



Global Compact
Network India

ROLE OF TECHNOLOGY IN **TRANSFORMING** **INDIA'S** **SUSTAINABILITY** **AGENDA**



 **accenture**strategy

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MESSAGE BY GCNI PRESIDENT



Shashi Shanker
President, GCNI & CMD,
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The 2030 Agenda for Sustainable Development Goals (SDGs) brought into force by the United Nations lay out a clear vision to shape a new era for business. As a part of Making Global Goals Local Business campaign, United Nations Global Compact (UNGC) has developed a global program called 'SDG Pioneers' to bring forward leaders of the future who will accelerate the implementation of the Sustainable Development Goals through innovative solutions. These solutions can range across financial services, healthcare, technology services and digital platforms to list a few. In the Indian context, it is highly imperative for our industry leaders to identify key social and environmental challenges within and outside their organization, design innovative solutions to address them and become the 'SDG Pioneers'.

Recognizing these imperatives, the theme for the GCNI 14th National Convention – 'Sustainable Development Goals - Pioneering Solutions for India' shall showcase industry leaders sharing their key interventions/ solutions which have been implemented within their company to address sustainable development. The Convention shall bring together leaders from UN Agencies Government, Business, Academic and Civil Society committed to accelerate the implementation of the Sustainable Development Goals through innovative solutions.

Accenture Strategy has been associated with GCNI for the past several years as their official knowledge partner. I would like to take this opportunity to thank Accenture Strategy and GCNI for their efforts in shaping a very compelling thought paper. The paper brings to light the critical need for low-cost and rapidly scalable solutions to drive India's transformation agenda. I hope this paper serves as a reference document for the stakeholders to understand the art of possible and helps accelerate the country's progress towards achieving the SDGs.

PREFACE



Rajeev Dubey

Group President (HR & Corporate Services) & CEO (After-Market Sector)
Member of the Group Executive Board,
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Over the past few years, SDGs have provided a robust framework for countries to address some of the most critical developmental challenges. In the Indian context too, the Government has introduced a variety of regulatory schemes and policies to achieve the SDGs. However, our march towards achieving the SDG targets often faces headwinds from challenges such as rapidly rising resource constraints, demand-supply imbalance and last mile connectivity due to infrastructure gaps. With just around 4,200 days to go for the 2030 transformation envisaged by SDGs, it is critical to overcome these challenges and implement scalable solutions. This is where technology can play a transformational role.

There are already several illustrations of how digital technologies such as IoT, Artificial Intelligence, and Cloud are providing scalable innovations to address sustainability challenges. In particular, technology can help accelerate the progress through unique benefits such as cost effectiveness, accessibility, scalability and the ability to engage with diverse stakeholders. This theme paper helps to demystify these opportunities by providing a rich compilation of success stories and case studies. The paper also outlines critical success factors for technology to be successfully deployed in the Indian context.

I would like to congratulate GCNI for organizing the 14th National Convention on such a relevant theme. I would also like to thank Accenture Strategy and all the organizations that participated in this pioneering study. I am confident that that this collaborative effort positions us strongly and will put us on an accelerated path towards achieving a more secure and sustainable future for the country and its citizens.

INDIA'S SDG SCORECARD - WHERE DO WE STAND TODAY?

The Sustainable Development Goals (SDGs) are a bold set of 17 goals set out by world leaders to achieve economic, environmental and social well-being of societies. Given India's population and growth impact on the global economy, almost 50 percent of the transformation envisaged by the SDG framework hinges upon India's ability to meet its SDG targets by 2030. Below is a preview of India's status on the 17 SDGs.

“...India's success in 2030 UN SDGs can change the face of the world...”
- **Maria Fernanda Espinosa** (UN General Assembly President)

Table 1: India's SDG scorecard (scores from Niti Aayog's SDG Index 2018)



13 CLIMATE ACTION



NA

World Bank has warned that over 600 mn Indians will be moderately or severely affected by rainfall and climate change¹⁰.

14 LIFE BELOW WATER



NA

In India, only 31 percent of the biodiversity marine sites are protected⁴.

15 LIFE ON LAND




India has 21.5 percent area covered under forests against the required 33 percent¹.

16 PEACE, JUSTICE AND STRONG INSTITUTIONS




India leads in the number of pending cases (33 million) in the world with an average pendency rate of 4-6 years¹¹.

17 PARTNERSHIPS FOR THE GOALS



NA

India accounts for only 1.6 percent of world exports and 2.7 percent of world imports as compared to China's 12.7 percent and 11.4 percent respectively¹².



0-49: Low



50-64: Medium



65-99: High

Note: The scores showcased here are on a scale of 0-100, where 0 indicates lowest performance and 100 indicates target has been achieved. The NITI Aayog SDG index did not include Goals 12, 13 and 14 as comparable state level data could not be found, whereas it excludes goal 17 as it is more focused on international level partnerships and less relevant for domestic policy actions.

Based on our research and the results released by NITI Aayog's SDG index, it is evident that there are significant opportunities for India to improve its SDG scorecard.

In its part, the Government has introduced several policy measures and National Programs to overcome these challenges.

Table 2: Regulatory measures / programs introduced by the Government to improve SDG performance

1 NO POVERTY



Illustrative schemes

Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)

Pradhan Mantri Awas Yojana (PMAY)

Brief details (illustrative actions / targets)

Provides legal guarantee for 100 days employment in a year to any adult member of rural household willing to do unskilled work; in 2017-18, ~84.7 percent of eligible people were provided employment in rural India¹.

Seeks to provide housing for all by 2022¹³; as per the ministry's official figures, 0.85 mn houses were completed till 21st Aug 2018 since the launch of PMAY while work was underway on ~3 mn units across the country¹⁴.

2 ZERO HUNGER



National Nutrition Mission

Prime Minister Krishi Sinchayee Yojana (PMKSY)

Pradhan Mantri Kisan SAMPADA Yojana

Strives to reduce the level of stunting, under-nutrition, anaemia and low-birth weight babies; \$200 mn loan from World Bank was sanctioned in May 2018 to scale-up interventions in 315 districts¹⁵.

Seeks to extend the coverage of irrigation 'Har khet ko pani' and improving water use efficiency 'More crop per drop'; 8,214 projects executed during 2014-18; \$9.1 mn central assistance released in 2017-18¹⁶.

