



Perspectives by The Boston Consulting Group



THE BOSTON CONSULTING GROUP

SHAPING INDIA'S FUTURE. TOGETHER.

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FOREWORD

This year, The Boston Consulting Group completes 20 years in India. When we had set up our first office in India, the Indian GDP was less than INR 14 trillion whereas today it is more than INR 135 trillion—with an average real GDP growth rate of 6.5% over two decades—among the highest in the world. In 1996, no Indian company was in the Fortune 500 list. Today, there are seven. The government expenditure on public service delivery has grown 8 fold over this period and India's score on the Human Development Index has gone from 0.46 to 0.61.

In the last two decades, BCG India has grown from 5 people serving a handful of clients to over one thousand people partnering with more than 150 clients. We have been privileged to partner with large private companies, family owned businesses and public sector units, emerging challengers and young startups, central and state governments and not for profit organizations. We have collaborated with our clients to deliver industry shaping insights across a wide range of topics—ranging from strategy to transformation to digital. In every engagement with our clients, we strive to bring to life new ideas that will transform businesses and create lasting impact—for our clients, their partner ecosystem and most significantly, the lives of millions of Indians.

Ever since BCG was founded in 1963, we have been advising leaders and their organizations to be proactive, to take decisive action, and to seize the day boldly and collaboratively. This is what we mean by 'Shaping the Future. Together.'

The next twenty years are going to be as critical, if not more, as the past twenty years in realizing India's true potential. Sustaining growth in this vulnerable, uncertain, complex and ambiguous environment will be a formidable challenge. Furthermore, it is important to ensure that growth is not just sustainable but also equitable and balanced. As a nation, India needs to focus on building capabilities and ensuring that people live valued and valuable lives.

To mark the 20 years of BCG in India and to help its leaders to navigate the next two decades, we have discussed, debated and assembled a set of short essays that suggest a roadmap to shape India's future. The perspectives in these essays draw inspiration from our assessment of global trends and how these will impact India, BCG's work in India and globally, our belief in the value of local innovation, and the power of a few to make a difference. We hope these perspectives will help initiate a dialogue, raise potential solutions, and challenge the status quo to build a strong foundation for the India of 1.2 billion dreams. We look forward to working with our clients and society on Shaping India's Future. Together.

Rich Lesser

President and CEO

The Boston Consulting Group

INTRODUCTION

“The future depends on what we do in the present”

-Mahatma Gandhi

‘Where will India be in twenty years?’ This is a common question discussed and debated in many forums. In almost all situations, the answer involves making comparisons to other countries, most often on the basis of per capita income and growth. In a few situations, the discussion is more nuanced and examines the underlying drivers: savings and investment levels, physical and social infrastructure, nature of governance, and government. These comparisons are based on the fundamental premise that there is a broadly predestined path to growth and transformation.

We believe that the central question regarding India’s future should move from ‘What is India’s potential?’ to ‘How can India’s true potential be unleashed?’ The answer to this may draw some inspiration from other countries’ journeys but has to be more driven by the current global context and India’s starting position. Most importantly, we believe that the future is not predestined and our collective actions in the present will transform India. In this book, we lay out how to Shape India’s Future. Together.

India’s context in the next two decades is going to be very different than most other countries at a similar stage of economic development. As one thinks about their role in transforming India, it is critical to develop a balanced understanding of the megatrends that will shape this context. Driving India’s economic growth requires identifying a set of sectors that have large and underexploited potential, laying a roadmap to achieve global relevance, and then executing flawlessly to get desired results. This transformation would be incomplete without creating the required infrastructure, both physical and social. This involves building the transportation and technology infrastructure as well as a healthcare and education system that delivers. Finally, India’s transformation is not a onetime action but an ongoing journey that will require building capabilities to achieve the India of our dreams.

This book is organized in four sections through a series of short essays that lay out a perspective on realizing

India’s full potential. These have been conceived as part of a joint series written for the publication *Mint* and have appeared in the same.

Megatrends: Setting the context

The first theme presents megatrends that will influence India’s journey. These trends represent global and local opportunities available to India as well as challenges that need to be addressed. The first trend lays out the changing face of globalization and what this means for the economic and development potential of India. The second trend establishes how the rise of the new Indian consumer impacts not only economic consumption but changes the mode of engagement between the consumer and the organization. The third defines the shape of future enterprises by exploring entrepreneurship and the startup generation and implications for business and society. The fourth trend examines the rapidly changing technological innovations to describe the building blocks available to spur industrial growth. Finally, the fifth trend discusses the challenge of balancing sustainability and economic development. Collectively, these trends are introduced to set the context for transformation and help determine the priorities for policymakers going forward, along with the tools available to the public and private sector.

Industry 2035: Driving economic growth

This section identifies the sectors and industries that will be the engines of future economic growth for India. We have identified sectors that have the potential to create significant economic impact and generate employment, and where India has the potential to be globally competitive and relevant. We share our perspective on five sectors of significance. These are (a) agribusiness where India is uniquely advantaged and could emerge to global significance, (b) manufacturing where technology changes and the ‘new’ globalization would require India to have a different mindset and approach than the Asian tigers and China, (c) IT services where India has been at the forefront globally but where it needs to set the tone

for the next wave of change, (d) retail which is a large employment generator and where India has the potential to leapfrog decades and (e) financial services which is not only a critical sector by itself but also a key enabler for economic growth. Each essay articulates the logic for why the sector is relevant and what the opportunities are, why India is advantaged to become a key player and what it will take to realize the potential.

Infrastructure: Laying the foundation

In this section we highlight both the physical and the social infrastructure that needs to be built in order to ensure India's competitiveness going forward. Infrastructure has been a priority for the public and private sector over the last two decades. However, the route to building it has been largely unchanged. As we move into the 21st century with new challenges and opportunities transforming the business, policy and people landscape, we look at the new requirements of this physical and social infrastructure and ways to leapfrog a generation to effectively meet these needs. We focus on traditional physical infrastructure of roads, rails, ports, energy, telecom as well as social infrastructure of education and skilling, healthcare and nutrition.

Capabilities: Developing tools for transformation

In this section we share our perspective on making this transformation a reality. We believe that achieving economic and social aspirations will require building capabilities at individual organizations, different levels of government and in the broader society. If India truly wants to build the industry of the future and the infrastructure to support it, there are a few critical capability gaps to be bridged. How do we build a leadership culture to make this happen? What digital capabilities will we need in order to leverage the technological innovations happening across the board? How do we build a culture of quality and excellence in everything that we do? How do we ensure operational efficiency and elimination of wastage to make this journey viable? How do we make large-scale change a reality?

We believe that it is critical for all four of these elements to come together in order to shape the India of tomorrow. This book is a call to action to the many stakeholders including the government, business community and nonprofit organizations but most importantly for each Indian as an individual.



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RIDING THE NEXT WAVE OF GLOBALIZATION

POLICY PRIORITIES FOR INDIA

India's policies are being crafted to help strengthen its competitive advantage in a globalizing world. But what happens if the basis of that globalization changes? The United Kingdom's decision to exit the European Union—popularly termed as Brexit—has been touted as an indicator of the end of globalization. While we believe this view is rather extreme, our research concludes that the nature of globalization is indeed changing. In order to thrive in the next phase of globalization, India needs to act quickly—and differently.

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DR. ARINDAM BHATTACHARYA
Senior Partner and Director, The Boston Consulting Group

Globalization in the past

India was a big beneficiary of the initial globalization phase starting in the late 1980s that led to rapid economic growth in Emerging Markets (EM) on the back of outsourcing and trade. This phase witnessed the widespread adoption of the Internet, the outsourcing of low-cost manufacturing and services and the development of globally integrated supply chains.

Consequently, India's Gross Domestic Product (GDP) expanded at a Compound Annual Growth Rate (CAGR) of 6.5% between 1990 and 2010. This represented a significant improvement over the 4.3% average economic growth recorded between 1970 and 1990. Export of services to developed economies accounted for the bulk of this expansion, with the share of services jumping from 40.3% of GDP in 1980 to 45% in 1990, and to 55% in 2010. Services export growth almost quadrupled from 4.5% during the 1980-1990 period to 17.5% between 1990 and 2010. India's integration with the global economy was made possible by the liberalization reforms initiated as a result of the International Monetary Fund's (IMF's) structural adjustment programs in the early 1990s. Further, institutions such as the World Trade Organization (WTO) which were set up to create uniform 'rules of the game' enabled greater trade between countries.

This model of globalization prevalent since the late 1980s was, however, not unique. Our study of globaliza-

tion, spanning the late 1800s to date, shows that globalization has phases of growth and periods of transition, usually triggered by a crisis event. Although each phase differs from the previous one, all of them follow the same model. This model comprises three forces (see Exhibit 1).

First—A new 'technology' (referred to in the broadest sense) was leveraged by a country or a set of countries to boost productivity and output.

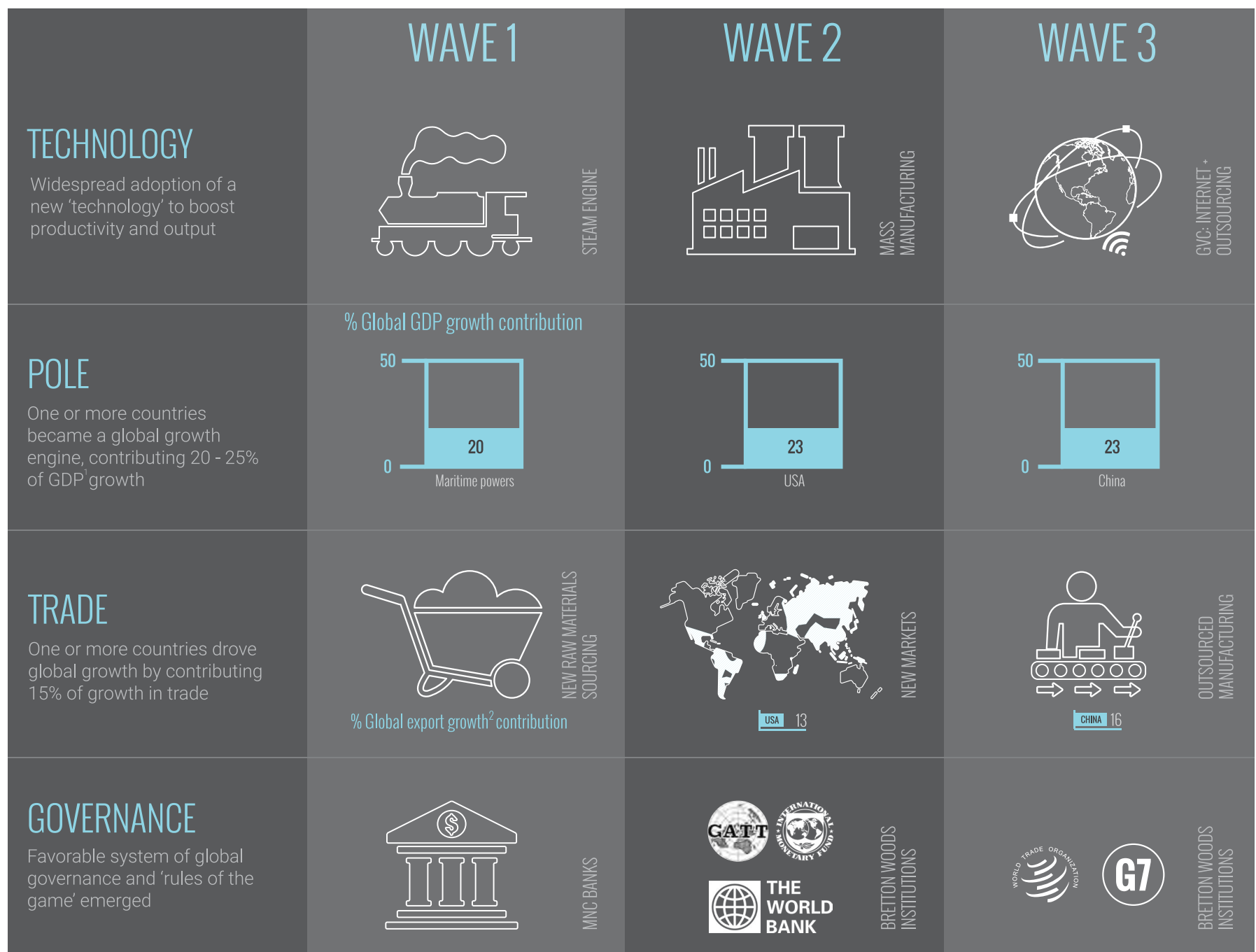
Second—One or more countries served as an economic 'pole' and became the global growth engine. Western European countries, the United States and China played this role in the first, second and third phases of globalization, respectively, driving 20% to 25% of world GDP growth and around 15% of the growth in global trade. This, in turn, fueled economic activity in other countries, especially the trading partners of the 'poles'.

Third—A favorable system of global governance facilitated cross-border financial flows and trade through the enforcement of stable 'rules of the game'.

Together, these forces have fostered a virtuous cycle of economic growth and greater global integration, ensuring that global economics takes precedence over local politics.

However, our research shows that this model of globalization is unlikely to repeat itself. New, emerging

EXHIBIT 1: THE OLD MODEL OF GLOBALIZATION



1. PPP adjusted; 2. Current US\$ values deflated by World GDP deflator to convert to 2005 US\$
Source: Angus Maddison, Penn World Tables, UNCTAD, BCG Analysis

technologies are expected to see fundamentally different adoption patterns from those seen in the previous waves. And governance structures will undergo transformative changes, necessitating compliance with multiple, often conflicting, global rules.

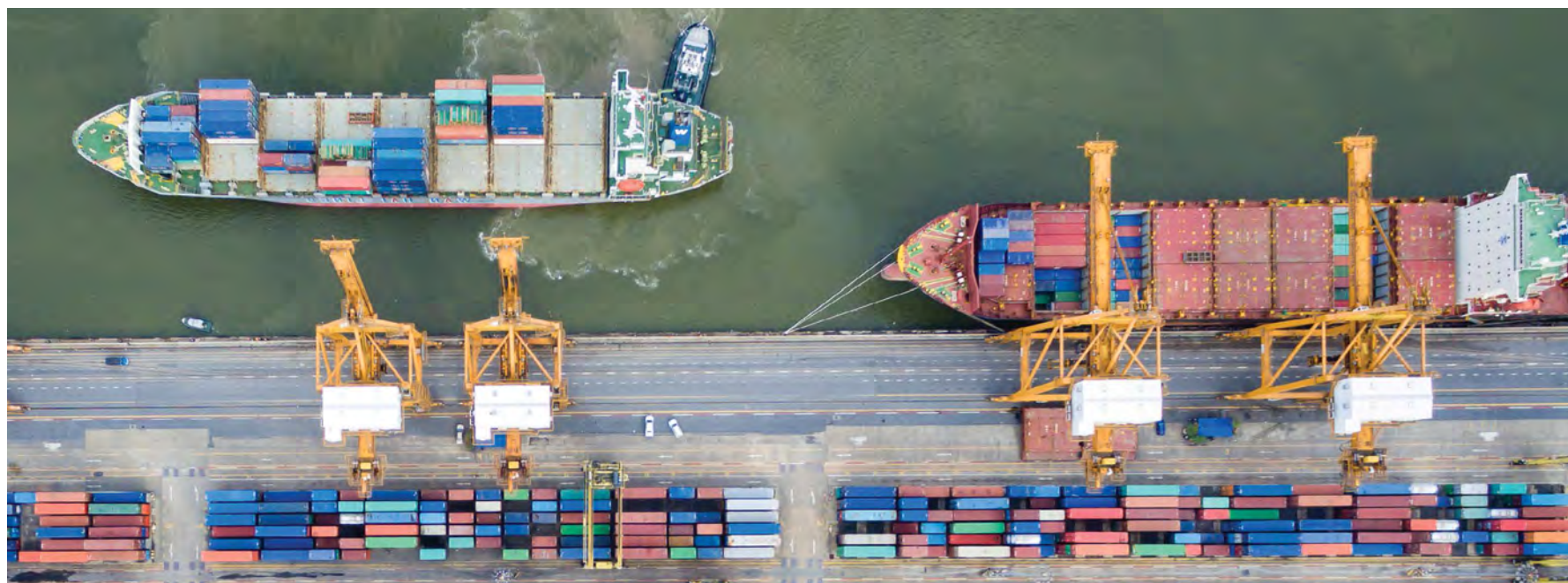
Globalization: What next?

Technological disruption: While emerging new digital technologies (robotics, digital services, global platforms) are beginning to impact productivity, they will not be able to create the same virtuous cycle of rapid economic growth through trading of goods so as to create a new global growth pole. Unlike in the past, digital technologies are not dominated by one or few countries. This marks a major deviation from previous cycles, where countries such as the US and China leveraged their competitive advantages in mass manufacturing and low-cost

production respectively, to emerge as the world's economic 'pole'. Furthermore, the adoption of digital technologies across various industries will result in more localized manufacturing and globalized services, giving rise to very different trade patterns.

Additionally, rapid, large-scale replacement of old manufacturing technologies by newer, digital ones is unlikely, given the growing unavailability of enough skilled workers like robot programmers. Rising income inequality and the need to protect jobs could also bring in stringent regulations, slowing down the adoption of disruptive technologies.

New governance structures: The stable rules of the game set by the Bretton Woods Institutions and the Group of Seven (G7) Nations is now changing, with the Group of 20 (G20) States playing an increasingly influen-



tial role. This is likely to create new winners and losers. In the previous phases of globalization, there was a fair degree of long-term alignment between economics and politics. Today, the WTO-governed free-trade regime is making way for more bilateral and regional partnerships and possibly, for mega regional and sub-regional trade agreements like the Trans-Pacific Partnership (TPP) and the Regional Comprehensive Economic Partnership (RCEP), although the latter have been stalled. There is growing protectionism across both developed and emerging markets. The multilateral financial architecture is getting decentralized, with China and other prominent developing countries teaming up to establish new institutions such as the Asian Infrastructure Investment Bank (AIIB) and the New Development Bank (NDB). There is also growing influence of state capitalism on capital allocation worldwide, through multiple levers such as direct acquisition of private companies, investments via sovereign wealth funds and loans and subsidies for the development of certain domestic industries.

The fourth wave of globalization

These shifts in geopolitics and the trade and financial architecture point to a growing divergence between economics and politics. This has the potential to create greater uncertainty and volatility, as well as a country-region centricity in decision making, hindering global integration. The market is losing ground to the state and labor advantage is giving way to digital advantage. These trends are driving the emergence of a new model of globalization.

It is unlikely that export-led trade growth, a core feature of the old model, will continue to be the primary driver of GDP growth going forward. The new model will be different on all three key dimensions.

Growth: The new model will see a shift away from the 'pole' model of economic growth, and the vocabulary of

developed economies versus EMs, to that of a multi-polar world. Countries will have varied growth trajectories, with many EMs becoming less reliant on exports and focusing more on boosting domestic demand. Meanwhile, DEs and China are likely to grow through greater increases in productivity and de-bottlenecking of the economy through internal structural reforms.

Technology: In the previous phase, global value chains were designed to be cost-optimized and relied on a dominant technology of low-cost manufacturing driven by labor cost advantage in emerging economies. In the next phase, these will give way to complex multi-technology value chains that blend digital technology with earlier low-cost technologies. We will also see greater integration across products and services. Moreover, global platforms (e.g. marketplaces like Amazon and Alibaba) are likely to assume increasing importance, as companies rely on these platforms for the exchange of goods and services, rather than investing in their own asset-heavy supply chains.

Governance: The 'rules of the game' will become more complex with the emergence of a multi-institutional governance architecture, wherein regional and local regulations will coexist alongside global rules, balancing national political interests with global multilateral economic agendas.

What does this mean for India?

New policies currently being enacted will allow India to build global competitive advantages going forward. However, these policies are unlikely to yield maximum payoffs unless they can be reset for the next phase of globalization. The emerging fourth wave of globalization requires India to dramatically rethink its policy priorities for the next 15 to 20 years:

Decoding policy implications for India: The most important one, perhaps, is that the low-cost manufacturing

driven growth model—based on exports to developed countries, followed by China and many other developing countries since the 1990s, is likely coming to the end of its ‘lifecycle’. Hence, for India to ensure sustained, medium-to-high level of growth, the primary policy thrust has to be on shoring up domestic demand, as opposed to relying on external trade. This does not mean that international trade will stop playing an important role, especially since the wide-ranging impact of ongoing technological shifts will take at least 10 to 15 years to play out. Stimulating domestic demand will require identifying services sectors ripe for ‘local production for local consumption model’, such as tourism and healthcare and incentivizing of investments by improving the ease of doing business and driving greater fiscal consolidation. Large-scale, internal reforms will be the most critical driver for boosting domestic consumption and the ramping up of domestic investments will be equally important as attracting Foreign Direct Investment (FDI).

Fundamental shifts in the drivers of growth

Shifting income pyramid: The proportion of households belonging to the bottom two income quintiles fell by 1.5% in the last 10 years, whereas that of the top two quintiles grew by 2.5% over the same period. Per capita incomes are projected to rise by 5% per annum with average household incomes expected to grow by 1.5x over the next decade, leading to a surge in domestic consumption power.

Digital boom: Rising adoption of digital technologies and associated services is another potential growth driver for India. While GDP has grown at 6% per year over the last four years, the services share of GDP during the same time frame has increased by 3.6%. The IT and ITES sector’s share has increased to 9.5%, implying rapid growth in digital technologies and associated services. Export of digitally-enabled services has grown by 12% annually over the last 10 years, also pointing to this trend as a key lever that will drive growth.

Expanding urban agglomerations: India’s urban population has nearly doubled since the start of the third phase of globalization in 1990, from approximately 220 million to 420 million currently. In comparison, the overall national population grew by 50% only over the given time frame. The number of million-plus urban agglomerations increased from 35 in 2001 to 53 in 2011, pointing to the rapid scale of urbanization. These structural shifts will result in a significantly different GDP growth trajectory, driven by new consumption and production patterns and hence, necessitate answering the following key questions to drive policymaking.

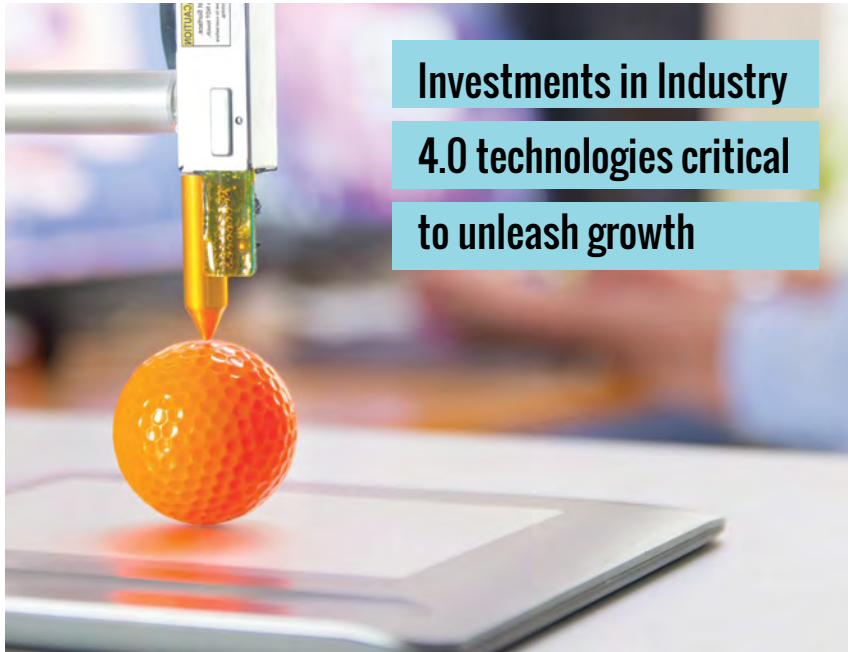
How do we drive growth? The ambitious Make in India initiative, geared toward establishing the country as a low-cost manufacturing hub, has to evolve from a 20th century mindset and strategy, to embrace the opportunities presented by the digital 21st century. The

industrial landscape of the future will see a large number of small-scale, reconfigurable plants closer to home markets, coexisting alongside large, asset intensive and highly automated plants with very few workers. Highly competitive Small and Medium Enterprises (SMEs) will be central to the growth of the manufacturing sector over the next two decades. A supportive policy regime that not only addresses the sector’s myriad problems but also incentivizes the adoption of digital technologies, collectively called Industry 4.0, which will be critical for success.

Where will jobs be created? Conventional wisdom based on the experience of many EMs, has been that manufacturing will create jobs in India, given its current levels of economic maturity. However, we believe India needs to recalibrate its job creation strategy. Industrial activity will continue to create jobs but not at the same pace as in the past. As manufacturers big and small embrace digital technologies to remain competitive, they will shed jobs. At the same time, there will be a dramatic growth in both digital and non-digital services, centered on manufactured products, as the boundaries between products and services blur. Understanding this huge structural shift and putting a policy framework in place that facilitates their growth will be critical. Under-penetrated non-manufacturing services sectors such as construction, tourism and healthcare will have to be at the forefront of this push for creating both growth and new jobs. To illustrate the immense potential of services, consider the tourism sector. In 2015, world-wide tourist receipts outpaced global GDP growth to rise by 3.6%, to over \$1.2 trillion, driving income growth in multiple sectors including accommodation, food and drinks (beverages), shopping and entertainment.

How do we create a future-ready workforce? Skilling must continue being a critical focus area for the government. However, skill development needs to move away from the traditional model of vocational training. With the rise of digital technologies, job profiles of the future will be very different. As traditional labor tasks get automated, workers will need to do increasingly complex activities and will need the skill sets to learn quickly and on-the-job. We will see the need for people who are drone programmers, robot worker managers and so-called ‘professional tribers’ (those who assemble free-lance teams quickly). Policy makers must revamp India’s skilling programs to prepare the domestic workforce to deal with these requirements.

What kind of infrastructure is needed? Infrastructure investments will be critical for India to sustain its pace of economic growth. The country needs to develop a plan for leapfrogging traditional infrastructure into the 21st century. How can we leverage newer technologies such as 3D printing to bypass conventional methods of infrastructure development and become future-ready faster, and cheaper? Beyond physical infrastructure, large-scale investments in technology backbones will be required to



Investments in Industry

4.0 technologies critical

to unleash growth

ensure competitiveness; be it robots, sensors and cloud computing for manufacturing, or high-speed connectivity and data pathways for supporting the global services industry.

How will changing geopolitics impact us? Global trade is increasingly being governed by bilateral and multi-lateral trade agreements that are altering market dynamics. For example, if the planned TPP passes, it will shift manufacturing competitiveness as additional trade benefits will be provided only to companies located in member countries. Additionally, intra-EM trade is becoming the fastest growing trade route and the driver of global commerce. Against this backdrop, how should India think about its own membership in key agreements? Should we consider extending our links with key regions such as South East Asia and the Middle East? As new development banks and infrastructure investment funds such as AIIB and NDB become more powerful and strategically relevant, India must assess its representation in such forums vis-a-vis traditional multilateral ones like the World Bank and the IMF.

Conclusion

The fourth phase of globalization will play out over the next 15 to 20 years. Navigating this phase requires key policy changes and a new set of policy priorities in order to maintain and build competitiveness. The time is ripe to develop the 15-year vision that PM Modi has asked Niti Aayog for, and it is critical that this plan is built to win in the fourth phase of globalization.

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THE NEW INDIAN

THE RISE OF ASPIRATIONS AND MORE

India is poised to become the third largest consuming economy. Decoding the shape of this growth will prove to be as crucial as understanding the size of the opportunity. The traditional elements of income increase, urbanization and nuclearization will soon be supplemented by emergent trends that can reshape economic and social outcomes. Digital, as a megatrend, will impact the new Indian across all aspects of her life. As we evolve as a country, there is increased pride in being Indian. The traditional unit of analysis is shifting from the family to the individual. Women are increasingly becoming an important demographic force. One size will no longer fit all, as organizations will be forced to rethink their operating model. Understanding the new consumer and citizen is going to be critical to unlock India's potential.

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ABHEEK SINGHI

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NIMISHA JAIN

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Kavita is a 35-year-old primary school teacher living in Nagpur. Her husband, Prakash, is an accountant working with a trading company. Together they earn about INR 90,000 per month. Their daughter Roshni, aged 8, attends an English-medium, ICSE School. They are all busy on weekdays, but do go out for lunch, movies, or for shopping on Sundays—Roshni calls it their 'funday'. The INR 90,000 income may not seem like a lot, but it is a big jump for Kavita, whose parents belonged to the lower middle class income segment.

Kavita grew up in a joint family in Ramtek, a small town near Nagpur, Maharashtra. Her father was a clerk with a public sector bank, while her mother was a housewife. Kavita's mother never went beyond primary school herself, but she made sure her daughter completed her graduation. She had to fight with the elders in the family for Kavita to do so. Roshni's dream is to study at a premier medical school and become a doctor. Kavita is already saving up so she can turn her daughter's dream into reality. This is not just Kavita's story. This is the story of millions of Indians whose lives have improved from a generation ago—with respect to areas like income and education—and who continue to aspire to a better standard of living.

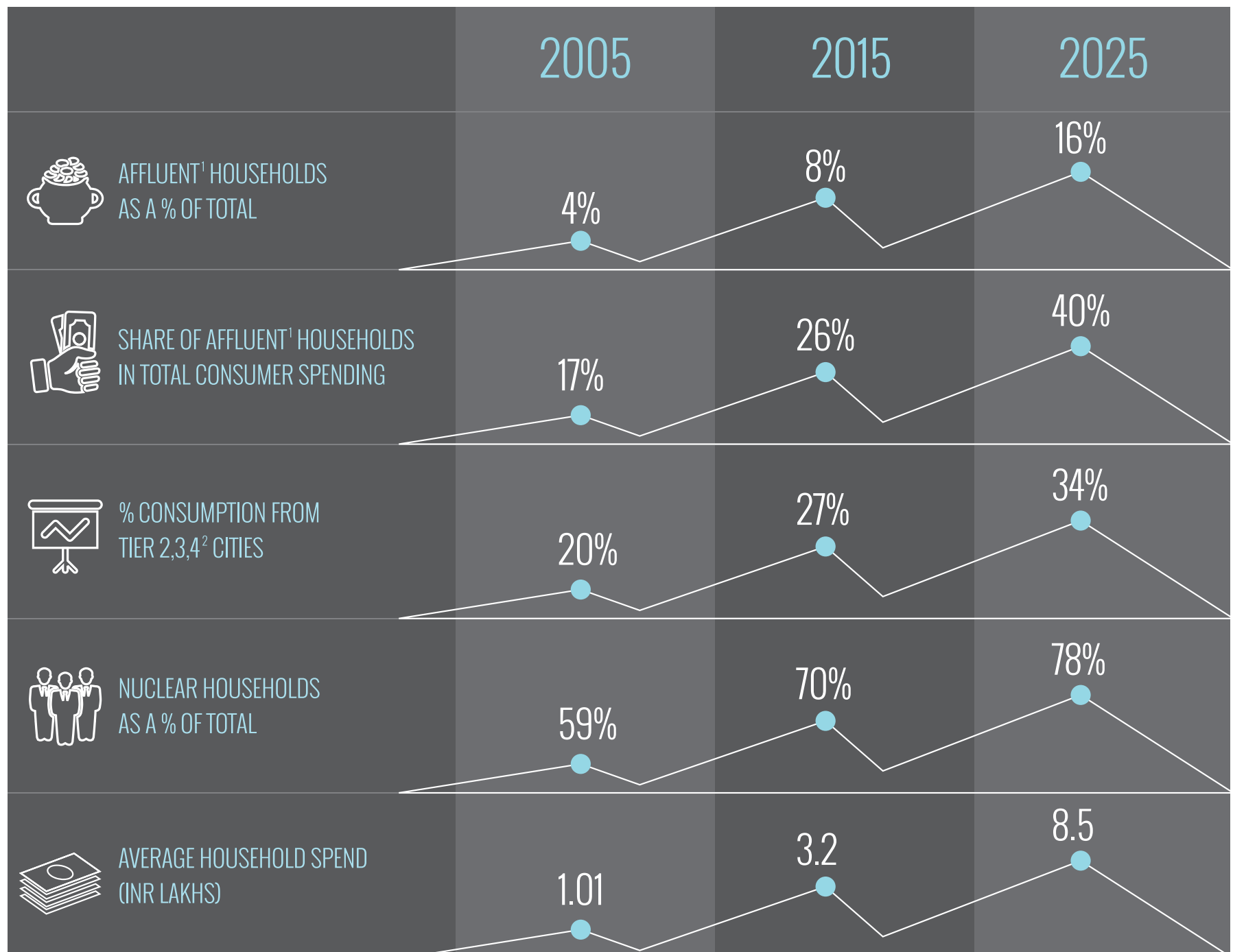
Most of the narrative on the Indian consumer focuses on how the INR 83 trillion consumption economy is poised to grow in double digits so as to become the

third-largest in the world in the next decade. No doubt, the numbers on the size of the consumer economy are mind boggling—the consumption by Indians has increased more than three-fold in the last 10 years and is poised for similar growth in the next decade, leading to a ten-fold increase in twenty years—a feat of this scale has occurred very few times in human history!

