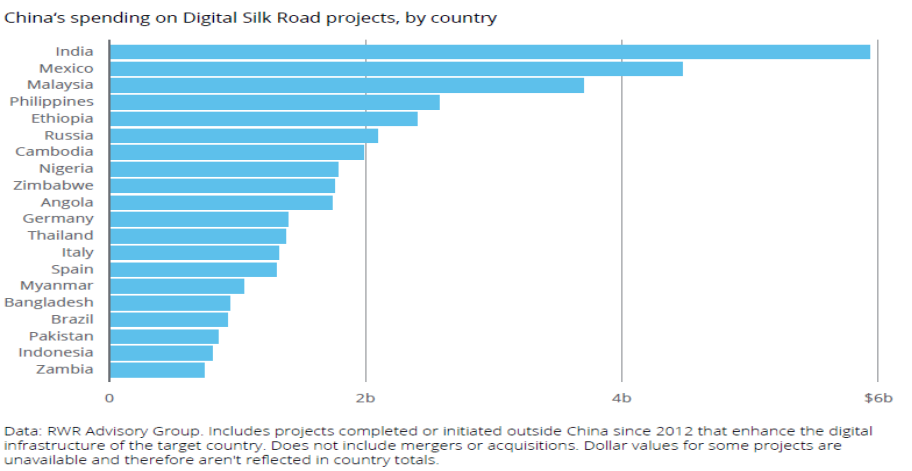
SCOPE AND STRUCTURE OF THE DIGITAL SILK ROAD

The idea of a silk road in the cyber and space domains has figured in the Chinese discourse for some time. The Digital Silk Road made its first formal appearance in the China-European Union forums in 2015 (Shi-Kupfer and Ohlberg 2019). However, it was only since the middle of this decade that it has been presented in a coherent form. In his speech at the first Belt and Road Forum in Beijing on 15 May 2017, Xi urged the international community to "...pursue innovation-driven development and intensify cooperation in frontier areas such as digital economy, artificial intelligence, nanotechnology and quantum computing, and advance the development of big data, cloud computing and smart cities so as to turn them into a digital silk road of the 21st century" (Xinhuanet 2017).Two years later, in April 2019, at the Second Belt and Road Forum, Xi again emphasised, in his speech, the "...need to keep up with the trend of the Fourth Industrial Revolution, jointly seize opportunities created by digital, networked and smart development, explore new technologies and new forms and models of business, foster new growth drivers and explore new development pathways, and build the digital Silk Road and the Silk Road of innovation" (Belt and Road Portal 2019). He further pledged that

the Chinese government will "...support companies of various countries in jointly advancing information and communications technology infrastructure building to upgrade cyber connectivity" (Ibid).

In presenting the Digital Silk Road as a collective international initiative, President Xi was trying to serve a few national objectives. According to one analysis, Xi had five major objectives: "cutting industrial overcapacity, enabling corporate China's global expansion, supporting the internationalisation of the Renminbi, constructing a China-centred transnational network infrastructure, and promoting Internet-enabled 'inclusive globalisation'" (Hong 2018). China's leading internet companies and state agencies are partners in this enterprise. Jack Ma of Ali Baba, for example, has sought to promote an electronic World Trade Platform that will bring barriers around the world down for e-commerce. The Chinese Academy of Sciences has launched an initiative on Big Earth Data that will deliver remote sensing data for a variety of projects along the BRI routes.

Figure 2: China's Spending on the Digital Silk Road Projects, by Country



Extracted from: 'BRI update 2019 – recalibration and new opportunities', Deloitte, https://www2.deloitte.com/content/ dam/Deloitte/cn/Documents/ser-soe-br/deloitte-cn-bri-update-2019-recalibration-and-new-opportunities-en-190422.pdf

To date, China has signed with over 16 countries cooperation agreements to strengthen the construction of the Digital Silk Road (Yidaiyilu 2019). The China-based Belt and Road portal has also reported that over 6,000 of China's Internet enterprises, alongside over 10,000 Chinese

technological products, have gained access to overseas markets (Yidaiyilu 2017). Among the areas that Chinese entities are making an impact are the following: telecommunication infrastructure including 5G, space and satellite services, e-commerce and smart cities. The low cost of Chinese digital products services and a solid alliance between state and the internet companies have made China's digital expansion rather welcome in most parts of the world (Figure 2). In India, its neighbourhood in South Asia and the Indian Ocean, there has been significant growth in China's Digital Silk Road technological projects and investments (Figure 3 and Figure 4).

Figure 3: China's Cable Projects

Year Initiated	Initiative/Project	Countries connected	Participating Firms of Chinese and South Asian origins
2011	Africa Europe-1 (AAE-1), Approximately 25,000km [Submarine]	Hong Kong, Vietnam, Cambodia, Malaysia, Singapore, Thailand, Myanmar, India, Pakistan, Oman, UAE, Qatar, Yemen, Djibouti, Saudi Arabia, Egypt, Greece, Italy, France	China Unicom, Pakistan Telecommunication Company, Reliance Jio Infocom
2013	Bay of Bengal Gateway (BBG), Approximately 8,040km [Submarine]	Oman, Malaysia, UAE, India, Sri Lanka	China Mobile, Reliance Jio Infocom, Dialog Axiata PLC
2014	Southeast Asia-Middle East-Western Europe (SEA-ME-WE 5) across the Bay of Bengal, Approximately 20,000km [Submarine]	Singapore, Malaysia, Indonesia, Thailand, Myanmar, Bangladesh, India, Sri Lanka, Pakistan, UAE, Oman, Qatar, Djibouti, Yemen, Saudi Arabia, Egypt, Italy, Turkey, France	China Mobile, Sri Lanka Telecom PLC
2017	Pakistan East Africa Cable Express, Approximately 13,000km [Submarine]	China, Pakistan, France, Egypt, Djibouti, Kenya, Somalia, South Africa	Huawei Marine, Hengtong, Cybernet (Lakson Group of Companies)
2017	Kashgar (China) – Faizabad (Afghanistan) optic line through Wakhan region (Afghanistan)	China, Afghanistan	China Telecom, Afghan Telecom
2018	Jilongzhen (China) – Rasuwagadi (Nepal) optical fibre cables outside Kathmandu	China Nepal	China Telecom Global, Nepal Telecom

Sources: Many, mainly from "Mapping China's Tech Giants" database, Australia Strategic Policy Institute, Barton, September 2019, https://www.aspi.org.au/report/mapping-chinas-tech-giants. Accessed on 16 September 2019.

Figure 4: Other Chinese Technological Projects, Space-Related Initiatives and Acquisitions in South Asia

Initiative/Project	Location	Parties involved	Category
Huawei Airlink Cloud data centre	Pakistan	Huawei, Airlink Communication	Data Centre
MoU in 5G and Internet of Things	India (New Delhi)	ZTE, Bharat Sanchar Nigam Limited	Internet of Things, 5G
Jio Pre-5G Partnership	India	Reliance Jio, ZTE	5G
Bharti Airtel Pre-5G Partnership	India	Bharti Airtel, ZTE	5G
Vodafone India Pre-5G Partnership	India	Vodafone, ZTE	5G
Smart Maldives IT Infrastructure	Maldives	Huawei	IT Infrastructure (General)
Sino-Nepal Joint Research Centre	Nepal	China and Nepal government	Research and Development; for Mountain Hazards, Ecology and Environment Monitoring
Pakistan R&D Centre	Pakistan	ZTE	Research and Development; for software development
BeiDou satellite navigation	Pakistan	BeiDou	Satellite Services
Supreme SAT-1, Supreme SAT-2	Sri Lanka	N. A.	Satellite Services
Afghan SAT-2	Afghanistan	N. A.	Satellite Services
AsiaSat-4 Pakistan Satellite Management Station	Pakistan	SUPARCO, China Great Wall Industry Corp	Satellite Services

Initiative/Project	Location	Parties involved	Category
Asia-Pacific Space Cooperation Organization (multilateral)	China	Pakistan Bangladesh China	Satellite Services, Research and Development
Huawei Safe City Project	Pakistan (Punjab, Lahore, Islamabad)	Huawei	Smart Cities
Daraz	Pakistan	Alibaba	E-Commerce/ Acquisition/ Major Shareholder
Paytm	India	Alibaba	E-Commerce/ Acquisition/ Major Shareholder/ Joint Venture
Big Basket	India	Alibaba	E-Commerce/ Acquisition/ Major Shareholder/ Joint Venture
Flipkart	India	Tencent	E-Commerce/ Acquisition/ Major Shareholder/ Joint Venture
Ola	India	Tencent	E-Commerce/ Acquisition/ Major Shareholder/ Joint Venture
Baidu India Internet	India	Baidu	E-Commerce/ Acquisition/ Major Shareholder/ Joint Venture

Sources: Mainly from the authors' compilations in another of their paper - C Raja Mohan and Chan Jia Hao, "South Asia's Space Programmes: Development and Diplomacy", Institute of South Asian Studies, National University of Singapore, https://www.isas.nus.edu.sg/wp-content/uploads/2018/07/ISAS-Working-Paper-No.-300.pdf; and '"Mapping China's Tech Giants' database", Australia Strategic Policy Institute, Barton, September 2019, https://www.aspi.org.au/report/mapping-chinas-tech-giants. Accessed on 16 September 2019.