Provides modern infrastructure with efficient supply chain management from farm gate to retail outlet; expected to benefit 2 mn farmers and generate 530, 500 employments by the year 2019-20¹⁷.



Illustrative schemes

Ayushman Bharat -
Pradhan Mantri Jan Arogya
Yojana (PMJAY)

National Health Mission

Pradhan Mantri Bhartiya
Janaushadhi Pariyojana
(PMBJP)

Pradhan Mantri
Ujjwala Yojana

Brief details (illustrative actions / targets)

“World’s largest government funded healthcare program” targeting more than 500 mn beneficiaries¹⁸; so far provided treatment to 1.2 mn people, and secondary and tertiary healthcare worth over \$224 mn¹⁹.

Aims to support the State Governments in strengthening their health systems; Extended in Mar 2018, to continue till Mar 2020; during 2014-18, 268 mobile medical units were added and operationalized²⁰.

Making quality medicines available at affordable prices for all, particularly the poor and disadvantaged, through exclusive outlets²¹; 4,410 PMBJP Kendras are functional in 35 States/Union Territories²².

Aims to provide 50 mn LPG connections to below poverty line families; Yojana achieved 60 mn mark in Feb 2019²³.



Samagra Shiksha
programme

Deen Dayal Upadhyaya
Grameen Kaushalya
Yojana

Launched in 2018, the scheme aims to treat school education holistically without segmentation from pre-nursery to Class 12²⁴; an amount of \$2,773.2 mn had been released (as on 31st Dec 2018)²⁵.

Aims to transform rural poor youth into an economically independent and globally relevant workforce; offers funding support for the placement linked skilling projects starting from \$360 per individual to over \$1,400²⁶.



SHe-Box

Pradhan Mantri Mahila
Shakti Kendra (PMMSK)

Pradhan Mantri Matru
Vandana Yojana
(PMMVY)

An online complaint management system for registering complaints related to sexual harassment at workplace; As many as 321 complaints registered with SHe-Box till 20th Nov 2018²⁷.

One-stop convergence support service for empowering rural women with opportunities for skill development, digital literacy, health and nutrition; annual budget until 2020 for each District Level Centre is \$1.2 mn²⁸.

Seeks to offer maternity benefit; a total of 4.8 mn have been enrolled under PMMVY till 13th September 2018; Out of these, 3.7 mn women have been paid the maternity benefits²⁹.



Swachh Bharat Mission
(Gramin)

National Rural
Drinking Water
Program (NRDWP)

Ensures access to clean sanitation and aims to make India open defecation free by 2019; National Annual Rural Sanitation Survey 2018-19 in over 6,000 villages found toilet usage in rural India to be 96.5 percent³⁰.

Provision of safe water for drinking, cooking and other domestic needs on sustainable basis; 44 percent of rural households and 85 percent of government schools and anganwadis were provided access by 2017³¹.



Illustrative schemes

Deendayal Upadhyaya
Gram Jyoti Yojana
(DDUGJY)

Saubhagya scheme

Unnat Jeevan by
Affordable LEDs and
Appliances for
All (UJALA)

Brief details (illustrative actions / targets)

Seeks to facilitate 24x7 supply of power; Projects worth ~\$2 bn have already been approved; energy deficit reduced to almost zero and India emerges as net exporter of electricity to Nepal, Bangladesh and Myanmar³².

Aims to provide last mile connectivity and service connections to all remaining households in both rural and urban areas; as on Nov 2018, 8 states have achieved 100 percent saturation in household electrification³³.

Aims to address India's high cost of electrification and high emissions from inefficient lighting; as on 11th April 2019, over 250 mn LED bulbs have been distributed under UJALA scheme³⁴.



Pradhan Mantri Rozgar
Protsahan Yojana (PMRPY)

Prime Minister Employment
Generation Programme
(PMEGP)

Deendayal Antyodaya
Yojana-National
Rural Livelihood Mission

Pradhan Mantri Mudra
Yojana (PMMY)

Kisan Urja Suraksha
evam Utthaan
Mahabhayan (KUSUM)

Seeks to generate employment through the Employees' Provident Fund Organization (EPFO); had crossed the milestone of 10 mn beneficiaries as on 14th January 2019³⁵.

Aims at generating self-employment opportunities; Since 2008, a total of ~0.4 mn micro enterprises have been assisted with a margin money subsidy of \$1.3 bn employing 3.7 mn persons³⁶.

Aims to help the poor by providing skill training; as on October 2018, over 7.3 mn households have been mobilized into 0.67 mn SHGs³⁷.

Seeks to provide loans up to \$1 mn each to the non-corporate, non-farm small/micro enterprises; During 2018-19, the number of loans sanctioned are 29.2 mn with total amount sanctioned \$21.5 bn³⁸.

Targets providing financial and water security to farmers; scheme provides ~1.7 mn off grid solar pumps to the farmers; government will spend \$6.7 bn (2018-2028) as central financial assistance on the scheme³⁹.



Jal Marg Vikas Project (JMVP)

Bharatmala Pariyojana

Digital India

Sagarmala

Aims for capacity augmentation of navigation on National Waterway-1; JMVP is being implemented with technical and financial assistance of the World Bank at an estimated cost of \$751.6 mn⁴⁰.

Optimize the efficiency of freight and passenger movement across the country; Government has sanctioned a budget of \$98 bn for 5 years (2017-2022)⁴¹.

Seeks to lay emphasis on e-governance and transform India into a digitally empowered nation; number of digital payment transactions have grown multi-fold from 3.2 bn in 2014-15 to 20.7 bn in 2017-18⁴².

Aims to improve the country's logistics sector; 2018 saw the completion of 89 projects, while 443 projects worth \$60.5 bn are under various stages of implementation and development⁴³.

10

REDUCED
INEQUALITIES

Illustrative schemes

Stand Up India

Pradhan Mantri Kaushal
Vikas Yojana

Pradhan Mantri Mudra
Yojana

Brief details (illustrative actions / targets)

Aims to support entrepreneurship among women and SC and ST communities by providing loans between \$14,000 to \$1,40,000⁴⁴; as on 31st Oct 2018, 66,080 accounts were sanctioned loans over \$2 bn³⁸.

Plan to skill train 10 mn Indian youths during the period 2016-20⁴⁵; Over 3.35 mn candidates have been trained till year 2018⁴⁶.