We believe that the full discussion on the above should not only look at the size of the opportunity, but also understand the shape of this opportunity and underlying consumer trends. The shape of the consumption function has changed and will continue to evolve in the coming decades. Some of these are secular trends from the past, increasing at a steady pace—and shall become noticeably significant in the next decade.

Rise of the 'affluent middle-class': Historically, and even in 2015, the largest set of Indian consumers have been those belonging to the 'next billion' income segment, accounting for 45% of the population and 39% of total spends. The Indian middle class—which held promise for many companies since the mid-90's—has been growing but has never been the largest segment. However, by 2025, the 'affluent' consumer segment will become the largest, accounting for about 40% of all Indian consumption, (up from about 26% in 2015). This segment resembles the global middle-class consumer, and would herald the rise of the Indian

EXHIBIT 2: THE CHANGING FACE OF INDIAN CONSUMERS



1. Annual household income > INR 10 lakhs at 2015 prices
2. Cities with population between 0.5 and 10 lakhs

middle class in its most literal sense for the first ever time. (see Exhibit 2)

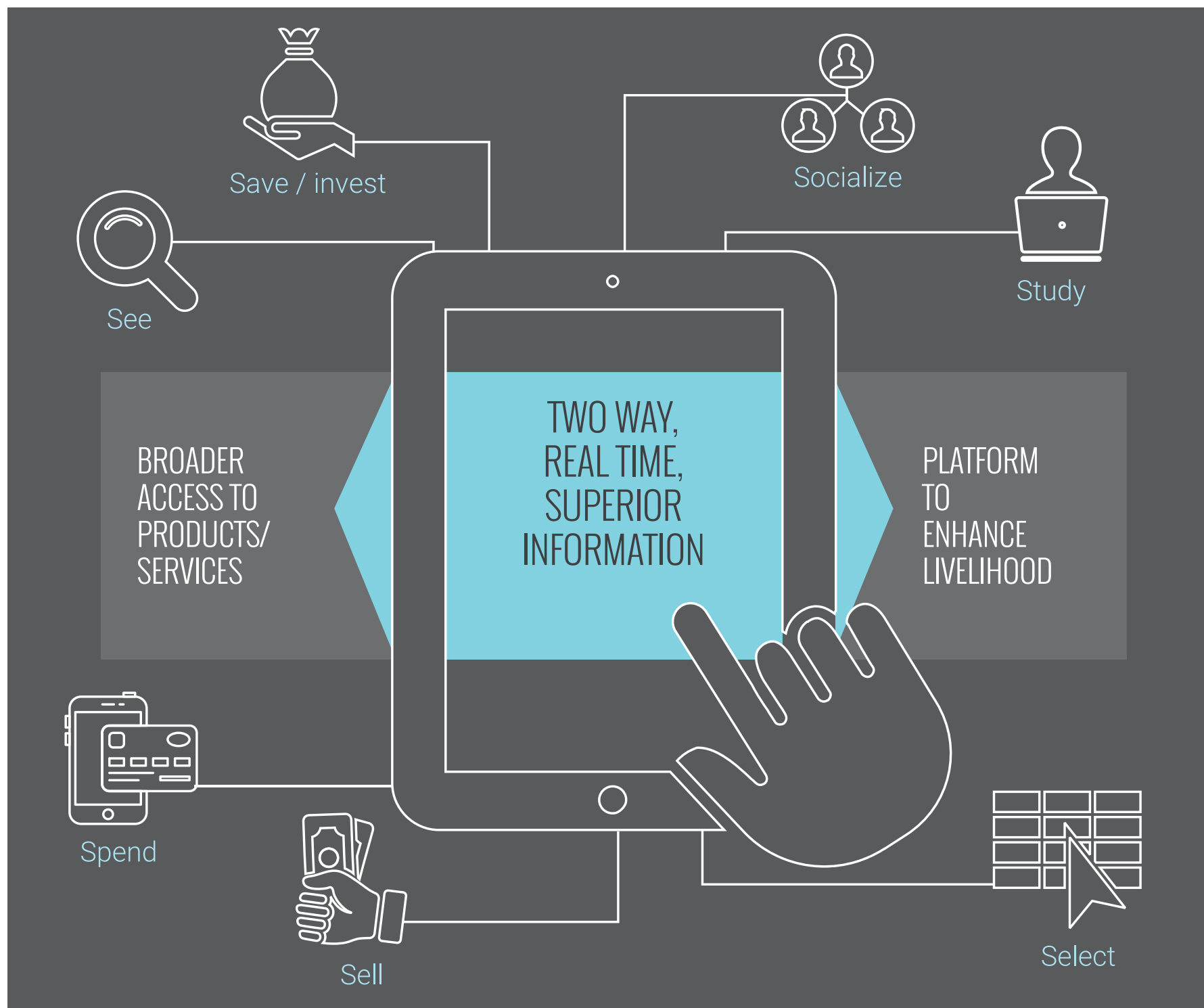
Shift in spending from basics to more: *Roti, kapda and makaan* have historically represented the largest expenditure for most Indians. Over the last few years, however, there have been two notable changes in consumer spend patterns. The first is a rise in the total amount spent on education, leisure and telecommunications, driven by both greater demand, as well a change on the supply side. The second is the shift toward better, higher-priced sub-segments in the same historical categories ranging from food to consumer durables.

Continuing rise of the urban: India's rate of urbanization has been very different from most other countries

as it is not concentrated in a few cities, like in Indonesia or Thailand; not as fast as in China; and it is not as dispersed as in the US. It has been uniquely Indian. We estimate that about 40% of India's population will live in urban areas by 2025, accounting for more than 60% of the total consumption spends. Interestingly, it will be the rise of the many cities (city #50 to 500) and not mega cities that will account for a large part of this growth.

Rise in the nuclear family setup: The great Indian joint family may be the focus of Hindi cinema, but in reality, the rise of the nuclear family has been a slow and steady phenomenon. It has been driven by multiple factors. Today, nearly 70% of Indian households have a nuclear construct, representing a 13% increase over the last two decades. While this has many social implications, from

EXHIBIT 3: DIGITAL IS TRANSFORMING EVERYTHING WE DO



a pure consumption point of view, it presents a unique opportunity—for the same income level, nuclear families spend 20% to 30% higher per person than joint families.

Rise of the digital Indian: The third certainty after death and taxes

The trends mentioned above have been steadily increasing over the last twenty years but there is one big discontinuity that is a more recent phenomenon. Two decades earlier or even 10 years ago, no one could have imagined the impact of digital technologies on the average Indian. For starters, the numbers are astonishing. The total number of Indians with access to a cellphone is already close to a billion. The number of people in the country today with Internet access is already 300+ mil-

lion-akin to the size of the US population. Over the next decade, this number is expected to rise to 800+ million.

This dramatic increase is going to be accompanied by a change in the profile of the average user. The first 100 million 'digital Indians' were largely men, urban, educated, earning higher incomes, and typically, young. The 400 to 500 million digital Indians are going to be the opposite—rural, mid-income, older with more women included. This digital democratization will have a profound impact on how Indians see, select, study, spend, save, socialize and sell. (see Exhibit 3)

Digital technologies will fundamentally change the nature of these interactions due to the following three reasons:



Two-way, real time, superior information: Digital channels are not only providing consumers with access to more information, but also bringing about a change in the nature of retail interactions. The content available today is better—whether on Wikipedia or customized ‘webtainments’—with channels additionally facilitating near-real-time dialogue between retailers and consumers. In recent times, Indian policy makers have also increasingly started tapping the internet to directly connect with citizens—e.g. TRAI call for Net Neutrality, or tweets solicited by the Railway Ministry.

Broader access to products and services: Geography is now truly history. E-commerce websites generate a surprisingly high share of their sales from tier two and three towns, due to the access they provide to consumers in these locations. The Internet is also enabling Indians to gain access to global education and healthcare. In Ajab, Gujarat, students take mathematics classes online from a teacher sitting hundreds of miles away, while villagers in Tamil Nadu now have remote access to professional advice on cataract problems.

Platform to enhance livelihood: Sufiyan Khatri, an artisan from Ajrakhpur in Kutch, has expanded his business manifold through his Facebook page. Milaap, an online crowdfunding platform, has raised INR 800 million to fund several poor working Indians. Such digital platforms thus are empowering several entrepreneurs and artisans to enhance their selling, marketing and financing functions. The potential for these platforms also lies much beyond the usual ‘buy and sell’ construct.

We believe that while the digital tsunami will have a significant impact on Indians as consumers, it holds transformational potential for Indians as citizens as well, across the framework described above. We have seen early signs of this in the way government-citizen interactions are changing, whether in the form of online redressal platforms or railway ministry tweets. At a fundamental level, the digital wave has changed the country’s administration model from a pure supplicant and provider system to one that resembles a true democracy.

New trends emerge with the potential to explode

Pride in being Indian: A couple of decades ago, many Indians looked forward to relatives visiting from abroad, bearing gifts like chocolates, perfumes and even shoes. How times have changed! Today around 60% of Indians are willing to pay extra for products made in India. The Generation I, whose formative years began after 1991, has never experienced an era of rationing. They are more confident about their country as well as their own capabilities.

There are different ways in which this national pride has started manifesting itself. Across categories, there is an increased curiosity and excitement around exploring local roots, as evidenced by growing consumer interest in natural products in personal care, local flavors in packaged food and hand-woven fabrics in clothing. The bindi is back in vogue—it has been listed among the top 10 all-time global political fashion statements by TIME

magazine. Forest Essentials has grown to be a premium personal care brand and is now going international after a stake purchase by Estée Lauder. FabIndia is potentially the single largest and most profitable retail apparel brand in the country.

Half the sky—gaining its rightful share: The recent performances of Sakshi Malik and PV Sindhu in the Rio Olympics, are probably the best examples of how the role of women in India is changing. Indian women, across urban and rural areas, are exercising greater influence. Several forces are driving this shift—changing family structure, electoral reservation for panchayats, improved healthcare and greater media reach and focus. We believe the most important factor is a transformation in women’s educational levels, which has changed dramatically. The enrolment rate for girls in secondary education has increased from 45.3% to 73.7% between 2005 and 2014 and is now higher than the 73.5% for boys. Even in higher education, girls have bridged the gender gap, with the enrolment level now at 19.8%, as against 22.3% for boys. Traditionally, the school-dropout rate (for standards I to X) used to be much higher for girls, but now it is lower than that for boys. The academic performance of girls has anyway always been better than that of boys!

Apart from greater literacy levels, this trend will have a much wider impact, ranging from changed workforce demographics, greater economic independence for women and other social changes. This is not going to be a sudden change, but more like a steady, tectonic shift.

The (almost) I, me, myself generation: While nuclear families may seem to be the new normal, the future could see a further shift in how one thinks about family. We believe that India could see a second wave of transformation—from nuclear households, to singles. There has been a steady increase in the number of people in the workforce who are still single. The average age of getting married went up from 22.6 to 28 for boys and 18.3 to 22.2 for girls between 2001 and 2011. The number of single women above 20 has increased by 40% over the same period. While this is largely a metropolitan phenomenon so far, it has started percolating to second tier cities as well. This change has implications not only for household sizes, demographics and the economics of income and expenses, but also for the very definition of family. Anecdotal evidence and parallels from other countries indicate that these singles, who are at one level, more individualistic, also think of communities (physical and virtual) and causes (social or political) as proxies for families.

A new reality: Reinvent or fall behind

That India is poised to become the third largest consuming economy is clear. It is understanding the shape of this growth that will prove to be crucial. As we described earlier, while some elements of the past will continue,

there are big shifts that cannot be ignored. These raise fundamental questions that organizations need to address.

Catering to different price tier segments: For the first time across most Indian categories, there would be scale markets across price tiers. How should organizations think of their business models / organizations to cater to these opportunities?

Addressing changing societal vicissitude: There are many societal / sociological changes happening in India—the changing role of women, increased individualism, differing role of family, national pride, etc. It is clear that these need to be addressed beyond just changing the image or punchline in the advertisement. How should organizations capitalize on these emerging vagaries?

Rethinking notion of market and competition: The digital world has created a paradigm shift where the conventional view of market access and traditional competition is being truly disrupted by differing offers and new players. How should organizations think about market / segment / competition definition?

Rebalancing the power equation: The nature of relationship between the consumer and the company, the state and the citizen is changing. Greater transparency, reduced information asymmetry and increased voice of the individual (magnified via the digital-social medium) has resulted in a situation, where the balance of power is tipping away from large organizations. How should companies and governments engage with the new consumer and new citizen in a truly democratic context?

As we look ahead, one thing is clear: The new Indian is different; who they are, what they believe, why they choose, where they shop and how they buy. Companies and governments alike will need to fundamentally reinvent themselves and create new rules of engagement to truly win in this new reality.

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INDIA'S STARTUP STORY

UNLOCKING TRUE POTENTIAL

India's startup ecosystem is not a recent phenomenon. It has been prevalent for over four decades. It has given rise to several industries and bolstered the Indian economy in its varied phases of evolution. In recent times, however, the startup ecosystem has garnered significant attention, not only because of the sheer number of entrepreneurial initiatives, but also given its strong angel investor network. With nearly \$20 bn of capital inflows and about 100,000 people, the Indian startup ecosystem today ranks amongst the top five in the world. However, the question that is foremost in our minds is whether this rapid growth is sustainable. What does India need to fully unlock the potential of startups and how best can it achieve this?

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The story of Indian startups is not just limited to the current century; in fact, it began over four decades ago. Through the 80s, a handful of pioneering IT service companies such as TCS, Infosys and Wipro placed India firmly on the global economic map. These companies invested in technology and leveraged the country's young, English-speaking workforce to provide cost-effective technology services to clients across the globe. The result is an industry that currently employs nearly four million people and generates \$150 bn in revenues.

The 90's witnessed the launch of Airtel, which today is India's largest telecommunications company, with over \$15 bn in revenues and more than 350 million consumers worldwide. Similarly, the 90's also witnessed the launch of ICICI, HDFC and Axis banks, which have gone on to rank amongst the top 10 banks in India as per balance sheet size (as of March 2016). In fact, ICICI and HDFC Bank rank number two and three respectively, after the State Bank of India. Most importantly, they have fundamentally reshaped every element of the Indian banking business model, leading to the betterment of the sector as a whole.

Cut to the present and India has seen a dramatic acceleration in both the quantum and the diversity of startups. Over the last 10 years, India has become one of the top five startup ecosystems in the world, alongside the US, China, the UK, and Israel. The country today is home to

a strong angel investor network with the sector witnessing active participation from every major Venture Capitalist (VC) or Private Equity (PE) firm. Over the same period, the startup sector has attracted nearly \$20 bn of capital inflows and today employs about 100,000 people, with that number doubling every two years. Furthermore, over 100 active incubators help entrepreneurs experiment with new ideas, by offering them functional expertise and resources.

This recent scale-up of the Indian startup ecosystem is the result of a confluence of multiple factors. On the demand side, there has been a massive explosion of consumers going online, driven by smartphone proliferation. The sheer number of these individuals and their ever-rising income levels, coupled with their desire for consumption, makes them a highly attractive captive consumer base. On the supply side, there has been a massive inflow of entrepreneurial and technology talent. The creation of marquee startups in India has made 'business' a highly lucrative career beyond the traditional mercantile community. Nearly 40% of India's startup founders and leaders come from premier engineering colleges and business schools, such as the IITs, IIMs and ISBs. This trend has reversed the nation's 'brain drain' by not only retaining the best and brightest in India, but also by attracting top quality talent of Indian origin back into the country. Finally, large capital inflows from global investors has helped catalyze the entrepreneurial





Startups have the potential to equip the semi-skilled population

their Israeli counterparts also want to build the ‘next big thing’. But the latter are more successful in their pursuits as they do a few things differently. They spend a disproportionate amount of time on research and development (R&D), resulting in unique ideas with a global appeal. Further, they follow a ‘lean-startup’ strategy and carry out extensive market experiments before raising large amounts of capital. Apart from being typically older than their Indian counterparts, Israeli entrepreneurs also often have prior professional or military work experience. While some of these traits are cultural, many of them can be imbibed by Indian entrepreneurs to script their own success stories.

The startup journey also needs continual support from the government. Setting up a SIDBI-run Electronic Development Fund (EDF) that makes the Indian Government a Limited Partner (LP) in a fund for the first time ever, is a great example. However, more is needed. The country’s administration needs to create a more progressive policy framework to nurture new ventures, especially encouraging them to address the country’s unresolved problems. While the long-term commercial viability of any business is non-negotiable, startup businesses will likely have different maturity cycles depending on the sector they are in. For example, startups with a social impact bias may take longer to reach self-sustainability, but have the potential to create significant eco-social value.

Without an appropriate enabling environment, there will be disproportionate emphasis on near-term commercial viability, leading to crowding out of startups that want to focus on longer term innovation for social good. The government can provide higher incentives for investment in sectors that are most crucial for India. These incentives can take different forms, with several precedents such as generation-based incentives for renewable energy, tax and depreciation benefits, capital subsidies, priority sector banking norms etc., already been set. Consider an example: If the government creates norms mandating

partial allocation of priority sector lending requirements toward social impact startups, a massive amount of capital could be channeled to deserving sectors. Having said this, it is important to remember that subsidies alone cannot create solutions that are sustainable over the long term. Subsidies should be directed toward ‘turbo-charging’ startups in the social impact sector, while holding these new businesses accountable for creating long-term sustainability.

The government could also do more to foster the creation of a larger number of startup cities. While India has joined the league of the top five global startup ecosystems, only one Indian city (Bengaluru) ranks among the top 20 startup cities in the world. Therefore, much like the creation of Special Economic Zones (SEZs) to promote the growth of IT services, the government can facilitate the creation of five to ten startup-focused centers across the country. Indian academics can further provide a boost to this endeavor by contributing novel ideas based on their deep technical and functional expertise.

And finally, corporate India can play a big role in shaping the future of this landscape. They should fully embrace corporate venturing, providing new companies with the capital to compete on a global platform. There are clear early signs of this happening with companies like Infosys, Wipro etc. seriously investing in startups through VC funds. But a lot more can be done. Indian corporates are today sitting on INR 135 bn in cash. They all aim to embrace new digital technologies such as mobile, Cloud, Big Data and analytics to transform their existing businesses, but often lack the mindset and skillset to do this. The way around this challenge is for the firms to acknowledge this capability gap and use their capital instead to establish independent startups employing external talent.

Ultimately, the combination of progressive government policies, capital assistance from corporates, guidance from academics and the sheer brilliance of Indian entrepreneurs, cumulatively can create the secret sauce required to unleash the true potential of our startup ecosystem.

While India is a land of many unique problems, its greatest assets include its brainpower and resilience. By harnessing these, it can overcome a wide range of challenges through innovative solutions. Startups provide an excellent environment to nurture talent as well as to leverage the power and scale of latest technologies. In doing so, some of them hold the promise of transforming the country and potentially becoming the next set of Indian technology giants. Now is the time for all stakeholders to come together to make this vision a reality.

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ACCELERATING TECHNOLOGY

INDIA'S OPPORTUNITY TO LEAPFROG

Technological change has led to rapid innovation across sectors. From a massive reduction in the cost of sequencing a person's genome, to making solar energy more affordable, technology is changing lives. Digital connectivity is no more a want but a need. As connectivity increases, corporates, governments and citizens benefit. Barriers including low average purchasing power, low efficiency of scale, and socio-economic inequality can be conquered with technology. The acceleration of technology is the need of the hour. It can create paradigm shifts that lead to rapid innovation. What are the new business and economic trade-offs in the evolving tech driven industries? How do we fully unlock the benefits of this technological revolution?

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One of the authors of this article built a speech recognition engine in the early 1990s. It was built on a special purpose digital signal processor, in a lab that was especially dedicated to this project. The engine required two days of training, could recognize a single voice and had a vocabulary of close to 50 words. It was close to state of the art at that time.

Cut to the present. All smartphones today have the ability to recognize speech. No special hardware is needed. Training needs are minimal—the technology works straight out of the box and can be trained to recognize anybody's voice. And the vocabulary is infinite.

The phenomenon that enabled this rapid change is the advancement in processing power, storage and communication. Computing speed is doubling every year, as per Moore's law, which predicted an exponential growth in the number of transistors in integrated circuits within processors. Similar stories of transformation can be told about storage and communication. Today's technology road maps have gone beyond the classical Moore's law with the advent of distributed computing, rapid development of smart devices packed with sensors and the Internet of Things (IoT).

While we have seen a lot of technology transformations over the last 20 years, what is even more fascinating is the expectation that the next two decades will see tech-

nology innovations being rolled out at a faster pace than ever before. Technological change will continue to be exponential. Noted inventor and futurist Ray Kurzweil argues that there is even an exponential growth in the rate of exponential growth! What this means is that in the 21st century, we won't see a 100 years of technological progress. We will see 20,000 years of progress at today's rate!

Five big technology themes for the future

While there are many technological advancements taking place all around us, we think five big themes will play a very important role in defining the next 20 years.

Gene is the new byte: In the grand scheme of things, we are all very similar. In fact, 99.9% of our genes are identical. It's the last 0.1% that makes all the difference! In April 2003, the human genome was completely mapped for the first time. The rate of reduction in the cost to sequence a person's genome has outpaced even Moore's law, from \$10 million in 2008 to just \$1,000 today. Going forward, this cost is likely to continue dropping and in the near future, we would be able get our complete genome mapped and stored in USB drives or on the Cloud for a mere \$100. This will open the doors to fantastic possibilities for preventive healthcare and personalized medical treatment. Genome mapping has large implications for agriculture as well, with possibilities like the



development of more productive and disease resistant crops, or the creation of diet plans tailored to suit our respective heredities!

Disruptions in energy: The end of energy as we know it is near. Advancements in technology have reduced the cost of solar energy to 45 cents a watt from \$100 a watt in 1970. Interestingly, during this period, other forms of energy have seen a 16-fold increase in price. The average cost of solar panels fell by 75% between 2009 and 2014, and is expected to decline by another 25% by 2018. Solar power tariffs are expected to reach grid parity in India in 2018, and then go below that level. Battery technology is advancing rapidly to help store this energy. Polymer and hybrid-flow battery technology being developed currently will increase energy density, increasing the storage capacity of a given physical space. It is likely that in the near future, many of us will be able to generate, store and use clean solar energy right off our rooftops, at a cost cheaper than buying electricity from the grid. With smart micro-grids, one will even be able to sell excess energy back, creating a truly distributed energy network.

Advancements in material science: In Star Trek, the science fiction television show, the crew on board starships used food 'replicators' to synthesize any meal they wanted while traveling through space. This surreal concept is now inching toward reality. 3D printers have come a long way since the 1980s, and are soon going to

be affordable enough for educational and residential usage. Nano materials with unique optical, electronic and mechanical properties are driving the next generation of consumer electronics, filtration systems and biomedical treatment. Similarly, advances in biodegradable plastics augur well for environmentally friendly packaging in the future.

Ubiquitous digital connectivity: Ubiquitous digital connectivity has been elusive so far although it has been widely talked about by policy makers and technologists. But it is inevitable. Digital access will become more and more affordable as prices reduce. Consumers will increasingly bracket digital connectivity among needs as basic as 'roti, kapda or makaan', and will allocate a larger share of wallet for it. Digital governance platforms will help governments to significantly improve the distribution of subsidy programs targeted at people with limited means; and lastly, corporates that stand to benefit heavily from a burgeoning consumer class may make the economic trade-offs differently.

AI and robotics revolution : Artificial Intelligence (AI) is already a reality today with Google Search, Siri and IBM Watson being some examples. Today's AI tools excel at complex analytics. In 2016, AI mastered 'Go', widely considered the most difficult strategy game. However, it struggles with cognitive tasks that a two year old can do—e.g. knowing the difference between the pictures of a cat and a dog. Genetic algorithms being developed to-



day will strengthen AI's cognitive reasoning capabilities. Limitations on raw computational power will soon be overcome, powering AI tools to do what human brains can. Meanwhile, rapid advances in robotics, such as the development of bio-hybrid robots built using living tissue, are starting to take shape. We are on the cusp of an explosion in AI and robotics, which could make androids a reality in the near future.

The interplay between these technology megatrends has the potential to significantly change the world as we know it today. Imagine solar energy-powered 3D printers being airlifted to disaster zones to provide food to people trapped there. Or, a woman in Salem, Tamil Nadu, getting her son's genome mapped, and later getting on a video conference with a New York-based doctor to seek allergy treatment options.

Fundamental paradigm shifts driven by accelerating technology

Change in technology fundamentally shifts the production possibility frontier. Every time we hit the law of diminishing returns, newer technology provides a breakthrough. In addition to fundamental shifts in the cost curve—which are a given—technology expands the gamut of 'the possible' by significantly altering core trade-offs. Let us look at three conventional business and economic trade-offs, which are getting busted:

Two-way real time interactions versus one-way outreach: In the past, businesses could either focus on 'rich' information tailored to a niche market or reach out to a larger market that sacrificed 'richness' for the additional 'reach'. However, today, two-way, real-time communication with rich and relevant content has become a reality. Digital technology enables access to global platforms for buying and selling, marketing and financing from anywhere. Advanced analytics, combined with mobile technology, is allowing companies to target each consumer

individually, across their entire client base. E.g. if it is raining, your regular coffee shop can tempt you to brave the weather and visit it by offering you a promotional scheme on your favorite drink, through an app on your smartphone.

Supply and demand mismatch: With the shift towards elimination of bespoke hardware, and value migrating to software, it is possible today to match supply with demand almost perfectly. Increased access and connectivity via technology are driving a revolution in the sharing economy as well. Sharing is not new to us. The barter system has been in place for centuries, long before money was invented. Today, we are not only sharing digital information, we are also sharing physical things like homes and vehicles with each other, using digital market places.

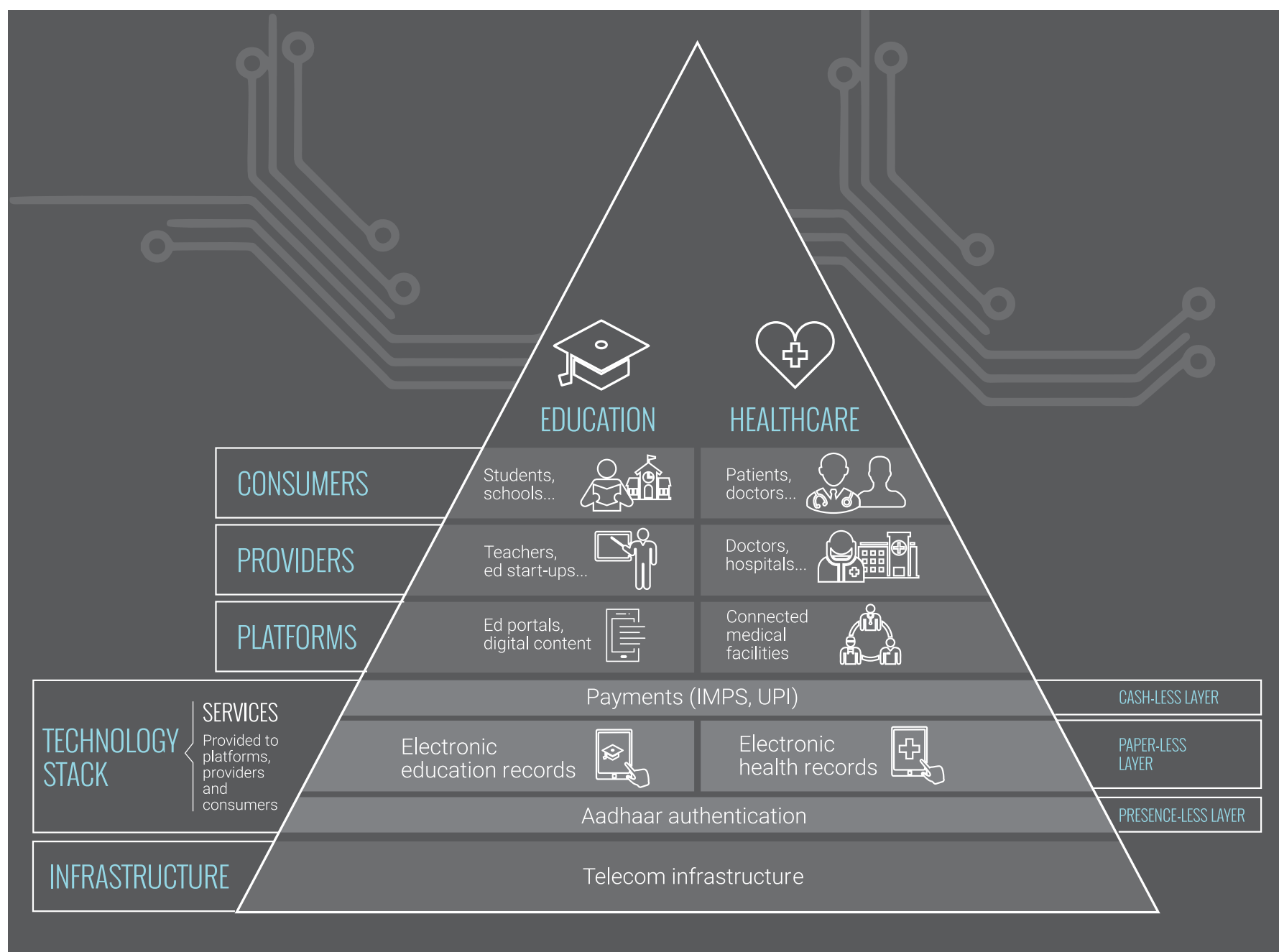
Scale versus cost: Technology is not only rapidly reducing servicing costs, it is also increasingly enabling businesses to move to an opex spend model, from the erstwhile capex heavy approach. This is helping expand firms' reach to new consumers at a faster rate than ever before. For example, consumers with very low deposits can be served economically in an opex spend model, telecom base stations no longer need minimum efficient scale, retail distribution can be customized economically at a micro-market level, and 3D printing can significantly change manufacturing scale.

Specific implications of accelerating technology for India

Radical innovation with next generation technology architecture: The Internet has served as the main platform for disruption across industries. Its architecture is decentralized, modular and 'stacked'. Lower down the stack, the focus is on scale and efficient utilization, e.g. server capacity. Higher up the stack, however, the focus is on content related to user needs and innovation. This stack-based architecture eliminates the trade-off between efficiency and innovation, as higher-layer innovators can rent scale from lower-level platform providers to conduct experiments at lower costs. This is already a reality in our lives. Case in point, Uber, which uses a stacked architecture comprising GPS, Google Maps, electronic payments and connected smartphones—none of which it owns—to offer a disruptive and consumer-friendly transportation solution.