INDIA AND CHINA'S DIGITAL GEOPOLITICS

As it envelops India and its neighbourhood, China's digital expansion presents at least three sets of challenges for policy makers in Delhi. The first is the impact of the unfolding contestation between China and the US on digital issues. The deepening economic integration between the US and China seemed to reach its pinnacle in the partnership between American technology companies and China in the 2000s. Tensions in the economic and technological relationship started rising in this decade and culminated in the vigorous push back from the Trump Administration. The US has begun to decouple the two economies that have fused over the last four decades. It has mounted a political challenge to the BRI and confronted the Chinese tech companies, especially the digital ones that have become quite central to the trade war between the two countries. There is a growing sense that the current conflict over 5G and Huawei are about deciding whether the US can retain its technological edge over China or cede space irretrievably to Beijing. If the US is putting pressure on India, as on so many other partners to keep China out of 5G development, Beijing is warning New Delhi that any rejection of Huawei in India's 5G choice would be an unfriendly act (Reuters 2019). India's careful navigation between China and the US, one of its principal foreign policy preoccupations in the 21st century, will come under increasing stress. New Delhi's simultaneous pursuit of good relations with both China and the US will become harder as pressure to make choices begins to mount. Somewhat unexpectedly technology issues have acquired place, front and centre, in the triangular dynamic between Delhi, Beijing and Washington. The choices Delhi makes will have deep impact on its information technology (IT) and telecommunication sector that has evolved with significant dependence on Chinese hardware and deep connections to the Silicon Valley on the software side. Rearranging its digital economy amidst the US-China Cold War will be quite hard.

Second, beyond 5G and the US-China confrontation, there are larger political issues of digital governance that will challenge India. For what is at stake in dealing with China's digital rise is the very Indian commitment to democracy and pluralism. India, on its part, has tended drift somewhere in the middle between the extreme positions that China and the West have come to represent in the debate on the issues. To be sure, there is no

longer absolute unity within the West on the issues of digital governance. The divisions are not just between Western nations, but within them as well. However, in the broader debate, India has often vacillated between the emphasis on the need for state control and the importance of limiting it according to democratic norms. In multilateral forums it has often tailed the Russians and Chinese on information and communications technology issues but has also occasionally tilted in favour of Western positions. While it will continue to balance the competing political imperatives, India has shown little inclination to support the framework of "cyber sovereignty" that China talks about. For China, cyber sovereignty is about subordinating entire digital domain and its uses in the service of the state and its ideology (Segal 2018). India has no reason to accept or support the kind of model for authoritarian digital state that China is promoting with its digital exports to the developing world (Polyakova 2019).

The third is the challenge of limiting China's power in India's neighbourhood. Although never stated in such bold terms, this has been a major Indian foreign policy objective since the middle of the 20th century. Concerning infrastructure and connectivity, India has either opposed Chinese initiatives on the grounds of sovereignty (Karakoram Highway, CPEC) or competed with the Chinese projects (road building in Nepal or port construction in Sri Lanka). As China rose to be a great power and its economic impact in India's neighbourhood grew, Delhi's concerns have rapidly grown and have been reflected in India's criticism of the BRI. However, New Delhi seemed to be utterly oblivious of the digital dynamic and its consequences for South Asia.

It is not that there were no warnings. Through the last two decades, there were frequent warnings from the intelligence community on the dangers of letting Chinese technology companies into the Indian market. But the low price of Chinese products and the commercial interests of Indian telecommunication companies, which were preparing for a major boom in the Indian markets, tilted the balance in favour of China. It has continued to deepen in the last two decades. An India that could not see the consequences for its own market seemed even less prepared to see China's digital expansion in South Asia and the Indian Ocean littoral. Despite much talk about 'neighbourhood first' and the emphasis on

connectivity, India has steadily ceded digital domain to China within the region. Although India had considerable advantages in the field of IT and space technologies, Delhi seemed unable to leverage it in pursuit of its foreign policy goals in the neighbourhood. One Indian initiative, the South Asia Satellite, for example has done little to counter the significant advance of China's space cooperation with Delhi's South Asian neighbours. The time has come for New Delhi to take a fresh look at the challenge of digital diplomacy in the neighbourhood, identify the current limitations and find ways to overcome them.

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MAPPING CHINA'S PARTICIPATION IN INDIA'S DIGITAL ECONOMY

Santosh Pai and Rajesh Ghosh

INTRODUCTION

Chinese participation in the Indian digital technology sector is not a recent phenomenon. Telecommunication equipment suppliers, Huawei and ZTE, made significant inroads into the Indian market in parallel with the rise of private telecommunication operators during the period 2000-2015. Their combined market share in India reached around 42 percent by 2016 (Communications Today 2017). Next followed the mobile phone industry where Chinese companies which were exporting their products to Indian mobile phone brands until 2015 rapidly intensified their efforts to capture Indian market share when growth in China slowed down (Damani 2016). They were able to ship their surplus production to the Indian market with minimal modifications on account of a technological twist of fate.[4] This phase was closely followed by the launch of India's Phased Manufacturing Program[5] which made exports less profitable and prompted Chinese brands such as Xiaomi, Vivo, Oppo, OnePlus and Realme to enter the Indian market on their own. These brands have since become household names in India on the back of relentless advertising campaigns and sales channel innovations. In the process they have almost decimated their Indian counterparts such as Micromax, Lava, Karbonn, Spice and even relegated multinationals such as Samsung, LG and Motorola to the sidelines by capturing an astounding 66 percent of the smartphone market by the first quarter of 2019 (Jain 2019). Such prolific growth of Chinese mobile phone brands has prompted contract manufacturers such as Foxconn and Winston to establish their factories in India along with a slew of component manufacturers from China.[6] While this Indian foray of Chinese players

[4]*China Mobile and Indian operators use the 900 MHz and 1800 MHz bands for 2G, technology used by China Unicom for 3G is same as Indian operators, and India and China both use 2300 MHz and 1800 MHz for 4G.*
[5]*A combination of increased customs duty and incentives for local manufacture.*
[6]*The Noida-Greater Noida area alone is home to over 100 such component suppliers.*

within the hardware domain is fairly well-known the main focus of this paper is to map out the more recent and less visible spurt in the activity of Chinese players in the digital economy through venture capital (VC) investments and launch of internet applications. These activities span across e-commerce, social media, food delivery, ride-sharing, fintech, logistics, edutech and many more emerging niches.

VENTURE CAPITAL INVESTMENTS[7]

Today China is home to the second largest venture capital industry in the world (PitchBook 2019). The Chinese government is credited with creating conditions to solve the "simultaneity problem" and nurturing this industry in a manner that no other country has managed so far (Lin 2017). Investors in the Chinese venture capital landscape can be categorised into Government Guidance Funds (GGF),[8] Policy Funds,[9] Corporate Venture Capital (CVC) funds[10] and VC funds.[11] With the exception of the China Eurasian Economic Cooperation Fund that has invested in Ola (Times of India 2018), no direct activity of policy funds or GGFs has been detected in India and hence we restrict our discussion to activities of CVC and VC funds from China.

Investments can be categorised according to their objectives into strategic,[12] financial or a combination of both. While strategic investments are mostly

[7]*Note that the investment data used in this paper has been collated from www.crunchbase.com.*

[8]*GGFs provide seed money to VC funds or enterprises that the government deems worthy of support. These are largely provincial and city level funds. For instance, the Hubei government's Yangtze River Industry Fund, Shenzhen government's Shenzhen State-owned Asset Reform and Development Fund.*

[9]*Policy Funds are largely meant to drive the government's policy initiatives and operate at the national level. The Silk Road Fund and the China State-owned Assets Venture Investment Fund are examples of such Policy Funds.*

[10]*Corporate Venture Capital funds are those which combine strategic and financial objectives. They differ from plan vanilla venture capital funds in that they have a single source of funds which is a large corporate house or conglomerate.*

[11]*Venture Capital funds pool investments from a variety of investors including invest purely for financial returns and seek to sell their shares either through a secondary sale or during IPO of the target company. Examples include Shunwei, CDH and Morning side.*

[12]*Strategic investments are those made by companies in targets that operate businesses in a similar industry. The primary objective of such investments is to extract synergies of*

made by industry players and financial investments are the forte of VC funds, CVC funds make investments which are partly strategic and partly financial in their nature. Since purely strategic investments by Chinese companies in India are relatively few, we have clubbed them here with venture capital investments for ease of study. Strategic investments made by Chinese companies in India include Ctrip's investment in MakeMyTrip,[13] Meituan's[14] three rounds of investments in food-delivery startup Swiggy[15] and TAL Education Group's[16] two rounds of investments in Vedantu,[17] an edu-tech startup. Chinese CVC funds that are active in India belong to conglomerates such as Alibaba, Tencent, Xiaomi and Fosun. Alibaba and its affiliates have made solo investments amounting to US$1.115 billion[18] and participated in joint investment rounds worth another US$1.150 billion.[19] A recent news report suggests that Alibaba is making a pause before embarking on further investments owing to unsatisfactory performance of its initial investments (Sriram 2019). Meanwhile, Tencent appears to be more bullish and has even secured a right of first refusal for its stake in Flipkart in case Alibaba makes an investment bid (Competition Policy International 2018). Tencent's solo investments amount to US$42.35 million[20] and joint investment rounds amount to about US$4.2 billion.[21]

scale or explore a business combination at a future stage. Blocking other competitors from acquiring these companies might also be an objective.

[13]A deal worth US$180 million in 2016 and a deal worth US$330 million in 2019.

[14]Meituan is an e-commerce services company providing services such as on-demand delivery, bike-sharing, car-hailing, hotel and travel booking, etc. In 2018 it was listed in The Stock Exchange of Hong Kong Limited (HKEX). It has participated in two rounds of financing in Swiggy.

[15]The rounds amounted to US$1.3 billion.

[16]TAL Education was founded in 2003 as an after-school tutoring service in China. It was listed in the NYSE in 2013 and today it the largest education company by market cap with 45 investments across industries including AI, machine learning, edu-tech, etc.

[17]Investments amount to US$53 million.

[18]Paytm (US$680 million in 2015), Paytm Mall (US$200 million in 2017), Zomato (US$150 million in 2018), Xpressbees (US$35 million in 2018) and BigBasket (US$50 million in 2019)

[19]Snapdeal (US$500 million with SoftBank and Foxconn in 2015), Paytm Mall (US$450 million with Softbank in 2018) and BigBasket (US$200 million with Abraaj Group and IFC in 2018).

[20]Byju's (US$40 million in 2017) and Pepo (US$2.35 million in 2017).