Intended at extending the facility of institutional finance to small business entities.⁴⁷; An amount of \$34.5 bn was disbursed during the year 2017-18⁴⁸.

11

SUSTAINABLE CITIES
AND COMMUNITIES

Smart Cities Mission

Pradhan Mantri Awas
Yojana (PMAY)

Aims to develop 100 cities to make them sustainable and citizen friendly.⁴⁹; 100 Smart Cities Selected in 4 Rounds—SPVs incorporated in all 5,151 Projects identified by Cities worth more than \$28 bn⁵⁰.

Intended at providing affordable housing to the poor.⁵¹; as on 10th Dec 2018, 6.5 mn houses had been sanctioned to be constructed by States/UTs, so far, 1.2 mn houses have been constructed⁵².

12

RESPONSIBLE
CONSUMPTION
AND PRODUCTION

National Mission for
Green India

Seeks to protect, improve and restore India's shrinking forest cover; During 2017-18, \$6.7 mn allocated against the committed liability for previous two years of \$12.5 mn⁵³.

13

CLIMATE
ACTION

National Cyclone Risk
Mitigation
Program (NCRMP)

National Action Plan on
Climate Change (NAPCC)

National Clean Air
Program (NCAP)

Seeks to minimize the vulnerability to cyclones and make disaster resilient infrastructure; Government approved Phase-II of NCRMP in 2015 for five years at an Outlay of \$330.6 mn⁵⁴.

National plan on water, renewable energy, energy efficiency, agriculture; from financial year 2014-15 to date, the government has spent a corpus of ~\$1.96 bn to fight climate change⁵⁵.

A five-year plan to tackle air pollution; NCAP has been allocated a budget of \$42 mn for 2019-20⁵⁶.



Illustrative schemes

Neel Kranti Mission (Blue Revolution)

O-STORMS (Ocean Services, Technology, Observations, Resources Modelling and Science)

Brief details (illustrative actions / targets)

Aims to create employment opportunities for over 0.9 mn fishermen & entrepreneurs in fishing activities; 29,128 hectares have been developed for aquaculture & 7,441 traditional boats have been modernized⁵⁷.

Launched in 2018, the scheme aims to develop ocean observational networks to collect real time data from seas around India; a budget of \$227.2 mn allocated during the period 2017-18 to 2019-20⁵⁸.



Adopt a Heritage Scheme (Apni Dhरोhar Apni Pehchan Project)

National Bamboo Mission

Integrated Development for Wildlife Habitat

Aims to develop tourist friendly monuments, heritage and tourist sites across India through adoption. More than 100 heritage sites are available for adoption out of which 10 have been adopted⁵⁹.

Envisaged to promote holistic growth of bamboo sector by adopting area-based, regionally differentiated strategies.⁶⁰; ~235 seminars at National, State & Districts Levels for 15,041 participants have been conducted⁶¹.

Government launched this umbrella scheme to foster three sub initiatives: Project tiger, Department of Wildlife Habitats and Project Elephant; the scheme will aid 18 tiger forests and 23 elephant sanctuaries⁶².



Rashtriya Gram Swaraj Abhiyan (RGSA)

Accessible India Campaign (AIC)

Inclusive India Initiative

Aims to strengthen the Panchayati Raj System across the country; the Government of India has estimated a budget of \$100 mn for capacity building for the scheme in the year 2018-19⁶³.

Intends to make a barrier free and conducive environment for Divyangjans across the country; in 2.5 years, access audits of 1,662 State Government buildings in 48 cities were completed for cost allocation for retrofitting⁶⁴.

Includes people with intellectual and developmental disabilities into mainstream social life; they have been provided scholarships in addition to aids and assistive devices through more than 5,300 nation-wide camps⁶⁵.



Students and MEA Engagement Programme (SAMEEP)

Program for International Student Assessment (PISA)

Aims to familiarise students across the country with India's foreign policy and global engagements. MEA officials will interact with students about how MEA works, nature of diplomacy and India's International Relations⁶⁶.

Plans a collaboration between Union HR Development Ministry and OECD for India's Participation in Programme for International Student Assessment- PISA 2021⁶⁷.

Note: The details captured in the table above are intended to be illustrative and are not an exhaustive representation.

Despite these ongoing national initiatives, there are gaps with respect to our progress on SDGs. For instance, there are significant opportunities to advance the transformation agenda on SDGs related to poverty, hunger, health, gender,

sustainable cities and industrial innovation. These gaps are largely attributable to some distinct execution challenges that India faces. The following table provides a view of these challenges.

Table 3: Typical challenges in India impeding the progress on SDGs

 <p>Scale</p> <p>As the second most populous country in the world, India is home to ~1.3bn people. This results in high demand-supply gaps – for example less than 1 doctor for 1,000 people⁶⁸, only 19 judges for every 1 mn people⁶⁹.</p>	 <p>Infrastructure</p> <p>With approximately two-third of the population living in rural India, there are significant infrastructure capacity challenges. For instance, about one-third of rural India does not have access to clean drinking water⁷⁰, close to one-sixth of the Indian population does not have access to electricity⁷¹, more than half of rural habitations in India are not accessible by road during bad weather⁷².</p>	 <p>Fragmented Ecosystem</p> <p>Given the sheer scale, there is a need to adopt a decentralized approach which at times leads to a fragmented ecosystem and complex procedures. For instance, 10 procedures are required to start a business and 18 to get a construction permit in India⁷³.</p>
 <p>Misaligned Incentives</p> <p>Though business sector is expected to play a major part in financing the SDG agenda, corporates in India have limited incentives to go beyond the mandated 2 percent CSR budget, resulting in a significant funding gap. According to conservative research estimates, India faces an annual funding gap of around \$565 bn to achieve SDG targets by 2030⁷⁴.</p>	 <p>Data & Monitoring</p> <p>The lack of reliable data poses monitoring and tracking challenges. For instance, NITI Aayog had to exclude 3 SDGs (Goals 12, 13 and 14) from the SDG Index due to lack of comparable data available across states.</p>	

ROLE OF TECHNOLOGY IN ACCELERATING TRANSFORMATION AGENDA

Any effort to accelerate the progress on SDGs should closely examine the challenges (covered in previous section) and identify potential measures to address these challenges. This is where the role of technology could be critical – in particular,

there are five distinct advantages that technology offers which could potentially equip us to effectively combat the existing challenges.