In India, we are witnessing the rising usage of a similar stacked architecture, called the India Stack, in the financial services sector. Jan Dhan Yojna, Aadhaar and Mobile phones (JAM) have created a fundamental layer of customer identification and access, on which multiple digital transactions can be built. This has the potential to solve our financial inclusion problem by eliminating the classical roadblocks of paper-based identity proofs, interaction with a physical bank and the availability of hard

EXHIBIT 4: LEVERAGING TECHNOLOGY STACKS FOR SOCIO-ECONOMIC CHANGE



cash. The entire stack is an ‘open’ resource, which means anyone can access and leverage it.

A similar open stack architecture is being used by the Goods and Services Tax Network (GSTN) to provide a platform for tax data management and reporting. The platform will provide the ‘plumbing’ to bring together all GSTN stakeholders, including taxpayers, banks, and central and state governments, to completely transform India’s tax landscape.

This is a paradigm shift in technology architecture where innovation happens at the bottom of the stack and is available as a public good at a very low cost to everybody. The implications of this shift are quite profound and if deployed well can be used to address some of our very core socio-economic challenges.

Ability to address India’s chronic challenges:

Healthcare is one of the most complex challenges of our time, with the infrastructure and capital required to fix the problems and reduce the inequity in health care access being insufficient so far. Despite making progress over the last decade, India accounts for a disproportionate percentage of global incidences of disease. We have seven doctors for every ten thousand people, which is only half the average global doctor-patient ratio. Large-scale change is never easy, but technology holds extraordinary promise in helping address our healthcare challenges. By leveraging the technology stack already in place—wide connectivity through mobile phones and high speed data networks, Aadhaar, and digitization of health records—we can significantly improve every element of our health system, from education for prevention, to treatment and management. Big data and ana-

lytics can fundamentally alter healthcare delivery and transform our public health and medical research initiatives through the establishment of national registries (see to Exhibit 4). India can become data-rich very rapidly. And a nation-wide, connected, many-to-many health information highway with common data standards and interoperability features can just be what the doctor ordered!

A similar approach can also be deployed in critical areas such as education and skilling and it can fundamentally transform how India teaches and learns.

Enabling organizations to be trailblazers: Historically, Indian firms have found it hard to address the challenges of low average purchasing power, lack of minimum efficient scale and widespread socio-economic inequity. With the acceleration of technology, these challenges get decimated. Acceleration in technology, coupled with relatively lower legacy investments, gives Indian firms the opportunity to leapfrog their peers to become global trailblazers. Technology makes investments modular, reducing capital outlays and experimentation costs, while increasing speed and agility, which are critical advantages in today's dynamic macroeconomic environment. There is every reason to believe that the next Alibaba, Amazon, Google, Tesla or Uber can emerge out of India.

We need to address three key areas to unlock this technology revolution

1. How do we ensure sufficient investment in infrastructure at the lower level of the stack? Private returns on infrastructure investments are often substantially lower than the underlying social benefits generated. While benefits accrue to the economy at large through positive externalities, this does not assure returns for the infrastructure investor. Also, when infrastructure investment requires an entirely new generation of expensive technology, such as fiber, 4G or 5G, it can compound market failure. The government, through policy formulation, has a key role to play in encouraging sufficient investment in infrastructure.

2. What changes should we make in our education system to equip our youth for the technology revolution? There is a need to rethink technology and vocational skills being imparted at higher education institutions. Future jobs will be very different from those in the market today. In addition to solving the existing challenges our education system faces, we need to ensure that it equips our youth with the necessary multi-disciplinary skills to meet the needs of tomorrow.

3. How do we drive collaboration across stakeholders to unlock the full potential of technology-enabled transformation? The government, large corporate firms, startups and NGOs have different strengths and capabilities. There is a need to draw upon the expertise of all

these stakeholders, and marry together their complementary skills. We need the right policies and construct for public-social-private partnerships to make this happen.

In summary, technological change is accelerating at an unprecedented pace and will change the world as we know it. If we get our act right as a nation over the next decade, technology can help us take India back 1,000 years—when we were the most advanced and thriving economy in the world!

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THE DEVELOPMENT-SUSTAINABILITY BALANCING ACT

India is poised on a precipice; it must choose between economic growth and environmental sustainability. Or must it? Can both coexist to create a new economy that is both financially profitable yet environmentally friendly? India today has an opportunity to demonstrate sustainable growth, shattering past paradigms of development that have largely dominated environmental interests. To make the right choices, there is an urgent need for information, awareness, international collaborations and government intervention, to enable intelligent trade-offs and sustainable choices. How will India embrace a green vision agenda for development? And how are we to expect India's journey towards sustainable growth to eventually pan out?

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On June 15th 2012, Nikolas Nik Wallenda did something remarkable. A seventh-generation member of The Flying Wallenda family, famous for its acrobatic feats, Nikolas became the first human to cross the Niagara Falls on a tightrope after a lifetime of practice and protracted discussions with both the US and Canadian governments!

Finding the right balance between economic development and environmental impact is just as close to walking the tightrope across the Niagara Falls.

On one side is the argument for economic growth. India has made a lot of progress in the last two decades but it is clear that the growth engine has to fire for many more years to ensure increased incomes, improved livelihood and a better quality of life. Multiple other countries have made this journey—some in the last couple of decades (like China), some in the last half century (the Asian tigers) and others over the last century (most of the Western world).

The other side of the debate is around the issue of environmental sustainability. The proponents of the same paint grim scenarios of the future that include water scarcity, high levels of pollution, extreme weather phenomena, regular occurrences of natural disasters such as floods, droughts etc., that can have a catastrophic im-

pact, affecting millions of lives. Constant rehabilitation of displaced citizens, erratic food supply, contaminated water and rampant disease, among other issues, could strain an economy fighting to grow, destabilizing the very fabric of our society.

Some of these scenarios can actually become a reality, unless we think of the balance between development and sustainability. Some would argue that India's past environmental record for most key pollutants tracked globally has been less effective than desired. India's carbon dioxide (CO₂) emission levels are the third highest in the world, and soon likely to become the highest. Some of the cities in India have earned the notoriety of being the most polluted in the world, based on their poor urban air quality.

Others would argue that on a per capita basis, they are still among the lowest! They would make the argument that every country as it went through its period of economic development, made trade offs and then went and fixed it. Some of the rivers in Europe were amongst the most polluted at the turn of the twentieth century but then have improved dramatically.

The fact is that this is a complex issue with no easy silver bullets to satisfy either side. What makes it even more complex is the intergenerational and global nature of



impact. The impact on the environment in many cases, is not localized, and in almost all cases, will have greater influence on the next generation rather than the current. There are those who argue that countries like India should curb their consumption and contribute to the environmental impact—in fact tighten their belts and not eat so much so as to save the planet. Those on the other side would say that the developing countries have come to the party during the dessert course of a five-course meal—but are asked to pay for the entire dinner eaten by developed countries!

As our economy grows and we strive to bring 280 million people out of poverty, our socio-economic development models will be put to the test. One of the challenges we will face, will be to responsibly manage the environmental impact of our country's rapid growth.

There are four key aspects in the way things work today that merit consideration as we think through our sustainability paradigm. First and foremost, India will need to recognize and factor in the environmental implications of development into its growth road map up-front, rather than deal with these issues as an after-thought. Secondly, the current model of 'managing' the impact of growth on the environment, involves a combination of 'license raj' permits and remedial 'judiciary-led' prescriptions. This model will not help in dealing with the complex, interrelated effects of India's large-scale, cornerstone infrastructure projects on the environment. Thirdly, while our fundamental environmental laws are

comprehensive and well intentioned, what we lack is an active entity that focuses exclusively on ensuring that these laws are adhered to right at the beginning, during the planning process. Many individuals and organizations adhere to these laws only on paper, taking advantage of loopholes in licensing processes. Identifying those who bend the rules to procure permits has been left to public activists or to non-governmental organizations (NGOs). The only method of redressal for them is to appeal to the National Green Tribunal (NGT) for justice. This mechanism, however, is not sustainable.

And finally, the learnings from the development models of the past 200 years, from the Industrial Revolution, America, Europe, Japan, to the more recent Chinese model and the sunrise knowledge economy model, provide the benefit of 'historical' wisdom to make choices that stay clear of the environmental costs and 'mistakes' and hence forge a unique development model that is inclusive of the sustainability imperative. India should learn from the past and also work collectively with others in the future to find the solution.

To do that, **first and foremost**, we must acknowledge the problem and not dismiss it, or worse, accept the situation, as is our customary habit. Our well-honed *jugaad* capabilities help us surpass and 'delay' the recognition of problems but not wish them away. When tap water was found to be contaminated, water filters emerged. We then had bottled water everywhere, letting us bask in our false sense of security of having surmounted the



problem. Today, we are trying to battle air pollution with air filters and facemasks. Soon, people will start stepping out of their homes with portable air filters, raising the false sense of security to a whole new level. Many will start working harder in a growth economy to be able to afford these new contraptions, which ironically, address problems of our own making. Those unable to do so will see their lifespan shortened. We will then move into an era of 'survival of the richest'. It would be important not to repeat the story of our 'innovativeness' with water to other elements. Let us first and foremost recognize the problem for what it is and direct our energies in solving it from the root rather than 'masking' it.

Second, we need to realize that environmental issues are not secondary to other issues related to growth, such as improving infrastructure, providing uninterrupted power for all, or arresting inflation. The premise that environment should take a back-seat until we have developed as a nation and solved our basic needs, could prove to be flawed. It is likely to lead us down a path where we transfer the costs of our short-sightedness to our future generations. We can learn from the 'mistakes' of our predecessors who have been on similar development journeys and combine it with the emergence of newer, better and cheaper technologies to ensure that our choices and solutions address environmental aspects. Environmental issues must be addressed simultaneously as we move along the path of development. Just as civil engineers design buildings with re-enforcements to ensure they can endure the seismic conditions of the region, we need to make environmental planning a mandatory and integral part of the development process. This debate and its conclusion, with its inherent trade-offs, will necessarily have to be a multi-partisan effort.

An important aspect of the development path we choose is that we must not merely accept the duality of the problem, i.e. the fallacy that we have to choose between growth and environmental perseverance. The two can and must co-exist. To make the right choices, we need to have as much information as possible about the environmental impact of development, including the true cost of this impact. Equipped with this data, we can make intelligent trade-offs and sustainable choices.

A case in point is the debate on coal versus natural gas as a source of power. Prima facie, coal-based power is cheaper than gas-based power—the reason why we have chosen coal to meet about 60% of our power requirements. But is coal really cheaper? Have we factored in the cost of CO₂ emissions? Or the cost of other air pollutants (SO_x, NO_x, PM₁₀, PM_{2.5})? We also need to understand that in comparison to gas, conventional coal uses four times as much water. These are not straightforward issues and even so-called developed countries are facing some of these choices as they think about energy security and pollution. The important element is to realize explicitly, the choices that need to be made and factor in the best possible information available at the time.

There is no duality. There are multiple development paths available and a holistic understanding of the environmental impact of each alternative will allow us to make sustainable choices. This understanding of trade-offs with a longer horizon may allow us to make the case for even bolder moves in renewables.

Third, we need to create new institutions or bolster existing ones to drive greater vigilance, compliance and enforcement of our environmental laws and policies. In most countries, there are quasi-autonomous, quasi-government organizations or agencies that ensure compliance and enforcement, such as the Environment Agency in the UK and the Federal Environment Agency in Germany. In India, we have similar institutional establishments: the Central Pollution Control Board (CPCB) and the associated State Pollution Control Boards (SPCBs). However, these entities need to be revamped to gear up for the challenges ahead.

Finally, we should not bear the burden of solving these issues alone or in isolation; we can and should lean on other nations. Global warming, for instance, caused by GHGs, is a worldwide problem and advanced economies have historically contributed disproportionately more to this problem than developing nations. Developed countries bear a higher responsibility for the costs—the \$100 bn fund committed in COP-21 is a reflection of this 'guilty' sentiment. But this \$100 bn fund should be a real fund that creates real impact and not merely a symbolic or rhetorical gesture.

India should find ways to mobilize public and governmental support in developed countries to ensure that

a balanced outcome can be achieved. The recent Kigali agreement signed by India and 196 other countries is a good example of the same. Critics on both sides would argue that India did too little or conceded too much, but the fact that there are differential time frames and thresholds is a step in the right direction that takes into account India's starting position and position on the economic developmental curve.

We should therefore work with foreign governments and global organizations to find ways and means to subsidize the price of clean fuels to clean our rivers and aquifers. We should unashamedly ask and work with developed countries and traditional 'polluters' to fund the sustainability war. India should use the best technology available anywhere in the world and have the developed countries fund the same. The future 'wars' to protect our environment require a new Coalition of the Willing as the problem we face is as much local as it is global.

Making the move, now

India has an enormous opportunity to demonstrate sustainable growth and break away from the development paradigms of the past that have largely subjugated the interests of the environment. To be able to realize this potential, we need to acknowledge the urgency of the environmental agenda and make bold moves heretofore uncharted. Instead of leaving the quagmire for a later 'developed' day, we must adopt green vision as part of the development agenda in full earnest today. The time has indeed come to add *swachh paani* and *hawa* to *roti-kapada-makaan-aur-bijli*, so we can begin our journey towards sustainable growth.



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INDUSTRIES 2035: DRIVING ECONOMIC GROWTH

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INDIAN AGRIBUSINESS

THE NEXT REVOLUTION

Indian agriculture is at a crossroads with productivity well below global standards. If the gap between demand and supply worsens, it bodes ill for the country as a whole, in the coming decade. Several distressing trends highlight the enormity of the challenges lying ahead. However, if these are addressed in time, Indian agriculture has the potential to bolster economic growth for India and also to be a source of food for the entire global population. Can India pick up the gauntlet to face upcoming challenges head-on? What would be the levers that could turn agribusiness into a lucrative venture for its farmer community? And will India be able to optimize the prevalent potential and effect a turnaround?

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Indian agriculture is approaching an important cross-road. Based on the sector's current trajectory, the demand-supply mismatch in crops is likely to hit more than 15% by 2020, with the gap worsening to 20 - 25% by 2025 if unaddressed. The underlying trends (input variables if you will), are equally distressing. Agricultural productivity levels have been stagnant for the last 10 to 15 years, with our crops requiring around two to four times the average global water intensity. Wastage levels in our agricultural supply chain hover between 30% and 40%. More than a third of farmer households today live below the poverty line. These distressing trends highlight the enormity of the challenges lying ahead for the Indian agricultural industry. The Niti Aayog recently highlighted that the sector is 28 years behind its time. So, can Indian agriculture close this gap? We believe so. As the country with the largest arable land acreage, India can not only ensure its own food security, it can also become a source of food for the entire planet.

For Indian agriculture to make up for lost time, changes will be needed across three main dimensions: farm productivity, farmer profitability, and adoption of new technologies and farming business models.

Farm productivity

Simple benchmark comparisons with other countries show that there is significant room to improve India's productivity. For instance, our farmers produce an average 2.9 tonnes of rice per hectare, whereas the

global mean is 4 tonnes per hectare. In Egypt, farmers produce 10 tonnes per hectare. Similarly, in case of oilseeds, India's yield is 1 tonne per hectare, while the global average is 1.6 tonnes. Germany has an average yield of 3.7 tonnes per hectare. To fix this gap, a range of improvements will be needed on inputs, resource availability and farming methods. Around 70% of China's rice acreage uses hybrid seeds as compared to a mere 5% in India, while India's micro-irrigation coverage of 8% pales in comparison to USA's 63%. Adopting best practices to boost productivity will call for a significant investment in farmer awareness programs. If our farmers have access to the best seeds, can leverage state-of-the-art treatment practices and cultivate the right crop portfolio, we believe productivity can be enhanced by 15 - 20% over a ten year period.

Farmer income and ownership models

The second dimension to transforming Indian agriculture is related to improvements in farmer's economic health. Several surveys and studies have highlighted the plight of the Indian farmer. Some studies have shown that 40% of farmers would quit, if they had alternative employment choices. We believe that this calls for a two-pronged approach. The first is to fundamentally change the economics of a farm, by not only improving productivity, but also ensuring that farmer financing issues are well addressed. Subsidized rural credit, creation of innovative agri-financial instruments like sale option contracts and rural insurance are key elements that can



help in this regard. Secondly, as farmer financial well-being is highly correlated to a robust rural ecosystem, there should be special focus on the development of supply chain-related infrastructure (warehousing), the food processing sector and logistics.

Another key issue with regard to farmer economic health relates to trends in urbanization and implications on land ownership. Most farm holdings in India are small. Many farm owners are aging and the next generation is migrating to urban India for jobs. The challenges of effective land utilization will therefore be under further pressure in the years to come.

Agricultural rentals in India have long been caught in a Catch 22 situation. Agricultural rental restrictions have not been revisited to reflect the realities of a very different India today. Many land owners keep their land fallow or underutilized. Even where informal rental agreements exist, land owners remain hesitant of long-term leases for fear of losing their land. At the same time, tenants, feeling the duration of tenancies being too short and unpredictable, do not invest in productivity enhancing improvements. The recent draft on the law to formalize leasing of agricultural land is a step in the right direction. More than just regularizing rentals, the Draft Model Act makes it possible for all the estimated 25 million farmers renting agricultural land, to qualify for bank finance, insurance and other government benefits.

Technology

The third dimension relates to the adoption of new business models and technologies in the agricultural sector. Agribusiness technology applications typically fall into three buckets:

- Sensors—such as those that monitor soil, weather and crop conditions or animal biometric collars—help agriculture by enabling real-time traceability and diagnosis.
- Automation solutions, including technologies like agricultural robots that can simplify farm work in a variety of ways, e.g. plough a field in just an hour compared to the full day taken by humans.
- Engineering solutions, such as vertical farms that optimize resource consumption and effectiveness.

To illustrate one of these, consider the potential of agricultural robotics in an Indian context. The real benefit of agricultural robotics comes from the man-machine interface. Rather than being seen as a replacement for labor, robotic solutions are being considered as a way to free up farmers' time to focus on other activities. Use of robotics in many cases, has reduced pesticide requirement by 80% in farms; a number that may seem unimaginable. This technology revolution is not a faraway dream. Agri-



ownership rights of farmers. Additionally, wasteland development should be used to pilot commercial farming.

3. Revamp policies related to procurement and movement of agri-commodities: Three changes are critical here. Firstly, to provide remunerative incomes to farmers, procurement at MSP should only be done when prices go below that level. This should apply even to procurement for buffer stock and any social schemes. Secondly, the government needs to drive the implementation of a standardized Agricultural Produce Market Committees (APMC) Act. Finally, to enable free inter-state movement of agri commodities, the Essential Commodities Act should be scrapped.

4. Streamline subsidies to encourage sustainable use of inputs: The current subsidy policy encourages over-use of inputs like power, water and fertilizers. These incentives can be redesigned without compromising end-goals of productivity or costs.

While some of the above solutions have been well talked about, the key is to create the right platforms to implement them, while ensuring they are sustainable over the long term. We believe several innovations will be required to make this work. For example, the government and the private sector would have to strike effective partnerships to serve multiple needs like:

- Developing the agricultural supply chain.
- Fostering agricultural innovation and technology transfer.
- Building and upgrading the *mandi* infrastructure.
- Providing business development services to farmers and rural enterprises.

The potential of the Indian agricultural sector to become a growth engine for the country and food provider to the world can definitely be achieved. The only question is, how soon?



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cultural robots have been modified for multi-terrain rugged surfaces prevalent in India and lightweight low-cost drones have been designed to survey a number of Indian crops and weather conditions. Costs of robots are also falling every year—some are expected to become 60% to 70% cheaper over the next ten years. Hence, models of community ownership, leasing or even rental services for robots may not be far off.

All of these will come together to drive ‘precision farming’ that uses data at the level of the square meter or even at an individual plant, to optimize consumption of inputs and adjust variable characteristics within fields. Globally, precision farming has begun to revolutionize agriculture and we expect its influence to continue growing across applications in seeding, fertilizing and crop protection. Our study of agricultural patents suggests five clusters of patent filings: autonomous vehicles, crop protection, fertilizer & planting methods, seed varieties and GMO seeds.

Government support

Government support is essential in transforming the agribusiness sector. Political will and cooperation have been a critical component of all agricultural ‘revolutions’ and will play a key role even in the next round of revamps. We have put together four imperatives for the government.

1. Build national awareness of best agripractices: This requires driving an integrated national program involving research institutions, state administrations as well as the private sector.

2. Drive land aggregation: The government must take steps to encourage contract farming and producer companies. However, this requires facilitating lease-based models of land aggregation while protecting the land

RE-TOOLING MANUFACTURING FOR THE 21ST CENTURY

While India lost out in the manufacturing revolution of the late 20th century, it now has an opportunity to make up for lost time. The recently launched Make in India campaign is a current validation of India's stance to turbo-charge the manufacturing sector and seize back lost opportunity. While the campaign is a great start, it needs to evolve into a version 2.0, so as to keep up with disruptions and emerging trends in the global manufacturing landscape. How can India define its place in the global manufacturing landscape?

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India lost out during the manufacturing revolution of the late 20th century. This period saw the emergence of global supply chains and witnessed the rise of China as the 'factory to the world', generating jobs for hundreds of millions of its people. The transformation of global supply chains was driven by better information flows and greater visibility, enabled by the growth of the Internet. Consequently, large pools of low-cost labor in developing countries became productively deployed on factory floors, making products for global use. In September 2014, the new NDA Government launched the Make in India campaign as a landmark policy to turbo-charge the manufacturing sector and seize back lost opportunity.

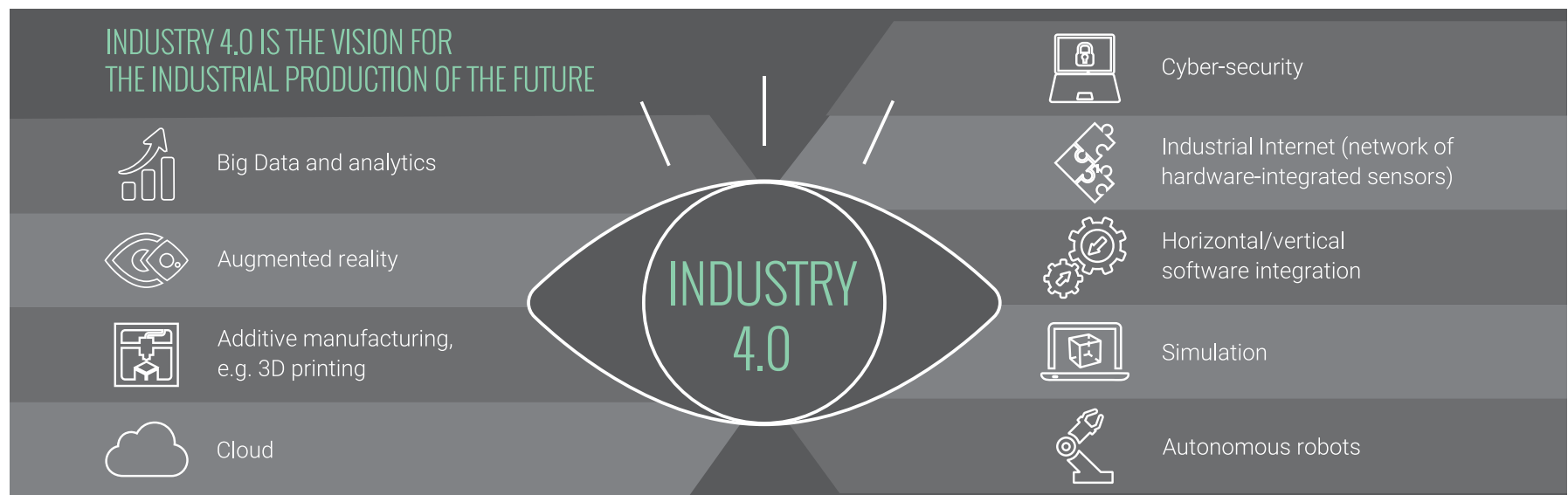
Make in India is underpinned by three key thrust areas: (1) Procedural simplification to ensure ease of doing business, (2) Infrastructure development including fast forwarding the delivery of industrial corridors and (3) Opening up new sectors for growth, for instance, allowing FDI in defense and railways.

The project also focuses on growth in labor intensive sectors such as textiles with a competent incentive package to attract production capacity moving from China.

Since Make in India was launched, a lot of progress has been made. India has moved up on the 'ease of doing business' rankings, with individual states becoming more aware and competitive in the wake of rankings being made transparent. Infrastructure build-out has gathered momentum, the productivity of clogged, government-owned ports has improved impressively and FDI in manufacturing has increased considerably. These foundational elements are critical to the growth of the sector. Without them, India is not even in the game and faces missing the manufacturing-and-job-creation bus once again. However, these thrust areas represent the late 20th century manufacturing paradigm. A new paradigm that is in tune with the digital 21st century is fast emerging, driven by Industry 4.0 (I4.0), which is a collection of nine cyber-physical and data technologies.

I4.0 is the fourth manufacturing revolution since the maiden one triggered by the development of the steam engine. The second revolution, driven by electricity, led to rapid mass production in the second half of the 19th century, once again transforming industry. Subsequently, the third revolution began in the 1970s and 1980s with the growth of the Internet. This phase saw the deconstruction of value chains and outsourcing of production

EXHIBIT 5: NINE TECHNOLOGY DRIVERS IMPACT THE PRODUCTION OF THE FUTURE



to low labor cost destinations like China and Thailand that eventually emerged as manufacturing powerhouses. What does Industry 4.0 stand for? Simply put, it is a set of key digital and technological mega trends transforming the manufacturing workplace the world over. There are nine sub parts to Industry 4.0, as explained in Exhibit 5.

The fourth manufacturing revolution will redefine production in the digital 21st Century. To be a part of the new revolution, manufacturing growth and creation of new jobs in India have to go beyond the industrial parks housing large-scale, labor intensive plants from the 20th century. The challenge for India is daunting as this new wave of the digitization of manufacturing is coinciding with a period of sluggish global economic growth with little sign of revival in the near future. In fact, the global merchandise trade as a percentage of global GDP has been stagnant at 24% since 2010. The new paradigm will be characterized by three key structural shifts in manufacturing.

First, I4.0 is fundamentally altering the cost economics of manufacturing and competitiveness of countries. This shift erodes India's big advantage of a large pool of low-cost labor, as the trade-off between labor and automation swings in the favor of the latter. BCG research indicates that the price of industrial robots is expected to come down by 25% over the next decade, with a 5% performance improvement year-on-year, accelerating the pace of adoption of robotic automation.

The changed economics of manufacturing also erode the advantage of large-scale plants in low labor cost countries, leading to low-scale plants that are closer to the market being more competitive. For example, Adidas recently announced that it was bringing back some of

its production from China to Germany, as advances in robotics made it cost effective to do so. The company is also planning to build smaller plants in its major markets over the medium term, thereby cutting lengthy shipping times and enabling faster delivery to customers. Robots in this new paradigm are not just the automatic welding bots that have been used for decades in the automobile assembly line. They are more trainable and have a very high artificial intelligence (AI) coefficient. 'Baxter' is a cost-effective robot, available for \$25,000, that can be trained by simply moving its arm through a work -cycle. Within a minute, the robot can be transformed to perform any desired activity.

The second structural shift is the growth of global digital services driven by I4.0 technologies. These services are becoming growth and profit drivers for manufacturing companies. For example, the aeronautical industry detects and solves problems in aircraft engines flying all over the world through digital remote sensing technology. The technology enables them to harness massive amounts of realtime data collected from the millions of embedded sensors in the engines. In 2013, services constituted 23% of the total exports from the Organization for Economic Co-operation and Development (OECD) countries, up from just 17% in 1980, reflecting the growth of these revenue streams for global companies. GE is building a completely new business of digital services with the launch of 'Predix', the world's first industrial operations system and platform. Predix connects industrial assets, collects and analyzes data to deliver real-time insights to optimize industrial infrastructure and operations. The major implication for India is that digital services render boundaries between countries and labor cost advantages irrelevant. The availability of skills and capabilities will now be key factors driving manufacturing location decisions going forward.



The third structural shift driving the new manufacturing paradigm is the growth of digital trading platforms. These platforms are transforming global supply chains, further blurring boundaries between countries and making traditional country-based business models redundant. Today, goods worth \$700 billion are traded through Alibaba and Amazon. In effect, these global market platforms and their associated supply and delivery systems are replacing the complex supply chains that were once a common feature of the first three phases of globalization. Even small companies, therefore, find it much easier to compete in a global market today. For example, a few years ago, a Chinese mobile phone company entered India by leveraging one such platform and did so more quickly and with much less investment than one of its competitors. It is quite possible that Alibaba founder, Jack Ma, may in the future propose building a global e-commerce platform that enables small and medium-sized enterprises to directly market to customers and source from suppliers all over the world. This would eliminate the need for businesses to set up independent supply chains.

These structural shifts will not just transform competitive rules and supply chain operations. They will impact entire industries such as logistics and even international banks that have built significant businesses funding global trade.

To be a part of the new paradigm, India needs a Make in India 2.0 policy framework that will allow it to build relevant capabilities and competitiveness, creating jobs for the 12 million young people that enter the job market every year. To deliver effective results, the policy framework must be based on a four-pronged strategy.

First, we must continue our increased focus on labor intensive sectors to successfully create jobs. Between 2008 and 2013, 80% of production growth and 40% of

export growth have been in non-labor intensive sectors such as metals, chemicals and plastics. We have a big window of opportunity in textiles as production capacity moves from manufacturing behemoth China, given an increase in wages. The Indian government has already responded to this opportunity by introducing an innovative policy with many firsts, including allowing fixed term employment. However, we can do more, such as tying up market access with a free-trade agreement (FTA) with the European Union (EU) etc.

In the textile industry, we could encourage manufacturers to build 'future-ready' facilities that combine the labor cost advantage with new age digital technologies like robotics. To make this happen, the Technology Upgradation Fund (TUF), a policy for the textile industry, aimed at incentivizing capital formation with a technology bias, could be revised with specific focus on I4.0 investments.

Second, we need a renewed policy focus on the small and medium enterprise (SME) sector to be prepared for the growth of smaller plants in the new paradigm. India has had an SME policy for a long time and is perhaps one of the few countries with a specific ministry for the segment. Despite this, the fact remains that companies with annualized sales of over INR 1,000 crore continue to grow, while SMEs do not. Credit extended to SMEs, as a proportion of total corporate lending, is also shrinking. To drive positive change, we need to rethink our SME strategy for the new manufacturing paradigm with a 21st century mindset. We can take inspiration from many countries that are doing so. For example, Singapore announced an industry transformation package of S\$4.5 billion to help companies, especially SMEs, become future-ready by building their I4.0 technology capabilities.

The third effective Make in India 2.0 strategy should be to grow digital services. Globally, trade in digitally-en-

abled services is growing faster than trade in goods and traditional services. Cheaper and smarter sensors are enabling the Internet of Things (IoT), while 3D printing is allowing remote production of spare parts. These advances are shifting the potential life cycle value from equipment manufacturers to service providers. Large software companies are well placed to provide these services across a range of industries. However, we need to build the requisite digital ecosystem and invest in newer technologies such as sensors, 3D printing and cloud networks. NASSCOM recently announced that India is looking to capture 20% of the IoT market, which is projected to be \$300 billion by 2020. This is just the starting point. As the value and ambit of digital services grows, we need to leverage the advantage we have built in ITeS globally. However, estimates suggest India is facing a critical talent shortfall in areas such as cyber security and big data analytics. Reorienting our skilling initiatives toward building requisite skill sets to win a share of the global digital services pie, will therefore, be critical.

Finally, large-scale sectors such as automation that are further along the I4.0 adoption curve, have to be encouraged to make prominent investments in technology and build capabilities to manage 'robot workers'. As tasks involving humans become increasingly more complex, the capacity of workers to master new skills and the availability of programming talent will become key drivers of competitiveness.