[21]Ola (US$1.1 billion with Soft Bank in 2017), Flipkart (US$1.4 billion in 2017 along with Microsoft and eBay), Byju's (US$31.3 million in 2019 with General Atlantic), Ibibo (US$250 million in 2016 with Naspers) Gaana (US$115 million in 2018 with Times Internet), Hike (US$175 million in 2016 with Foxconn), Practo (US$90 million in 2015 with Sofina and

Xiaomi, which recently invested about US$500 million (Gill 2019; Jia 2019) in its mobile phone manufacturing business, has also participated in deals worth about US$170 million[22] in five Indian startups that are strategic to its core business. The Fosun Group, which made the single largest Chinese investment in India until date when it acquired 74 percent of Gland Pharma for a consideration of US$1.09 billion in 2017 (Economic Times 2017), has made a series of bets on Indian startups amounting to US$0.75 million[23] in solo investments and participated in joint investment rounds amounting to over US$480 million.[24]

Among Chinese VC funds investing in India, Shunwei Capital, which was founded by Lei Jun, founder of Xiaomi, and Singaporean, Xu Dalai, is the most active one. It counts sovereign wealth funds, funds of funds, university endowments and family offices as its investors.[25] In November 2018, it raised its sixth fund with the aim of investing a large portion of it in Indian startups (Khatri 2018). So far it has made 24 investments in 14 Indian startups with solo investments and investments through participation in joint investment rounds amounting to about US$612 million. Hillhouse Capital,[26] with eight investments,[27] Morningside Venture Capital,[28] CDH

Altimeter Capital), Practo (US$55 million in 2017 with ru-Net, RSI Fund, Thrive Capital, among others.), NiYO Solutions (US$35 million in 2019 with Horizon Ventures and JS Capital), Swiggy (US$1 billion in 2018 with Naspers, Hillhouse Capital and Wellington Management), Dream11 (US$100 million in 2018).

[22]Sharechat (US$117.4 million in 2018, January and September combined), Samosa (US$7 million 2018), Krazybee (US$8 million 2017), Hungama (US$25 million 2016), ZestMoney (US$13.4 million).

[23]List deals with amounts and years Headfone (US$0.75 million in 2019),

[24]List deals with amounts and years Ixigo (US$15 million in 2017 with Sequoia Capital), LetsTransport (US$12 million in 2018 with Bertelsmann India Investments), PerkFinance (US$0.9 million in 2018 with angel investors Eric Bunting, Krishna Vinjamuri and Karan Virwani), Kredily (US$0.75 million in 2019 with Mohit Tandon, Avinash Anand and others), Delhivery (US$30 million in 2017 with The Carlyle Group), Kissht (US$10 million in 2017 with Ventureeast, Endiya Partners), Delhivery (US$413 million in 2019 with Soft Bank and The Carlyle Group).

[25]Details can be found in the website www.crunchbase.com.

[26]Hill House Capital is a private equity firm with investments in startups as well as established public companies. It has made investments across industries, including e-commerce, biotechnology, financial services, etc.

[27]Car Dekho (US$235 million in multiple rounds in 2014, 2015, 2016, 2019), Udaan (US$300 million 2019), Swiggy (US$1 billion 2018), Cred (US$120 million 2019).

[28]Morningside Venture Capital is one of China's earliest VCs and has invested in 2 Indians startups so far. It manages around US$1.7 billion. Some of its successful Chinese investments include Sohu and Ctrip, both of which are today listed on NASDAQ. Sharechat (US$199

investments,[29] with three investments each, and Qiming Ventures,[30] with two investments, and GGV Capital,[31] with one investment, are other well-known Chinese VCs that have invested in the Indian digital ecosystem. Besides them a number of lesser known VCs from China have also made investments in the India.[32]

INTERNET APPLICATIONS

In 2018, 44 out of the 100 most downloaded internet applications in India were developed by Chinese companies (Ghaswalla 2019). These included games such as PUBG and Clash of Kings; e-commerce applications such as Club Factory, SHEIN and ROMWE; online content apps like TikTok and LIKE; video and live streaming ones such as LiveMe, Bigo Live and Vigo Video; utility apps such as BeautyPlus, Xender and Cam Scanner; social content apps such as Helo and SHAREit (Shaikh 2019). Most of these applications mirror their counterparts in China with a certain level of localisation to suit the Indian market. The quantum of investment required to enter the Indian market in such a manner might not be substantial but if the application goes 'viral' its impact and consequently monetary returns can be significant. Alibaba's UC web browser for mobile phones had gained more than 43 percent market share in India by December 2017 (Tao 2018) which had reduced to 17.81 percent in August 2019 (Statcounter 2019). Unlike an internet application used for a specific purpose, the browser forms the backbone of a consumer's internet experience. This provides a wealth of data that can be mined and monetized.

million in two rounds in 2018 and 2019), Cred (US$25 million 2018), OkCredit (US$15.5 million 2019).

[29]CDH Investments in a PE firm with more than US$2 billion under management. It was founded by China International Capital Corporation and has investments in logistics, healthcare, education and other industries. Mayfair (US$3.2 million 2018), Glowroad (US$10 million 2019), Cashify (US$12 million 2018).

[30]Qiming Venture Partners founded in 2006 has made more than 380 investments worldwide, with 1 of them in India. More than 50 of its invested companies are listed on overseas stock exchanges – Pratilipi (US$15 million 2019), RedDoorz (US$45 million 2019).

[31]GGV Capital is a US$6.2 billion global venture capital firm investing largely in the US, and Asia. Udaan (US$300 million 2019).

[32]Plum Ventures (Krazybee US$3 million in 2016), Bace Capital (Healofy US$10 million in 2019; Rapido Bike Taxi US$54 million in 2019), Better Capital (Kruzr US$1.3 million 2019), among others.

MOTIVATING FACTORS

Undoubtedly the single largest motivating factor for Chinese investments in the Indian digital ecosystem is its market potential. India's relatively low per capita income of US$1700 (Sahu 2019) and internet penetration of 34 percent as of 2017 (Alexander 2019) combined with its growing number of smartphone users (Capital Market 2019) represent the single largest logical market for Chinese investors with first-hand experience of a similar trajectory in their home market. E-commerce players such as Club Factory (Economic Times 2019) and Shein (Fibre2Fashion 2018) count India as their largest market.

Chinese investors are also excited by the untapped potential of the Indic language market in India which is described by terms such as the "Next Billion" or "Bharat". Sharechat, which exemplifies this opportunity, counts many Chinese investors amongst its backers (Srivistava 2018). Chinese investors also consider their vast prior experience in a similarly enormous market like China as a source of ideas to transplant into India although they are wary of localising Chinese concepts to suit the tastes of Indian consumers. For instance, Shunwei Capital sees its many Indian investments like Sharechat, Clip App and Rozbuzz as equivalent of its Chinese investments Weibo (微博), Kuaishou (快手) and Today's Headlines (今日头条) respectively.

Availability of a rich pool of technical personnel in India is another attraction for Chinese investors although this is yet to be substantially demonstrated at the ground level. Huawei which has established its largest R&D centre outside China in Bengaluru and is believed to employ around 5,000 employees (Economic Times 2013) is a rare exception. The median case is more similar to that of UC Web whose total employee strength in India was only 30 when its market share touched a peak of 55 percent in 2016 (Chathurvedula 2016).

ISSUES

In recent years several issue areas have surfaced regarding Chinese investors and technology. One such issue is the debate surrounding India's response to Huawei and ZTE rolling out India's 5G network. Thus far, the Indian government has trod very cautiously on the issue and has not

declared an outright ban like Australia and the United States. While a ban may not be in India's overall economic interests given the cost benefits Chinese counterparts bring for Indian consumers vis-à-vis international competitors, India has other models to emulate. The United Kingdom model seeks to keep Huawei and ZTE out of 'core', sensitive networks, but allow it in other areas. Germany has decided to not pre-emptively ban any actor but design clear security standards that all actors are expected to abide by (Rinke and Douglas Busvine 2019) India has to find a balance between protecting its national security and considering cost-efficiencies towards telecommunications and consumers.

Another issue that is vicariously debated in India is concerning China's economic footprint in India, and in particular in the latter's hardware and increasingly so in software technologies. Take for instance the sheer market dominance of Chinese phone-makers like Xiaomi, Vivo and Oppo, which have collectively far surpassed their Indian competitors. India needs to rethink ways and incentives which can aid in the creation of competitive Indian companies, thus preventing Chinese dominance in other industries.

A third related issue has to do with internet applications. In early 2019, TikTok was temporarily banned from Apple and Google app stores because a court found the app encouraging salacious content. Even though the ban was later lifted, it nonetheless highlighted that operators without a local presence are willing to push boundaries to gain more users. And the fact that Chinese apps are available in up to 14 vernacular languages, it makes monitoring of content a tall order. There are security- and privacy-related concerns with apps, and this challenge cannot be met without a data protection law to regulate storage of data. Also, in the absence of a security review mechanism for foreign investments, it is difficult to trace the source of funds and its potential security-related implications. To be sure, these problems emerge universally from all investors and are not unique to Chinese investors per se.

AREAS OF CONCERN

One controversial motivating factor for Chinese investors is the potential for regulatory arbitrage in India. Several segments of the internet industry such as social media sharing platforms and financial technology (fintech)

applications whose regulatory frameworks are still at the drawing board stage offer abundant opportunities for Chinese investors to back business ideas that were never or no longer feasible in China due to regulatory clampdowns. The infamous TikTok scandal where alleged inappropriate content that went viral enabled Bytedance to garner a 12-time increase in traffic within two days after the ban (Banerjee and Srishti Choudhary and Abhijit Ahaskar 2019) is a case in point. Such a scenario would have been thwarted in China by its real-time state censorship regime.

An instance of Chinese companies displaying a blatant disregard for Indian laws has also come to light. In June 2019, a couple of e-commerce companies were found to be misusing a loophole in Indian customs regulations to avoid customs duties by shipping commercial packages in the guise of 'gifts'. Further investigations revealed that the value of such shipments was also grossly under-reported (Business Standard 2019).