Table 4: Advantages offered by technology solutions

<p>Accessibility </p> <p>Helps address challenges associated with physical infrastructure, thereby enabling hassle-free and efficient access to services.</p> <p><i>Drones can deliver supplies to areas inaccessible by road in 30 minutes or less⁷⁵.</i></p>	<p>Affordability </p> <p>Enables efficient processes, thereby enabling cheaper product development and service delivery.</p> <p><i>A prosthetic hand can cost as much as \$42,000 while a 3D-printed hand can cost just \$50⁷⁶; AI can reduce medical treatment costs by as much as 50 percent globally⁷⁷.</i></p>	<p>Rapid Scalability </p> <p>Facilitates efficient onboarding of beneficiaries (through remote delivery models), thereby enabling accelerated scale-up.</p> <p><i>Number of digital payment transactions have grown multi-fold from 3.2 bn in 2014-15 to 20.7 bn in 2017-18⁴².</i></p>
<p>Integrability </p> <p>Enables diverse stakeholders to be connected on a common platform, thereby facilitating efficient collaboration.</p> <p><i>IndiaStack connects governments, businesses, start-ups and developers on a unique digital Infrastructure (Aadhar was the first step in providing unique identification in this initiative).</i></p>	<p>Reliability </p> <p>Eliminates errors, inefficiencies and leakage associated with human intervention by automating underlying processes.</p> <p><i>Government of India saved over \$3.8 bn over two years through Aadhaar-linked direct benefits transfer⁷⁸.</i></p>	

In the context of the ongoing fourth industrial revolution, there are three distinct types of technologies being leveraged. These are **Digital** (such as AI, IoT, and Big Data), **Physical** (such as Robotics and Nanotechnology), and **Biological** (such as Bio-based

materials and Bioenergy) technologies. These technologies can be potentially applied in diverse ways to positively impact the SDGs.

The table below brings out sample case studies to illustrate the potential role technology can play in transforming SDGs.

Table 5: Illustrative representation of role of technologies in impacting SDGs



ARTIFICIAL INTELLIGENCE

Enables machines to simulate human intelligence and act without explicit instructions.

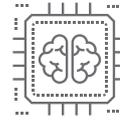
Niramai, a Bangalore based start-up diagnoses breast cancer using AI. Niramai provides breast scan for \$21 as opposed to the traditional mammography which costs around \$53.2⁷⁹.



CLOUD COMPUTING

Hosts web-based content and applications in a central location, making them available to many devices at the same time.

Rubicon's cloud-based, big-data platform connects waste producers with a network of independent waste haulers across 18 countries. Enables higher diversion rates from landfill, creative reuse of waste material, and the detailed analysis of waste data⁸⁰.



MACHINE LEARNING

Enables machines to perform new tasks after being trained on historic datasets.

Infosys Nia Advanced Machine Learning enables exponential increase in the data scientists' productivity by applying automation to the data science workflow⁸¹.



BIG-DATA ANALYTICS

Analyses large datasets to uncover patterns, trends, and dependencies.

Socialcops is a data intelligence company that processes big data to empower global leaders and organizations to make bigger decisions with it. They partnered with Tata Trusts to help transform 264 villages in Andhra Pradesh under 90 days.



INTERNET OF THINGS (IOT)

Deploys wireless devices with embedded sensors that interact and trigger actions.

Tata Communications is using IoT for environment monitoring. The IoT devices provide real-time data on temperature and humidity, enabling them to take corrective measures accordingly⁸².



BLOCKCHAIN

Uses digital transaction ledgers that are shared by all parties in an established, distributed network of computers. This enhances transparency and secures information sharing.

The Ministry of Commerce and Industry has launched a blockchain based online marketplace for coffee. The project is currently in its pilot phase. This initiative will ensure that the farmer get legitimate access to the markets and receive a fair price for their product⁸³.



BIO-ENERGY

Derives energy from biomass, which includes biological material such as plants and animals, wood, waste, (hydrogen) gas, and alcohol fuels.

Green Connect produces cooking gas from biodegradable waste. It has installed bio plants in hospitals, IT companies and organizations across India⁸⁴.



ROBOTICS

Applies machines that are programmed to automatically carry out a complex series of actions. Especially suitable for repetitive and rules-based processes using structured data.

Ecoppia, a robotics company from Israel is deploying solar panel cleaning robots in Madhya Pradesh. The system will enable automated panel cleaning with zero water wastage⁸⁵.



NANOTECHNOLOGY

Manipulates matter on an atomic, molecular, or supramolecular scale. Examples include fullerene, carbon nanotubes, and quantum dots.

Bilcare is providing security solutions using R&D in micro and nanotechnology. It has developed a technology – nonClonableID which enables products to be authenticated as they move through the supply chain to the end consumer⁸⁶.





VIRTUAL REALITY/AUGMENTED REALITY

Provides interactive, fully immersive digital reality in a computer-generated or video-enabled environment (VR), or superimposes text, sounds, and graphics on top of the real physical world via wearable devices (AR).



CARBON CAPTURE AND UTILIZATION

Captures waste carbon dioxide from large point sources (such as fossil-fuel power plants), transports it to a storage site, and deposits it where it will not enter the atmosphere.



3D PRINTING

Creates 3D objects by forming successive layers of material under computer control.

Loop Reality, a Telangana based start-up helps data driven talent acquisition and management, helping reduce bias at workplaces. It enables corporates to conduct VR-based assessments to measure cognitive abilities and personality traits of potential recruits⁸⁷.

10 REDUCED INEQUALITIES



Strata Enviro, a Pune-based company manufactures and installs air pollution controllers in public places. The units are internet-enabled and can suck in polluted air to filter out particulate matter and smog. It is currently deployed in 100 Indian cities⁸⁸.

13 CLIMATE ACTION



Field Ready uses 3D printing to manufacture disaster relief supplies. They helped extensively in the relief procedures during Haiti earthquake in 2010⁸⁹.

11 SUSTAINABLE CITIES AND COMMUNITIES



BIO-BASED MATERIAL

Uses substances derived from living organisms to produce new materials. These substances could include biopolymers and other natural fibres.