One of the strategies under discussion in several countries is to build 'I4.0 Immersion Centers' in a public-private partnership (PPP) model to help companies accelerate their learning process. Immersion centers bring all the nine I4.0 technologies in a working plant to demonstrate how the plant of the 21st century will look. The industry also needs to take full ownership of leveraging I4.0, learning from global leaders like Bosch, which is already producing key parts in a semi-automated way. The engineering and electronics major produces disc valves at 30% lower production time and cost using I4.0 technologies in its Homburg factory.

In conclusion

The global manufacturing sector is undergoing a massive structural transformation. Make in India 2.0 must enable us to re-tool our manufacturing for the digitally-driven future. India has time to get it right this time—every new manufacturing technology in the past took about several decades to mature. We missed the bus when low-cost manufacturing took off in 1990. Hopefully, we will emerge winners now, as the digital revolution takes off over the next few decades.

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INDIAN IT 3.0

THE WORLD IS YOUR OYSTER

IT and technology cannot be discussed without mentioning India in any global forum. Indian IT accounts for almost 55% of offshore services including IT, engineering and business process management. The largest Indian IT firms are in the world's top 20. The industry plays a big role in India's economy and has the capability to influence enterprises around the world. IT 1.0 and 2.0 were about improvements in IT operations and business performance, but now is the time for disruption and innovation, not just incremental impact. With technology megatrends and related shifts, opportunities will be created, current paradigms will be tested as technology and software move from back office to core driver of competitive advantage. What shifts will drive disruption in the IT industry? How can Indian IT go from good to great?

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A credible start

Most people don't realize this, but India's tryst with Information Technology (IT) started more than three millenniums ago. Aryabhata laid the basic foundation of IT and digitization with the invention of zero.

Fast forward to the 20th century, and Indian IT industry veterans have even more fascinating stories to tell. In the 1970s and 1980s, code was physically shipped to clients. Every programming change warranted another shipment, something very hard to believe for most people today. Authorities were unsure of how to treat software codes. Were they goods or services? What tax regulations would apply? Amid this confusion, the IT industry slowly took shape in the 1980s, taking advantage of the huge opportunity presented by computerization.

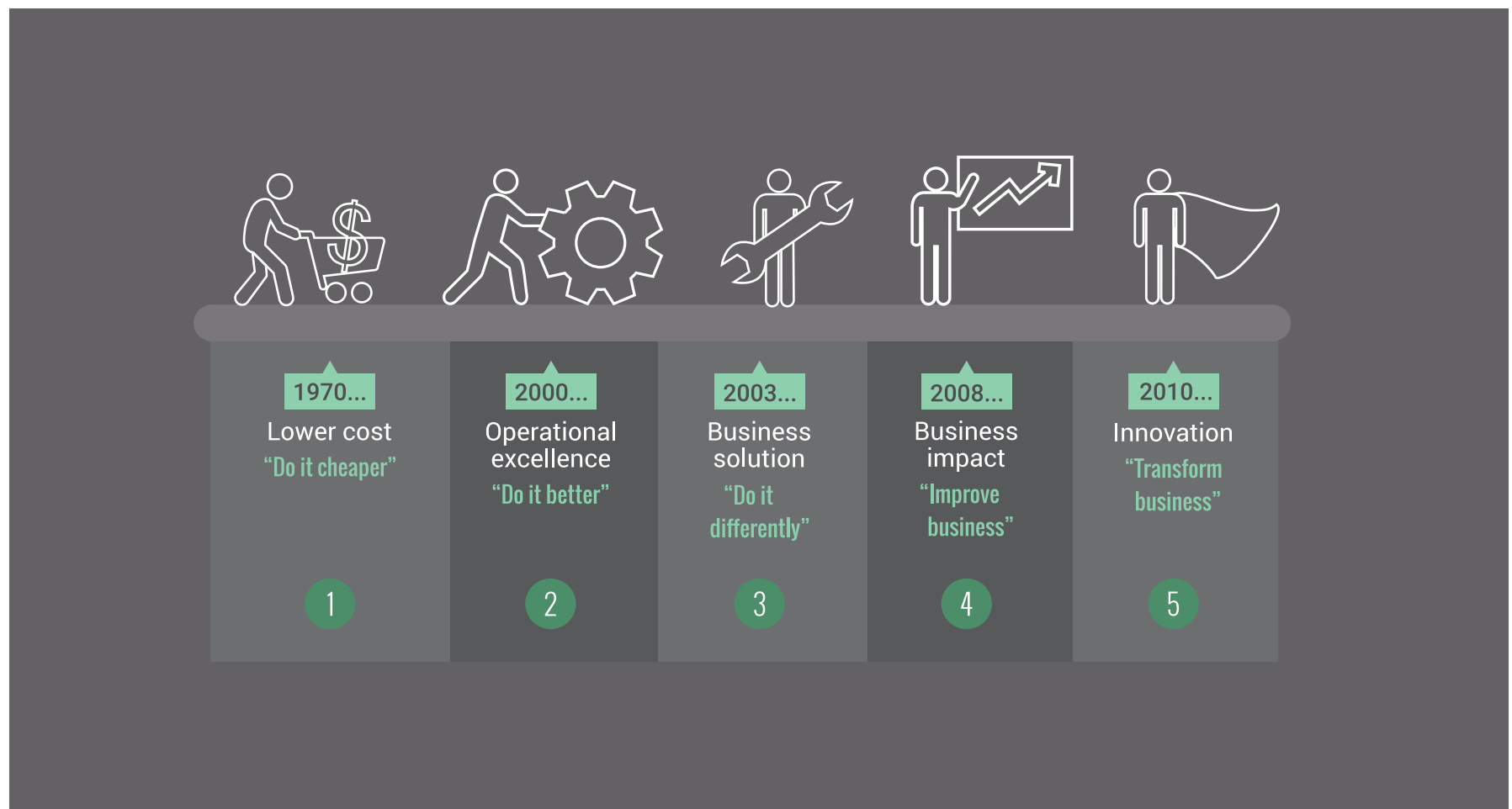
The industry remained small until 1990, gained some momentum in the post-liberalization age; Y2K was the game changer for the sector. Faced with the massive IT implications of a changing millennium in the late 90s, the Western world found itself unprepared, coming up short both on capability and capacity to deliver the requisite transformations. Indian IT companies stepped up to the challenge. History is witness to the seamless transition that enterprises made to January 1, 2000—no major

incident of computing malfunction reported. The world acknowledged the contribution made by Indian IT in making this happen, catalyzing a decade of hypergrowth for the sector in the country.

The statistics since 2000 talk for themselves. At the time of liberalization in 1991, this was a \$150 m industry. By the turn of the millennium, the sector had grown by more than 30 times to around \$5 bn and has since ballooned to \$150 bn, having expanded another 30 times. India accounts for nearly 55% of the 'offshore' services market comprising of IT, engineering and business process management. India leads by a margin, displacing erstwhile incumbents like Canada and Ireland. India's five largest IT companies today count themselves among the top 20 firms in the industry globally, with the quintet also appearing among the largest ten IT enterprises in terms of market capitalization.

The industry has been a major contributor to the Indian economy. Directly or indirectly, the sector contributes around 10% to the Gross Domestic Product (GDP), nearly 25% to exports, and employs over 13 million people. Smaller IT firms account for about 60% of this contribution, while women make up around 35% of the industry's workforce, making it one of the most diversity-friendly sectors in India.

EXHIBIT 6: VALUE JOURNEY



The industry has changed brand India forever. The land of snake charmers and elephants is now the land of technology and home to a vibrant IT industry that is transforming enterprises across the globe. Any discussion on IT in global forums is incomplete without a reference to India's prowess in the sector.

Opportunity to capitalize on this tremendous head start

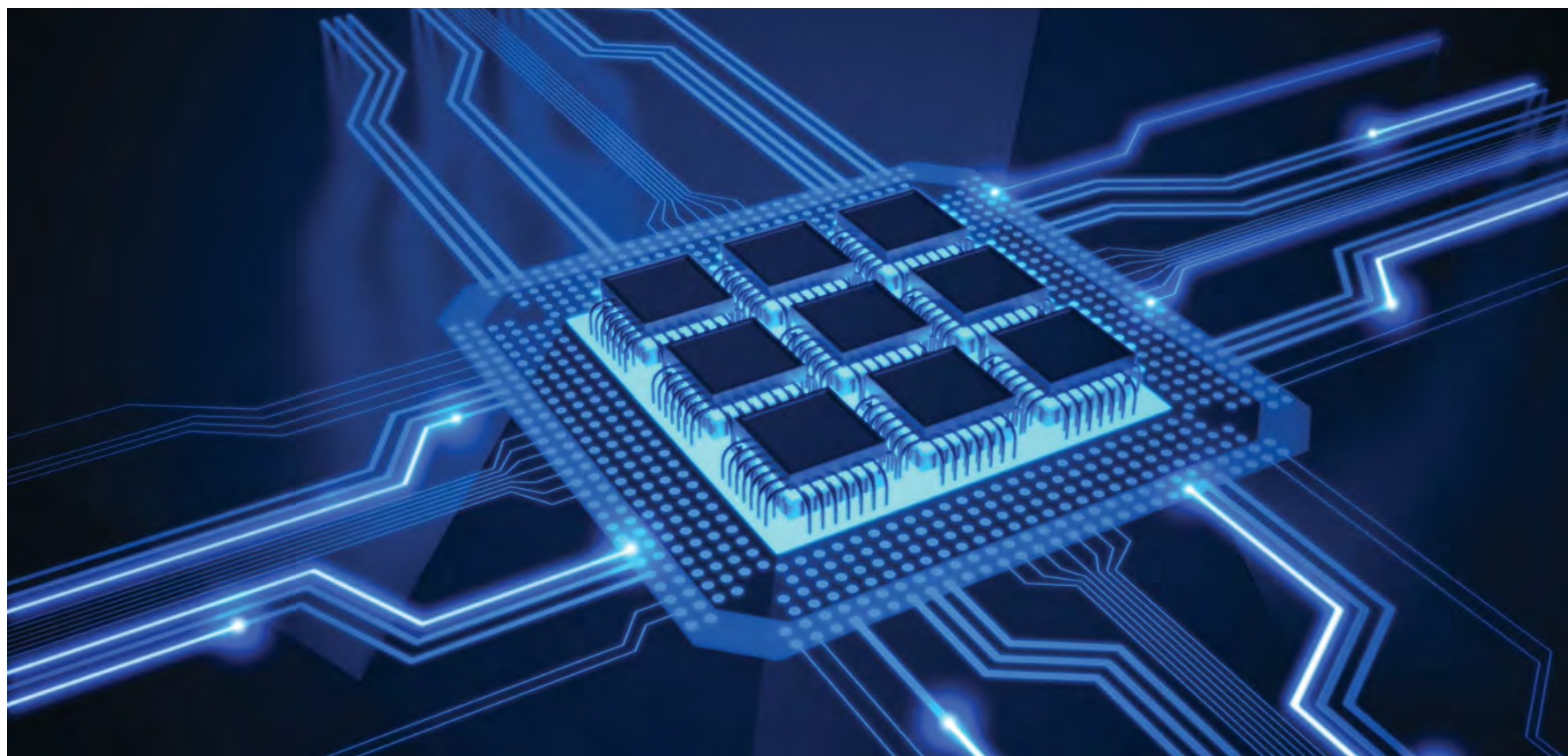
Indian IT has the opportunity to play a pre-eminent role in shaping the future of the entire industry.

Innovation partner for global enterprise: After pioneering the global delivery model, the Indian IT industry has been steadily moving up the value curve. Starting off as a provider of talent, Indian IT enterprises today are increasingly partnering with enterprises on their transformation journeys. We estimate that around 15% to 20% of IT projects today involve delivering business impact (Level 4) or enabling innovation (Level 5) for their customers (see Exhibit 6). Having said that, there is tremendous scope to increase the proportion of these high-end services further, as companies the world over look for robust solutions to address disruptions around them. A recent survey by BCG of global IT clients found that over 90% of the respondents wanted Indian IT firms to do more in terms of partnering with customers on their innovation and transformation agenda.

Transformation engine for India: Looking within India, the role played by the IT industry beyond the economic impact is quite substantive. There are many examples of large-scale transformations that have taken place over the last decade in India. Today, over 65% of railway tickets are booked online, passports are issued within a week, and nearly 23 million Indians filed their taxes online in 2016. The landmark GST reform will be implemented on a platform built by the Indian IT industry. Similarly, core banking solutions from IT companies transformed banking forever. AADHAAR, with over one billion Indians registered, is the largest biometric database in the world. However, there are a lot of areas that still need an IT revolution. India continues to face the challenges of capital scarcity, a highly dispersed population and low levels of literacy.

Technology will serve as a critical enabler in bridging these gaps. IT can be the force multiplier for India, bringing in transparency, efficiency and access to address issues of governance, health, education, sanitation, infrastructure and many more.

The progress achieved by the IT industry over recent decades has resulted in a trained talent pool of two to three million Indian engineers. More importantly, the country today has a large pool of talented architects and experts with 10 to 20 years of IT experience, including rich client interactions and expertise in cutting-edge



technologies. These individuals can help shape Indian IT's future, and some of them are already spawning startups to this effect. India was home to over 4,000 startups as of 2015, around 40% higher than the previous year. Today it is the third-largest base of startups, of which nearly 50% are in the technology sector, and several having been founded by Indian IT executives. Clearly, the innovation engine is humming.

Mega shifts poised to create massive disruptions

Ubiquitous connectivity, explosion of data driven by an extensive proliferation of connected devices, and an exponential increase in computing power, are together driving fundamental disruptions for industries, consumers, employers and the broader society. This will have a fundamental impact on the IT industry, challenging existing paradigms and creating a plethora of new opportunities.

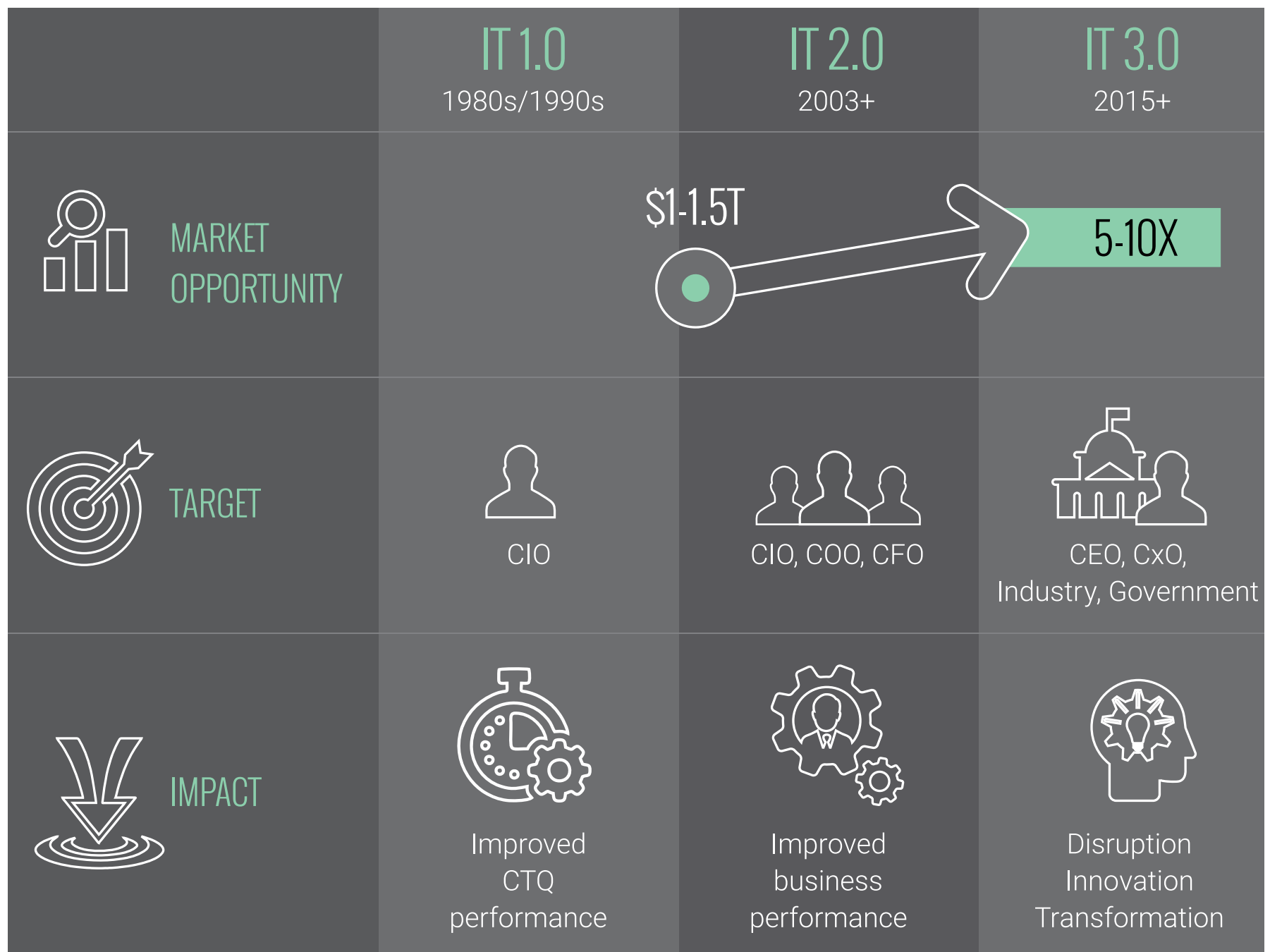
Everything is software: How much of a car is made up of software? Today, mechanics run diagnostic programs before looking under the hood, even in the case of a traditional ICE (Internal Combustion Engine) vehicle. There are 30 computer processors in a basic car, and up to 80 in high-end vehicles already. Tesla's Model S has only 18 moving parts compared to more than 2,000 in a traditional car—the rest is made up of software and batteries. Jeff Immelt of GE recently said, 'Industrial companies will become software companies'. Today, he sees the jet engine as 37 sensors generating one Tera Byte (TB) of data during every flight, and is betting the house with GE Digital. Technology and software is blurring industry boundaries and the competitive landscape. Amazon, a retailer, is now the biggest public cloud provider. De-

troit, facing huge existential threats, is actively investing in Silicon Valley-based technology companies that are disrupting transportation. With software becoming so critical to value creation and competitive advantage, the opportunity facing Indian IT companies is immense. Is it possible to imagine that a car in the future would have 50% of its technology and software coming from an IT major? Now, that would be a huge, and largely new market!

Carbon to silicon shift: The L-K curve in economics is playing out in the IT industry as well. In the industrial era, machines used steam and then electricity to replace labor. In IT, human labor (carbon) is increasingly being replaced by computing (silicon). As computers are increasingly able to mimic human capability and actions, this will accelerate. These technologies will disrupt the traditional service delivery model. In low-end Business Process Outsourcing (BPO), up to 75% of the current human effort can be eliminated with cognitive and robotic technologies. Human effort will predominantly be required only in services higher up the value chain. Dealing with business models that are not based on labor as well as a pyramid where talent is largely high-end is pretty much opposite to the current business model of the industry that is based on large-scale and relatively low-end talent factories. The need for upfront investment in Intellectual Property (IP) and assets will be another new shift driving an overhaul in the current propositions and the business model.

Changing buying paradigms: With software becoming core to the enterprise, IT spend itself is decentralizing. The business buyer, or the 'C-not-IO', is becoming important. Recent estimates suggest that already, over a third of IT spend—on an average—is being influenced

EXHIBIT 7: THE WAY FORWARD



by the business, and not the CIO. This means significant changes in terms of front-end engagement and proposition. In addition, the consumerization of IT, changing employee behaviors, and dynamic customer requirements in a hyperconnected world are also disrupting traditional ways of IT delivery. The traditional approach of 'design-build-test-deploy' will only create dinosaurs—irrelevant at 'go live'. The need of the hour is for an iterative and agile approach, leveraging the best in class solution components from a partner ecosystem, allowing rapid stitching together of end-to-end solutions. Overall, the traditional model of building internal capabilities (do-it-yourself), focusing on the CIO, and using offshore leverage and pyramid structures to drive competitiveness will change as the world changes how it buys and consumes services.

These disruptions and shifts will challenge existing business models, while also creating significant new opportunities. This will provide the opportunity to develop

Indian IT 3.0, where the industry can play a pivotal role in a world that is being continuously impacted by the forces of technology.

Indian IT 3.0: The journey from good to great!

We think the evolution of the Indian IT industry over the last two to three decades can be described in two major waves, and believe that the third one is ready to take off. (see Exhibit 7)

Indian IT 1.0 was aimed at making the CIO a more effective business partner—responsive, efficient and effective. Quality and cost effective talent and globalized operations were the foundational elements of this proposition.

Indian IT 2.0 saw a more active engagement on business issues with the CIO (and CXOs). From cost-effective talent, the proposition evolved to include domain exper-

tise, as well as some IP frameworks and operational best practices. Cost savings were complemented with process re-engineering and the associated impact on business metrics. This \$1 trillion market, growing in steady single digits, has been the playground of the industry so far. The future, however, will see a far richer set of avenues as technology and software pervade businesses further. With an increasing role in the enterprise agenda and value creation, many disruptive opportunities will emerge for Indian IT organizations.

End-to-end play: This is the ‘deepen the core’ extension of the current proposition. As companies grapple with changing technology landscapes, rapidly changing needs and cost pressures, companies will be willing to hand over the business process to technology stack to make it future ready and scalable. They would likely entail the relevant mix of scale and innovation at each layer. For example, highly automatable operations could potentially leverage robotic factories at the top of the stack (the business process layer). Custom solutions could be built using a modular architecture with a partner ecosystem, with infrastructure layers being provisioned by public cloud providers (think Google, AWS or Azure of today). This provides scalability, attractive economics, and flexibility for the enterprise and opens up pathways for large-scale partnership. This will also create opportunities to create new industry platforms and utilities; like Amadeus for travel.

Disruptive non-traditional plays: Can we imagine software from India riding over the commodity hardware of the next generation autonomous car (remember the EV has only 18 moving parts)? IT companies are already playing an increasingly bigger role in media. Accenture and Sapient have combined their strong digital capabilities with acquired creative talent to become leading media agencies, actively competing with traditional players. In the financial sector, some companies are trying to become payment banks—competing with traditional players as well as fintech startups. Could the next digital bank be created by an Indian IT firm? Manufacturing 4.0 is set to have multiple technology drivers, including autonomous robotics, analytics, industrial internet, augmented reality and 3D printing. Can Indian IT position for 3D manufacturing and extend, given it is more about technology? Many non-traditional plays emerge given the strengths of the Indian IT in technology.

New roles and services: A recent BCG study for an Asian government indicated that 75% of the existing jobs in that economy would be impacted by cognitive technologies and robotics, and that almost a third of them will get eliminated before 2035. Some other analysts have more aggressive predictions for traditional jobs indicating significant disruptions by 2025 itself. At the same time, this disruption will create several new roles—think drone traffic coordinators, robot compliance managers, or 3D printing specialists. Can Indian IT

serve as a manufacturing operator for companies, using 3D printing remotely, just like how applications and infrastructure are managed offsite? As more such roles emerge, India’s talent advantage will once again come into play. Can Indian IT firms create large pools of such new skill sets to serve the emerging needs of their clients in the future?

These opportunities represent a multi-trillion dollar market that is likely to grow at a very fast rate. Instead of mere share shifts, IT firms will have the chance to pursue new markets with disruptive propositions and new business models. Unleashing Indian IT 3.0 can pivot India to innovation leadership, giving it a more central role in shaping the industries of the future.

Time to change the engine while still flying:

The success of the Indian IT continues to drive high expectations, not giving it any breathing space to step back and reflect. The future is filled with new and exciting opportunities, but they pose some fundamental questions for Indian IT and all the stakeholders that must be rapidly addressed.

- Today, Indian IT is the incumbent and innovation is being driven by nimble and new-age competitors. What should Indian IT do to avoid being disrupted and to take advantage of the opportunities being presented?
- What policy changes and infrastructure enablers would the government need to think about to encourage the sector?
- The future will require a very different, and more heterogeneous, talent pool. How can the IT industry, the government and academia together collaborate on ways to develop the requisite skillsets for tomorrow?

Indian IT is in pole position to build on its strong legacy and capitalize on the disruptions underway. The world is Indian IT’s oyster, but the sector will require a major metamorphosis. As Indian IT 3.0 evolves, it will not measure its success by the number of people employed or revenue generated. It will measure its success by the impact it delivers in transforming lives, enterprises, industries and societies. This will indeed be the journey from Good to Great for the sector.



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RETAIL

E-NABLING CONSUMERS AND PRODUCERS

Modern retailing as we know it hasn't changed in over a century. The business as we know it, is based on the three tenets of choice (under one roof), transparency (in pricing) and experience (leading to discovery). This model is being fundamentally challenged by the rise of the Internet and we are witnessing the rise of a completely new form of retailing that can be described as a 4A mode: Anytime | Anywhere | Anything | Anyone. India is one of the major markets where these changes are gaining momentum. Changes, that threaten to blur the boundaries between the classical retail format definitions of Traditional, Modern and E-commerce. Changes, that have deep implications on business models and a profound impact on economy and society. Changes, which if not embraced fully can wipe out long established businesses and create new champions.

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In 1346, English troops faced the French during the Hundred Years' War in the Battle of Crécy. The French were five times stronger than their opponents, and were clad in heavy armor, which had led them to victory so many times. However, this time, the English troops were armed with longbows manned by archers of deadly accuracy and power. What ensued took the French by surprise. The French knights were shot out of their saddles and weighed down with their heavy clunky armor, were comprehensively beaten. This battle was a milestone for the craft of warfare, when the manner in which wars had been fought for over two centuries, changed forever.

The business of retailing is in the throes of similar changes around the globe. And nowhere is the change as quick and profound as it will be in India. In this article, we will explore what is driving the disruption, what makes India unique, and the potential impact of this disruption on the socio-economic fabric of the country.

The basic elements of modern retailing as we know it today, have not changed in over a century. The last big wave of change was marked by the emergence of department stores in the nineteenth century, when the likes of Harrods changed how categories like apparel, furniture and homeware were sold. Similar shifts occurred in gro-

cery retailing at the start of the 20th century, when supermarkets and hypermarkets started replacing bazaars in the western world. This new model was based on the three tenets of **choice** (under one roof), **transparency** (in pricing) and **experience** (leading to discovery).

The combination of these three parameters resulted in a different experience for the consumer and changed the economics of retailing. In the last hundred years, this model has not changed fundamentally—even though there has been a significant improvement in efficiency and effectiveness in every step of the value chain.

This model is now witnessing a transformation, with the eastern world—best signified by the rise of Alibaba—leading the change. While the Internet is the key enabler driving this change, dismissing it as a mere technological phenomenon is an over-simplification. The changes in how consumers make choices and the resulting implications on business models have a profound impact on economies and society.

It is important to reflect on this tectonic shift in retailing. From the traditional model of shopping across the counter, to removing the counter, to a point where the shop itself has moved. The constraints of time and



space—in terms of location and shopping hours have been relaxed. The most fundamental change has been in terms of anyone being a retailer, or a true democratization of retail.

We call this the **4A** model for ‘Anytime. Anywhere. Anything. Anyone.’ retailing.

Anytime: The notion of ‘shopping time’ is fast eroding. Shopping will extend well beyond planned monthly outings for purchases or impulse buys made when walking around the market. It is already possible to shop on a train ride to work or in the middle of a leisurely Sunday afternoon at home.

Anywhere: Shopping will no longer be limited to physical stores. In fact, the traditional mantra of ‘location, location, location’ has been fundamentally challenged by this new model. The only location that matters is where the site or the app sit—on the computer, smartphone, tablet or perhaps, the watch!

Anything: While choice still remains central to shopping, the range of selection has already far exceeded what modern retailers imagined when they put a few tens of thousands of products on hypermarket shelves a few decades back. Today, Amazon alone claims to carry upwards of 500 million products in the US, adding an average of 485,000 products every day.

Anyone: The role of customers in retailing is now moving beyond shopping. Reviews and recommendations from customers are now easily accessible, and are influencing buyer behavior in a big way. Peer-to-peer retailing has turned customers into vendors. India could be at the vanguard of this revolution, driven by a huge population that is increasingly turning digitally savvy. The exhibit 8 reveals some staggering facts about this ‘digital tsunami’.

However, Indian retail spans across various formats, all coexisting, with their own unique characteristics. The three broad types of retail

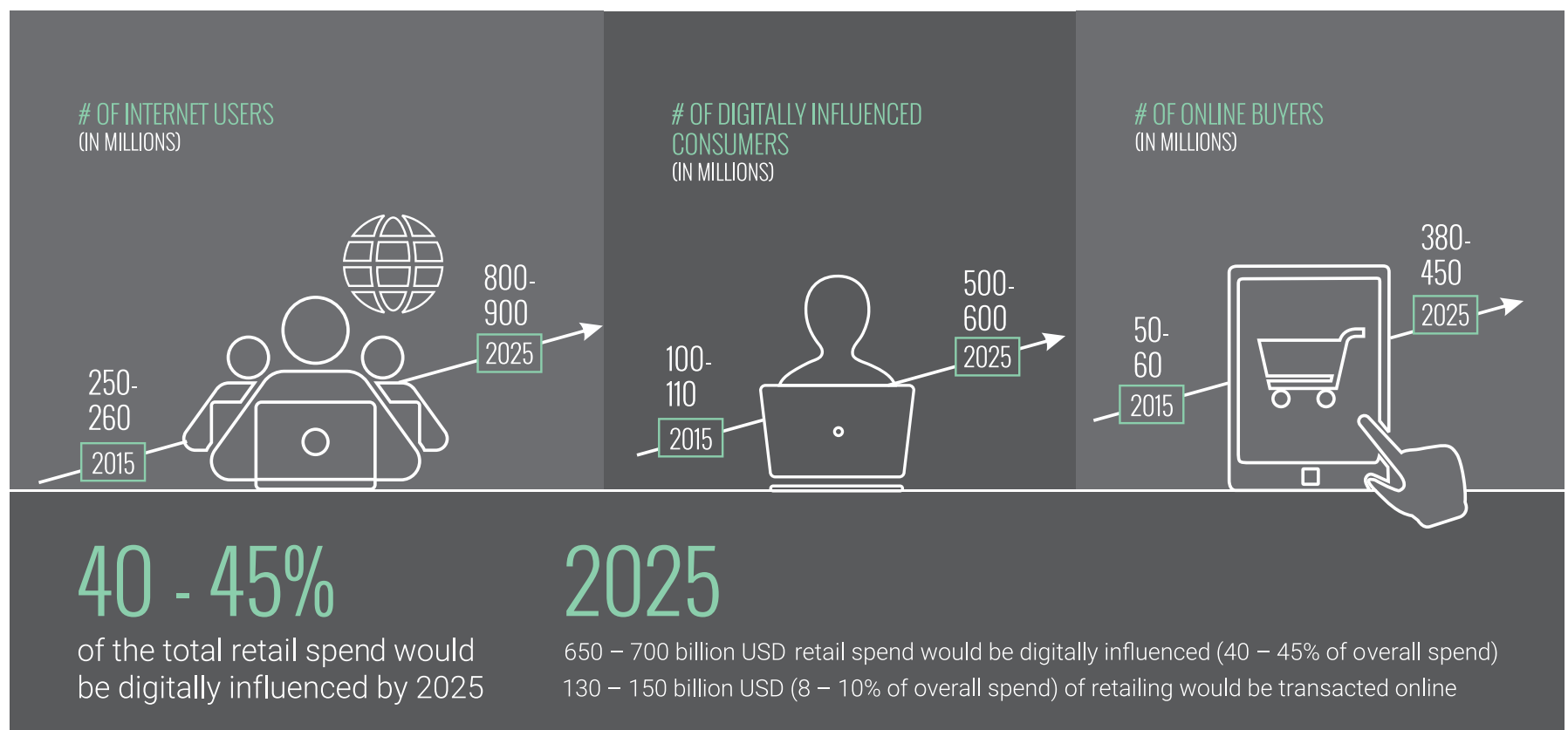
- ‘Traditional’ retail, characterized by a large number of mom-and-pop stores.
- ‘Modern’ retail, which typically operates in the form of chain of stores.
- ‘E-commerce’, which includes horizontal multi-category players as well as specialty retailers focusing on specific categories.