When China implemented strict peer-to-peer (P2P) lending regulations in 2018, the number of P2P lenders crashed from a high of 3,800 in 2015 to 1,836 in June 2018 (Gooptu 2019). Within a space of six months, there was a corresponding spurt in the interest shown by Chinese players in the Indian market where easy availability of financial data on Indian consumers to unregulated entities was fuelling the growth of fintech applications. It remains to be seen whether Chinese investors will stay the course when India finally implements its data protection legislation and stricter regulatory standards for sharing of financial data (Gooptu 2019).

POSSIBLE MITIGATORS

There are a few measures that can be taken to offset some of the abovementioned negative externalities. One, India needs to create a robust data governance mechanism. Data generated from Indian user content should be restricted within the reach of Indians. Even though in a world of emerging technologies it is difficult to realise such goals, localisation, however, should be a policy guideline. Localisation should also be closely followed by platform liability, where liability for inappropriate content or infringement of privacy is made to rest on content creators, thus discouraging moral hazards.

Second, foreign technology companies doing business in India should be required to make greater disclosures about their Indian as well as

international operations. For instance, Chinese companies should disclose to Indian consumer-affiliated apps they own in China. In doing so, Indian users and other stakeholders can inquire about the legal status of such affiliated apps in China before trusting their data with the company. This issue is particularly important in light of a report published by Chinese authorities in which about 100 apps have been found wanting of user data protection. Compulsory disclosure of such illegalities in another legal jurisdiction would make Indian users wary of such apps.

Third, the Indian government could draw up a government-to-government (G2G) protocol with the Chinese government to exchange regulatory lessons and share information on violators. Regulations often fail to keep up with the fast-changing world of technology and therefore countries that are ahead in the curve in terms of regulations could be a point of reference for those lagging. A protocol would also set out the scope and the terms on which information regarding violators could be shared between the two countries, thus allowing each to be wary of common investors and companies. While this may not necessarily bear the intended outcomes as there exist strong incentives on both sides to withhold information, both sides would be better off with a G2G protocol than without.

Fourth, akin to multi-tiered diplomatic engagement between countries, an effective way of knowledge sharing would be to encourage Chinese and Indian policymakers and academic institutions to have increased exchanges on issues of data protection, regulating emerging technologies, among others. This would be a great value-addition to the G2G protocol as it would create a supplementary knowledge channel. This medium could also be useful to spreading general information regarding related issues to the larger public, which may otherwise be only limited to official circles.

CONCLUSION

When India opened its aviation sector to foreign investors for the first time in 2000, it prescribed a maximum threshold of 40 percent for foreign direct investment. It also prescribed a security clearance from the Home Ministry for directors appointed to the board of companies receiving such foreign investment (Pallavi 2012). Such conventional methods are no longer 'fit for purpose' when it comes to managing potential risks that might arise due to foreign ownership in the digital technology sector. Even an insignificant

shareholding can offer significant opportunities for foreign investors to facilitate cross-fertilization of ideas, practices, algorithms, technical teams, etc. (USTR 2018). Moreover, such transplants can occur in near real-time timeframes.

As more Indians go online, linkages between the digital ecosystems in India and China are bound to grow deeper. Indian entrepreneurs will benefit immensely from China's experiments in a plethora of internet applications. And foreign capital will be a crucial pillar for development of India's digital technology sector. Although both countries have emerged as strong advocates of data localization there is bound to be significant interplay in terms of development of algorithms, technical standards and management expertise. The only downside to this thread is an imperative that Indian policy makers and regulators perform a careful balancing act which accounts for consumer interest, industry concerns and national security.

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IDENTIFYING AND OFFSETTING IMPORT DEPENDENCE IN ICT MARKETS

Vivan Sharan and Yamini Jindal

INTRODUCTION

India is among the fastest growing information and communications technology (ICT) markets in the world. This includes a diverse range of industries spanning information technology (IT) services, IT-enabled Business Processing Outsourcing (IT-BPO), software products, engineering services, research and development (R&D) and hardware. These industries generated combined revenues of US$156.3 billion in 2017-18 and account for around 6 percent of India's gross domestic product (Table 1). However, IT services account for an asymmetric share of this value.

Table 1: Segments of the ICT Ecosystem (US$ Billion)

Segments	2017-18	Percent Share
IT Services	86.9	55.6
ITeS-BPO	32.6	20.8
Software Products, Engineering Services, R&D	33.5	21.4
Computer Hardware	3.3	2.1

Source: NASSCOM, Electronics and Computer Software Export Promotion Council

India's comparative advantage in trade in ICT also stems from IT services, and exports of such services account for around 80 percent of total revenues. Conversely, India's low capacity for hardware manufacturing and a growing appetite for such hardware within domestic markets offset competitive gains from IT services. This is also reflected in balance of trade metrics, wherein India enjoys a large IT services-led surplus with the United States (US) and a growing merchandise trade deficit with China, which is the largest supplier of IT hardware to India.

Table 2: IT and ITeS Trade Surplus with the US Offset by Hardware Trade Deficit with China

Year	India's Trade Surplus with US (US$ Billion)	US Share of India's IT-ITeS Service Exports (%)	India's Merchandise Deficit with China (US$ billion)	Share of IT Hardware in Merchandise Deficit with China (%)
2014	29.4		44.8	35.0
2015	26.0		52.0	36.7
2016	26.8		51.6	39.7
2017	26.3	62	59.5	45.5
2018	NA	NA	57.3	39.8

Note: IT Hardware approximated using Electronics (HS 85); Source: ITC Trade Map and NASSCOM

India's services-focus in ICT has also helped attract investments. Around US$2 billion of Chinese investments were made in India in 2017, with majority concentrated in e-commerce and fintech (Forbes 2018). While the Indian government's Digital India and Make in India programmes should have given some impetus to holistic development of domestic ICT capacities, the experience thus far does not confirm this.

THE ANATOMY OF HARDWARE DEFICIT

Indian IT services grew out of an entrepreneurial wave in the 1980s which sought to leverage the availability of cheap skilled labour. Economic liberalisation in the 1990s subsequently led to global market access. In the mid-1990s, demand for IT services increased on account of unforeseen factors like the Y2K bug for which India provided technical support; and the collapse of the internet bubble in the early 2000s accelerated off-shoring by American companies to save costs. Domestic demand also favoured services-led development, with integration of IT services across transport, banking, financial services, insurance and telecommunications.

As a result of the favourable conditions, Indian ICT companies remain concentrated in the services market. Neither the private sector nor policy planners seem to pay sufficient attention to development of complementary hardware or R&D capacities. Even within large IT service entities, the focus remains on leveraging labour arbitrage rather than developing software products or intellectual property (IP), which are typically natural corollaries to achieving sophistication in such markets across most advanced jurisdictions. For instance, R Chandrasekaran, Executive Vice Chairman at Cognizant, was quoted in a 2019 interview with The Economic Times highlighting that: "it is clear that the old model which was based on low costs will not work anymore. It must move from labour arbitrage to intellectual arbitrage."

India first released a policy for incentivising development of software products only last year, a policy which was in the making for around five years owing to hesitance of the IT industry. And India lags much behind China in ICT-based IP filings – a proxy for the lack of innovation centricity of Indian industry (Table 3).

Table 3: ICT Patent Publications (2015)

Technical Field	China	India
Audio-visual technology	20,712	531
Telecommunications	15,043	531
Digital communication	36,987	1,487
Basic communication processes	4,410	155
Computer technology	61,353	1,621
IT methods for management	10,232	427
Total ICT-related Patent Publications	148,737	4,752

Source: WIPO

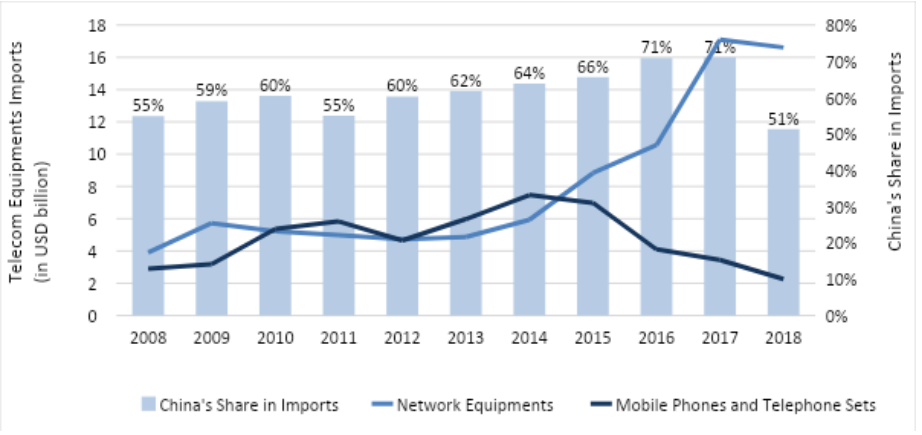
A pattern of harnessing the lowest hanging fruits in terms of revenue generation has remained intact even as mobile communications markets have matured in India with privatisation. Domestic telecommunication service providers (TSPs) remain service-oriented, with a limited level of integration with ancillary industries like network equipment manufacturers or device manufacturers. Network equipment includes transmission lines, base transceiver stations, multiplexers, satellites as well as customer premises equipment like routers, modems and switches.

This stands in contrast to the experience of countries like the US and China. In the US, TSPs (or common carriers in US legal parlance) like Bell received over 90 percent of their hardware from subsidiary companies like Western Electric even as far back as the 1960s (Irwin and McKee 1968). Similarly, in China, local devices manufacturers were encouraged by TSPs at every stage of technological transition. For instance, a leading TSP – China Mobile – championed an indigenous standard for 3G devices called 'Time Division Synchronous Code Division Multiple Access'. While the long-term success of the standard was limited, it was a significant non-tariff barrier. This helped Chinese device manufacturers capture market share along with the fact that device manufacturers were able to leverage interoperable software ecosystems such as Android (Internet and Mobile Association of India 2019). In fact, China only transitioned to 3G in 2009 after its indigenous standard was fully developed for deployment.