IKEA uses bioplastic in the manufacturing of its products. In 2016, they utilized 90 mn PET bottles in KUGGIS boxes, replacing 3,700 tons of virgin fossil materials with recycled plastic⁹⁰.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



In the following section, we explore the role of technology in achieving SDGs in the Indian context. To keep the analysis focused, we have analyzed the role of technology on the most pressing challenges India faces classified across environmental (air pollution, plastic waste), social (poverty, hunger, health) and economic (industrial innovation, sustainable cities and communities) dimensions.

ROLE OF TECHNOLOGY IN DRIVING ENVIRONMENTAL TRANSFORMATION

Air pollution

Air pollution is becoming an increasingly critical challenge for the cities in India. According to a recent study, 7 out of the top 10 polluted cities in the world are in India⁹¹. This is a major health hazard for the citizens of India. A few research studies have indicated that the impact of air pollution on public health can be compared to smoking 15-20 cigarettes a day⁹². While the health hazards associated with air pollution are clear, it also has serious economic implications. Consider this – the economic cost of exposure to air pollution from stubble burning (one of the major causes of air pollution in North India) is around \$30 bn annually, which is almost 1.7 percent of India's GDP⁹³.

The Government is taking active measures to combat the challenge. Earlier this year, the National Clean Air Program launched a five-year plan to improve the quality of air. The plan seeks to reduce air pollution in 102 cities by up to 30 percent by 2024 from 2017 levels⁹⁴. Given the intensity of the challenge and the required transformation, technology could play a critical role. Technology could help with aspects such as ensuring reliable air quality data, reducing emissions as well as transforming existing pollutants into alternate useful products. In the following section, we explore these possibilities through a few select case studies.

Technology for reliable Air Quality Data

One of the challenges with respect to managing the air-pollution challenge is the lack of reliable and standardized data. In fact, the India SDG index built by NITI Aayog in 2018 excluded Goal 13 (climate action) from the index due to lack of comparable data across the states⁹⁵.

Pigeon Air Patrol Project – A case study

The pigeon air patrol project executed in London is an interesting example of technology-enabled innovation to gather real-time air quality data. The project entailed flying pigeons with tiny air quality monitoring sensors over the London city. This enabled the citizens to check the air quality readings relayed from the sensors by tweeting their location to the Pigeon Air patrol twitter account.



Traditional air monitoring stations depend on just a few data collection locations due to high costs of setting fixed monitoring stations. The inputs from these locations are used as proxy to represent the general air quality for the entire city. For instance, Gurugram currently has just one air quality data monitoring location⁹⁶. However, a study conducted in 2018 in London confirmed that air quality can vary significantly between two locations just a few meters apart and can be impacted by simple factors like wind speed and wind direction. Traditional solutions are not agile enough to capture the real-time variations in air quality by geography and time, resulting in unreliable data for the citizens⁹⁷.

This is where technology can play a significant role⁹⁸. With the advent of communications and IoT-enabled sensor technologies, the world is witnessing a growing adoption of low-cost IoT enabled sensor devices to gather air quality data. These devices are capable of sensing air quality several times a minute and typically deliver a one-minute average value to a connected analytics solution. According to research estimates, the global market for air pollution control equipment is expected to increase from over \$14 bn in 2016 to over \$20 bn in 2021⁹⁹.

“...My favourite example of deploying technology / digital solutions to address an environmental or social challenge is pollution control. Regular monitoring of air parameters at various levels, for measurement to be taken for improving the air quality. We need sensors for PM 1, PM 2.5, TVOs, CO₂, SO_x, & NO_x at many places in a given city. This means looking end to end for opportunities to make better use of data, and apply user-centric design principles to digitize processes...”

- Kamal Meattle (Chairman Emeritus, Paharpur Business Centre)

Smog vacuum cleaner – a potential short-term solution to fight air pollution

While combating air-pollution challenge is a journey that may span across several years, some countries are also leveraging technology solutions as quick-fix measures to mitigate the immediate health hazards associated with air pollution. For instance, China has deployed a 23-foot tall smog vacuum cleaning tower with air purifying capabilities. The tower absorbs air pollution in its immediate vicinity and creates a bubble of breathable air for the citizens¹⁰⁰.

India too has started the adoption of technology-enabled pollution mitigation equipment. For instance, in 2018 National Environmental Engineering Research Institute (NEERI) in collaboration with Design Centre at IIT Bombay developed a device called Wind Augmentation and Purification Unit (WAYU). The device consumes around half a unit of electricity for 10-hour operation and can provide purified air for an area of about 500 square meters. While the prototypes of WAYU have already been installed at the ITO Junction in central Delhi and Mukarba Chowk in north Delhi, the researchers are working on scaling up the solution to enable it to cater to 10,000 square meters.



The challenge of plastic waste

India generates 25,940 tonnes of plastic waste every day and around 80 percent of this is discarded as waste, which is never recycled¹⁰¹. This exerts considerable strain on the environment and different species. A research study indicates that as many as 800 species are affected by marine debris (a large share of which is plastic waste)¹⁰². For instance, in 2018, an Indian elephant in Kerala died due to consumption of dumped plastic¹⁰³.

Technology for Efficient Waste Collection

In the Indian context, waste management is executed through a largely fragmented ecosystem, which leads to inefficiencies in the value chain – for example, many times the garbage collecting vehicles make unnecessary trips to the areas where the garbage bins are not full. This not only wastes fuel, but also leads to ineffective utilization of workforce.

To address this challenge, there is a need for real time data (representing the state of garbage bins) so that collection trips can be planned accordingly. This is where technology can play a significant role. IoT devices can relay real time reliable data which, when coupled with big data analytics, can help schedule garbage pick-up routes for the vehicles to optimize the output. Delhi is currently experimenting with this technology, where IoT enabled garbage bins are being deployed in north and south Delhi¹⁰⁴.

IoT enabled garbage bins – A case study

Steel Authority of India Ltd (SAIL) has launched IoT-driven garbage bins which automatically sends a signal to the waste collection authority once the bins are full. The waste bins are made up of stainless steel and will be set up in underground Reinforced Cement Concrete (RCC) pits at the corporation's smart garbage station. The plan is to have separate bins for recyclable and non-recyclable wastes. The RCC pits will be covered with a pit-cover fabricated out of stainless-steel slip-free sheets. Suitable openings on the pit cover will allow the sanitation crew to dump the collected garbage into the bins placed underground.