‘Traditional’ retail, accounts for close to 90% of Indian retailing. These stores have the advantage of being very close to their customers and forging strong relationships with them, providing unmatched convenience, and localization benefits. However, they are threatened by the scale, range of choices and better shopping experiences provided by the newer formats.

‘Modern’ retail started in India almost 25 years ago. While store chains are really strong in the conventional elements of retail (choice, transparency, experience), the ramp-up has been slow and profitability remains challenged. This segment accounts for less than 10% of all retailing in the country, compared to around 40% in China.

‘E-commerce’ has captured the imagination of the country, as well as several global investors, over the last few years. Online retailers today offer benefits like high degree of customization, access to a large assortment, convenient delivery and value-added services and aggressive prices. However, many have been plagued with flawed business models or weak execution. As a result, currently e-commerce accounts for less than 2% of all retail, albeit this percentage is growing rapidly.

EXHIBIT 8: THE DIGITAL TSUNAMI HITTING RETAILING IN INDIA



Given all these pushes and pulls, what is the future of retailing in India? What will be the impact of the same on the various constituents? Who will be the winners and the losers?

We believe that the winner in the future cannot be classified into one of three buckets of retail formats (traditional, modern, e-commerce). In fact, someone who falls neatly into one of the three buckets will most likely be the loser. The future is about blurred boundaries between retail formats and the customer at the centre of it all.

The winners of tomorrow could be (a) a 'traditional' kirana store that has a tablet-based billing system and uses a cloud-based inventory management tool to determine what and how much to buy. This kirana store could also be the last mile delivery hub for online grocers. (b) An 'e-commerce' player that provides a platform for small manufacturers of apparel / textile / home décor to showcase their offerings to a wider platform—and who also sets up hundreds of small stores to showcase the key products. Or (c)... up to your imagination!

In India the future will be an AND of formats, rather than an OR. So unlike how it has played out in most developed markets with clearly dominant formats at various points of time, India will have winners who span across the three formats described above—picking the best of the consumer and economic propositions from each.

India's economic growth has been driven largely by domestic consumption, and retail plays a critical part in that growth. The debate on retail gets derailed when one pits one stakeholder against the other. We believe that in the new construct of retail, there will be multiple winners: consumers, manufacturers, producers, employees and the government. This model will result in wide implications on the socio-economic fabric of the country.

To start with, in almost any scenario, the 1.2 billion consumers will benefit significantly. The sustained growth in the sector will provide for better quality and a wider variety of products. Market forces will compel players to maintain competitive prices and there is adequate room for efficiency improvements in the supply chain to continue passing on the benefits to the consumer. The responsiveness of retailers to the customer is bound to go up.

The 4A or Anytime / Anywhere / Anything / Anyone model will be a game changer for the small suppliers and producers. It allows a platform for product marketing, price discovery and new market creation. Manufacturers who have been traditionally constrained by distribution choices, are now embracing online marketplaces, eyeing markets beyond the country as well. Farmers will have greater direct access to end retail and can reduce wastage and intermediary margins to capture greater share of value. The fact is that the retail and manufacturing sectors will be mutually beneficial and dependant. The

example of Alibaba in China (and increasingly a few in India) has clearly displayed what an online platform can do for small players.

The retail industry is already the second-largest employer in the country. However, most of the jobs in this sector currently are informal and offer limited growth opportunities for individuals. We believe that with the change in the model, the nature of jobs in retail—traditional, modern and e-commerce sector will change—with higher skill requirement and greater dignity of labor. With greater formalization of the sector, job security and opportunities for career growth will rise dramatically.

The icing on the cake will be the increased tax collections for the government. With a larger portion of country-wide retail sales getting billed more accurately, and with the implementation of the new Goods and Services Tax (GST) regime, most medium-sized retailers, and many small shop-owners, will be included in the formal economy for the first time.

The retail industry has the unique ability to play both the supply and demand sides of growth—creating jobs and income growth that drive consumption, while also catering to that consumption with great efficiency. It is also an industry that is in the midst of a digital revolution globally—a revolution unique in the fact that it has the potential to be driven from the East. To realize its full potential, the industry must transform itself and embrace technology as a driver of innovation. It must become the English army with its longbows and not the French army weighed down by its own armor.



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INDIA BANKS ON FINANCIAL SERVICES

Indian Banking presents tremendous potential. From being conducive for the emergence of strong, 'next-generation' banks to offering one of the finest banking experiences, India has it all. But are all current Indian banks in a position to take advantage of what can be?

The convergence of three key factors comprising macroeconomic tail winds, positive developments in the country's banking infrastructure, technology and regulatory framework, and expected reforms, can help raise Indian banking to greater heights if utilized right. All these factors have the potential to create a conducive environment for accelerated growth in banking in the near future. But only those banks that embrace distinct new capabilities will be able to harness the new opportunities and emerge as winners.

How can Indian financial institutions deliver a whole new banking experience to individuals and corporate entities alike?

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Hidden behind the dark clouds of bad debt, lies the opportunity for an exciting new dawn in Indian banking. Once the clouds begin to clear, over the next two to three years, there will be tremendous potential for the emergence of strong, 'next-generation' banks. But lenders that fail to prepare for the spectacular possibility, enabled by the confluence of three key factors as outlined below, could miss the bus. The **first** of these are macroeconomic tailwinds. India is expected to rank among the top three global banking markets, in terms of revenue size over the next decade. Millions of new banking customers, a majority of whom will be armed with smartphones, will join the workforce every year. Thousands of new companies created by enterprising entrepreneurs, will have the chance to thrive in a vibrant startup ecosystem. Over 500 new billion-dollar companies will be created in India. The net new demand for modern banking services in this rapidly growing

market, is estimated to be one of the strongest in the world.

The **second** set of factors entails several positive developments in the country's banking infrastructure, technology, and regulatory framework, enabling us to leapfrog many advanced economies on the quality of banking experience. Indian regulations have been very progressive in the recent past. Over the last five years, the Reserve Bank of India (RBI), has been steadily promoting the spirit of embracing technology to deepen and broaden banking in India. Innovative experiments like the creation of specialized payment banks and small finance banks have been undertaken. India is also poised to have the world's finest banking infrastructure in the form of an online identity system (powered by Aadhaar), credit information bureau coverage and interbank payment systems.



Once these projects are completed over the next few years, every single Indian resident will have an online, verifiable biometric identity and address record. It will be possible for banking to be almost entirely paperless. Furthermore, information bureau scores will help bring millions under the purview of the formal banking system, creating a complete picture of the credit history of more than half the population.

The payment infrastructure in India is also poised to become one of the most advanced in the world. The National Payment Corporation of India (NPCI), has quietly set about connecting all the banks in the country to ensure seamless, convenient and instantaneous payment transactions across banks. The much-discussed Unified Payment Interface (UPI) is just one of the organization's many levers of change. The biggest driver of transformation, is the fact that digital technology is becoming more affordable and powerful than ever. Continuous innovation and productivity enhancements have become a norm in banking. Some global banks are discovering that India is one of the most conducive markets to pilot their digital innovations.

The **third** set of factors that will help raise Indian banking to greater heights are the reforms, likely to be engendered by the current crisis of non-performing assets in corporate credit. These reforms will lay the foundation for next generation data-driven credit practices. The increasing digitization of the economy is generating large volumes of useful, online electronic information on commercial enterprises. These rapidly growing data repositories are expected to get a further boost with the introduction of the Goods and Services Tax (GST), potentially helping digitize invoices across commercial value chains. Given the rising importance of data, banks are gearing up to use advanced analytics and technology for

better risk management. In addition, the bankruptcy law is also likely to be refreshed in due course.

All these factors have the potential to create a conducive environment for accelerated growth in banking in the near future. But only those banks that embrace distinct new capabilities will be able to harness the new opportunities and emerge as winners. By building and leveraging differentiators, financial institutions can deliver a whole new banking experience for customers—individuals and corporate entities alike.

Ten differentiators to set the winners apart

1. Digitized operations: We believe that banks that become digitally proficient, will be able to enhance customer engagement, ultimately achieving improved brand loyalty and profitability. As more banks deliver digital services in the future, we will see a dramatic decline in paper-based, manual processes. With the widespread use of world-class, online biometric authentication infrastructure, the need for filling out paper applications or using physical signatures to access services, could reduce significantly. As banks' internal processes become electronic, they can control risks better, deliver on customer requests much faster and at much lower costs. Customers will be able to gain real time, granular visibility into the status of their requests.

2. Mastering payments and analytics of payments data: Banks must be able to harness the top-quality payment infrastructure in the country to upgrade the payment experience of their customers. This will be manifested most starkly in the way customers pay utility bills and make payments at merchant shops. Both are expected to be on mobile and with a single click. Winning banks will enable their customers to safely make



seamless payments, keep track of their expenses and make offers and suggestions to them, based on analysis of their payment transactions. Winning banks will also master making contextual offers to customers based on knowledge of where customers are at the moment and what they are doing.

3. Blending technology with human touch: Instead of being purely digital, future banks will be hybrid, compelled by customer demand for such a proposition. They will most likely offer a 'bionic model of distribution' that blends digital with a human touch. Branches in the future could look like an extension of digital channels, where one can seamlessly continue what one initiates over digital channels. In all probability, branches would also be smaller, taking on an advisory role, or focusing on training customers to effectively use their digital channels. Winning institutions will also establish advanced call centers that support their faceless digital channels, with audio or video calls, whenever customers need assistance.

4. Online sales: Digital sales are poised to become the cornerstone of future success. Today, banks feel satisfied if their electronic channels are effectively used for transactions by customers. However, in the future, banks will increasingly look to drive sales and acquire new customers over online channels. In that sense, tomorrow's successful banks could quite possibly look like e-commerce companies.

5. Transaction banking at the center stage: Today, the primary banker to a commercial enterprise is the one that lends it more money. In the future, this role would go to the bank that provides enterprises with a technology-based transaction platform for efficient liquidity and risk management. Transaction banking could then become the centerpiece of commercial banking relationships. Successful banks would create sector-specific

solutions that all participants across an industry value chain, can embrace. Winning banks will leverage Application Programming Interface (API) solutions that effortlessly integrate with client technology platforms, making the lenders themselves invisible. Further, apart from advising clients over financing issues, banks may also start counselling them on operational bottlenecks, based on insights obtained from transaction analytics.

6. Enabling capital markets access: India will still need large-scale and long-term funding for infrastructure projects, such as huge steel and power plants. The risks involved in lending to such big-ticket, uncertain projects will not dissipate overnight. Banks that will be able to help clients access capital markets in a cost-effective manner, instead of taking on the entire risk by lending their own balance sheets will, in our view, gain significant competitive advantage.

7. New ways to doing credit: Banks today rely on the financial statements of borrowers to make decisions regarding lending. However, the quality of financial statements, especially of small and medium enterprises and self-employed individuals, continues to be suboptimal. The future belongs to banks that will institute robust systems consolidating surrogate data from a variety of sources so as to ascertain the credit-worthiness of borrowers. Banks will need the capabilities to analyze transaction data in order to recognize early warning signs and to take proactive action against potentially risky clients.

8. Customer propositions that go beyond banking: Winners of tomorrow will break free from traditional boundaries and offer non-banking services and advice to customers. Consider the example of a home loan. Today, banks enter the scene only when a customer starts looking for a home loan, after having zeroed in on the property. But in the future, banks may need to engage with customers much earlier, educating them and influencing their decision-making by providing vital information. Likewise, banks could, in the future, become customers' trusted platform for getting information for making key decisions like selecting the right school for kids or choosing a vehicle or healthcare plan. Banks must think beyond their conventional offerings to serve as a facilitator, creating marketplaces that permit buyers and sellers to come together.

9. Building effective partnerships: Creating and managing partnerships has not been a strong strength of banks hitherto. However, it will be a core differentiator in the future. Banks may find it challenging to drive changes in isolation. They would be well placed to rely on a host of partnerships to bring together a range of capabilities. Banks should start focusing on identifying and managing effective partnerships with non-banking entities. This will help them complement their firm's core skills and create unique value propositions for corporate as well as individual customers.

10. Mastering agile IT and cyber security: Banks would need a holistic technology-driven strategy to fulfill their vision for the future. Unlike today, it will not be enough for technology to be just about procuring large systems and running them efficiently. The challenge would be to raise the bar by ensuring quick service releases, to get a clear pulse of what customers are relating to. Apart from advanced technology capabilities, an agile organizational structure will also play an integral role in propelling banks toward success. Such a setup will allow all banking functions, including business, technology, operations, legal, risk and compliance, to work collaboratively to deliver winning products and services. In doing so, the winners would be those who can demonstrate their mastery over cyber security to give customers complete confidence that their interests are entirely safe in the hands of their bank.

Future perfect

The future promises many changes, possibilities and opportunities. However, not all banks will be able to survive changes or embrace new capabilities. Many incumbents may be marginalized or may get acquired by rivals, while new enterprises may try to enter the market. Meanwhile, several foreign banks could start looking at India as an attractive destination to make significant investments. All these possibilities have the potential to truly revamp Indian banking.

We expect a strong and resilient banking sector to emerge from the shadows of the current bad debt crisis in India. Over the next decade, we are likely to witness refreshingly new customer experiences, innovative and diverse business models and financially robust, profitable banks. Bankers, investors, and customers have very exciting times ahead, we think. It's time to stock up on sunscreen even while the raincoats are still on!



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INFRASTRUCTURE: LAYING THE FOUNDATION

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RE-IMAGINING EDUCATION AND SKILLING

India is dealing with a demographic time-bomb due to inadequate job creation. We need measures not only to expand the economy but also to create jobs. However, even that is not enough. Skilling and school education require a significant shake-up. The capacity as well as quality of the skilling space remain questionable. Are we even looking at the issue in the right manner? On the other hand, while capacity issues have been largely addressed in schooling, quality has been found to be not just stagnant but deteriorating. How do we diffuse the demographic time bomb and once again convert it into our advantage?

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At a recent round table on the future of employment in India, each participant was asked to bring an object that represented their outlook on the subject. To everyone's amazement, a renowned JNU economist brought a knife. He explained that if India continues to witness its historical pattern of employment, our streets may soon be taken over by unemployed youth brandishing knives!

While the Indian GDP continues to grow at one of the highest rates worldwide, the rate of job creation lags far behind the economic requirements. Every year, over two crore young Indians join the workforce. While a predominantly young population fuels the demand side of the country's employment equation, factors like the democratization of technology are significantly impacting the supply side. According to some estimates, India's employment elasticity—the percentage point increase in jobs for every 1% increase in GDP—has been falling steadily over the last 10 to 15 years, and is lower than the global and Asian averages. The future too does not look very promising. Industry 4.0—heralded as the biggest wave of technology disruption to impact all sectors—is likely to further reduce the labor intensity of most industries. Service sectors like ITES/ IT and banking which were hiring in large numbers until recently, may not require the same number of employees in the future amid the rise of robotics and Artificial Intelligence (AI).

Given this scenario, the much-hyped term 'demographic dividend', once used to describe India's growth prospects, is being replaced by terms such as 'demographic time-bomb'. How can India overcome this crisis? How can we build a large, suitably employed workforce that underpins national economic growth? The answers lie in addressing the following three elements simultaneously:

1. Establishing a set of measures to ensure that economic expansion comes with adequate employment growth.
2. Aligning India's higher education and skilling efforts with the potential employment requirements of the future.
3. Ensuring a functional elementary education system that effectively prepares children for secondary education and skilling.

In this article, we focus on the last two points, examining how we can expand productive employment through educational and skilling reforms. Successive Indian governments have invested extensively in skilling, creating a variety of institutional structures, like the sectoral skills councils and the National Skill Development Corporation. A number of schemes such as the STAR scheme, STAR II scheme, and Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY) were also introduced to help citizens equip themselves with marketable skills.



However, several years after these efforts first began, the skilling capacity of the country still remains inadequate, both in terms of quantity as well as quality. While the number of skilling centers and their capacity is far below target, the placement rates of the existing centers is also poor, raising questions about the value of the skilling efforts.

Real transformation, therefore, calls for some fundamental changes in how we define and drive our skilling efforts. Three issues that need to be addressed are as follows:

1. Redefining skilling: The world over, skilling involves pursuing very focused, 1 to 3-year courses or apprenticeships that impart skills that are otherwise difficult to learn. These are high quality programs that ensure employment and offer long-term career pathways. However, skilling in India has come to mean taking up a three-month course in limited areas such as carpentry, call center services, or beauty and wellness. Such courses, therefore, are today largely perceived as things that are taken up 'if one cannot get a proper job'.

Driven by this narrow approach, we have created significant capacity for a variety of short-term, entry-level courses. In doing so, we have failed to create a healthy

ecosystem to promote the longer, more evolved courses that can deliver real value. While ITIs were set up to serve this purpose, they continue to lack both in footprint and quality. A truly skilled mid-cadre can deliver disproportionate returns in terms of productivity across professions, from construction to education, and from shop floor manufacturing to software development. Consider this example. Where does a company find an entry-level analytics professional today? Nowhere. Firms usually just hire engineers or science or commerce graduates and train them on analytics. What if there were one to three-year courses on analytics? To realize India's true economic potential and to boost industrial productivity by supplying firms with skilled resources, we need to think of skilling in a holistic manner. We have to stop focusing on just training people to become plumbers, security agents and beauty workers.

2. Identifying the jobs of the future: What are the industries and trades that will drive India's economic growth and stay relevant 10 to 15 years from now? One study suggests that jobs in the future will be divided into routine and non-routine, and manual and cognitive tasks. It is expected that non-routine and cognitive jobs will see a huge surge in demand, while vacancies for routine and manual jobs will reduce. Although new jobs



India should have a far higher number of ITIs (public and private) or similar institutions, offering a wide range of high-end skilling courses and fewer generic arts, science and commerce courses. Corporate enterprises also need to play their part in this effort. The private sector has been roped in for many skill development schemes in the country. Yet, their contribution to course and curricula design has, so far, been limited. There is still not enough 'pull' for skilled employees in the system. The job market offers little premium for skill certification. Industries that have designed skill courses themselves refuse to acknowledge the value of these certifications. Clearly, something is not working and needs to be made better. The industry must take on some responsibility for this, and work towards addressing the challenges.

But the challenges are not just with respect to higher education; secondary school education also needs to incorporate skilling. Today, more than two-thirds of our children drop out of school because they see no value in continuing. Besides the addition of some vocational courses in a handful of schools across the country, secondary education in India has seen no major shifts in decades. This experiment on vocationalizing school education needs a rigorous push in the right direction. One possibility is setting up dedicated skills schools that students can enroll in at the secondary education level. These schools can offer a wide variety of courses and ensure significant learning and skilling over a three to four year period. Perhaps, with this effort, we can enable students to find meaningful careers after they graduate from high school.

We strongly believe that this three-step fundamental rethink, if supported with much needed policy and budgetary measures, may help India achieve its vision for skilling.

An effective elementary education system is critical to ensure that children have the basic skills—academic, cognitive and social—as they enter skilling or higher education programs. So far, India has done well on access and enrollment to schools. However, the quality of education remains a key concern across government and aided private schools, which together cater to 70% to 80% of the country's children. Half the children enrolled in class V in India cannot do basic mathematics or read a simple sentence. How can we expect these children to move on to higher education or skilling institutions and learn effectively there? While a lot needs to be done, here we highlight three levers that are perhaps most fundamental to transforming elementary education.

Greater investment in early childhood education: Education before the age of six remains a grossly neglected subject within the Integrated Child Development Services (ICDS). Anganwadis currently lack the infrastructure, human resources, and skill sets to provide children the learning inputs and stimulation that are critical between the ages of two to six. Consequently, children

will be created, several positions will also be displaced. Are we prepared for this? Will the new employment opportunities come from the industries boosted by the Make in India campaign or from Startup India? Will we need many more health and sanitation workers given our increased focus on Sustainable Development Goals (SDGs)? Where will the Indian food processing industry be in 2025? Will the automobile industry ecosystem look the same as it does today?

If we want to be ready for the opportunities of the future, we need to start thinking about how we should educate and skill our children today. All stakeholders—government, companies, education and skilling institutes, military, and the public—need to be involved to make sweeping changes in the area. Economic and technology trends should also be taken into account while making amendments. Many countries including several South East Asian (SEA) nations, have already taken this agenda up on high priority.

3. Transforming secondary and higher education: Today, India produces lakhs of arts, science and commerce graduates every year, most of who struggle to find jobs. We have nearly 4,000 business schools, many of them on the verge of shutting down. The same is the case with engineering colleges.

Corporate firms constantly complain about the quality of educated and skilled workforce in the country. Estimates suggest that around 80% of people joining the workforce today are unemployable. This implies that higher education in India requires a significant rethink.

moving on from Anganwadis to primary schools usually lack a strong foundation that is vital for their formative years. Studies show that this gap has a significant impact on not only an individual's lifelong learning and employment capabilities but also at a national level on per capita productivity, and hence GDP. The business case for increased investments in early childhood education, therefore, is a no-brainer.

An outcome-driven primary education system: In most schools around the country, the first time a child's learning outcomes are measured is in grade eight or ten. Therefore, this is also the first time the system's effectiveness is measured, and that is just too late. Across the country, this has led to many shortcomings in elementary education. These include a proliferation of sub-scale schools, a large number of teaching vacancies, greater administration responsibilities for teachers, and a general disregard for learning.

A system that is not held accountable for anything except enrollment and disbursement of the mid-day meal is unlikely to deliver on greater goals. The situation can be remedied by setting up a simple but frequent and robust learning assessment mechanism. This will help drive positive results in the system at all levels—from the center and the state to the district, and all the way down to individual schools and teachers. By measuring and acting upon these results, we can ultimately plug the gaps in the system—ranging from human capital issues, to curriculum and pedagogy, and everything in between.

Technology as the key enabler of change: If there is one sector that technology has not touched—forget transformed—it is education. Technology still remains at best that one hour in a computer lab sometime during the week. Learning is for the most part an individual journey—where every child learns at her own pace in her own style, in the social setting of a classroom. It is nearly impossible for teachers to effectively teach 30 to 40 kids at the same time, especially in the multi-grade/multi-level classroom format in government schools. Placing technology-based learning tools in the hands of teachers as well as parents can be a significant game changer. Simultaneously, we need to enable educational administrators to harness student, teacher, and school level data to be significantly more data driven in their decisions and strategies.

For this to happen, incremental steps such as instituting computer labs in a few thousand schools every year will not suffice. Tangible results will hinge upon a thoughtful, large-scale infusion of technology into education. This requires the concerted efforts of key stakeholders at all levels of the system, supported by a proactive public-private partnership.

There are many challenges in the Indian education system that have a direct bearing on our employment scenario. Fixing each one of them will likely become a

catch-up game we may never win. Perhaps there are different ways to do this. Perhaps this is a time to pause and reflect on the future, on possibilities that we want to bring to life. Perhaps this is not the time to think only about incremental changes, but also to bring about big shifts in our education system, in order to rewrite our destiny.



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HEALTH SYSTEMS LEAPFROGGING IN INDIA

A NEED AND A POSSIBILITY

Healthcare in India has seen progress over the last decade, but we still missed out on our Millennium Development Goals (MDG) due to high maternal and child mortality rates. Building a sustainable healthcare system in India promises to be one of the biggest challenges of our times. Emulating the development paths of mature health systems however, is not the answer, since such approaches take too long and are riddled with pitfalls. In order to achieve its health goals, India needs to act quickly and differently.

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India's healthcare system has come a long way

India has made significant strides in healthcare over the last decade, with key indicators of health outcomes showing marked improvement. Life expectancy has increased by almost four years during this period, from 64.4 years in 2005 to 68.3 years in 2015. The rate of infant mortality has declined from 57 deaths per 1,000 live births in 2005 to 37 fatalities per 1,000 live births currently. Utilization of health infrastructure has accelerated—the number of institutional births has risen to 79% in 2015, from 41% in 2005. Notably, India was declared polio-free in 2014, and tetanus-free in 2015.

Both the public and private sectors have contributed to improved health outcomes. Various government initiatives have mobilized communities on health, and enabled increased access to public health services while ensuring higher utilization of available infrastructure. For example, nearly 900,000 female community health volunteers (ASHAs) have been deployed in rural areas to support mothers over the last decade. The coverage of state-sponsored insurance schemes expanded six-fold from 2005 to 2010. The government's flagship Swachh Bharat Abhiyan program aims to provide every household with access to sanitation by 2019.

Private sector innovation, meanwhile, has fostered the emergence of pockets of efficiency—low-cost services at international standards of quality. For example, HCG (a chain of cancer specialty hospitals) optimizes operations through a hub and spoke configuration, housing expensive equipment in its hubs. Similarly, the adoption of well-defined protocols for even relatively complex procedures has contributed to a reduced risk of errors. Pioneering surgical procedures, such as beating heart surgery, and affordable medical devices have addressed local challenges, and helped increase access to healthcare.

Yet, there is significant ground to cover

Despite making substantial progress over the last decade, India has missed its MDG for healthcare, in particular for maternal and child mortality rates. Like other developing countries, India faces the dual burden of communicable diseases and Non-Communicable Diseases (NCD). Among communicable diseases, respiratory infections, tuberculosis and diarrheal diseases remain the leading causes of death. NCDs account for about 52% of total burden and 60% of deaths in the country.



Government expenditure on healthcare—at around 1.3% of GDP currently—significantly lags equivalent budgetary allocations being made by peer countries, estimated to be between 3% to 4% of GDP. Public health infrastructure and staff availability in India are woefully short to meet actual demand. For instance, the country faces a nearly 50% shortfall in the supply of doctors, with the doctor-to-patient ratio of 0.57 per 1,000 being almost 53% lower than the equivalent ratio of 1.2 per 1,000 for the average Asian developing economy. Additionally, there is significant regional variation and inequity, with shortages being most acute in the northern and eastern states. Suboptimal utilization and negligence in the maintenance of scarce public healthcare facilities result in the population relying on expensive private healthcare—an issue exacerbated by abysmal levels of insurance coverage. While both the public and private sectors have undertaken many pilot initiatives using new technologies and operating models, none of these ventures has been designed for scale. Governance for large public health programs remains weak, leading to less than optimal impact. Achieving the desired health outcomes, thus, continues to remain a challenging goal.

Creating leapfrogs for sustainable health systems








For health systems development in India, policy makers must choose one of two paths: the familiar, but lengthy, expensive and unsustainable path chosen by developed economies, or an accelerated pathway that leads to

a sustainable future. Following the well-worn path of advanced countries can lead to spends as high as 17% of GDP, as is the case in the US, with only marginal improvement in outcomes. Emerging economies, including India, would be well placed to follow the second path. These countries have fewer impediments to overcome than developed economies, including fewer sunk costs related to existing infrastructure and equipment, lower fixed costs from not building overcapacity, and a less divided public opinion. They also have at their disposal technological innovations, alternative operating and financing models, and legal frameworks that were not previously available to developed countries.

It is with this idea in mind that BCG collaborated with the World Economic Forum (WEF) over a three-year time frame (the Leapfrogging in Emerging Economies initiative) to develop a holistic understanding of challenges in emerging economies and create strategies to ensure that systems are financially sustainable, while delivering high quality, cost-effective care. For the Indian context, we would recommend scaling up healthcare innovations or leapfrogs as a complementary approach to the ongoing initiatives, which are necessary but not sufficient.

Leapfrogging means using a new technology, operating model, or pattern of behavior to help a system skip development stages that had previously been considered unavoidable. ‘Technology’ encompasses new health-related activities and products. ‘Operating model’ refers to any modification either in the organizational setup, or in the delivery of health-related activities. ‘Behavioral

EXHIBIT 9: PROVEN OR EMERGING LEAPFROGGING IDEAS, MANY IN INDIA

HEALTH SYSTEM CATEGORIES	INNOVATION TYPES	A	B	C
		TECHNOLOGY	OPERATING MODEL CHANGE	BEHAVIOR CHANGE
	PREVENTION & HEALTH PROMOTION	Arogya World's mDiabetes services providing multi-language informative text messages on diabetes	Health Promotion Board in Singapore brings health into every aspect of a citizen's life	HUL's campaign to promote the concept of good hygiene and drive behavior change
	SERVICE DELIVERY	Biosense's uChek technology for smartphone based analysis of urine reducing cost per test and increasing access	GE-Fortis tele-ICU initiative leverages centrally located expertise; reduces errors by remotely guiding hospitals with shortage of experts	Abdul Latif Jameel Poverty Action Lab study uses non-financial incentives to increase immunization rates
	MEDICAL PRODUCTS	Embrace Global's infant warmer is tailored to rural market requirements	Adopting a pay-per-use model for medical equipment can increase access and affordability	CARE hospitals drive workforce focus on equipment life by emphasizing regular maintenance and safe reuse of devices sold as single-use
	WORKFORCE	MOHFW ¹ 's IVR based Mobile Academy equips rural health workers with required skills	Operation ASHA deploys community health workers with limited expertise to monitor compliance to the TB regimen	Narayana Health's cost awareness policy promotes transparency and rewards process improvement
	INFORMATION	MOHFW's Kilkari voice message service increases awareness of low-income group women by providing maternal health information	NABH ² 's hospital accreditation standards allow for meaningful benchmarking	Traffic light nutrition labeling (in the UK) drives healthy choices
	FINANCING	RSBY ³ uses biometric smart cards to register low-income insurance takers, streamline administration / service delivery and facilitate data collection	Narayana Hrudayala's Yeshasvini program increases access to care for low-income populations while limiting financial risk	Rewarding health insurance buyers for healthy lifestyles by adjusting premiums to lifestyle improves health and reduces cost
	LEADERSHIP/ GOVERNANCE	A nationwide, integrated electronic health record system can improve quality and efficiency of care by avoiding data silos	Intersectoral governance can bring health considerations into all aspects of public policy making in a holistic manner	Imposing excise taxes on unhealthy products (foods, tobacco, alcohol) can discourage unhealthy consumption habits

Note: 1. Ministry of Health & Family Welfare | 2. National Accreditation Board for Hospitals & Healthcare Providers | 3. Rashtriya Swasthya Bima Yojna

change' pertains to the evolving preferences and conduct of various individual and institutional stakeholders within the ecosystem, such as patients, health workers and payers. Innovation around these three dimensions can enable leapfrogging across the seven different dimensions of health systems specified by the World Health Organization (WHO). A classic example is the introduction of mobile phones across remote areas of India that allowed people living there to reap the social and economic benefits of the connectivity revolution, while avoiding the massive outlays involved in fixed line infrastructure. Many such innovations in healthcare already exist in India—some at scale, as well. (see Exhibit 9)

Overcoming scalability challenges

As described above, many seeds of experimentation and innovation are being planted in the Indian healthcare landscape, and there is potential to scale up these initiatives for creating outsize impact. However, in our experience, leapfrogs typically progress rapidly through early development stages to proof of concept, only to fail while attempting to scale up. Scale up is the most challenging stage because it can involve governmental, financial and market roadblocks, more so in healthcare, since the sector is complex, context-specific, and conservative.

So, what does it take to succeed? We studied the evolution pathways of multiple leapfrogs across emerging markets and identified six key lessons:

Anchor innovation in fundamental human behavior:

A leapfrog's defining characteristic should appeal to a universal human trait. This makes any required behavioral change and the leapfrog adoption, easier. For example, social experiments by the Abdul Jameel Poverty Action Lab aim to change behaviors related to immunization in Haryana considering a fundamental human trait—a mother's desire to act in favor of her child. A bouquet of initiatives are facilitating change, including non-financial incentives for completing immunizations, tailored reminders on immunization schedules and getting village networks to spread the word.

Adapt to survive, diversify to thrive: Tailor operating models to local communities. Customize products and services as needed to increase adoption. Arvind Eye Care diversified into manufacturing intraocular lenses with a view to supplying global markets through its Aurolabs subsidiary, capturing 8% of the global market share of intraocular lenses.