China Mobile is a state-owned enterprise and dominates the telecommunication market in the country. In contrast, India's public sector utilities (PSUs) are now confined to a small share of the telecommunication markets despite supply chain integration with manufacturing PSUs. Before privatisation of telecommunication services, procurement of telecommunication equipment from locally manufactured sources was an essential clause in most public tenders. This promoted domestic manufacturing of telecommunication equipment, including switches, fixed wireless terminal, electronic push button telephone, optical fibre cables, telecommunication towers and test instruments. However, after the advent of mobile telephony, the manufacturing landscape for telecommunications underwent significant changes and PSUs were unable to keep up. This inability stemmed from underinvestment in R&D and exponential demand for mobile telephony following privatisation.

By 2018 India was already importing US$18.8 billion in telecommunication equipment, including devices. During the last 10 years, the imports of telecommunication equipment have increased at an annual rate of 12 percent on average, with majority share sourced from China (Figure 1).

Figure 1: India's Import of Telecommunication Equipment from the World and China



Note: This data pertains to HS codes: 851761, 851769 and 851762 (Base Stations, Routers and parts of Telephones, Multiplexer and Telecom Transmission or Reception Apparatus. respectively), 851770 (Parts of Transmission/ Reception Apparatus), 851762 (Telecom Transmission or Reception Apparatus), 90011000 (Optic Fibre Cable), 851712 and 851718 (Mobile Phones and Telephone sets, respectively) and 852910 (Aerials or Antenna).

Source: ITC Trade Map

India has tried to mitigate growing import dependency by applying custom duties on telecommunication parts, as part of a Phased Manufacturing Programme. However, industry reports show that these duties have catalysed an assembly ecosystem in India – wherein increase in imports of components and subcomponents have more than offset the decline in imports of finished mobile handsets (Internet and Mobile Association of India 2019). Some of the industry prescriptions to enhance domestic manufacturing include larger incentives for exports and better integration with Global Value Chains through "lead companies" or "motherships".

PATTERN OF DEPENDENCIES

Worryingly, India has developed hardware dependencies across several other ICT-enabled segments/markets too, despite a fair chance at managing technological transitions through a mix of government interventions and private sector agency. Consider India's import dependency on set top boxes (STBs) for meeting the broadcasting demand, for instance. Approximately, 95 percent of the market demand for STBs in India is met through imports mostly from China and other Asian countries (Shamim 2016). According to the Consumer Electronics and Appliances Manufacturers Association, Indian manufacturers are losing out to imports due to price difference arising out of tax structures.

This import dependence on Chinese STBs is counterintuitive given that the timeline and implementation of digitalisation is closely managed by the Indian Government and could have been aligned with a programme for indigenisation. The mandate for Digital Addressability, through which digitalisation is achieved in television broadcasting, is spread over four phases (Table 4). Moreover, the Telecom Regulatory Authority of India, the nodal regulator for broadcasting distribution services has also been advocating for interoperability of STBs, which entails prescriptions of standards for signal modulation, middleware and compression. These are all the technical aspects central to STB design – and were the Telecom Regulatory Authority of India to mandate interoperability – it could lead to demand for close to 200 million new boxes.

Table 4: Phase-wise digitalisation of TV broadcasting

Timeline for Completion and Phase #	Territories to be Covered
Phase I – 31 October 2012	National Capital Territory of Delhi, Municipal Council of Greater Mumbai area, Kolkata Metropolitan area and Chennai Metropolitan area
Phase II – 31 March 2013	38 Cities with a population of more than one million;
Phase III – 30 September 2014	All other urban areas (Municipal Corp./ Municipalities)
Phase IV – 31 December 2014 (incomplete)	Rest of India

Source: Ministry of Information and Broadcasting, Government of India

Another similar example where Chinese equipment import dominates despite close government control and oversight is in digital payments. India imports a large share of automated teller machine (ATM) and point of sale equipment (PoS) – despite retaining the ability to manage the pace of digitalisation of payments through bodies such as the National Payments Corporation of India (which is responsible for running the National Financial Switch on which all ATM transactions are run) and the Reserve Bank of India (which has the ability to set all manner of technical standards for banks which ultimately deploy PoS machines).

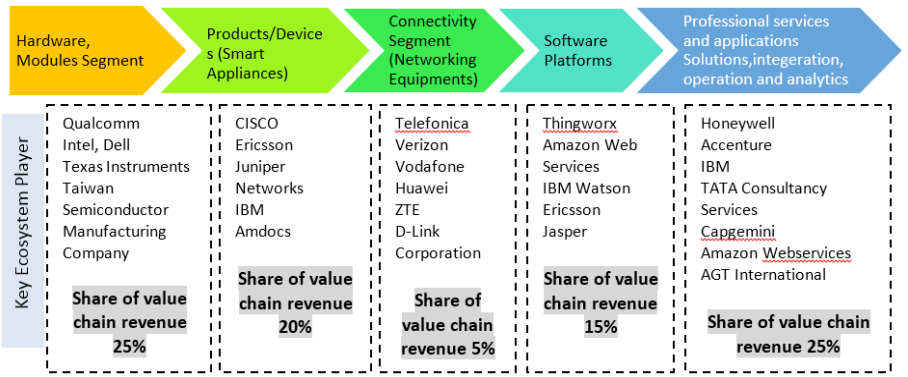
This dependency on PoS imports is particularly striking. Two firms, Verifone and Ingenico, control nearly 80 percent of the global market and most of the Indian market, and manufacture in China. In fact, to meet its digitalisation ambitions in the payments market, India waived basic custom duty on import of PoS machines in 2016 and exempted imports from mandatory labelling by the Bureau of Indian Standards in the same year.

Such device-import dependencies will become irreversible over time with proliferation of Internet of Things (IoTs). The IoT landscape in India is rapidly expanding owing to demand for both industrial and retail sector end-uses. Driving factors for this secular expansion include the realisation

of operational efficiencies, availability of better network infrastructure, government push through initiatives like Smart Cities and Digital India and increasing thrust on providing enhanced user experience (FICCI and EY 2019). The Indian IoT market was already valued at US$1.3 billion in 2016 and is expected to grow several folds in the years ahead. For instance, the domestic market for augment and virtual reality is projected to grow at a compound annual growth rate of over 55 percent during 2016-2021. What is encouraging is that the past few years have witnessed the emergence of 170 virtual reality and augmented reality startups in the country.

All IoT applications ride atop hardware equipment and components consist of several high value parts such as embedded chipsets, sensors, transponders and so on. Clearly, India lacks a robust domestic manufacturing ecosystem for such high value hardware components as well as networking equipment – whereas China has made market gains in the latter and is investing heavily in the former, particularly semiconductor R&D (Figure 2). In sum, a growing consumer appetite for IoT will increase India's dependency on China.

Figure 2: The IoT Value Chain



Source: FICCI and EY (2019). "Future of IoT".

RECOMMENDATIONS

India's import dependencies, particularly on Chinese network equipment and devices, are potentially its greatest economic vulnerability.[33] While

[33] *According to Deloitte Touche Tohmatsu (2018), India's electronics import bill will likely surpass the oil import bill by 2020.*

there is no panacea, identification of such dependencies is a starting point. Moreover, past experiences – some of which are documented here – must be used for developing conceptual clarity. And known trends can be leveraged as opportunities to sharpen policies. In this context, some areas worth exploring are highlighted below:

Sequencing technology transitions with development of manufacturing capabilities: India will undergo several technology transitions over the next decade. These include future areas such as technology infrastructure deployment to support digital terrestrial transmission of TV broadcasts, where complementary local manufacturing capacities can be easily developed. Equally, experiences from ICT markets highlight that mandates such as data centre localisation may in fact exacerbate trade vulnerabilities in the absence of the ability to phase local manufacturing with industry and retail sector demand for data services (a large part of this demand also stems from expansive presence and demand for Chinese content platforms in India).

Deploying domestic standards strategically: Technology transitions, such as the transition from 4G to 5G telecommunication services, also offer India a chance to take a leaf out of the Chinese playbook. Indian researchers have developed a cutting-edge 5G standard called Low Mobility Large Cell which can help domestic manufacturers create a competitive niche. Similarly, acceptance of Indian regional satellite navigation system NavIC by the 3rd Generation Partnership Project provides Indian companies an opportunity to design and develop products (including Integrated Circuits) based on indigenous standards (Times of India 2019).

Leveraging vernacular digital products: India's digital product industry competes with global industry on an equal footing. As this industry evolves and content becomes interactive, Chinese devices may flood Indian markets. India should explore non-tariff barriers, such as local language requirements, to enable domestic manufacturing of equipment. A ready template already exists in the case of virtual keyboards for mobile devices. In 2016, India added local language support for mobile phones to the Schedule of "Electronics and Information Technology Goods (Requirement for Compulsory Registration) 2012 Order (Ministry of Electronics and Information Technology 2016).

Encouraging vertical integration while ensuring competition: Vertical integration in infrastructure markets helps unlock capital required for such businesses but triggers antitrust concerns (the Bell Telephone Company was broken up for this reason). A good way of balancing vertical integration and antitrust can be to mandate last-mile interoperability wherever possible – such as within digital addressable systems for Direct to Home broadcasters or infrastructure sharing among telecommunication providers.

Focusing on export competitiveness: Lastly, India has failed to offset imports of mobile equipment through an import substitution approach. One of the reasons for this is failure to achieve local economies of scale, something China has excelled at. Moreover, large mothership firms that help India integrate with GVCs will only invest in capacities for high-value component manufacturing locally if they are given incentives that outweigh the infrastructural and other cost disadvantages of manufacturing in India (as compared to China, Vietnam and so on). These incentives can be a combination of financial incentives like tax breaks and non-financial export incentives in order to promote the concept of making in India for the world.

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CHINA'S DIGITAL SILK ROAD: IMPLICATIONS FOR INDIA

Ananth Padmanabhan

INTRODUCTION

The maturing of China's internet ecosystem and the increasing presence of these players in India, coupled with the parallel competition from technology companies with Indian promoters that are often backed by Chinese venture capitalists and entrepreneurs, compels India to think more seriously about the direction that technology policy must take within the country as well as international positions that must be developed to place India as a global leader at the cusp of change. To add to the policy confusion, the Chinese model has often been projected as a dominant direction for India to adopt, with some technology leaders, industry bodies and policy thinkers calling for data localisation and other measures that will take India closer to this model. Opponents of this move have rightly argued that these recommendations arise from an incomplete understanding of how China managed to promote the Baidus and Tencents of the world. Hence, it becomes all the more important that an accurate perspective on the Chinese internet story be presented in India.