“...Through implementation of Big Data, precious information can be obtained which can further help in garnering deep, meaningful and actionable insights backed by empirical evidence...”

- Dr. Bhaskar Chatterjee (Secretary General & Executive Head, Indian Steel Association)

Integrated Plastic Waste Management Ecosystem - Banyan Nation case study

Banyan Nation uses technology to collaborate with the informal supply chain of plastic and proprietary plastic cleaning technology to create new quality granules which can then be used for packaging of new products. Their mobile and cloud-based technology platform integrates the informal sector (last mile collectors) who collect over 70 percent of India's plastics¹⁰⁵.

Banyan's IoT based Smart Waste management platform senses, aggregates, and analyses data to help cities make waste management more effective and economical. Their plastics cleaning technology removes dirt, remnant product, inks, paints, and adhesives from plastics to restore it to near virgin quality. Simultaneously, they are working with cities to divert valuable resources from ending up in landfills, thereby playing a role in solving India's plastic waste challenge. Until Jan 2018, the company has recycled over 7 mn pounds of plastic and integrated about 2,000 informal sector waste workers¹⁰⁶.

ROLE OF TECHNOLOGY IN DRIVING SOCIAL TRANSFORMATION

In this section, we explore the role technology can play in addressing social challenges such as poverty, hunger, and health.

Poverty and Hunger

India's per-capita income is just above \$4 per day¹⁰⁷ and about 22 percent Indians live below poverty line. This seriously impacts people's access to adequate nutrition and has led to India being the home to the largest undernourished population in the world¹⁰⁸. Low income is one of the major causes of poverty and hunger in the country. Technology can play an important role in addressing this challenge – for instance, it can create jobs raising rural income levels, AI and IoT can improve agricultural yield that will increase supply of food and improve financial status of farmers, and tech-enabled public service delivery can deliver benefits directly to the intended beneficiaries.

Jobs creation for Rural Youth

About two-third of rural income in India is now generated through non-agricultural activities¹⁰⁹. Considering this, one of the major levers to address poverty in rural India could be creation of non-farm job opportunities. Technology can play an important role here by providing new employment opportunities by upskilling the workforce in digital skills.

Impact Sourcing – A case study

Samasource is a non-profit business that has developed an internet-based model to outsource digital work to unemployed people in developing countries. The workers are trained in basic computer skills and paid local wages. Some of the largest companies such as Walmart, Google, and eBay are its clients. About two-thirds of their work is in managed services for image capture and annotation. Samasource reportedly provide jobs and digital skills training to people below the poverty line in Kenya, Uganda, Haiti, and India.

Technology-enabled improvements in agricultural yields

Agriculture contributes about 17-18 percent to India's GDP and technology can completely transform the agricultural production systems. An Accenture study says – digital farming and connected farm services can impact 70 mn Indian farmers in 2020, adding \$9 bn to farmer incomes.

“...Agrarian issues such as uncertain weather conditions, drought, crop failure can be foreseen by integrating smart farming technologies. Drone Technology can offer some significant crop insights which currently are unavailable in traditional methods of land-based farming...”

- Dr. Bhaskar Chatterjee (Secretary General & Executive Head, Indian Steel Association)

AI for crop yield forecasting – A case study

NITI Aayog and IBM have partnered to develop a crop yield prediction model using AI to provide real time advisory to farmers. IBM's AI model for predictive insights to improve crop productivity, soil yield, control agricultural inputs and early warning on pest/disease outbreak will use data from Remote Sensing (ISRO), Soil Health Cards, IMD's weather prediction and soil moisture/temperature, Crop Phenology etc. to give accurate prescriptions to farmers. The project is being implemented in 10 aspirational districts across Assam, Bihar, Jharkhand, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh.

Akshaya Patra leveraged technology to serve 1 mn more meals a year to school children

The Akshaya Patra Foundation is a non-profit organization that provides mid-day meals in Government schools, to not only to fight hunger but also to bring children to school. They tied up with Accenture to enhance the capacity of their kitchens without compromising on quality¹¹⁰.

Leveraging AI technologies, they were able to predict the next day's meal requirements. IoT sensors enabled monitoring and sequencing the cooking process to ensure optimum energy consumption and consistent food quality. Blockchain brought in transparency in auditing and invoicing.

Health

Indian healthcare sector is expected to grow threefold from 2016 to reach \$372 bn in 2022¹¹¹. Despite this, India ranks 145th among 195 countries in terms of quality and access to healthcare. The country has less than 1 doctor per 1,000 people with rural India getting only a third of the total doctors¹¹². Shortage of doctors and physical infrastructure, access to quality medical help, affordability, and awareness about diseases continue to pose major challenges for the Indian healthcare system.

Telemedicine can bridge the rural-urban accessibility divide by extending low-cost consultation and diagnosis facilities to the remotest of areas via high-speed internet and telecommunication. AI solutions can solve problems of scarce personnel and lab facilities. Mobile-based health delivery such as CycleTel Humsafar¹¹³ can help women plan families and lower infant mortality rates.

“...Healthcare remains elusive to many, and AI embedded telemedicine solutions can create dents in this market. Cloud based solutions for management of medical records would not only save costs, but also enable better treatment...”

- Ravneet Gill (MD & CEO, YES Bank)

Remote Health Monitoring addresses accessibility problem

Remote health monitoring helps patients and doctors use mobile medical devices to track vitals (such as blood pressure) and analyse data in real time. Doctors can provide consultations to patients and track multiple critical patients remotely. This solution has advantages of affordability, scalability, accessibility, and connecting doctors, nurses and patients.

Fortis Hospital has set up an e-ICU facility in which it uses intensive Electronic Medical Records, audio visuals and smart alert system to monitor, assess, support, and intervene when necessary. After establishing this system, they have observed 50-60 percent lower mortality rates and 30-40 percent fewer post-op complications¹¹⁴. Stasis Labs, a Bengaluru-based start-up, has also developed a continuous remote patient monitoring system, which measures six core vital signs and deploys predictive AI to provide actionable insights to doctors, anytime, anywhere¹¹⁵.