Empower communities to shape and own the model:

Encourage community ownership of the model, instead of adopting a 'top-down' approach. This will result in a much higher impact, due to greater involvement of emotionally connected community participants. VisionSpring trains Vision Entrepreneurs from the communities that it serves to operate a micro franchise, traveling from village to village and conducting vision camps, checking eyesight and selling glasses.

Build partnerships: Actively seek partnerships, even outside the healthcare industry and leverage relevant innovations. For example, MicroEnsure (a micro insurance provider) and Airtel have partnered in nearly eight African countries to launch a health incentive plan. Airtel subscribers are entitled to health insurance coverage, provided they spend a minimum amount of airtime. Insurance coverage is directly correlated to the amount a consumer spends on airtime. Airtel pays for insurance premiums offset by the increased utilization of its services. For around 86% of Airtel/MicroEnsure consumers, this scheme was the first time they had insurance of any kind.

Ensure 'design-to-scale': Actively engage with the government to design solutions that target the gap in public healthcare and can scale up effectively within the constraints of the public healthcare system. Operation ASHA utilizes the community to bridge the gap between the disadvantaged and government infrastructure in six Indian states and Cambodia. The organization partners with the government-run Indian National Tuberculosis Prevention Program that provides free treatment and diagnostics and leverages technology and community

health workers to ensure compliance to the TB treatment regimen.

Objectively evaluate progress, and course correct: Set the foundation for rigorous data collection and evaluation during the development stage itself. Robust tracking of key metrics will help engage the concerned stakeholders, and influence changes to care delivery.

From leapfrogging to health system transformation

Successful leapfrogs can provide tremendous benefit to their communities. A well-chosen combination of leapfrogs could also pave the way for an eventual transformation of the healthcare system.

However, sporadically investing in micro-level innovations, and expecting them to independently grow into transformative and inclusive health solutions, is ambitious. The private sector in India remains fragmented. The public sector still controls the lion's share of resources. Yet, budgetary and political constraints limit the state's capacity to be the driver of innovation. Both sides need to work together to overcome their limitations.

Public-private cooperation in healthcare has traditionally been task focused—either to supply subsidized products and services or to build health infrastructure. Traditional modes of PPP suffer from many pitfalls, including mistrust, push of commercial solutions, short-term financing, 'white elephant' assets, and unclear outcomes with lower efficiency.

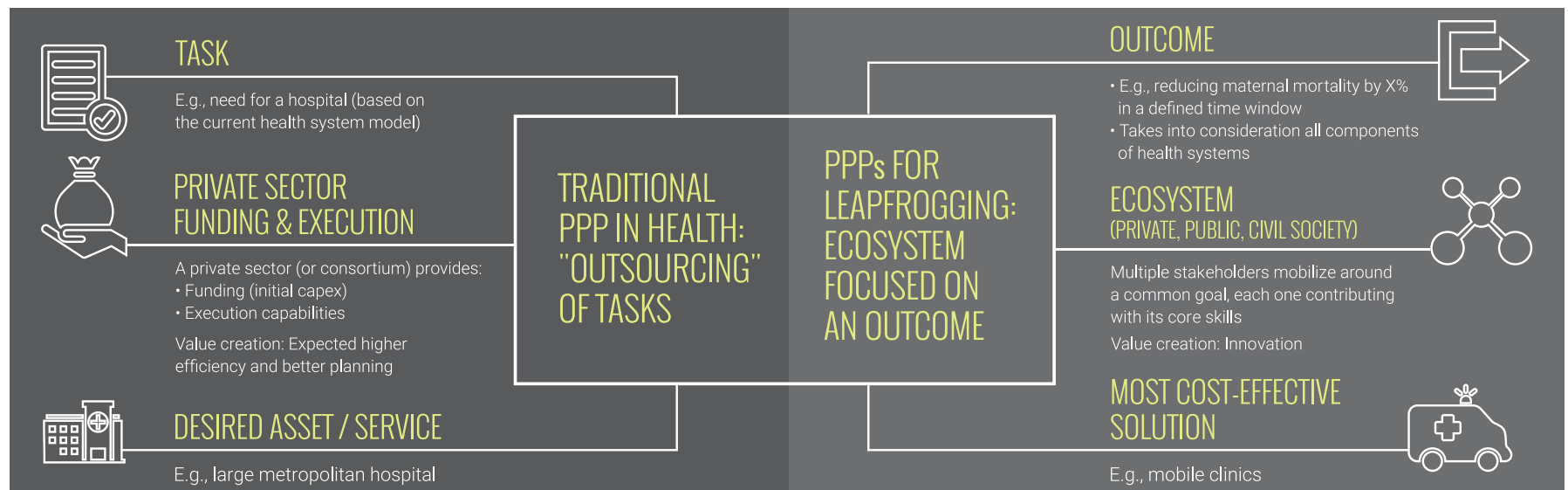
We propose a new approach, an 'ecosystem model', that mobilizes multiple stakeholders around a common, measurable outcome or goal—for example, reduction in maternal mortality rates by a defined percentage within a fixed time period. An approach focused on outcomes would incentivize the concerned stakeholders to collectively brainstorm for solutions, and leverage innovative business models to finance and deliver sustainable results. (see Exhibit 10)

This model is superior to traditional PPPs in three significant ways: it harnesses elements of collective design, financial sustainability, and data-based decision making.

Collective design of 'smart' and holistic solutions by providing a forum for stakeholders to work together. GAVI, Global Alliance for Vaccines, is leveraging new technologies and partnering with the private sector to integrate aspects of supply chain, data management, workforce training, and other assets into an overall immunization strategy.

Financial sustainability achieved through new business models and innovative structures for financing or invest-

EXHIBIT 10: DIFFERENCES BETWEEN PPPs AND ECOSYSTEM MODELS



ing. 'Social impact' bonds have gained traction in multiple capital markets as an instrument to funnel Corporate Social Responsibility (CSR) funding.

Data-based decision making using mutually agreed metrics, tracked throughout project lifecycles, helps prove on-ground results, and identify course corrections. A Project Management Office (PMO) needs to be established to monitor progress, and measure outcomes.

Call to action

India is at the cusp of a triple opportunity to chart its own path to establishing a sustainable healthcare system. It has access to a wide range of technological, process and operating model innovations. In absolute terms, the Government of India and state governments today manage a large healthcare budget. Finally, there is significant potential to invest in new solutions, given the limited fixed costs incurred on existing health infrastructure and entrenched techniques. The 'ecosystem model' is definitely not a 'silver bullet' for curing all the ills of Indian healthcare. It needs to be supplemented by appropriate reforms, robust governance, and a genuine will for change. Nevertheless, the 'ecosystem model' can help mobilize and coordinate a large and diverse community of stakeholders around a shared goal.

The government will continue to be the single most critical stakeholder in provisioning universal healthcare services, but other actors can play an effective supporting role on this front. Under the healthcare system of the future, the government will need to provide the requisite platform for engaging various stakeholders, and support the scaling-up of promising leapfrogs. Meanwhile, the private sector, including hospitals, pharmaceutical and medical technology companies, and non-governmental

organizations (NGOs), will need to focus on developing tailored, low-cost products and process innovations that can help change the way that healthcare services are delivered. Global agencies, on their part, will have to provide financing, expertise and access to their networks, to promote the growth of a sustainable Indian healthcare ecosystem.

A tailored approach is needed to transform India's healthcare system, and key stakeholders must work in tandem toward realizing a common goal. This will ensure the most effective use of India's scarce resources to the benefit of its people. The time to act is now.

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TRANSPORTING INDIA CLOSER TO GROWTH

The Indian transportation industry has immense potential to bring change to the country's people and its economy. While India has one of the world's largest road networks and the largest railway system, access has not been uniform and key challenges prevent growth. Congestion and high spend on logistics are two primary obstacles. Convenience and connectivity are other factors that need to be worked on to make India globally competitive in this space. While the focus has been on building traditional infrastructure, what should the new transport agenda for the next 20 years be that will truly deliver growth and development?

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A well coordinated transport system helps in the sustained economic growth of any country. This holds true for India as well. The Indian transport system comprises several modes of transport, including roads, railways, shipping, air transport, etc. India boasts of one of the world's largest road networks, spread over 33,00,000 kilometers, and the largest railway system under a single management. However, access has not been uniform.

India's transport and logistics infrastructure challenge can be summarized in 4Cs: Cost, Congestion, Connectivity and Convenience. According to studies, India spends about 14 percent of its GDP on logistics, which is 40-60 percent more than what countries such as Singapore, Germany, US and Japan spend. This is the single biggest hurdle in making India globally competitive. Congestion is another challenge, driven by the concentration of economic activity in few cities, long delays in new project delivery and sub-optimal planning of existing infrastructure assets. While solving cost and congestion are important for driving growth and prosperity, ensuring uniform connectivity and convenience to all parts of the country is essential in enabling equitable and inclusive growth. Public transport, which is not known for its connectivity or convenience, is still the only means of transport for the poor. It allows them to look for work opportunities, and gives them access to education and health services. Over the years, a lot of focus has been

on building traditional transport infrastructure, and rightly so, but the time to shift gears and re-imagine the country's transport needs is now. With the above priorities in mind, we've drafted India's transport action agenda for the coming years.

1. Right modal shifts India relies significantly on roads and railways for moving goods. For example, 62 percent of cargo is moved on roads, 29 percent by railways and a meager 3.3 percent by domestic sea route and inland waterways. According to BCG's analysis, the cost of moving goods by rail and inland waterways is much lower than by roads. It costs INR 2.6/tonne-km to move goods by roads—the comparable numbers for railways and sea & inland waterways is about half at INR 1.4/tonne-km and INR 1.1/tonne-km respectively. We have structurally set ourselves for higher logistics costs. Unlike India, most countries have developed modes that keep costs of operations low. (see Exhibit 11)

India's 7,551 km coastline and 14,500 km of navigable inland waterways can easily be used as an alternate and cost-efficient mode of cargo transportation. Moreover, with land acquisition increasingly becoming more complex and prone to litigation, the waterways could offer a quicker solution. The National Waterway Bill 2015 and the new rigor visible at Inland Waterway Authority of India is a welcome change in this direction but more needs to be done, and sooner.



2. Make the most of existing infrastructure: While building new infrastructure assets ranks high on the national agenda, it is important that we make the most of existing infrastructure. Until recently, 'operational efficiency' was an uncommon term in the infrastructure sector as for most government entities there used to be clear directions and targets for new asset creation. However, things are changing and there is increasing realization world over.

Take the major public ports for instance. Over the last two years, these government entities have driven substantial operational efficiencies with changes in policies, mechanization, use of digital technologies, etc. This has doubled their cargo-carrying capacity and dramatically reduced vessel turnaround times.

The three ports of Paradip, Vizag and Kandla which account for about 40 percent of the total cargo handled have witnessed a steep improvement in turnaround times over the last one year. The turnaround times for Paradip decreased from 7 to 4.5 days, marking a significant improvement of 35 percent, Vizag recorded a 33 percent improvement from 5.7 to 3.8 days and Kandla a 13 percent improvement from 5.4 to 4.7 days. Like in the port sector, there is a need for concerted action in roads and railways to drive operational efficiencies in parallel with new asset creation. Many countries in Europe are already realizing significant gains by focusing on better utilization of existing infrastructure. For example, Germany has recently been able to add more number of trains within the same setup by optimizing the time table. Leading European tolling solution companies are involved in a number of innovative electronic tolling projects. Traffic jams in London have declined by 30% since the introduction of e-tolling. These are the kind of actions required to drive higher efficiency from existing infrastructure.

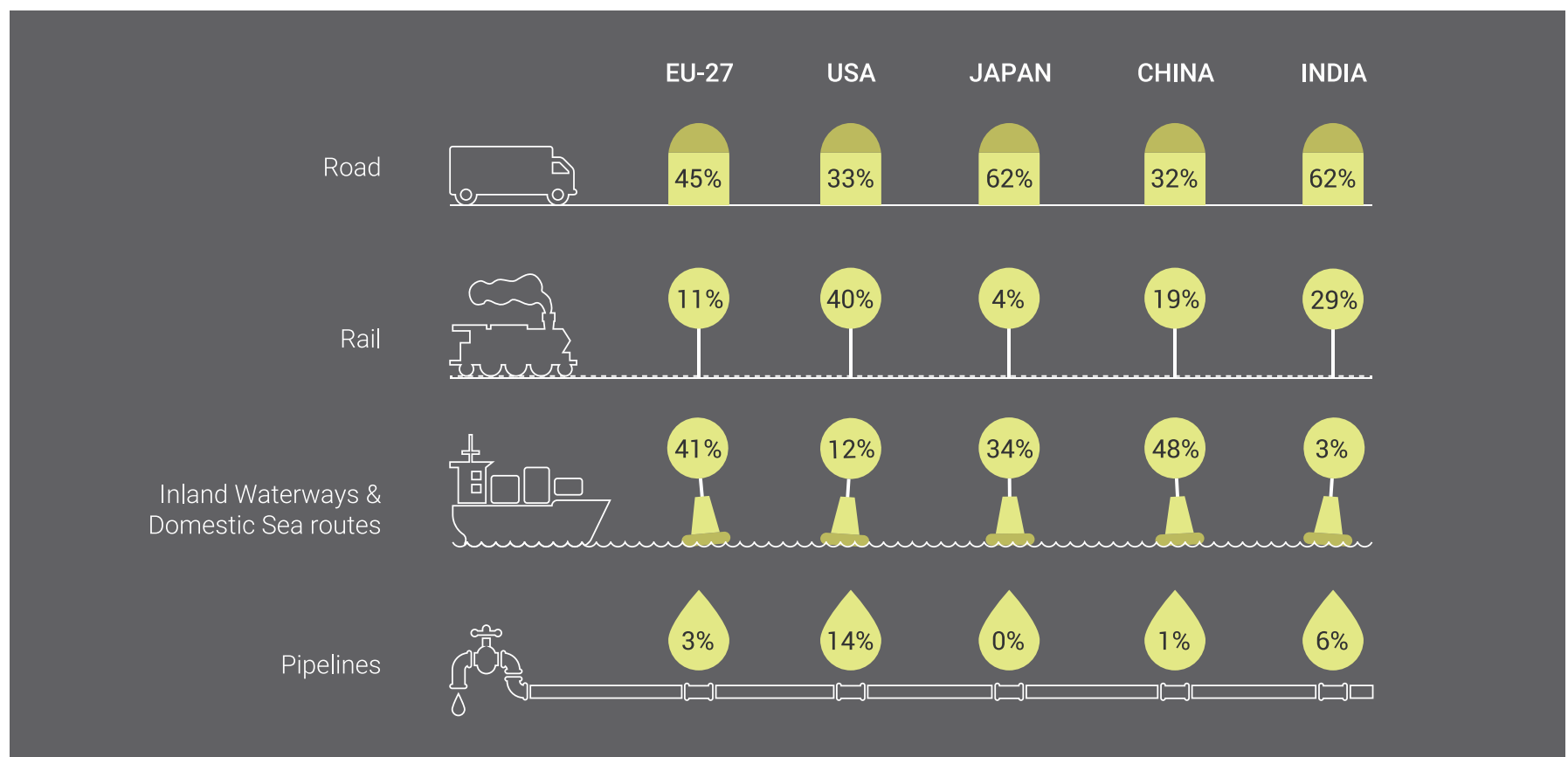
3. Ensure transit convenience for passengers: World over, urban transport is being planned around transit convenience i.e. locating the hub terminals of different modes of transport close to each other. This helps passengers move from a bulk mode of transport (like rail) to a last mile mode of transport (like buses) easily. Many major cities such as Singapore, Hong Kong, Tokyo and Stockholm have all designed their urban transport around multi-modal, co-located terminal developments for transit convenience. On the contrary, if you look at the 15 most frequented railway stations in India, the average distance to intercity bus stations is around 4 kms. Passengers currently use uneconomical and inconvenient modes of transport to transit from one to the other. Transit inconvenience across these 15 railway stations affects approximately 2 - 3 million people daily.

It is critical to improve the quality of travel for these millions of people through transit-oriented development/ redevelopment of some of our busiest transit points.

4. Encourage disruptive startups: Technology disruptions are changing the face of many industries, including transport. Disruptions like predictive analysis, virtual aggregators, remote tracking and control, vehicle-to-vehicle communication (truck platooning), etc., are challenging the norms and changing business models in the logistics industry. This shows that the modernization of transport and logistics sector can be done without heavy expenditure, and instead the focus can be on improving efficiencies with low Capex.

Everyone knows what Uber or Ola have done to intra-city passenger travel. There are a number of Indian startups who are redefining cargo transport through simple processes and advanced technologies. Rivigo, for example, wants to build a more reliable and safer logistics network with the goal to ensure that long-haul road

EXHIBIT 11: RE-IMAGINING TRANSPORT TO ACCELERATE INDIA'S GROWTH



shipments are just as quick and reliable as shipments by plane. Startups like The Porter, LetsTransPORT and Blackbuck are all driving the unorganized trucking industry towards efficiency. The need of the hour is to encourage such disruptive startups by limiting regulations and allowing them to challenge traditional government thinking in transport systems.

5. Improve rural transport connectivity: Nearly 50 per cent of trips from villages involve the use of the National Highway. But the connectivity from the highway usually extends only up to a distance of 5 km on either side of the highway. Establishing uniform and deep connectivity is important to efficiently connect the rural economy with its markets. Better connectivity will also give those living in rural India access to better education and health facilities. While the Pradhan Mantri Gram Sadak Yojana (PMGSY) is a step in the right direction to create the required infrastructure, it is also important to ensure adequate public transport frequency and quality.

In most states, the State Transport Undertakings (STUs) dominate the road transport sector. Currently, the total number of STUs stand at 55 across the country with a total fleet size of 1,48,000 buses carrying about 70 million passengers daily-almost three times more than the Indian Railways, which carries over 23 million passengers daily. These STUs, barring a few, have been incurring huge financial losses, have below par quality

of buses and do not provide the requisite frequency of connectivity.

In the past, some efforts have been made to reform these STUs but with limited results. Reform of STUs needs to begin again, especially since this is the largest mode of transport and even a small change will benefit a large section of the population.

6. Establish an integrated transport plan: Earlier, transportation development was driven by the respective ministries of Railways, Roads and Shipping. They would all develop their own investment plans. Of late, however, a few steps have been taken with dedicated freight corridors wherein a holistic approach is being adopted. Yet, an integrated transportation plan is needed that ensures that different transport systems are aligned. The split of responsibilities of the management of different transport modes, between ministries at the national level, inhibits smooth and well-coordinated development. What India needs is a unified transport plan to deliver a multi-modal transport system. The time is ripe for change and India needs to re-imagine its transport agenda. 2016 has seen a flurry of action in the right direction and hopefully this marks the beginning of a coordinated effort to bring about the desired change.



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ENERGIZING INDIA'S FUTURE

India is expected to be a leading global driver of growth in energy consumption in the next 20 years. The impressive growth of per capita energy consumption needs to be addressed while ensuring basic access to the currently 240 million energy-less. Growth must be built by transformation in infrastructure build out, energy availability, with a strong focus on sustainability. There are structural issues to be addressed immediately including underpriced resources, the burden of subsidies, a perception of an unstable policy and administrative regime, and lack of efficiency in processes. Additionally, debt levels affect stakeholders. Investors are wary. How do we build an efficient, investor-friendly energy sector for the next 20 years that can withstand global commodity cycles while providing the fillip to India's ambitions?

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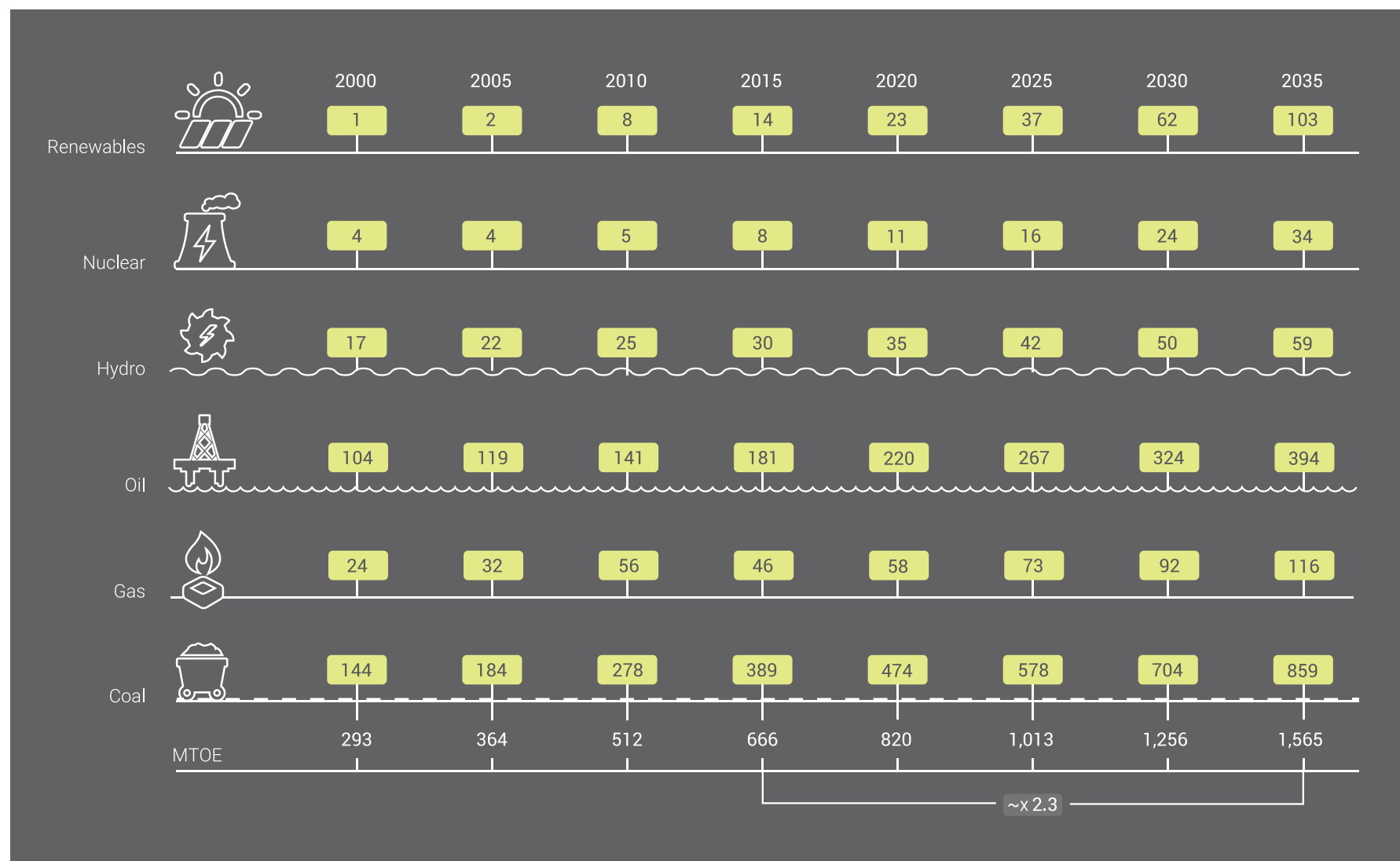
India is firmly set on a path of economic growth that is estimated to usher in prosperity like never before. This economic prosperity will need to be built on the back of significant transformations across several facilitating elements, the primary ones being infrastructure build out, energy availability and sustainability. India's per capita energy consumption currently is almost one third the global average and trails far behind the mean figure for the developed world. Our energy consumption is largely based on coal, along with a preponderant dependence on other fossil fuels. Although per capita energy consumption has more than doubled over the past 15 years, almost 240 million people do not have access to affordable energy supply today.

Energy consumption in India has grown at a Compound Annual Growth rate (CAGR) of about 6% during the last decade. BP Energy Outlook 2035 expects India to achieve the fastest energy consumption growth among all major economies, despite rapid increases in non-fossil fuel production. The total energy consumption is expected to grow by 128% by 2035. Demand for gas is expected to expand by 155%, followed by coal (121%) and oil (118%), while demand for renewables, nuclear and hydro are estimated to rise by 656%, 334%, and 99%, respectively (see Exhibit 12). Our potential clearly positions us as the leading global driver of growth in energy consumption in the next 20 years, possibly surpassing China in the process. Even under the most somber growth scenarios, it is fully expected that India's growth ambitions will lead to a 100% increase in energy consumption, thereby requiring double the existing energy sources.

On the supply side, India is significantly dependent on coal as a primary fuel, which accounts for 58% of the energy consumption in the country. It is estimated that we have one of the largest resource bases of coal, with the policies and gains of the past few years positioning us strongly for the future. It is expected that India will be the largest consumer of coal, equivalent to over 435 million tons of oil by 2035. According to current estimates with respect to oil and gas, India is home to only 0.3% of the world's sedimentary basins. Further, we account for a mere 0.3% of the global oil and 0.8% of the global gas reserves. We are, however, blessed with abundant natural resources in the form of sun and wind. The total wind potential in the country is estimated to be over 30 times the current installed capacity of 27GW, while our solar potential is expected to grow by about 90 times the current installed capacity of 8GW. Already, the government has an aggressive target of 60GW of wind capacity and 100GW of solar capacity by 2022.

Successive governments have embarked on addressing the upcoming challenge at varying intensities and levels of aggressiveness. There are, however, some structural issues that affect the sector. Firstly, we have successively underpriced our resources, making the economics of the sector unattractive to a large number of serious investors. The energy subsidies over the years have been a major burden to the economy. The total subsidy for 2014-2015 was INR 76,285 crores. The diesel price deregulation and Direct Benefit Transfer (DBTL) of LPG, coupled with low oil prices, led to a 64% drop in the subsidy burden for 2015-2016, which now stands at INR 27,571 crores. Gas prices in the country have also

EXHIBIT 12: INDIA PRIMARY ENERGY DEMAND GROWTH TO 2035



been fixed by the government based on different regional benchmarks. Domestic prices were reduced by over 50% from \$5.1 MMBTU in November 2014 to \$2.5 per MMBTU for the period between October and December 2016, making the sector unviable for producers, even though the country is in a supply deficit.

Given this scenario, the newly announced pricing regime that promises market prices for natural gas produced from upcoming fields is a favorable step to attract investment in the sector. While the government has provided support to several segments of our polity at different points in time, the mechanism of delivering such support has been inefficient.

Secondly, past events in the policy and governance ecosystem have created the impression of a less than desirable regime of instability and a lack of administrative efficiency.

Thirdly, the relative naivety of infrastructure financing in the early years resulted in increased corporate leverage, without commensurate assets to underpin

the debt levels, thus putting pressure on stakeholders, including financial institutions.

These three factors, coupled with inefficient underlying processes and systems, have reduced the attractiveness of the sector to investors, whose participation is crucial for us to fulfill our 2035 aspirations.

Our current path of growth and evolutionary reforms is likely to widen the gap between the supply and demand of energy, and has the potential to cripple any 'aggressive' growth plans. If no significant changes are made to the current trajectory, India might increase the burden on the fiscal front associated with energy independence and sustainability. We will then need to import significantly larger quantities of primary resources to fulfill our growth ambitions. BP expects India's energy production as a share of consumption to decline from 57% in 2014 to 54% by 2035, and imports to rise by 153%. The country's oil imports are expected to increase by 161%. This will account for 52% of the increase in imports, followed in volumetric terms by increases in coal imports by over 122%, and gas by over 301%.



The future of India and its economic growth plans are critically linked to the fortunes of the energy sector.

To propel this key primary sector to the next level, we need a combination of bold and aggressive moves, and a 'clean up' to bring in more efficiency and effectiveness. The moves need to be comprehensive and coordinated. They must be focused on all aspects of managing the demand side, while fomenting the supply side, while ensuring that critical enablers are in place and firing on all cylinders. Given our requirements, the Indian energy landscape will continue to be a combination of fossil and new energy based solutions over the next 20 years. It will be important to get the balance right.

The key question is, 'Is it time to get even bolder on renewables'? The present government has certainly made huge strides in achieving our renewables aspirations. Can we be the country that sets the course for a new development model for the energy sector? Can we blaze a new trail by learning from the 'mistakes' of the more developed countries with regards to renewables? Is it possible for us to create a new paradigm for the sustainable and viable development of the sector as the core to energy independence? All these would imply significant public and private investments in developing cost-effective technologies for the generation, storage, and distribution of energy. So the main concern here is, 'is it better to channel government money earmarked for resource segments toward bets on the future of renewables'? Significant innovation, both in terms of technologies and business models, will have to be made to make the entire value chain an attractive proposition. The key is to accelerate the process of building scale, experience, talent and knowledge, in order to help us advance the large-scale viability of the sector by many years.

Secondly, commodity cycles normally go through high and lows. Currently, we are in one such trough. Is it

time to make some aggressive moves that secure our fossil-related resources? The prolonged run of lower oil prices afforded the government an opportunity to create an 'investment fund' to help Indian oil and gas companies bolster domestic as well as overseas investments. While some companies are actively seeking overseas opportunities by leveraging their own financials, we seem to have missed the opportunity for setting up a 'sovereign oil fund'. The basis of this one-time infusion of funds to secure everything from resources to strategic reserves is paramount to our future energy independence. The often mentioned challenge of 'how would we administer such a fund?' is, at best, rhetorical. Our inability to find answers to such administrative challenges has laid many a good ideas to an early rest.

Thirdly, we must consider complementing our initiatives for supply augmentation with measures that help increase our efficiency in managing demand. These initiatives also need to be supported by policies and regulations like time-of-day pricing, incentives, and so on, along with large-scale investment in efficiency boosting technologies across the value chain.

Finally, there is a need to rationalize the energy governance software infrastructure. The existing resource-focused governance structure (coal, oil and gas, renewables, etc.) should give way to a more integrated and comprehensive mechanism. Such a mechanism must help us understand the complex trade-offs, and allocate both human and financial resources with energy independence in mind, rather than just the 'oil versus gas versus coal versus renewables' paradigm. The 'audit and licensing mindset' must be replaced with effective measures to drive flexible administrative mechanisms that are more facilitative and supportive.

In conclusion, the future of the economic growth of India is dependent on our ability to leverage energy sources to fuel our ambitions for the sector. In his book, *The Audacity of Hope*, Barack Obama, states, "A nation that can't control its energy sources can't control its future." Securing our energy future is thus critical for India to become a superpower in the future.

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BUILDING INDIA'S DIGITAL HIGHWAY

Although India continues to lag behind with respect to physical infrastructure, digital infrastructure is on the brink of take off. This growth in digital infrastructure will provide India with unique opportunities to innovate public service delivery, improve productivity, enhance employment, and create a much larger socio-economic impact. Unfortunately, the economic barriers to developing ubiquitous digital infrastructure are very high. Issues such as high cost of spectrum, availability of spectrum, and rigid regulatory frameworks need to be addressed in conjunction with faster technology adoption by the industry. How do we achieve this while overcoming issues like consumer privacy, data ownership, data security and protection which can hinder growth? Can we prevent market failures in digital infrastructure creation? What role should the government and policymakers play? How can industry players facilitate growth from their side?

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The next few years will be definitive for the evolution of India's digital infrastructure and the role it can play in the country's growth. There is significant unfinished business—India is ranked 91st among 139 countries on the Networked Readiness Index 2016, compiled by the World Economic Forum (WEF). Only 15 out of 100 households have access to the Internet, and mobile broadband remains for a privileged few, with only 5.5 subscriptions for every 100 people as per the WEF. However, India has skipped a generation in telecom technology, going from no connectivity to over 350m mobile Internet users in less than two decades. This needs to be factored in while planning the democratization of digital access in India.