This paper begins with an independent assessment of the priorities and goals that India must keep in mind while designing tech policy. While many of these would have a bearing on our interaction with the Chinese internet ecosystem or the flexibilities offered to Chinese, among other, players within India's internet ecosystem, such bearing is not the primary focus here. Instead, the focus is on trillion-dollar economy projections made out recently and what India needs to do to get there. In this regard, two key themes have been identified for discussion here, namely, the need for an integrated data governance vision that goes beyond data protection, and the need for a rethink on how India regulates and formulates policies surrounding emerging technologies. Through this assessment, the paper also makes a deeper comparative argument: there is at least one key

lesson to imbibe from the Chinese experience, and one critical aspect of the Chinese internet evolution that must be wholly discarded. Thus, there is no one size fits all, but when it comes to learning from comparative models, there are no absolute untouchables either. India must develop a pragmatic vision towards tech policy that can help her achieve her aims and objectives without disturbing or eroding her constitutional fabric.

DATA GOVERNANCE

The rise of the data economy has had huge ramifications for both governments and businesses. Its impact ranges from reorganising human and labour relations to redesigning goods, services and policies (World Bank 2017). A recent World Bank Report identifies the practical utility of artificial intelligence (AI) and big data analytics in furthering each of the 17 sustainable development goals (World Bank 2019). The NITI Aayog's comprehensive National Strategy for Artificial Intelligence is a notable domestic research initiative that emphasises the centrality of data to emerging technologies. The National Data Sharing and Accessibility Policy, 2012 (NDSAP) had earlier highlighted the data crisis in India, noting in this regard that a large quantum of data generated using public funds by various national organizations and institutions remained inaccessible to civil society, although most such data may be non-sensitive in nature and could be used by the public for scientific, economic and developmental purposes.

In the years following the release of the NDSAP, the technologies available to process such data as well as the types of data we are contending with, have fundamentally undergone change. Interfaces have also changed, with the increasing push towards platformisation. Some of this shift is captured in Indian policy making through the push for the data.gov platform. An indigenous initiative that continues to evolve, this platform now has 148 departments (Centre and States combined) putting out data sets for public consumption. This platform is envisaged as an open government data platform that provides an opportunity for many more departments to come on board and publish datasets, documents, services, tools and applications collected by them. Much of what India needs to address on an urgent footing – the breaking of data silos, deepening digitisation, enhancing local

platforms, improving data quality ,etc. – can be tackled through similar platform-based thinking.

Besides changing perceptions of the digital interface, capabilities also have changed with advances in deep learning and machine learning techniques. At the core of these advances is the rise of big data. The NDSAP defines data as "a representation of information, numerical compilations and observations, documents, facts, maps, images, charts, tables and figures, concepts in digital and/or analog[ue] form." This technically correct definition does not appropriately reflect the granularity within data assets which renders some of them more important and some less. There is, in particular, no definition of "big data" contained in the document, though it is precisely the rise of big data that has served as a complete game-changer in enhancing the value of data.

Big data is best defined by its features, as the National Institute of Standards and Technology in the United States duly notes in its National Big Data Interoperability Framework. The key features in turn are volume (the usually massive size of these datasets); variety (data from multiple repositories, domains, or types); velocity (the rate of flow of data); volatility (the tendency of these data structures to change over time); and variability (the change in other characteristics). Big data's rise is the combined result of activity on social media platforms and other consumer-facing digital services as well as the increasing digitisation of internal processes within organisations. In parallel with this rise, advances in artificial intelligence and deep learning algorithms, and the transition to a semantic web – web 3.0 where machines rather than humans are capable of deriving meaning from the vast amounts of data shared online – have resulted in ascribing significant value to data in the digital age (World Bank 2019).

As a result, nations have increasingly started to perceive data generated within its shores – be it citizen data, organisational data, consumer data, or phenomenon data – as a natural resource or asset, much like oil and other tangible resources, and started making laws and policies along the lines of India's recent Personal Data Protection Bill or the European Union's General Data Protection Regulation. The various national approaches or strategies to protecting this resource, in turn, have important implications for data-driven innovation (Bastin and Wantz 2018) as well as trade

relations (Casalini and Lopez Gonzalez 2019). There is no finite and pre-defined set of themes that any such strategy must necessarily contend with. The choice of such themes is often based on the needs and gaps that a domestic setting must prioritise. Yet, insights from comparative policy-making experiences and approach documents help towards identifying certain patterns and commonality of themes.

For instance, most such strategies focus on building a data ecosystem. However, the emphasis on this proactive project varies depending on how much of this ecosystem already exists (Economic and Social Research Council 2018). In countries where substantial data resides in digital formats, the emphasis is likely to shift towards technical infrastructure for a data-enabled society (Centre for International Governance Innovation 2018). However, even when this is the case, data governance features as a recurring critical issue. This wide-ranging concept encapsulates sub-themes such as identification or creation of entities in charge of data within individual organizations and for the government as a whole; principles of accountability and division of roles and responsibilities within and outside such entities; overall standards and guidelines that govern how departments access, collect, use, safeguard and share data, and a clear process for developing and refining these over time; and transparency measures to ensure that citizens are aware of the government's management and use of data (Government of Canada 2018).

Other recurring themes are the guarantee of data quality and interoperability, privacy and security standards and ethical governance, continuous improvement of the data ecosystem and data governance practises through cyclical feedback mechanisms, and data literacy and skills upgradation (Government of the United States 2019). The draft action plan for the first year, released by the US Federal Government for public comments in June 2019, in pursuance of the federal data strategy, captures many of these themes while indicating the nature of measures required to address them. For instance, the draft plan recommends a cross-agency data council under the auspices of the Office of Management and Budget to coordinate across statutory offices on information policy development and implementation activities and to provide guidance on government-wide data standards and improvements. It also envisages a curated data

science training and credentialing catalogue, data ethics framework, data protection toolkit, repository of federal data strategy resources and tools, automated inventory tool and standard data catalogues as part of the execution framework (Government of the United States 2019). In Singapore, for many of these themes, technology itself emerges as the strategy on account of an outsized focus on digital products and services that are designed to tackle these themes while promoting e-governance (Crates 2017).

Therefore, to power up the digital economy, India needs to develop a data governance strategy rather than emulate policies of localisation and restrictions on cross-border data flows. Such strategy must address the key themes highlighted above. In a first step in this direction, the Ministry of Electronics and Information Technology has constituted a high-level committee to examine regulatory framework for non-personal data, including community data and anonymised data. It is imperative that the strategy arising from the committee's deliberations addresses current imperatives such as the creation of effective and trustworthy data exchanges, pathways toward data interoperability and consistent data standards, the enhancement of data quality, the minimisation of data silos, and the strengthening of state capacity and governance structures to attain these goals. At the same time, the Committee must not be immune to the security and privacy risks arising from mass gathering and processing of non-personal data (Narendran 2019).

Once the normative strategy is set, India also needs to develop an execution strategy that works well for the data ecosystem here. A particularly striking feature of this ecosystem is the extent of heterogeneity – social, cultural, religious, linguistic, economic, political, and across many other lines – in Indian society and the diversity of data and data patterns that this leads to. Hence, a centralised execution strategy for building up the requisite datasets that can make India a competitive player in a world powered by AI and Internet of Things appears to be a highly unrealistic possibility. Instead, India would do well to learn from the Chinese model of experimental and decentralised policy-making and execution. In the Chinese model, the idea is not to encourage freewheeling trial or error, or spontaneous policy diffusion. Instead, an experimentation-driven model entails purposeful

and coordinated activity geared to producing novel policy options which are then injected into official policymaking and then replicated on a larger scale. Thus, innovations happen at the implementation level and are then translated into policy rather than the other way (Heilmann 2008a). The major tools that China deploys to achieve this model of experimentation are experimental regulations, that is, interim regulations that are revised and finalised by formal legislation only after sufficient experience is gained during a trial period; experimental points, that is, limiting policy experimentation to a certain policy area or economic sector and carrying it out in limited experimental units; and experimental zones, that is, geographical units and jurisdictions that are vested with broad discretionary powers to generate or test new policy approaches (Heilmann 2008a).

Studies also indicate that the Chinese approach to local issues like health delivery is very localised, with ample room for policy tailoring and innovation by sub-national governments under a broad agreement over the ends of reform. While the health ministry sits at the apex of decision-making, the policy-making responsibility is divided across a range of actors at the local level. Take for instance, the Chinese experiments with rural health insurance, which was spearheaded in the 1990s by various sub-national entities through pilots that worked within the local setting. In its early phase, these pilots were arguably less of a success than expected but they provided information from ground up for a national pilot scheme. The latter scheme, when implemented in the early 2000s, that is, a decade later, allowed around 300 local governments to experiment with a range of implementation choices in scheme design (Husain 2017). The "scattergun approach" that this experimentation resulted in, provided a wealth of data to the Communist Party of China (CPC) on what would, could, and wouldn't work, and under what set of circumstances. Considering this element was the driving motive for the CPC's choice for a decentralised policy formulation model in the 1940s and early 50s, the health insurance reform experiment can be considered in sync with a longer history and political culture of an experimentation-driven outlook to policy (Heilmann 2008b). As one scholar has remarked: "…it is experimentation under hierarchy, that is, the volatile yet productive combination of decentralized experimentation with ad hoc central inference, resulting in the selective integration of local experiences into national policy-making, that is, the

key to understanding China's policy process" (Guy and Yongfei 2017). Emerging theoretical literature on complex adaptive systems highlights the benefits of this approach, including deeper and richer insights into the emergent order that stands generated when the collective action of smaller entities results in a whole that is greater and more complex than the sum of the parts (Husain 2017).