Technology helps scale-up efforts to curb Tuberculosis

As per NITI Aayog's SDG Index Report 2018, India notes 138 cases of TB per 100,000 people annually. For families living in remote areas, frequent travel to a TB centre to take medication is very challenging. When patients stop coming for treatment, their TB converts into a deadlier, drug-resistant version that is almost always fatal and just as infectious as regular TB.

Global estimate is that TB could be eradicated in the next 170 years. However, Operation Asha proposes to eradicate it in 20-25 years. Operation Asha has taken TB treatment to the doorsteps of 15 mn individuals living in disadvantaged areas¹¹⁶, leveraging technology's advantage of accessibility and scalability, and affordability. They launched a software

called **eCompliance** which uses fingerprints to centralize the database for patients suffering from TB. Using this system, doctors can ensure compliance with the medical regime and take instant corrective actions in case of irregularities.

Early identification of non-communicable disease improves affordability

Non-communicable disease cause 60 percent of all deaths in India¹¹⁷. Big data and AI can help to prevent these diseases and save future treatment costs.

For example, Microsoft and Apollo have designed a platform that can predict the risk of Cardiovascular Disease in the Indian population. The application is developed using a combination of applied AI and clinical expertise on a large sample of retrospective data on health checks and coronary events. The scoring considers risk contributors including lifestyle attributes and psychological stress. It assists physicians to consult patients in a more holistic way, while providing insights to patients for lifestyle modification and timely interventions.

ROLE OF TECHNOLOGY IN DRIVING ECONOMIC TRANSFORMATION

Smart Cities – Transforming Indian Lives

India's economy is expanding rapidly and is making a steady shift from 'rural' to 'urban'. India is anticipated to witness a rise in urban population from 472 mn in 2019 to 607 mn in 2030¹¹⁸. To maintain and accelerate economic growth, India needs approximately \$640 bn until 2031 for investment in urban infrastructure and services¹¹⁹.

To revive the urban landscape of the country, to make them more liveable and inclusive, besides driving economic growth, Government has embarked on an ambitious Smart Cities Programme. Taking the Smart Cities Mission further, the Union Cabinet chaired by Honourable Prime Minister, cleared the Smart Cities Mission and the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) for 500 cities with significant budget outlays in April 2015. 2019 Budget allocated to AMRUT has been increased by 14 percent from \$896 mn to \$1,022 mn¹²⁰. A key challenge in developing smart cities is the complexity of how cities are planned, operated, and financed. In the following section, we explore these possibilities through a few select case studies.

Technology for smart citizen services

The essence of smart cities is to provide efficient citizen services and a safe and secure living environment. One such excellent example of 'citizen centric' smart initiative is visible from NYC 311.

NYC311 – A case study

The New York city had more than 40 call centres and numerous hotlines run by individual agencies, which meant that it was difficult for citizens to easily reach the necessary services. The city created '311' as a citizen service centre to allow New Yorkers to reach all city services by calling a single, non-emergency number. NYC 311 was developed on the assumption that New Yorkers did not know how to navigate the complicated government bureaucracy, leading to longer wait times, increasing number of calls on the emergency 911 number, and varied customer service experiences. This led to not only accelerating transparency and accountability but also increased citizen confidence in the government along with a next level of engagement between citizens and community.

India too has been implementing technology-led initiatives to create a safe and secure living environment. According to media reports, there have been 300 manhole-related deaths in India over the past three to four years¹²¹. So, how is technology being leveraged to address this? Inspired by Iron Man, the Robot named Bandicoot was developed by a group of engineering student as a part of a start-up Genrobotics, to do the job of manual scavengers. The Kerala Water Authority that manages the sewage department in the state has already placed orders for 50 such robots¹²².

Big Data for rural microplanning

Technology can play a transformational role by promoting growth, improve delivery of services, expand the reach of education, and support social and cultural advances to implement Smart City Mission. An excellent example of using technological intervention is where SocialCops partnered with Tata Trust to create a platform for microplanning 264 villages in Andhra Pradesh. It was an end-to-end solution right from data collection to analytics and visualization, enabling constituency planning and budgetary control. They used a mobile data collection app to collect and map 100 mn data points across households, schools, healthcare facilities etc. The data builds aggregate profiles of villages, indicating their development requirements and priorities¹²³.

The platform was used to analyse eligibility of families in the village for various government schemes. Even the corporate sector benefitted from this; for example, companies used this platform to match job vacancies with candidate profiles and a taxi company used it to find unemployed people and hired them as drivers.

Industry Innovation and Infrastructure Development

The infrastructure is important for faster economic growth and alleviation of poverty in the country. It has a domino effect on the other sectors of the economy. India has an investment requirement of over \$700 mn¹²⁴ in infrastructure by 2022 to have sustainable development in the country. Out of 71,772 km of National Highways, only 24 percent¹²⁵ are four-lane, therefore offering an immense scope for improvement. Initiatives like 'Housing For All' and 'Smart City Mission' will support the growth of the infrastructure in the country.

The adequate infrastructure in the form of road and railway transport system, ports, power, airports and their efficient working is also needed for integration of the Indian economy with other economies of the world. One such effort by the Indian Government has been Jal Marg Vikas Project (JMVP) for capacity augmentation of navigation on National Waterway-1 (NW-1) at a cost of \$751.6 mn with the technical assistance and investment support of the World Bank. The project is expected to be completed by March 2023.

Jal Marg Vikas Project (JMVP) – A Government Initiative

JMVP has drawn appreciation from the world's best. In April 2019, IWAI was invited by the prestigious Massachusetts Institute of Technology, US, to share the success story of developing the waterway between Varanasi and Kolkata on river Ganga.

IWAI has taken up a technologically challenging project of setting up of River Information Service System on NW-1 for the first time in India.

The IWAI is also working with State Livelihood Missions for imparting necessary skill training for the youth, boatmen and other community members so that they could benefit from the employment opportunities.

ENABLERS AND CRITICAL SUCCESS FACTORS FOR TECHNOLOGY-LED TRANSFORMATION

Adoption of technology to deliver transformative impact on India's sustainability goals would require an enabling ecosystem, which encourages identification and adoption of new business models. Our research indicates that four factors would be critical to harness the power of technology in India. These are – (i) Awareness, (ii) Skilled Workforce, (iii) Policy Landscape, and (iv) Stakeholder Collaboration.