The impending growth of digital assets will present India with many unique opportunities to leapfrog its traditional deficit in physical infrastructure. It will help enhance the economic conditions in remote areas and spur new businesses by enabling access for a large number of small and medium enterprises (SMEs), creating a strong digital identity for the country. Above all, digital infrastructure growth can empower the government to embrace as well as enable innovation, provide resources to help increase agricultural productivity as well as enable improved healthcare access for rural areas, potentially

reducing mortality levels. It can also bring financial services to the unbanked rural and underprivileged communities and help fulfill the country's longstanding goal of 'education for all'.

Digital literacy in smaller towns and villages can create employment in sectors such as business process outsourcing (BPO), retail, IT, telecom and financial services. Digital India can also ensure citizens have ubiquitous access to government services. While mobile technology is already starting to make a transformative impact, digital access in Internet-dark areas could have a much larger socio-economic impact.

While the story of the potential value that India's digital infrastructure can add has been told many times, developments in this sector have so far lagged expectations. The government's flagship project—the National Optical Fibre Network (NOFN)—is yet to fulfill its promise for rural India. Given this scenario, we continue to trail the world's major economies with respect to telecom infrastructure maturity and penetration. Network investments by mobile operators are being held back, thanks to the poor economics driven by low tariffs and an unusually high level of competition. This has influenced carriers' ability to upgrade consumer services, meet



demand in highly populated urban areas and expand networks to provide coverage to rural areas. The next few years could see unprecedented changes in the ‘quantity’ and ‘quality’ of digital access. Few would argue against the need to ensure a robust development of digital infrastructure in India. However, one must realize that the economic barriers to developing ubiquitous digital infrastructure are very high. The following few factors will determine whether India’s digital infrastructure dream can be achieved:

Expanding spectrum assets: Few policy changes have a greater impact on infrastructure creation, than optimizing spectrum availability over time by releasing unlicensed spectrum, revising allocations and enabling free sharing and trading. Spectrum is a scarce resource. The ever-increasing projections of mobile traffic growth in India make a compelling business case for allocating more spectrum towards mobile usage. These allocations need to include licensed as well as unlicensed spectrum bands to accommodate both network coverage and capacity needs.

While India has taken a few steps in the right direction such as the Department of Defence releasing spectrum in the 1800 and 2100 MHz bands, the country still requires a better and more comprehensive spectrum policy. India lags behind many developed and emerging markets in terms of per-capita availability of spectrum. In addition, the cost of spectrum here is one of the highest in the world. The primary goal for policymakers and regulators should be to maximize the use of spectrum, rather than focusing on its short-term value. Also, the

more harmonized the spectrum used by mobile operators is, the more economically viable the overall solution to improving Internet access will be. This calls for effective synchronization of India’s spectrum planning, allocation, network design, financing and construction. It also requires a national policy to enable access densification in areas with low-income but high-growth potential.

Creating broadband infrastructure: Let us turn our attention to the resources required for the creation of broadband infrastructure. India currently ranks low in broadband penetration, even among developing countries. Internet access has grown, driven by a higher penetration of mobile handsets and wireless infrastructure in urban and Tier-1 and Tier-2 towns. However, broadband penetration in the larger part of the country continues to be dismal. Current estimates indicate that broadband only reaches approximately 600 corridors, largely in and around the top 50 to 100 Indian cities. On the other hand, the country aspires to create a ‘Digital India’ with a broadband highway offering 100-Mbps connectivity to 250,000 gram panchayats. The investments required to create a national IP backbone and ensure ‘last-mile connectivity’ have not been supported by a strong underlying business case. The creation of ‘Digital Bharat’ calls for radical changes to regulatory frameworks, allowing a generation of viable business models for inclusive broadband growth. While there is significant public funding involved in making NOFN come true, private sector operators have so far seen little value in pursuing fibre deployment beyond the top cities. This calls for the creation of robust models of public-private partnership, driven by a combination of rights of way, release of



**Dream of Digital India
rests on efficient
technology adoption**

spectrum and creation of a content ecosystem to spur revenue generation through digital infrastructure.

Enhancing technology adoption: This is the other side of the story, where industry participants need to get their act together. Over the last few years, new and existing players have made significant investments in transforming the infrastructure for 3G/4G/LTE rollouts. In a country with relatively low average revenue per user (ARPU), carriers will need to continue focusing on infrastructure build-outs to increase coverage and improve customer service quality. With a large part of the data consumption moving indoors, the industry needs to move towards small cell deployments. White-labeled small cell deployment makes great economic sense for all high demand concentration centers. Further, developments in Software-Defined Networking (SDN) and Network Function Virtualization (NFV), have the potential to redefine the economies of infrastructure deployment for operators. Virtualization needs to become business-as-usual. This will make infrastructure deployments simpler (commodity hardware with centralized software), more cost effective, agile, reliable (battle-proven commodity hardware) and flexible (digitally defined network topology and functions). These virtualized networks will be at the core of the telecom industry's digital transformation, redefining our infrastructure into a programmable platform for a variety of new services. As an example, Business-to-Business (B2B) connectivity business models are already being completely disrupted with software-defined Wide Area Networks (WANs).

Ultimately, the economics will work when there is demand for services and development of new use cases. The creation of the content and services stack in remote locations will be critical to drive adoption. There are multiple areas where digital infrastructure can play a significant role in creating opportunities. These include public and law enforcement records, health data including patient and insurance records, and academic

and employment records. Other areas include location services, digital identity including identifiers and demographics, communications and local content. Multiple stakeholders need to come together to create an effective ecosystem of content, services and governance that will increase usage, ultimately creating the business case for a robust public-private investment.

However, implementation of such initiatives is fraught with multi-faceted constraints related to consumer privacy, ownership of data, data security and protection. Digital India will become a reality only if we can actively create the data ecosystem required and find solutions to overcome these constraints.

Over the next few years, we need to prevent market failures in digital infrastructure creation—failures that are borne out of unfavorable economics and lead to suboptimal development of digital infrastructure and issues in both 'quantity' and 'quality' of digital access. The scale of change required to make this happen is disruptive and unprecedented. For digital infrastructure to take root and flourish in India, all stakeholders will have unique roles to play. For individual business leaders, it will mean overcoming technical, economic and business model-related growth challenges in a transformative way. Ultimately, the combination of public-private funding, progressive government policies and freeing up of spectrum assets will determine whether India is able to fully address the digital divide. The initiative will also hinge upon faster adoption of new, cost-effective technologies by industry players and the creation of compelling business use cases. Now is the time for all stakeholders to come together to transform India into a digital economy.

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INDIA@DIGITAL

THE NEW DNA FOR EVOLUTION

Digital is ubiquitous, all pervasive and fundamentally changing the way we live. India has an excellent opportunity to be a leader in digital technologies, unlike other physical infrastructure when compared to developed economies. However, this needs a spectrum of capabilities. Some of these (above the water line, like in an iceberg) are well understood e.g. infrastructure, technologies and design thinking. Risk is an exaggerated focus on these because these are clearly visible, and missing those below the water line—which are truly going to be transformative. How do you truly transform mindsets and adopt? How do you embrace ‘phygital’? How to solve the complex supply chain and logistics issues and leverage data?

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On 10th December 2015, the pantry on a train from Varanasi to New Delhi ran out of milk, causing discomfort to a hungry infant and her mother (Kusum Yadav). Following a frustrated mother’s tweet at 11:03 AM, the Ministry of Railways swung into action and directed the DRM of Alla- habad to take action, which led to the station master at Fatehpur providing milk to the cranky child at 11:47 AM. This is a classic case of how an unmet need was fulfilled in a short time frame by leveraging various facets of digital—social media, handheld devices, ubiquitous connectivity—and an ecosystem of support, including physical resources.

And the recipient of this digital solution was not the stereotypical young, urban, English-speaking male. This is just one example of how all-pervasive the impact of digital has already become. In the future, the impact of digital technologies will be felt widely across Bharat, touching the lives of men and women, whether young or old, located in urban or rural areas, and including vernacular users. In fact, it is estimated that the 2020 ‘Internet population’ will be older, more rural, more gender balanced and more vernacular. By 2020, more than 54% of Internet users will be older than 25 years of age, as against 40% in 2013, while more than 50% will be from rural areas—up from 29%. Digital has the power to fundamentally impact every

aspect of life, including the level of consumption, access to financial services, education, working and playing styles, information usage as well as interactions with friends and family. And the Internet will impact each of these aspects in different ways, right from enhancing the physical experience to substituting it, while enabling a broader reach of physical offerings by lowering delivery costs. This complete transformation of the physical experience makes the Internet a clear game-changer.

Before one analyzes the impact of digital, it is important to properly define it. At BCG, we view ‘digital’ as primarily covering five dimensions:

- **Core technologies:** The simplistic SMAC (Social, Mobile, Analytics, Cloud) moving onto emerging technologies: Internet of Things (IoT), Artificial Intelligence (AI), Augmented Reality (AR), Virtual Reality (VR).
- **Data:** Driven by the low cost of storage and an explosion of structured and unstructured data being captured by various devices.
- **New business models:** New ways of thinking around ownership (on-demand, subscription, rental, free-mium) and partnerships (marketplaces, ecosystems, freemium).



- **New consumer behavior:** Not only the quintessential millennial demanding personalization, sharing economy, simplicity, multitasking, speed, security, but also the conventional user increasingly going digital, while seeking vernacular, on tap and other user-friendly features.
- **New ways of working:** Led by design thinking, and entailing concepts like agile, lean start-ups, open innovations, customer centricity, ethnographic research and exponential organizations.

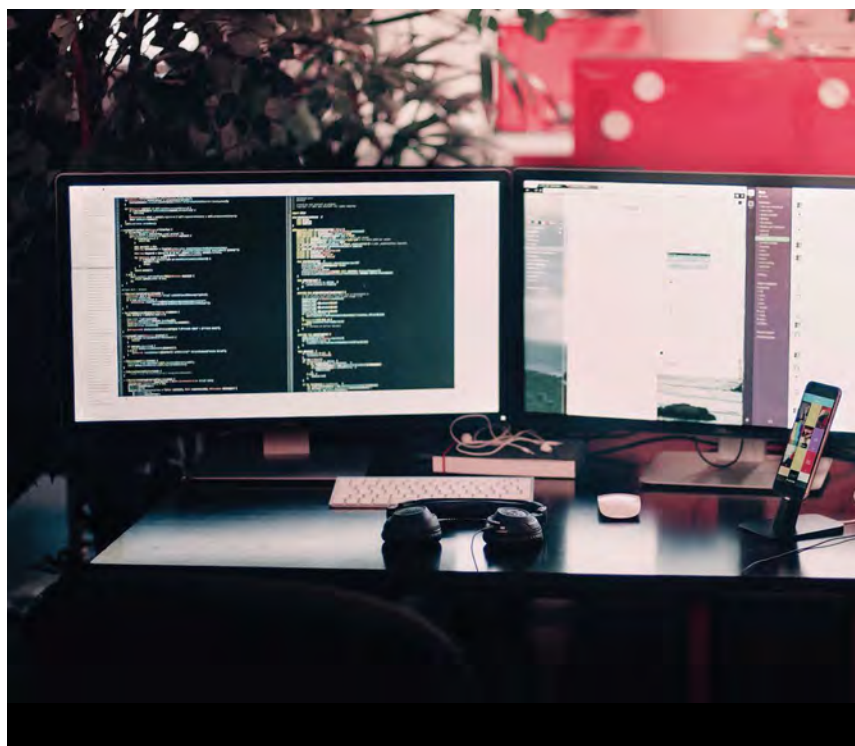
India has taken decades, and in some cases, centuries to develop physical infrastructure comparable to those in developed markets. For example, Indian trains, cars and planes are nowhere close to the developed markets even after decades. But in the case of digital adoption, India is much more in line with the rest of the world, which offers our country the opportunity to leapfrog. For example, cars (per million) in India are at 0.026 (compared to 0.7 for some developed markets), even after 120 years since automotive was first launched in India. On the other hand, India has already achieved 34% smartphone penetration, which is expected to rise to 65% by 2020, just within 10 years of the invention of smartphones. This is not that far behind some developed markets, where the average smartphone penetration is between 70% to 80%.

However, achieving this digital leapfrog, especially in a diverse and complex country like India, requires a certain set of 'capabilities' to be in place. Just as in the case of an iceberg, some of these capabilities are 'above the water line'. These capabilities have been spoken about ad

nauseum, with the agenda regarding them now very obvious, although significant action has yet to be taken. At the same time, a few capabilities still remain 'below the water line' and have not been addressed well. However, for India Inc. to be able to fully realize the benefits of digital, developing these hitherto hidden capabilities will be critical. The capabilities **above the water line** that are now known but need solving for, include:

- **Telecom/network infrastructure:** Including an ICT highway (with 3G/4G+ networks), affordable broadband and data devices.
- **Payment network and infrastructure:** Covering mobile payment modes and a ubiquitous and universally accepted payments network.
- **Supporting regulations:** Covering decisiveness and clarity on cyber security and privacy, Intellectual Property Regulations (IPR), net neutrality, labour laws, IT act, Copyright act, education framework—especially for online distance education and e-learning of SMEs.
- **Core technologies:** Starting with social, mobile, analytics, cloud but also moving to Internet of Things (IoT), 3D printers, machine learning, virtual and augmented reality, artificial intelligence and other emerging technologies.

New ways of working: Abilities in ethnographic research (as opposed to conventional consumer research), design thinking including UI/UX, open architecture and an ability to integrate through APIs, with internal up-



dates and enhancements. As one looks beyond the more obvious and discussed capabilities, to below the water line, there are a set of capabilities that need to be addressed to fully harness the potential of the digital revolution. These include (a) transforming mindsets to adapt to new ways of working, (b) leveraging Big Data and analytics, (c) going ‘physical’—a marriage of the digital and physical worlds, with optimal supply chain and logistics delivery, and (d) partnering to create relevant support ecosystems.

a. Transforming mindsets to adapt to new ways of working: As organizations look to the future, they will need to completely revamp their structure and working styles to effectively embrace digital, and create a digitally-native enterprise. The entire organization will need to adapt to digital, this is not just a role for the IT department. This change of mindset will likely pose a huge social challenge. For the first time in human history, younger people with less experience will know more about something, i.e. digital. At the same time, decision making will still lie with the older, more experienced people. This gap between capability and authority will be a key challenge facing organizations going digital.

‘Agile’, in this context, is an interesting concept. Organizations understand the ‘why’ with regards to embracing ‘agile’ in their pursuit to deliver digital solutions. However, they struggle with the ‘how’ of building capabilities for such agile implementations. How do you handhold organizations and their people in the first few cycles of implementations? How do you percolate this way of working to the entire company, and not have it tagged as an IT initiative? How do you create a start up mindset—involving ideas like Digital Centres of Excellence, daily immersions, ‘implement fast-fail fast’—instead of letting agile be equated to chaos? Enterprises that combine the best of both worlds—the digital capabilities of young staff with the maturity of more experienced people—

while building the required capabilities, will create truly successful, innovative and agile models.

b. Leveraging Big Data and Analytics (BDAA): Two years ago, the Harvard Business Review (HBR) dubbed the role of a data scientist as ‘the sexiest job of the 21st century’. The Big Data panel recently in Boston said that the time to hire a data scientist was ‘yesterday’. And top paying job listings at Facebook and LinkedIn are no longer for software engineers, but for data scientists. Hence, it would seem that all Indian organizations need to do is to hire a few good data scientists—assuming they exist—and be done with that. And therein lies the fallacy, that a few data scientists with fancy algorithms and great visualization tools are all there is to BDAA. This is definitely not enough.

There are three clear capabilities that firms should invest time and energy into. First, they should define end-state use cases and associated value propositions and work backwards to identify the data elements needed to drive this value. This calls for strong outcome-oriented and value-based mindsets as well as robust data governance. Second, all business units, including IT divisions, need to recognize the need for as well as know how to extract, transform and use the right data elements for meaningful analyses. Finally, robust master data and transactional data governance is needed on an ongoing basis. This will ensure that structured as well as unstructured data can be extracted and analyzed in real time to drive superior business decisions. This is an iterative cycle that, if embraced correctly by organizations, will help drive significant value. Starbucks is a classic example that invested in this cycle a few years back and is now able to reap the benefits of having moved from user segmentation to the aspirational ‘segment-of-one’.

c. Going ‘phygital’—a marriage of digital and physical worlds: Virtual technology is fast merging with the physical world, making ‘phygital’ the latest buzzword. Apple Watch epitomizes all that is good about this phrase. Ironically, the less glamorous physical nuts and bolts of supply chain and logistics are extremely important factors driving the success of digital. It is quite interesting that one of the most critical capabilities to win in the digital world will require mastering the physical world. Take the example of milk being delivered to the mother on the train we mentioned at the outset of this article. While it is just an example, imagine if one wanted to offer this as a service to everybody. Just think about the challenges of predicting volumes required by geographic locations, of storing a perishable commodity like milk, and the infrastructure required to be able to deliver the milk at the right time and place, with marginal incremental costs. Hence, we believe that the winners in the digital world will be the ones that master the physical world.

As the world’s leading e-commerce provider, an organization like Amazon is taking its strides in ‘phygital’ to a new level. In e-commerce, supplier cost and profitability

is directly proportional to the number of Stock Keeping Units (SKUs), the volume of inventory stored, and the number of warehouse hubs required to reach customers easily. Now imagine a situation where Amazon could avoid these storage costs while still delivering products to customers faster, using emerging technologies like 3D printing. In the week of February 18, 2016, Amazon filed a patent to partner with Mixee Labs to meet customer demand by 3D printing their products through mobile hubs. In simple English, they will soon have trucks with 3D printers installed, so that new orders can be quickly given physical form using the new technology and delivered practically anywhere within an hour.

d. Partnering to create support ecosystems: The fact that a technologically advanced leader like Amazon needs to partner with Mixee Labs speaks volumes of the need to create ‘ecosystems’ and form partnerships with other firms to stay competent in this digital age. The Google story and the rise of Android has given a new meaning to ‘open architecture’. As recently as late September 2016, organizations like Facebook, Amazon, Alphabet, Microsoft and IBM joined hands to launch their new Partnership on AI. This is a classic example of how intense rivalry is morphing into true commercial partnerships. With the fast-evolving digital capabilities needed to ‘stay in the game’, it would be foolish for organizations to try and ‘do it alone’. Technological advances enable various stakeholders to plug-and-play into each other’s assets and tools, creating experiences and offering value propositions that no single firm can deliver.

Firms need to rapidly create partnerships with players in related areas and go-to-market together with a commercial relationship that is a ‘win-win-win’, for the organization, its partner, as well as the end consumer.

In summary, the digital revolution is here to stay. This is no dotcom boom waiting for a bust. Organizations have only two options; either invest in digital, or perish. Not every investment today will have a cogent business case. Yet, you need to make these investments, and believe that they will pay rich dividends. This is your only chance of survival, and, like Steve Jobs said: “You cannot connect the dots looking forward; you can only connect them looking backwards. So you have to trust that the dots will connect in the future”.



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BUILDING INDIA'S QUALITY MUSCLE

Given its vast population, India needs to ensure that its manufacturing industry contributes to a significant part of its GDP in order to gain from higher employment and economic growth. Recognizing the need for quality in every step of the manufacturing process is the key to putting India on the global manufacturing map. What does a quality mindset and culture really mean and how does one build this? Can the Make in India campaign put emphasis on quality to enable manufacturers to make it their main differentiator? What will it take for India to become a global destination for high value-added manufacturing?

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What is quality?

Quality is an oft-misunderstood concept. It is generally perceived as meeting a set of absolute product or service specifications, like durability or high performance.

A more pragmatic definition of quality is being 'fit for purpose' over the intended life of a product or service. Fit for purpose means delivering optimal specifications and performance in line with customers' expectations, while maintaining consistency across all units sold.

However, customer expectations and perceptions vary a lot and quality must then be viewed subjectively, in the context of a well-defined target audience. Consider an example. A car's basic purpose is to facilitate transportation from point A to B. But the expectations of the prospective buyer of a basic car are very different from a customer who is looking to buy a premium vehicle. Both may want a comfortable ride in terms of space, suspension, and smoothness—however, specifications that will satisfy the former, at the price that she can afford, will likely be very different from those expected by the latter. Therefore, the quality of the product offered to a customer should always be measured only against that buyer's specific specifications and perception of value.

Another critical quality factor is maintaining consistency, both in terms of variability in performance and du-

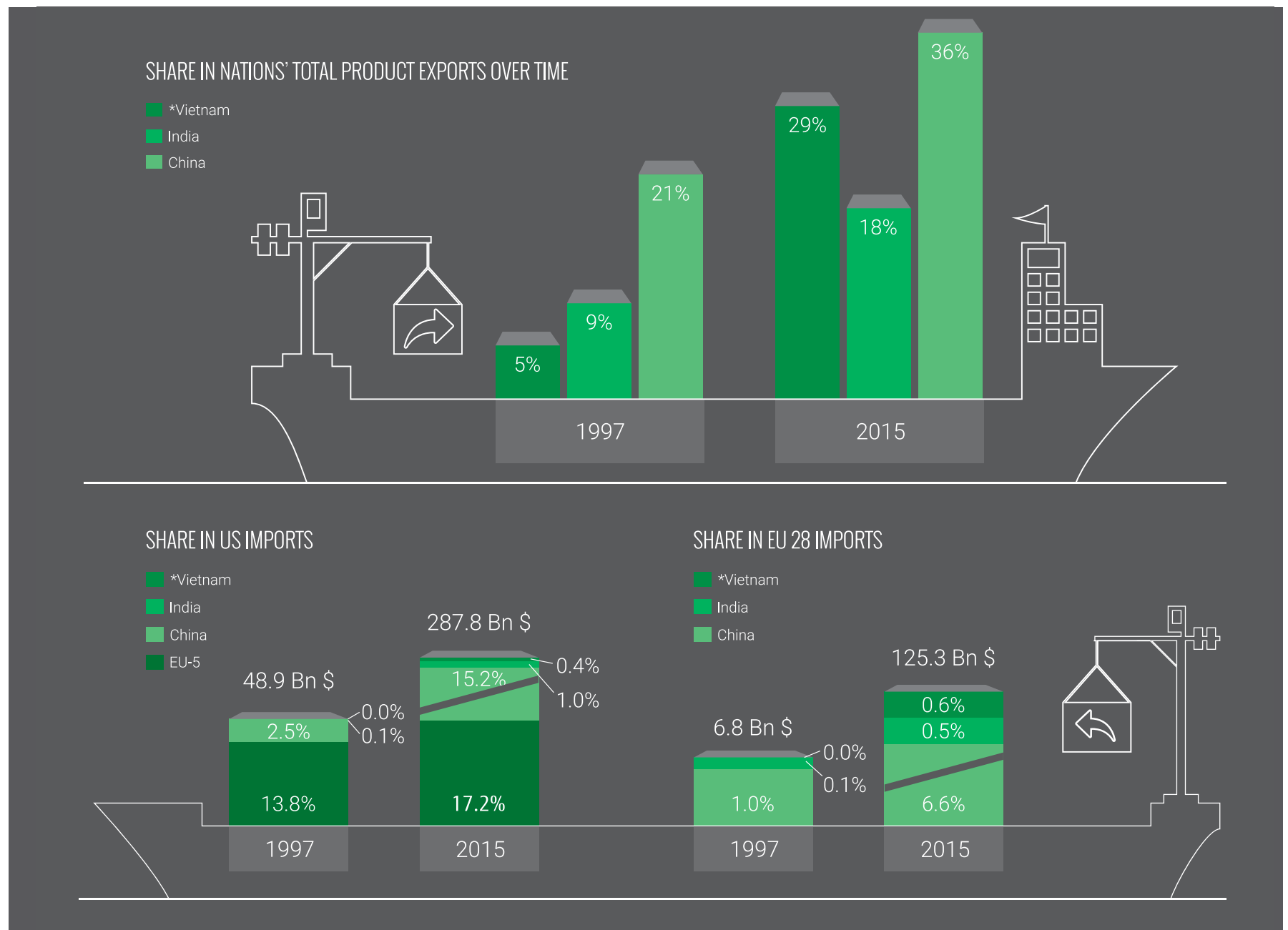
rability, across all delivered units of the product. A good quality product or service has a certain expected variation in performance over its promised lifecycle. If a product's performance deteriorates faster than this expected variation, it will be called an inferior quality good.

Should we worry about the quality coming from India?

Quality can be our competitive advantage: A large and populous nation like India needs manufacturing to be a significant part of its GDP to ensure higher employment and prosperity. While consumption in India is on the rise, making quick and deep inroads into overseas markets will help us accelerate growth. Furthermore, for profitable growth, we have to strive for a premium that will accrue only if we target products that need high quality engineering and manufacturing. Data, shown in Exhibit 13, however indicates that we are and have remained an inconsequential import source for such products in developed markets for over two decades.

The Make in India vision sets out to correct this. But India's much-vaunted cost advantage will not be adequate to best China on the world stage. Given the relative size of domestic markets, it is unlikely that Indian players will be able to achieve the scale that China has established for several products. Despite adverse labor cost movements in China, this scale effect, coupled with cost ad-

EXHIBIT 13: SHARE OF PRODUCTS NEEDING ADVANCED ENGINEERING/MANUFACTURING



*- 1997,2015 data unavailable for Vietnam; 2000, 2014 data used instead of 1997, 2015 resp.

Note: 1, Manufactured products considered for this analysis are products requiring high levels of engineering and manufacturing skills and fall under 12 out of the 97 two-digit HS code categories.

2. Total exports consist of merchandise exports and exclude services exported.

Source: UN COMTRADE Database - Trade Statistics

vantage and strong government backing, makes it challenging for India to compete and win against the country head-to-head on costs, for most products.

As a result, strong quality will be a critical building block in fulfilling the Make in India vision. Empirically, better quality has had a significant role to play with respect to products or services where we have managed to carve a substantial share in developed markets. Off-road tires, a sector where Indian companies are doing well in developed markets like Europe, serve as a good example. A key reason is these firms have found the optimal balance between quality and value for a specific target segment

of value-conscious customers. This has helped them create a space between the much cheaper and unreliable Chinese tires, and very reliable and innovative, but far more expensive European tires. A second example is the generic pharmaceutical industry, where India has managed to corner over 40% share of markets like the US, compared to an insignificant share by China. We are also winning on quality in other segments such as software, textiles, and two wheelers.

Quality is critical to continue winning at home: Even at home, delivering high quality output consistently is becoming increasingly important. Indian firms have to



compete with more evolved competitors who are raising the standards and expectations of customers. In today's virtually borderless world of e-commerce and international travel, competitors do not even need to set up shop in India. Customers today can choose from a large variety of global sources for a wide range of products and services. Ubiquitous information, peer-reviews, and neutral comparisons of competing offerings, combined with a growing base of digitally connected consumers, are eliminating information asymmetry and raising quality expectations.

Quality failures can have far-reaching implications:

Containing quality failures is virtually impossible now. An irate customer can reach thousands on social media networks in a matter of a few hours and seriously damage brand equity. The cost of quality failures is also increasing. Heightened product liability risks, class-action suits or regulatory action for poor quality can pose a serious financial cost to firms. VW, GM, Takata, and closer to home, Ranbaxy, are all examples of firms that have paid a hefty price in recent years for poor quality.

Why are many Indian industries struggling with quality?

During the 'license raj', the lack of competition for firms and the limited choice available to customers encouraged mediocrity. Now, as we look deeper, 25 years since liberalization, several structural issues emerge at the heart of the quality problem. These issues do not apply

equally to all sectors, but a subset applies to most of them.

First, minimum quality standards in many of our industries are not as stringent as in developed markets. For example, the emission and safety norms for all vehicles in India have always lagged behind the developed world. Likewise, our standards for approving pharmaceutical drugs and sites are far behind those in the west.

Second, the implementation of standards is still voluntary in some industries. The regulatory machinery for the development and enforcement of these standards is not as well-resourced, skilled or experienced as their developed-market counterparts. All this leads to a large gap in standards between the leading and trailing firms in those industries.

Third, this divide between standards in leading and trailing firms is weakening the talent pool in several sectors. The industries with the highest growth suffer the most. Leading firms enjoying rapid growth have to recruit from trailing firms that run on weaker standards. As a result, they have to make do with relatively less competent talent. This is likely slowing down the pace of growth as well as weakening the enforcement of standards even in leading firms.

Fourth, the quality philosophy in many Indian companies is still focused on testing products using Statistical Quality Control (SQC) techniques. Companies typically rely on sampling, detecting and correcting or rejecting errors in products. SQC, while necessary, is however

not sufficient. It cannot really test whether quality will be retained over the product life, and the sampling does not cover all products. Further, failures typically lead to rejections and wastage, or expensive rework. Hence, whenever the cost of rejection is high, the moral hazards are high too.

How do we as a nation prioritize quality?

Our ambition should be to make quality our differentiator—which will first win our firms competitive parity and then help provide a premium in domestic and overseas markets. Sectors that aspire to this goal will need both individual and coordinated action by the state and companies.

Implement world-class standards: To compete with global leaders, we need a strong regulator to create and implement world-class quality standards. Minimum standards should be high, and time bound compliance should be made mandatory. The regulator will also need a well-resourced arm to train companies and enforce these standards. Failure to comply with norms should meet with harsh consequences, such as the suspension of approvals to operate or participate in specific demand pools like government purchases. Salary levels for the regulatory staff should be benchmarked to industry standards to help attract the right talent from corporate circles and academia.

In the absence of external standards, companies aspiring to compete at the global level need to benchmark their specifications to international standards. Instead of merely complying with minimum requirements, they must adhere to higher, self-imposed quality standards.

Push the Make in India agenda: In industries that we want to dominate, setting and enforcing standards alone is not enough. We need to attract investments from leading firms globally, to be able to source the latest technology, expertise, and practices, and expose our talent pool to them. This ‘osmosis’ will result in quicker growth of capabilities. This will automatically enhance the drive to deliver quality, while the practices we imbibe from global companies will enable large-scale change. Make in India is a good platform to enable and drive this rapid evolution.

Focus on quality assurance, not quality control alone: Companies need to complement quality inspection and control with a quality assurance approach. There should be an organization-wide effort to ‘build quality in’ at each step starting from product development, all the way to commercial scale manufacturing. Unlike quality control, this approach prevents quality failures from happening in the first place through better process control.

To succeed, companies will need to rethink their quality organization and capabilities. They can cross-pollinate the required skills from industries that are more evolved in this thinking. Industries such as automobiles, auto-ancillary, pharmaceutical products, and bulk drugs have implemented this better than others, thereby flourishing as globally competitive manufacturing destinations. Companies in these sectors can provide the seed human capital needed by others. They can also attract global talent to coach the Indian teams. Firms with transnational operations can benefit from carefully considering where to house their quality leadership talent, and providing well-planned job rotations for Indian teams to overseas operations.

Aggressively adopt operations 4.0 for improved quality: We are now witnessing the end of traditional operations as we know them. Our ability to capture, store, transmit, and process data in real time has grown exponentially, enabling us to find and act on patterns in supply chains and manufacturing. Development timelines are being significantly shortened with the use of computer aided simulations, and rapid prototyping using 3D printing for moulds and pilot parts. Scale and experience curve benefits are becoming less relevant with newer production techniques based on advanced robotics and additive manufacturing. All this is not science fiction but a real revolution that is already underway.

These developments offer immense potential for an aggressive play. Apart from influencing design of newer facilities, older facilities can also be retrofitted for significant improvements in quality and productivity. For example, transducers that capture data on manufacturing conditions like spindle speed, temperature of bearings, noise and vibration of a shaft, can be retrofitted for a paltry sum of money on older machines. The data captured can be analyzed and used to improve process control.

Quality as mindset and culture: Leaders will have a critical role to play in driving this transformation. A culture of quality can only flow top-down. It has to be a core operating tenet, not just a choice. Quality needs to be institutionalized in business processes and equally ingrained in the minds of all operations staff right from those on the shop floor to those driving management decisions. Such a large-scale DNA change requires the management to fully embrace and drive quality. Only then will it manifest in the form of a mindset that spans all key aspects, from the quality of finishing and the reliability of performance, to the level and consistency of service offered, including public service.