RESPONSIVE REGULATION

A 2018 report by the Startup India Initiative states: "The ecosystem comprises of over 14,600+ Startups, approximately 270 incubation & business acceleration programs, 200 global & domestic VC firms supporting home-grown startups, and a fast-growing community of 231 angel investors and eight angel networks. India also boasts of being home to the third largest unicorn community, with over 16 high valued startups having raised over [US]$17.27 billion funding, with overall valuation of over [US]$58 billion" (Department of Industrial Policy & Promotion 2018).

However, with this exponential growth comes a set of policy and regulatory challenges. First, government policy and the regulatory framework need to be aligned to enable the growth of a robust technological ecosystem, rather than impede it. Second, as various incidents post 2016 demonstrate the rise of the digital has created new vulnerabilities and new types of harm to individual and group rights. A digitally connected ecosystem is rife with security concerns, which become worse when digital literacy has not kept pace with digital use. Moreover, with personal data becoming a critical tool for monetisation and profiling, the incentive from both industry actors and the State to secure such data and respect individual privacy is quite low. Both the Facebook-Cambridge Analytica controversy and the unrestricted seeding of Aadhaar data in multiple databases to build a 360-degree view of citizens pose distinctive kinds of threats to individual and community rights. Therefore, respect for privacy and individual / community rights must be externally imposed with regulations playing a part in this process (Chang 2018; Khaira, Sethi and Sathe 2018). In short, developing an indigenous regulatory framework for new technologies is a pressing need for India. Three central principles are integral to this transition.

The *first principle* is to bear in mind is the need for a clear identification of the problem involved. For instance, the draft e-commerce policy released for discussion in 2019 defines "e-commerce" to include "buying, selling, marketing or distribution of (i) goods, including digital products and (ii) services; through electronic network." Evidently, this is an extremely wide definition that brings within regulatory control a wide range of activities from online retail to app-based health delivery. The document also attempts to make policy for a host of different problems – data; infrastructure development; e-commerce marketplace regulations such as anti-counterfeiting, anti-piracy and foreign direct investment; consumer protection; payment related issues; export promotion; and content liability exemption, among others. The concerns of social media are far removed from fashion retail, and consumer woes pertaining to online travel booking differ vastly from digital health solutions (Padmanabhan and Sinha 2019). The unfortunate result is a heavily diluted effort that portends regulatory overreach. To avoid this in the future, regulatory approach must shift course from deciding in advance the range of business activities that need regulation, to identifying the specific problem that proposed regulations must address under the first principle discussed above. Inability to do so would only cause apprehension and uncertainty for businesses and extremely ineffective and diluted protections for citizens.

The *second principle* involves adopting a risk-based and responsive regulatory approach. The bureaucratic instinct to play safe and apply a "precautionary principle" comes at the cost of innovation and entrepreneurship (Allen and Berg 2018). Moreover, because many new technologies have cross-cutting impact, even these decisions are taken in silos with one agency or regulator taking a more pro-technology view while another acts more restrictively. The changing stance on data localisation in India is a very good example. At the heart of this debate is whether private entities must be compelled to store the data of Indian citizens in servers located within India. A compelling rationale offered in support of this measure is that law enforcement officials find it difficult to investigate criminal misconduct when data resides in servers located elsewhere. Another rationale offered is the vulnerability to national security because of the possibility that foreign governments can spy on Indian citizens, taking advantage of the fact that their data resides in servers within their

jurisdictions. A third rationale argues that localisation can help advance a domestic artificial intelligence and data ecosystem, as done by China previously. But amidst these multiple narratives, there is no clear study from the Indian government or any of the regulators as to the extent of harm caused because of servers residing outside India, the less restrictive measures that could equally address any of these concerns, or the costs and benefits of compliance with this policy shift.

To address these concerns, regulation of emerging technologies should be risk-based and responsive. This new approach involves detecting undesirable or non-compliant behaviour, responding to that behaviour by developing tools and strategies, enforcing those tools and strategies on the ground, assessing their success or failure, and modifying approaches accordingly (Black and Baldwin 2010). By valuing these processes, the overall approach towards regulation changes in an organic manner. Risk assessment involves multi-stakeholder conversations and an engagement with data that goes beyond projected fears and growth narratives. It entails creating a mechanism meant to gather the requisite information, including engagement with technical bodies. Finally, it also brings about some consensus among different regulatory bodies regarding the kind of enquiry involved, if not the answers to such enquiry. A healthy debate on the risks surrounding a new technology is essential to the creation of a proportionate regulatory framework that best balances innovation and protection.

Finally, democratic principles and values too need to be respected when regulating technology or using it for governance. While many of governmental interventions do not come from a place of *mala fide* intent, it is important to be reminded often as a polity, and especially so for policy makers and regulators, that India is built on a foundation of democratic values and important constitutional safeguards. As our experience with Section 66-A of the Information Technology Act, 2000, subsequently struck down by the Supreme Court in *Shreya Singhal* vs *Union of India* demonstrates, the impetus to regulate online behaviour or technological innovation should not emanate from a deep-seated desire to command and control. Such desire is likely to result in unconstitutional behaviour and impermissible inroads into the fundamental rights of citizens, including

free speech and expression and the freedom to do business. While realities such as the virality of fake news in the age of social media raise serious concerns, responses cannot be built on the assumption that a strong State (like China) will put a stop to these concerns. Often, responses of this kind change the very dynamic of citizen-State engagement in a democracy, leading to possible misuse and a surveillance architecture that evokes fear. Thus, recently popularised Chinese interventions like a social credit system or the great firewall of China should not be the inspiration for Indian policymakers to follow.

To conclude, India needs to place considerable emphasis on data governance if she has to emerge as a significant player in the new technologies' realm. This entails not only a data protection law in sync with the realities consumers face but also a robust strategy with emphasis on remedying current gaps like the absence of reliable data exchanges, operation through data silos and poor data quality. Additionally, India needs to revamp its processes of policy making and regulation in the technology domain in the light of the principles highlighted above. It is only through these interventions that India can project herself as a nation with something significant to contribute when it comes to global norm setting in cutting edge areas like AI and IoT.

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ABOUT THE AUTHORS

Ambassador Ashok K. Kantha joined as Director of the Institute of Chinese Studies, Delhi, on 31 March 2017. A career diplomat, Ambassador Kantha was Ambassador of India to China until January 2016. Prior to this, he was Secretary (East) at the Ministry of External Affairs in New Delhi with responsibility for about 65 countries in India's extended neighbourhood. His previous assignments include High Commissioner of India to Sri Lanka and Malaysia, Consul General in Hong Kong, Deputy Chief of Mission in Kathmandu (Nepal) and Joint Secretary (East Asia) in the Ministry of External Affairs. Earlier, Ambassador Kantha served in different capacities at Indian missions in Singapore, China and the United States, and at headquarters in New Delhi.

In his diplomatic career spanning over 38 years, Ambassador Kantha specialised in Asian affairs, with particular focus on China. Apart from three assignments in China, he served as Joint Secretary (East Asia) and Director (China) at the Ministry of External Affairs for periods of four years each, closely involved in the formulation and implementation of India's foreign policy in respect of China and East Asia. He has an advanced certificate in Chinese language from National University of Singapore.

Ambassador Kantha joined the Indian Foreign Service in 1977.

Professor C. Raja Mohan is Director of the Institute of South Asian Studies at the National University of Singapore. Earlier, Professor Mohan was Professor of South Asian Studies at Jawaharlal Nehru University, New Delhi, and at the S Rajaratnam School of International Studies, Nanyang Technological University, Singapore.

Professor Mohan has been associated with a number of think tanks in New Delhi, including the Institute of Defence Studies and Analyses, the Centre for Policy Research and the Observer Research Foundation. He was also the founding director of Carnegie India, New Delhi – the sixth international centre of the Carnegie Endowment for International Peace, Washington DC. Professor Mohan was the Henry Alfred Kissinger Chair in International Affairs at the United States Library of Congress, Washington DC, from 2009 to 2010. He served on India's National Security Advisory

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Professor Mohan is one of India's leading commentators on India's foreign policy. He writes a regular column for the Indian Express and was earlier the Strategic Affairs Editor for The Hindu newspaper, Chennai. He is on the editorial boards of a number of Indian and international journals on world politics. Professor Mohan has a Master's degree in nuclear physics and a PhD in international relations. Among his recent books are *Samudra Manthan: Sino-Indian Rivalry in the Indo-Pacific* (2013) and *Modi's World: Expanding India's Sphere of Influence* (2015).

Dr Mareike Ohlberg is an analyst at the Mercator Institute for China Studies (MERICS) in Berlin. Her research is focused on China's digital policies as well as its influence operations in Europe. Dr Ohlberg holds a PhD in Chinese Studies from the University of Heidelberg and an MA from Columbia University. In her doctoral thesis, she analysed changes in China's global propaganda apparatus since 1978. She has spent several years in China and speaks and reads Chinese fluently.

Prior to joining MERICS, Dr Ohlberg spent a year as an An Wang Postdoctoral Fellow at the Fairbank Center for Chinese Studies at Harvard University and another year as a postdoctoral researcher at the Cheng Shewo Institute for Chinese Journalism at Shih Hsin University in Taipei, Taiwan. She is a frequent speaker at China-focused conferences and events around the world and has briefed various European policymakers on China's growing footprint in Europe.

Mr Dev Lewis is a Fellow and Program Lead at Digital Asia Hub as well as a Yenching Scholar at Peking University. His interests lie at the intersection of technology, politics, and policy, especially in Asia, and he is currently working on a project mapping the build out of social credit scores in China. Dev has an International Relations degree from Roger Williams University and studied Mandarin in Shanghai and Zhengzhou. He frequently writes for several regional publications and think tanks, and previously spent time at Gateway House, a foreign policy think tank in Mumbai, and Infosys China, an IT services multinational.

Mr Chan Jia Hao is a Research Analyst at the Institute of South Asian Studies, National University of Singapore. His current research interests lie in foreign technology (digital connectivity) and economic policy across the Asia-Pacific region. He has co-written a number of in-house working and insights papers on how strategic-technology initiatives like China's Digital Silk Road and the Blue Dot Network affects the South Asian and Southeast Asian neighbourhood.