Awareness

According to Accenture-GCNI CEO Study 2018, over one-third of the Indian CEOs are unable to identify the business value of their sustainability initiatives¹²⁶. Addressing this challenge requires creating greater awareness – awareness not just about the 'art of possible' that can be achieved through technology, but also about the business case for such technological intervention.

“...Organization-wide buy-in, from senior leadership through the ranks is one of the most important critical success factors for successful implementation of digitally enabled solutions in the Indian context...”

- Vaishali Nigam Sinha (Chief Sustainability Officer, ReNew Power)

There is another research study that suggests that a CEO's environmental awareness can significantly promote the technological innovation of his/her enterprise. CEOs who are more environmentally conscious invest more in R&D activities, obtain more patents and achieve greater innovative success¹²⁷.

Skilled Workforce

NASCCOM predicts that by 2022, ~46 percent of the Indian workforce will be engaged in entirely new jobs. i.e. jobs that do not exist today or jobs that have radically changed skill sets¹²⁸.

There is no dearth of human resource in India, but only 10 percent of India is digitally literate¹²⁹. This represents a huge opportunity to upskill the workforce to align with the changing needs of Fourth Industrial Revolution that the world is witnessing today. The Government's Digital India policy is a step in the right direction. Such measures will enable a smooth transition and ensure scalable adoption of technology solutions.

Policy Landscape

The roll-out of technology initiatives to achieve SDG targets could benefit immensely from a favorable policy landscape, which could be critical to ensure a conducive infrastructure.

The Government's IndiaStack initiative stands as an illustration of a rapidly scalable platform that brought together multiple stakeholders and continues to provide room for innovation. Policy initiatives to mirror this success could be critical to keep the momentum going.

From a policy perspective, it would also be critical to ensure the right data privacy and security standards. European Union's General Data Protection Regulation (GDPR) guidelines, which were enforced in May 2018, encourage the design of less-privacy invasive systems. Given the scale at which technology solutions need to be adopted in the Indian context, a similar data privacy framework could be critical to ensure smooth and rapid execution of technology initiatives.

Stakeholder Collaboration

India spends only 0.6 percent of its GDP on R&D with lion's share coming from the public sector¹³⁰. In most of the developed countries, the private sector has always been the chief carrier of R&D investments.

In the Indian context too, collaboration among all stakeholders to create an ecosystem for funding and innovation will help accelerate our progress towards SDG goals. The Government has launched the Startup India initiative to build a conducive environment for the growth of startup businesses, to drive sustainable economic growth and generate large scale employment opportunities. Such initiatives enable innovation and private sector can play a major role by funding existing efforts or even creating innovation hubs within their organizations.

According to Accenture-GCNI CEO Study 2018, 9 out of 10 Indian CEOs see cross-sector coalitions and partnerships as essential to accelerating transformation. Companies have an opportunity to leverage their influence on the entire value chain and reach out 'beyond the firm' to engage ecosystems of consumers, investors and partners in developing new innovative solutions.

CALL TO ACTION

Given the critical relevance of SDGs in the Indian context, the Government continues to undertake several strategic initiatives. For instance, NITI Aayog has undertaken a mapping of schemes as they relate to the SDGs and their targets, and has identified lead and supporting ministries for each target. They have adopted a holistic approach to sustainable development, emphasising the interconnected nature of the SDGs across economic, social and environmental pillars. States have also been advised to undertake a similar mapping of their schemes¹³¹.

With just around 4,200 days to go for the planned timeframe to achieve SDGs, business sector has a unique opportunity to accelerate India's journey towards a sustainable future. The SDG framework provides strategic guidance for the companies to identify their priorities and strategic initiatives.

“We believe that the single most important element is the mindset shift and commitment on behalf of Corporate leaders to leverage technology to not only drive economic transformation but environment and social transformation within and outside their business boundaries”

- Vishvesh Prabhakar (Managing Director, Sustainability, Accenture Consulting)

The companies could couple this strategic guidance with their resources, networks and management abilities to not only accelerate the achievement of SDGs, but also create shareholder business value along the way.



ACKNOWLEDGEMENT

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The authors would like to thank the following people for their insights and assistance:



Nikhil Bidkar



Sukanya Deshmukh



Akshay Raghunath



Ritesh Kapoor

The authors express gratitude to the following company executives for taking out time to share industry perspectives:



Dr. Bhaskar Chatterjee,
Secretary General &
Executive Head,
Indian Steel Association



Mr. Ravneet Gill,
MD and CEO,
Yes Bank Ltd.



Vaishali Nigam Sinha,
Chief Sustainability
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ReNew Power



Mr. Anil Chaudhry,
MD & Zone President,
Schneider Electric India



Mr. Manish Tandon,
CEO,
CSS Corp Pvt Ltd



Dr. Shikha Nehru Sharma,
Founder and MD,
Nutriwel Health India Pvt. Ltd.



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“SwachhShree”
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- ¹²⁹A look at India's deep digital literacy divide and why it needs to be bridged an article by Financial Express
- ¹³⁰India's R&D spend stagnant for 20 years at 0.7% of GDP, article by The Economic Times
- ¹³¹United Nations in India – Sustainable Development Goals

About Global Compact Network India

Global Compact Network India (GCNI), formed in November 2000, was registered in 2003 as a non-profit society to function as the Indian Local Network of the UN Global Compact, New York. It is the first Local Network in the world to be established with full legal recognition. It, also as a country level platform for businesses, civil organizations, public and private sector, aids in aligning stakeholders' responsible practices towards the Ten Universally Accepted Principles of UNGC in the areas of Human Rights, Labor, Environment and Anti – corruption, broad UN goals including Sustainable Development Goals and other key sister initiatives of the United Nations and its systems.

At present, the India Network ranks among the top 10, out of more than 90 Local Networks in the world. It has also emerged as the largest corporate sustainability initiative in India and globally with a pan India membership of 230 leading business and non-business participants and 341 signatories, strengthening their commitment to the UN Global Compact Principles by becoming proud members of the Local Network in India. For more details, please visit www.globalcompact.in

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Accenture Strategy operates at the intersection of business and technology. We bring together our capabilities in business, technology, operations, and function strategy to help our clients envision and execute industry-specific strategies that support enterprise wide transformation. Our focus on issues related to digital disruption, competitiveness, global operating models, talent and leadership help drive both efficiencies and growth. For more information, visit www.accenture.com/strategy

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