Leverage metrics to drive quality improvement: While companies are often fanatical about direct cost metrics and sales metrics, they rarely give the same importance to quality. Perhaps, part of the reason is that



**Quality mindset critical
to win share in high value-
added manufacturing**

ufacturing stage. Presently, a majority of our exports comprise low value-added commodities. A significant part of the value accrues to countries processing these commodities and making finished products. We can claim that value—but we need to earn the right to do so. This requires a significant improvement in the perception about the quality of Indian products, backed by concerted action from the government as well as industry associations and firms. We need to quickly narrow the gap in quality standards and embrace competition as a way to evolve faster. Firms need to invest in building quality into each operational element by leveraging newer digital interventions that provide a cost effective way to do so. How soon and decisively we act will shape the next two decades. Will we count ourselves among the developed countries by the end of the time period, or continue to remain a country with a large population, blessed with natural resources?

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the impact of poor quality on their Profit and Loss (P&L) can look low as it is limited to the cost of waste, rework, and so on.

However, the fact remains that many companies understate the true cost of poor quality in terms of the reputational risk, pricing weakness, need to offer greater discounts, or poor word of mouth. Here is a case in point. A firm that has a supply constraint in its plants will account for rejections based on the cost of the material it had to reject. This view fails to value the incremental revenue and profit that the company had to forego because of not being able to sell the rejected products. Another example is where the poor performance of a product affects the company's reputation and compels it to price its future products at a discount. Poor quality after-sales service can similarly lead to negative word-of-mouth and lower demand for the product.

A broad understanding of this fallacy in reporting quality costs is the first step. Companies then need to start identifying more appropriate output metrics, and finding creative ways to measure and utilize them. For instance, a company that is worried about the impact of poor quality on consideration must use social listening or brand advocacy index measures to understand what customers are saying about its products or services. It must correlate these views to the consideration and conversion it enjoys vis-à-vis competition. The company then needs to understand and measure the required remedial measures, baselining, roadmapping and bringing them to the management dashboard, and constantly engaging in ways to improve the scenario.

Conclusion

India has always been touted as a country with immense potential to play a much larger role on the global man-

CONNECTING THE DOTS

INCREASING OPERATIONAL EFFICACY

Businesses have long focused on operational efficiency; however even today about 10 - 15% value is left on the table. This is a result of inefficient collaboration and ineffective harnessing of existing technologies. Across industries, there is potential to improve asset productivity, logistics systems and inventory management, to name a few. It is widely accepted that technology has the potential to markedly increase operational efficiency. We put forth a perspective on what Indian industry can do in order to boost operational efficiency by adopting the right levers that can drive significant change.

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Through the ups and downs of economic cycles, the focus on operational efficiency has been one constant theme, maximizing return on existing investments. Our experience across industries suggests that companies can achieve an increase of up to 20% in profitability by boosting the operational efficacy of their manufacturing setup and beyond-the-factory-gate supply chain. Typically, this involves increased focus on throughput and yield improvement, asset utilization, manpower productivity, waste reduction, superior planning and optimal sourcing.

However, even today, about 10 - 15% value is left on the table, due to inefficient collaboration in the broader ecosystem and our inability to effectively harness existing technology. Across industries, asset productivity can be enhanced by three to five times, through utilization of better technology, disciplined process adherence and improved planning. Stranded assets, underutilized equipment and inefficient manufacturing plants lock in vast sums of capital, leading to larger implications for the broader economy.

Similarly, logistics systems are notoriously inefficient in India and this is only partly due to the complex (and hopefully obsolete in a few months' time) taxation system. Fragmented ownership of freight vehicles and the absence of a formal industry-wide platform for demand aggregation result in up to 25% to 33% underutilization of loads in the industry. By plugging this gap in utilization, companies can reduce freight costs by 15%, apart

from significantly reducing the amount of working capital stuck in inventory across various stocking points.

These technologies are enabling changes in operations, dramatically reducing cost, while driving higher levels of asset and manpower productivity. For example, 3D printing has been used by an aerospace player to reduce weight for select components by up to 55%, and by an automotive player to drive down tooling costs for some prototypes by over 90%. The use of Big Data and advanced analytics is allowing manufacturing operations to establish cause and effect relationships, hitherto impossible, thereby cutting down costs by 5% to 7%. Roughly 8% of manufacturing tasks worldwide are currently performed by robots. This is expected to increase to over 20% over the next 10 years.

BCG's analysis shows that robotics alone could reduce India's relative cost advantage over developed economies by 4% to 5% over the next 10 years. Add to this the effect of other components of Industry 4.0, and the cumulative impact on our competitiveness in the global arena could be significant. Companies thus need to start running faster, just to stay where they are in terms of competitiveness. Status quo is not an option. We believe that the Indian industry needs to focus on the following four areas.

First, invest judiciously in technology and harness its power effectively. **Second**, leverage technology to collaborate across companies and reduce the cost of oper-



ations collectively. **Third**, agree on common standards of technology to allow for interoperability. **Finally**, invest in reskilling manpower to obtain the social license to operate in this new 'science-fiction-like' world of industrial operations.

Though Industry 4.0 and the use of digital technologies are actively being discussed across boardrooms in corporate India, we are cautiously optimistic about this euphoria. Our experience shows that the effective adoption of technology by companies is quite dismal. While investments are made on the back of large expected benefits, managers fail to harness the power of the technology due to ineffective training and on-ground deployment. For instance, a large manufacturing company is struggling to reduce its maintenance costs due to corrupt master data in its enterprise resource planning (ERP) system. The problem has compounded over more than a decade, rendering the platform ineffective in maintenance planning. This proves that investment in new technology has to be accompanied by management oversight of its sustained and correct usage, in day-to-day operations, till such technology becomes a way of life for managers. The inability to reap the rewards of new technology will make today's excited boardrooms adopt a more cautious stance with regard to innovation in the future, an outcome that will be disastrous for India in the long run.

We also believe that new technologies are now allowing for industry-wide collaboration. Companies across the spectrum have invested in spare capacity—core manufacturing equipment, material handling equipment, office space, inventory of insurance spares, and direct and indirect material. New technologies such as digital platforms help 'uberize' these assets and make them available on-tap, across companies. For instance, typically 10% to 15% of insurance spares are held in inventory by companies, often locking in significant capital, in non-productive areas. Industrial clusters can seamlessly aggregate and fulfill requirements for such spares and create a common reserve by leveraging digital platforms that connect to multiple supply chains. But to enable this, companies must create common standards of interoperability. For instance, industrial consumables such as anthracite are required in small lots by companies. However, the economically viable quantity for import is significantly higher, causing high levels of inventory. If a common platform can build interconnects with the material requirement planning process of multiple companies, it can pool in demand and reduce the cost of carrying inventory, potentially lowering prices through scale benefits.

The most significant long-term implication of embracing technology to drive operational efficiency, will be on human resources. Planned adoption of technology



will automate a large number of manual jobs, leading to redundancy. If so, this is a non-starter. As we have seen across multiple industries and geographies, the social license to operate is of paramount importance. Government and industry need to work together to develop a plan to reskill existing and new entrants to the workforce, to make them truly employable in this vision of the future. A myopic vision on this long lead activity, will make us incompetent over the long run.

The days of incremental improvements in operations are numbered. The tectonic shifts that lie ahead of us will redefine the world of industrial operations as we know it. Fortunately, unlike in the previous industrial revolutions, India will have near-concurrent access to disruptive technologies this time around. The ball is now in our court.



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LEADING IN INDIA

WHAT DOES IT TAKE?

Leading in India requires a set of unique skills beyond the traditional core leadership qualities. Based on our experience, we present the seven skills leaders in India will need to amplify in order to deliver transformative change in their own organizations and for India.

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VIKRAM BHALLA

Senior Partner and Director, The Boston Consulting Group



RAHUL GUHA

Partner and Director, The Boston Consulting Group

India is unique, both in diversity and in its challenges. It has embarked on its journey towards becoming a global powerhouse. However, India is still nascent and has some distance to go before it achieves its full potential. What will it take to lead India and successfully deliver transformation over the next 20 years?

We all recognize India as a unique country—of riches and poverty, of diversity and of many Indians. We recognize that India is on its way to becoming a leading global powerhouse. And we also recognize India with its unique set of challenges. There is nothing quite like India.

The last 20 years in India have been truly transformative. The average size of a company listed on the stock exchange has increased 6x from 1996 and total international sales has grown 10x. Indian leaders are faced with larger companies; increasing international footprints and global competition. With the advent of the Internet and mobile, competition has become limitless. You could be competing with anybody; your footprint has changed and the existing business models are being disrupted almost every day.

During this transformative change in India over the last 20 years, we at BCG, have had the privilege of working with leaders across the world and in India, from government to business and non-profit organizations. While many of the qualities of leadership are evergreen, leading in India requires a special emphasis on several qualities that these leaders have in spades! And as we look forward to India's future, there are some asks of leaders that will be very critical for our country.

So, what will it take to lead in India and what kind of leaders does India need?

Ambition

“If people are not laughing at your goals, your goals are too small.”

-Azim Premji

Given all the diverse perspectives and identities that Indians have, the only way for us to come together is to have leaders who can lead with a sense of shared purpose or ambition. Getting small things done in India can be tough, but when people have had bold, shared ambition, they have achieved wonders. For example, every year, BCG compiles a list of 100 companies for emerging markets that are global challengers. More than 20 companies from India make it to this list consistently, and several, like Hindalco, Tata Consultancy, Tata Motors and Tata Steel, have even graduated from the list. Many of these companies have taken on the best in the world and have succeeded against them. Leadership that binds with a sense of a shared purpose is critical for India's future.

Inclusiveness

“We believe in compassionate capitalism. Growth for growth's sake cannot be an end in itself.”

-K M Birla

In India, you can't win alone. You can only win with society, people, government and others. In a country with



the income disparity prevalent in India and the large young population, any success that comes at the expense of others, runs the risk of destabilizing society or being very short-lived. It is not enough to just create wealth through business, but it is also necessary to think about sharing its benefits broadly. The best leaders in India have always demonstrated the ability to win-and-win, not just to win alone.

High standards

The late ex-President APJ Kalam said, “All birds find shelter during a rain. But (the) eagle avoids rain by flying above the clouds.”

India has been the land of *jugaad* and *chalta hai*. But our companies today compete with the best in many sectors, like pharma, auto, textiles, where quality and excellence are essential. A critical ask of leaders today is to set standards very high, possibly beyond what others are aspiring for. Some of the best leaders of India see quality and excellence as their legacy. They focus on it in their organizations beyond what is demanded of regulations. We need such leadership to be able to change the brand of what India can stand for.

Patience and impatience

“Challenge negative forces with hope, self-confidence and conviction.”

-Dhirubhai Ambani

Leading in India needs a mix of both patience and impatience. You need the patience to recognize that many things can be two steps forward and one step back. But at the same time, it’s important to retain the impatience to drive change, to push for a better future, to set a different expectation. Our leaders need to live this tension—the challenges of operating in India will not go away overnight and so, being able to foster a spirit of optimism and drive while navigating the environment, is critical to success.

Soaring and walking at the same time

“A leader must have the vision and passion, and not be afraid of any problem.”

-APJ Kalam

It takes boldness to make real change happen. There will be challenges but the devil lies in the details. This is

Leading in India needs a mix of both patience and impatience



ecosystem and also to shape it for the benefit of their organizations and society. It is impossible to succeed as an island or by being inward-looking. One must embrace the reality of the many and changing stakeholders and dive in to shape its flow.

Building the next generation

Narayan Murthy said, “In the fullness of time, when it is our turn to give, we must in turn plant gardens that we may never eat the fruit of, which will benefit the generations to come.”

There has been a lot of talk about the demographic dividend or the demographic bomb in India. Millions of youth will need employment and ways to achieve their potential. With the growth of digital, this challenge may be even more accentuated. If we fail in this, the social costs will be huge. We need our leaders to be able to see the best in people and bring that out of them. We need them to help people achieve the potential they often don’t see in themselves. We need them to inspire leadership in others. It is only through such engagement that the youth will participate in and unleash the transformation that India seeks.

We believe the next 20 years hold great promise for India. The Centre for Economics and Business Research projects India to be a ‘top three’ in terms of GDP by 2031. But whether we realize our promise or not will depend on our leaders and on our leadership. The challenges of leading in India are unparalleled. But we also have the fortune of having some of the greatest leaders the world has thus far seen. The future will require more such leaders and leadership from us!

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even truer in India, where progress can often feel slow. At the same time, many patterns of performance are still emerging. Often leaders ask whether they need to focus on the big picture and delegate the details. However, in our experience, successful leaders have been the ones who could both maintain focus on the big picture and revert to it when needed. They also have a grasp of the details and the ground realities. They know enough to course-correct, but have the ability to stay focused on the goals. Being hands-off is not a recipe for success in India.

Shaping the context

“If you want to walk fast, walk alone. But if you want to walk far, walk together.”

-Ratan Tata

In India’s vibrant democracy, there are many stakeholders with powerful voices. This is India’s blessing and strength. However, sometimes, if not navigated effectively, this can also seem like India’s bottleneck and this ecosystem is still evolving and changing. Leaders in India have learnt how to work with this changing, amorphous

MANAGING CHANGE IN INDIA

COMPLEXITIES OF UNLOCKING OUR POTENTIAL

"We should all be concerned about the future because we will have to spend the rest of our lives there."

Charles F. Kettering

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AMIT KUMAR

Partner and Director, The Boston Consulting Group



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India is changing at an unprecedented rate. Most of us understand this, but underestimate the speed, degree and permanence of this transformation. Changing aspirations, technology and globalization are driving deep disruptions all around us. Many of these changes are unprecedented—India is connected today in a way that has never been true before. In October 2015, India crossed the billion mobile subscriber mark. Aadhaar, considered the world's largest biometric identification system, crossed the billion mark a few months later. India has the largest number of Facebook users with over 195 million subscribers. Another sign was the singular focus on development as an election agenda in the 2014 general elections. This was the first time since 1984 that a single party won a majority on its own.

In isolation, these are important milestones, but taken together, these represent a new reality that many of us don't fully appreciate. Today, as citizens, customers or employees, we live in an always-on, data-rich world and have significantly higher aspirations. We are more aware of what is happening around the world, we are cognizant of competing products and services and more likely to assert our right to a better experience. If we are not satisfied with the product or service, we switch to a different brand. If we don't like our employer, we switch companies. If the government fails to deliver, citizens don't hesitate exercising the 'ultimate switch', electing in a new government rather than sticking with what does not work. A one-line summary of the world we live in is 'we need a better experience and we need it now'.

Consider this; it is now possible to know exactly when our taxi will arrive using an app. We expect the same ability to track government permissions and loan appli-

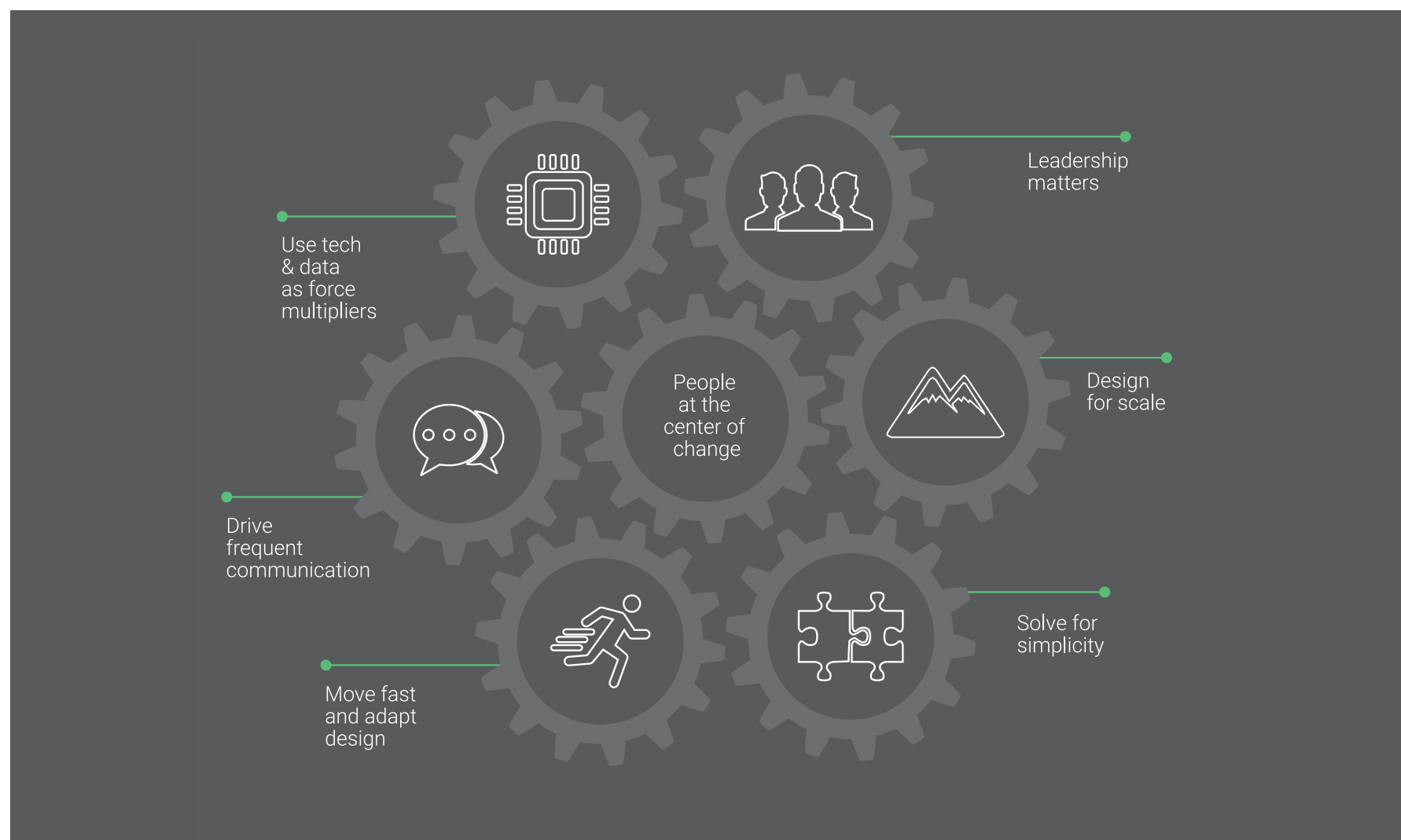
cations or ascertain when our new house will be ready to move in. Similarly, young employees have limited patience for 'black box' HR processes that lack transparency.

They want a 'career GPS' to smoothly navigate their professional journey—where they are, where they are headed, and which route will help them quickly land their desired role. From individuals in the society to the government and the corporate world, everyone will need to respond to these forces thoughtfully and constantly. Never before has the truism, 'If you cannot change, you will not stay relevant', rung more true.

When the pace of change was slow, it was enough to have a team of four or five senior executives driving a corporate change management program once a year. Often such change management initiatives would also be driven by a single business function. This is not the reality today. Change management now needs to be embedded across the entire company or government department and needs ongoing attention throughout the year. If you can change faster than your competitors, while exceeding all stakeholder expectations, then you have a real advantage.

The stakes involved here are hard to overstate. When government and societal initiatives succeed, they benefit the whole country. Think about the impact of successful programs such as the Green Revolution or Operation Flood. Launched in 1970, Operation Flood was the largest dairy program in the world. Over 30 years, it has transformed India from a milk-deficient nation to the world's largest milk producer. It generated massive employment and doubled the per capita milk availability.

EXHIBIT 14: SEVEN KEY TRUTHS TO IMPROVE THE ODDS OF SUCCESS



Aadhaar is an even more ambitious program—it is the world’s largest national identification project and has already enrolled more than 1 billion citizens. Other initiatives launched by the current government, including Make in India, offer similar potential. While the stakes are high, those involved in change management must recognize that the odds are stacked against any transformational program. For every Operation Flood, there are countless governmental initiatives that failed despite good intentions. In an efficiency-focused corporate world, it is easy to scoff at the inefficiency of anything that is ‘non corporate’. It is useful to remember that only six of the BSE 30 companies from 1995 are still on the present-day list, while eight new companies entered the ranking in 2015. While there are many reasons why the list changed over time, any informed observer would say that the drop-outs failed to keep pace with the evolving expectations of customers, employees or often, both.

Based on our vast experience with large change management programs across corporate, social and government institutions, we believe that any transformation project has to recognize ‘seven key truths’ to improve the odds of success. (see Exhibit 14)

1. Begin with people at the center of change: Effective change management programs are ‘of people, by people, and for people’. Memos, PowerPoint presentation slides and Excel sheets do not bring about changes, people do. Yet, those involved in change management spend a majority of their time and energy on the creation and assimilation of plans, and not on people. Change managers must focus on people and the behaviors that need to change. They can succeed by providing answers to five key questions: Why change? Change to what? What does it mean for me? Who is in charge? Will the change really happen? It is also important to limit the demands you make on people over and above their day jobs as endless demands of ‘one more thing’ have the potential to doom most programs. On the other hand, giving people more information, better tools, more on-the-job training, early on, often improves the enthusiasm and odds considerably.

2. Solve for simplicity: We live in a complex world and successful change management programs are no different. Complexity is inevitable but lowers the odds of success. For instance, program managers often adopt the wrong but far too common approach of out lining



plans through a 100-slide presentation or a book-sized memo, making them unnecessarily complex, and tough to comprehend.

However, simplicity is not the same as ‘dumbing down’. It is thinking carefully about the core agenda of change. A good yard stick for a simple, well-articulated plan is to check whether it fits the 5x5x5 template: five pages, five sentences on each page, and five words in each sentence. People can use such simple, yet well-thought-out templates to come up with rich thoughts on how they can execute their ideas.

3. Design for scale: The scale of operation of a majority of programs run by the government, companies and non-profit organizations in India is truly massive. Therefore, it is critical to design programs that can continue to work well as they are scaled up to cover the intended population. Many programs work well in the pilot stage but require unwieldy managerial support when scaled up. Large-scale programs need to accommodate multiple approaches rather than one unified, consistent model. Asking critical questions around how systems operate when 10 million or 100 million citizens start using it, often throws up different answers related to team, data, IT systems, resources and flexibility.

4. Move fast and adapt design: Experienced change managers do not aim for perfection. Instead of spending six months designing a program, they ‘go to ground’ quickly with well-designed experiments (or prototypes), and incorporate feedback regularly to improve effectiveness. This is quite difficult in most cultures where any departure from the ‘corporate center’ or ‘north and

south block’ script is seen as an act of failure, or worse, deliberate defiance. Leaders must make it known that they expect many experiments to fail. Good change management programs always take into account possible improvisations throughout the life of the project.

5. Use technology and data as force multipliers: India has the unique advantage of scale but it also represents a significant challenge. Government and business leaders must acknowledge that their charisma alone will not solve the problem at hand. With the advent of cheaper, more powerful digital technologies, it is possible to break down the entire plan into digital work flows. This helps eliminate subjective decisions on what and when to escalate, enabling progressive governments to ensure timely completion of programs. Technology should also be used to gain greater transparency into what is working and what is not, to be able to collectively remove key stumbling blocks. Modern governments, new age enterprises and non-profit organizations can also make use of ‘planet scale’ data to make intelligent decisions throughout the program.

6. Drive frequent communication: The more important the change, the more it needs to be communicated. In a large-scale change management program, people need to hear messages seven to ten times before they believe that their organization is serious about any transformation. Often leaders make the classic mistake of believing that an announcement at a company retreat or open house is sufficient. They need to realize that while this is just the beginning, successful execution requires consistent, frequent, and multi-modal communication. With the help of technology, leaders can drive hyper-custom-

ized and frequent communication, sharing timely and specific action-oriented messages through popular digital mediums like WhatsApp to motivate team members.

7. Leadership matters: Leaders have to be fully behind any change management agenda. Before anyone changes, leaders need to themselves model the behaviors they wish to see in their organization. Mahatma Gandhi had a very perceptive thought about change: ‘Be the change that you wish to see in the world’. This is especially true for leaders. Top leaders must invest time, energy and their own credibility in convincing the middle managers and rest of the organization about transformation programs. The science of change management is not complex, but its application requires deep commitment. It is easy to dismiss one or more of above lessons and believe that they won’t matter. However, in our experience, wherever a program compromises any of these lessons, the results, reputation and sustainability of the initiative invariably suffers.

The massive forces of change, while disruptive, are also a godsend to India. These have the potential to inspire positive transformation, and help scale up the coverage and quality of government services. By fulfilling the changing expectations of Indian customers, Indian companies have the opportunity of becoming global giants.

We owe it to our children and grandchildren to build a better India. When they ask us in 2030 about our contribution to a changed India, we should not come up short.



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AFTERWORD

CREATING AN OPPORTUNITY PLATFORM

DR. JANMEJAYA SINHA

Chairman, Asia Pacific, The Boston Consulting Group

BCG estimates suggest that while India has 240 million smartphone users today, this number is likely to go up to merely 540 million users by 2020. Should the fact that half the Indian population will not have smartphones by 2020 be a cause for concern? The underlying question I ask is, how may we shift the Indian government's subsidy regime from one being conceived out of obligation, to one that creates opportunity?

At a macroeconomic level, India has been a global outperformer since 1989. Over the last 25 years, our GDP growth has been 6.3% per annum, with a moderate 6.1% inflation. The inflation figure would have been even lower but for the post-financial crisis period of 2009 - 2013, when government subsidies were raised sharply as a percentage of GDP. The fiscal deficit has been brought under control and the current account deficit is below 2%. Considering the Planning Commission's measures on absolute poverty, the poverty ratio has fallen from 45.3% in 1994 to 21.9% in 2012. These figures are not insignificant.

Yet, the average Indian citizen has not seen the kind of improvement that this economic growth should suggest. On most social indicators, we lag behind the rest of the world. Water Aid cites that 60.4% of our population lacks access to sanitation, as against 33.6% of South Africans. We also trail much of the world on life expectancy, literacy, enrolment in secondary education, infant mortality, and agricultural productivity measures. For instance, the World Bank figures for life expectancy are 72 years for Libya and 68 years for India; secondary education gross enrolment in India stands at 69%, while it is 96% in China, and 100% in Sri Lanka; the infant mortality rate averages 38 per 1000 live births in India, while it stands at 11 in Thailand and Libya, and 13 in Kazakhstan. Similarly, China's agricultural productivity is nine times more than that of India. Within India, the variations are equally stark, making indicators of our poorest states abysmal. 2014 data from Indicus shows that the urban income of Bihar and UP is INR 67,500 and INR 72,000 respectively, compared to the overall national average of INR 125,200. The per capita rural income for Bihar and UP is even worse at INR 28,300 and INR 37,700, respectively, as against the national average of INR 47,300.

After seventy years of independence and despite very high levels of social payments, the needle has not moved much.

The government spends INR 2.7 trillion directly on subsidies. It subsidizes cooking gas, kerosene, and fertilizers, and provides 100 days of assured employment under the Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA) to anyone who needs it. In addition, most government hospitals are subsidized, public education is free, and electricity is not paid for by farmers in a majority of states. Agricultural income is not taxed, irrespective of the income level of the farmer. Despite all this, the life of the average Indian leaves a lot to be desired. How may we change this equation? How may we transform subsidies from being handouts for survival to becoming enablers for better life opportunities?

Opportunities for social and economic betterment are critical for a young nation where 650 million Indians are under 25 and 850 million are under 35, or this population faces the risk of being demoralized and unstable. There is no better proof of this than the massive mandate given to the Modi government in 2014. It captured and reflected this growing Indian aspiration. As a result, many of the things put on the national agenda were a first: cleanliness and toilets, better governance, power in every house, digital India, startup India and self-employment. Some subsidies were reduced and a platform for direct benefit transfer through the JAM trinity (bank accounts, Aadhaar and mobiles) was created. But the old subsidy regime continues. It must go.

The government has to change the way it addresses market failure—a situation in which the allocation of goods and services is not efficient—in important areas with high positive externalities such as education and healthcare. The most important market failure in the future is likely to be with respect to the access and usage of technology and data. This has to be understood and incorporated into new government initiatives. The rapid speed of change, driven by digitization (computing power, ubiquitous connectivity, improving bandwidth, limitless data storage), the roll out of Aadhaar (a unique and indisputable identity), artificial intelligence, robotics and

3D printing is reshaping the world. Together with these, improvements in our per capita income, widespread television and cell phone penetration, and frequent competitive election promises, have spurred our aspirations and the desire for a better life throughout India.

The government has to introduce a new paradigm which will have massive positive externalities if it provides easy and unfettered access to data. This will need all Indians to have smartphones, perhaps subsidized, with fast, stable and ubiquitous connectivity. The current government has started its journey down this path, but the process has to accelerate.

Let me offer five areas for immediate exploration that can effectively help craft this new paradigm.

1. Better health: While the government has made a great start with the provision of subsidized insurance coverage along with the Jan Dhan Yojana, it needs to do more. India's advantageous demographics in an aging world are of no use if our young people are malnourished, uneducated and unskilled. How may the government encourage simple steps that can promote basic hygiene and provide information on foods that nourish? Can it broadcast tips on hygiene, nutritional properties of different foods, and contraception over Doordarshan? Or announce the same through megaphones (as during elections) at places where married and young women congregate: near water pumps and vegetables vendors, or where clothes are washed? Can it also incentivize people to maintain better health, for example, by offering cheaper insurance if families practice better hygiene, as identified by proxies like the number of Lifebuoy soaps bought by the family every month?

2. Better education: The quality of learning outcomes in India is abysmal. How can we change this by using a combination of technology, independent measurement, and transparency of outcomes? Can we differentiate the approach we use for urban centers from that used in rural areas? In urban centers, can we introduce competition, auction municipal schools to private parties and provide parents with vouchers that can be used across schools? In rural areas, can we ensure that all teachers are provided with iPads or smartphones through which they can access lessons being taught in the best schools, and get a week of training every year? Can some oversight and measurement of outcomes be introduced? Can drones be used to track attendance and participation in schools? Can private independent outcome measurement be paid for by the government? Can audited learning results be made public and be debated in Parliament in order to incentivize improvement through competitive federalism?

3. Better skills: Could we use the appropriate agency to identify skill gaps in India and address them by creating a private-public partnership that is subsidized by the government? This would require gap identification and curriculum development and training provision. We would

also need a wide range of skills, right from housekeeping, carpentry and security services, to Unix programmers and data scientists. Thereafter, the government could provide basic training vouchers to applicants listed on an employment registry (names with Aadhaar numbers). Furthermore, universities could be encouraged to provide courses and modify their curriculum to address the more pronounced skill gaps.

4. Better information: What kinds of measures can the government undertake to facilitate the provision of important information? How may it cut asymmetry in information and mitigate disadvantage? Where may people be able to access government accredited health and education sites for free? Could information around the proper sowing patterns for different crops, Mandi prices of agricultural products across India, job openings and associated salary offerings in different regions be made easily accessible? Could the government maintain a national skill database with Aadhaar numbers, contact numbers, references and grades secured by people who have undertaken skill courses, to mitigate frictional impediments?

5. Better connectivity: Ubiquitous connectivity at fast speeds is the need of the hour. Railway stations and post offices across the country should be hotspots with high-speed internet connections. The government should consider whether the best way to do this would be to roll out a broadband network or to provide sufficient spectrum at affordable prices to ensure proper connectivity. Subsidizing the rollout of POS machines throughout India is another possibility. The pushing ahead of the JAM trinity should also be facilitated to effectively transform the existing subsidy paradigm. These measures will reduce the use of cash across the country, thus bringing in a lot of collateral benefits such as financial inclusion and the reduction in tax evasion. The larger population will have quicker access to information and services that can foster peer-to-peer learning.

I suggest some of these ideas and questions as a way to start a conversation. We need to revitalize our subsidy schemes and channel them to create opportunities for the growth and development of our youth. As we have proved time and again, when given the right environment and basic opportunities, Indians are quick to prosper. This is the route to an empowered and enabled India; where its citizens have a chance to actualize their dreams and build a society that is healthier, fairer, and more inclusive.



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