Mr Chan's policy-related works has found its way to a broader international audience, with the Council on Foreign Relations (United States), Nikkei Asian Review (Japan), Lowy Institute (Australia), Lee Kuan Yew School of Public Policy, S. Rajaratnam School of International Studies, The Diplomat (Japan) and The Business Times (Singapore and ASEAN).

Mr Santosh Pai has been offering legal services to clients in the India-China corridor since 2010. His areas of interest include Chinese investments in India, India-China comparative law and policy, cross-cultural negotiations and board governance. He holds a BA, LLB (Honours) degree from the National Law School of India University, Bangalore, LLM (Chinese law) from Tsinghua University, Beijing, and an MBA from Vlerick University, Belgium (Peking University campus). His manuscript, *Practical Guide on Investing in India for Chinese Investors,* has been translated into Chinese and published by China Law Press.

Mr Pai is currently a partner at Link Legal, an Indian law firm. He is a member of the Confederation of Indian Industry's Core Group on China, teaches two courses on India-China business at the Indian Institute of Management-Shillong and volunteers at non-government organisations in his free time.

Mr Rajesh Ghosh is a Research Assistant at the Institute of Chinese Studies, Delhi. At the ICS, his current research includes Chinese investments to India, China's new foreign direct investment (FDI) law, Chinese venture capital (VC) and private equity (PE) presence in India's startup landscape, among others. He is currently compiling a dataset of China's FDI to India for 2000-2019 which captures important dimensions of valuation, industry, state, etc. He has also created a dataset of China's VC and PE investments into Indian startups. Both these datasets are regularly updated and used

as tracker of Chinese activities. During 2018-2019, Rajesh received a one-year scholarship to study Chinese at the National Taiwan Normal University, Taipei. Before that he was at the O.P Jindal Global University where he earned an MA (International Relations) and was awarded the silver medal for academic performance. He graduated from the University of Calcutta with a B.Com (Hons in Accountancy and Finance). He graduated first class.

Mr Vivan Sharan is Secretary of the Esya Centre, a New Delhi-based technology policy think-tank, where he directs programmes on intellectual property and the new economy. He is also a Partner at the Koan Advisory Group, a research and advocacy firm based which works with several Fortune 500 clients, international organisations and governments. He is an economist with diverse experience in the policy circuit.

Previously, Mr Sharan served as the Chief Executive of the Global Governance programme at the Observer Research Foundation (ORF) and as the Business Head of a sustainability company that ran India's first energy efficiency index. He is also a Visiting Fellow at ORF where he is involved with research on the digital economy and a member of several industry committees. Mr Sharan is on the Board of several technology-enabled companies.

Ms Yamini Jindal is an economist who specialises in International Economics. She has previously worked at the Department of Economics and Policy Research at the Reserve Bank of India. She currently handles trade and investment-related research.

Mr Ananth Padmanabhan is a visiting fellow at the Centre for Policy Research. His research interests are in the fields of technology policy, intellectual property rights, and innovation scholarship. He has authored a leading treatise, *Intellectual Property Rights: Infringement and Remedies* (LexisNexis, 2012), and co-edited an important volume, India as a Pioneer of Innovation (OUP, 2017).

Over the past few years, Mr Padmanabhan has critically examined the policy implications of a wide range of technologies and solutions including digital identities, blockchain, civilian drones, gene editing, and electric mobility, with special focus on ease of innovating in India. His chapter

on Big Data in a recent volume on Regulation in India: Design, Capacity, Performance (Hart Publishing, 2019), is part of a continuing initiative to examine the public law and regulatory dimensions of new technologies. It builds on his understanding of the Indian State and the Supreme Court within the constitutional context, explored through chapters in Rethinking Public Institutions in India (OUP, 2017), and the Oxford Handbook of the Indian Constitution (OUP, 2016).

Mr Padmanabhan engages in broader public conversations on the impact of technology through his opinion pieces in ThePrint, Livemint, Indian Express and other print/new media. He has practiced law in the Madras High Court and taught at several institutions including the National Law University, Jodhpur, and the National Law School of India University, Bengaluru.

He holds a Master's degree in Law from the University of Pennsylvania Law School and is presently completing his doctoral thesis on digital copyright at the same institution.

SYMPOSIUM PROGRAMME

CHINA'S DIGITAL SILK ROAD: IMPLICATIONS FOR INDIA

Wednesday, September 25, 2019 | Conference Room 2,
India International Centre, New Delhi

09:30 hrs	Registration and Tea/ Coffee

10:00 hrs	**Opening Session**

Welcome Remarks
Ambassador Ashok K. Kantha
Director, Institute of Chinese Studies

Prof. C. Raja Mohan
Director, Institute of South Asian Studies
National University of Singapore

Keynote Address
Mr. Amitabh Kant
Chief Executive Officer, NITI Aayog

Vote of Thanks
Mr. Pankaj Madan
Deputy Head and Head-Programmes
Konrad-Adenauer-Stiftung

10:45 hrs	Tea/ Coffee Break

11:00 hrs	**Session One–China's Digital Rise**

- *Internal and External Factors Driving China's Digital Rise*
- *Policy Framework Behind China's Digital Ambitions*
- *Key Players Implementing China's Digital Transformation*
- *Focus Areas for China's Digital Silk Road*

Chairperson
Dr. Rajeswari Pillai Rajagopalan
Distinguished Fellow and Head, Nuclear and Space Policy Initiative
Observer Research Foundation

Presenters
Domestic Sources of China's Digital Transformation
Dr. Mareike Ohlberg
Analyst, Mercator Institute for China Studies, Berlin

China's AI Strategy
Mr. Dev Lewis
Researcher, Digital Asia Hub, Hong Kong; and
Yenching Scholar, Peking University

China's Digital Geopolitics
Prof. C. Raja Mohan
Director, Institute of South Asian Studies
National University of Singapore

Discussions

13:00 hrs Lunch

14:00 hrs **Session Two–Impact on India**

- *Differences in Chinese Overseas Investments in the Digital Space and in Traditional Industries*
- *Growth of Chinese investments in India's Digital Economy*
- *Types of Risks Posed by Such Investments*
- *Adequacy of India's Current Regulatory Mechanisms to Deal with Such Risks*

Chairperson
Dr. Nalin Mehta
Executive Editor, Times of India Online

Presenters

Mapping China's Participation in India's Digital Economy
Mr. Santosh Pai
Partner, Link Legal India Law Services; and
Member, ICS Finance Committee

Impact on Indian Digital Ecosystem
Mr. Vivan Sharan
Secretary, Esya Centre

India's Policy Challenges
Mr. Ananth Padmanabhan
Fellow, Centre for Policy Research

Discussions

15:30 hrs **Wrap-up and Next Steps**

Mr. Santosh Pai
Partner, Link Legal India Law Services; and
Member, ICS Finance Committee

Prof. C. Raja Mohan
Director, Institute of South Asian Studies
National University of Singapore

16:00 hrs High Tea

16:30 hrs End of Event

ABOUT THE INSTITUTE OF CHINESE STUDIES, DELHI

The Institute of Chinese Studies, Delhi (ICS) is one of the oldest research institutions on China and East Asia in India. With support from the Ministry of External Affairs, Government of India, it is the mandate of the ICS to develop a strategic vision for India's dealings with China and to help adapt India's priorities quickly and appropriately to address the research and educational demands arising from China's emergence.

The ICS seeks to promote interdisciplinary study and research on China and the rest of East Asia with a focus on expertise in China's domestic politics, international relations, economy, history, health, education, border studies, language and culture, and on India-China comparative studies. It also looks to fostering active links with business, media, government and non-governmental organisations in India through applied research, executive training programmes, and seminars and conferences, and to serve as a repository of knowledge and data grounded in first-hand research on Chinese politics, economy, international relations, society and culture.

ABOUT THE INSTITUTE OF SOUTH ASIAN STUDIES, SINGAPORE

The Institute of South Asian Studies (ISAS) is dedicated to research on contemporary South Asia.

It was established in July 2004 as an autonomous research institute at the National University of Singapore. The establishment of ISAS reflects the increasing economic and political importance of South Asia, and the strong historical links between South Asia and Southeast Asia.

The Institute seeks to promote understanding of this vital region of the world, and to communicate knowledge and insights about it to policymakers, the business community, academia and civil society, in Singapore and beyond.

ABOUT THE KONRAD-ADENAUER-STIFTUNG

The KAS is a political foundation, with a strong presence throughout Germany and all over the world. We cooperate with governmental institutions, political parties and civil society organizations building strong partnerships along the way. In particular we seek to intensify political cooperation in the area of development cooperation at the national and international levels on the foundations of our objectives and values. Together with our partners we make a contribution to the creation of an international order that enables every country to develop in freedom and under its own responsibility.

ABOUT THE INDIA INTERNATIONAL CENTRE

The India International Centre is one of India's premier cultural institution. The Centre stands for a vision that looks at India as a place where it is possible to initiate dialogues in an atmosphere of amity and understanding. The Centre's dedication to the values of liberal humanism is best reflected in its activities and calendar of events. These cover a wide range, from lectures, seminars, panel discussions, international and national conferences to a variety of cultural events of music, cinema, performing and visual arts, both classical and folk. Entry to these is not restricted to members as all its programmes are open to the wider public of the city.

This report summarises the discussions at a symposium titled 'China's Digital Silk Road: Implications for India' held in New Delhi on 25 September 2019. The symposium was organised by the Institute of Chinese Studies, Institute of South Asian Studies at the National University of Singapore, Konrad-Adenauer-Stiftung and the India International Centre.

The symposium sought to address a major gap in the Indian discourse on China's Belt and Road Initiative (BRI). Although there has been a vigorous engagement with the BRI, India has not paid enough attention to its digital dimension. The chief objectives of the symposium were to:

- assess the emergence of China as a digital powerhouse;
- examine the growing global impact of its digital strategy; and
- distill the potential implications for India.

cover image: Cuenta Defy/Zedge