Future of Jobs in India - 2.0



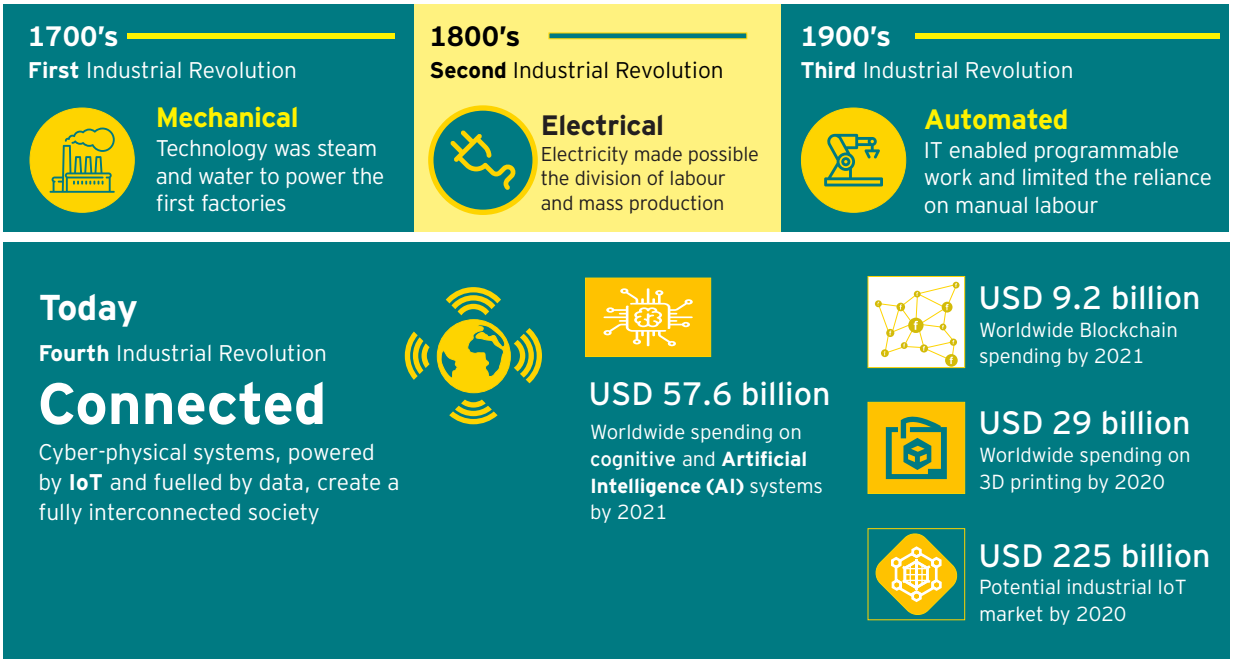
FICCI

Rise of Disruption

The world is at the cusp of fourth industrial revolution. Disruptive changes brought in by technological advancements are fundamentally revolutionizing the current job landscape with the impact ranging from job creation to job displacement and increased labour productivity to widening skill gaps.



Technology has been reshaping work since the first Industrial Revolution, which can be traced back to the 1700's when manufacturing was pegged with the emergence of 'industries' as Mechanical Technology powered the first factories. This revolution demolished guilds and replaced artisanal craftsmanship with assembly line production. In the 1800's, with the discovery of electricity, the electrical impetus made possible the division of labour and mass production. The third industrial revolution of the 1900's brought with it automated, IT enabled solutions which streamlined the programmatic work and limited the reliance on manual labour. Today, the fourth industrial revolution has augmented connectivity between cyber-physical systems, powered by exponential technologies and skilled data experts to create a fully interconnected society.



Currently emerging disruptive technologies such as Artificial Intelligence (AI), Machine Learning (ML), Robotics, 3D Printing, Internet of Things (IoT) and Blockchain – are giving way to innovations in business models that have never been envisioned before. Technological breakthroughs have altered consumer behaviour and expectations – most notably experienced among the millennial generation. What marks these technologies distinct is the pace at which upcoming start-ups are disrupting traditionally well-defined industries. Sharing economy that encompass everything from **taxi services such as Uber and DiDi, and peer-to-peer lending platforms such as Lending Club and Prosper to hospitality aggregators such as Airbnb** has revolutionised the business ecosystem in less than a decade. These start-ups are disrupting the conventional business models by offering affordable, accessible and scalable services.

Globally, the sharing economy is estimated to grow from **USD 14 billion in 2014 to USD 335 billion by 2025.** Similarly, the automotive industry is on the verge of a major disruption with innovators such as **Tesla Motors** trying to redefine the underlying dynamics of industry competition.

Exponential technologies are also facilitating the emergence of an online labour economy popularly known as the **'gig-economy'.** The gig-economy is facilitating outsourcing and offshoring of jobs beyond the boundaries of corporate towers in the form of short-term, part-time contractual or freelance work arrangements.

In today's world, industrial disruption has commonly come to mean a transformation of business models and value networks driven by technology or business innovation. However, recent incidence of transnational events such as Brexit, China's Belt and Road Initiative, US walking out of Trans-Pacific Partnership trade deal and Paris Climate Agreement, etc., that carry ripple effects across the globe, signal that disruption can also be a result of changing nature of public policy, macroeconomic trends, geopolitical events and other socio-economic developments.

Globalization and technology have collectively been disrupting businesses in the recent decade, however, a much bigger disruption is expected to appear with changes in demographic patterns across the globe. **A rising middle class, and millennial- dominated workforces** are embarking to reinvent the world economy. Another demographic phenomenon that is impacting economic systems and industries' structures is the aging of population across much of the world. **By 2020, for the first time in human history, world's population of people aged 65 years and older will exceed the number of children under the age of five years.**

The aforementioned forces are posing an increased threat of human workforce replacement and leading to drastic changes in the skills that firms are looking for. The phenomenon of technological innovations presenting a risk to human jobs and skills is not new or unexplored, but what makes the current transformation unique is that technology is not only impacting routine and manual tasks, but in-fact non-routine, cognitive, and social job profiles too. It is expected that not all jobs will be affected and not all affected jobs will be eliminated – as always, deployment of technology will both replace and supplement human labour.

It is necessary for us to be aware that unless we have a strategy in place to prepare ourselves for the upcoming transformation, the gains will not be widespread. A part of the solution, which is the most tangible for the near future, is development of education and skilling infrastructure across all sectors, corresponding to the emerging industrial set-up. As the new job roles emanating out of upcoming disruptions are entrepreneurial, scientific, creative, and emotional in nature, it is necessary for us to reform the education and skilling ecosystem.

Future of Jobs in India – A 2022 Perspective

FICCI and NASSCOM had partnered with EY to roll-out the 'Future of Jobs in India – A 2022 Perspective' in 2017. This report was the first research study exclusive to the Indian context on the future of jobs in five key sectors of the Indian economy in detail: **IT-BPM, retail, textiles & apparel, automotive and BFSI.** The report was based on extensive surveying of over **100 Indian CXOs across these 5 industrial sectors.**



The 'Future of Jobs in India – A 2022 Perspective' report provides a vision of change in the Indian job market over the next few years. It also provides an overview of the projected job creation rates for the next five years, new job roles that will emerge and the skills and expertise that will be required for success in this emerging dynamic environment.

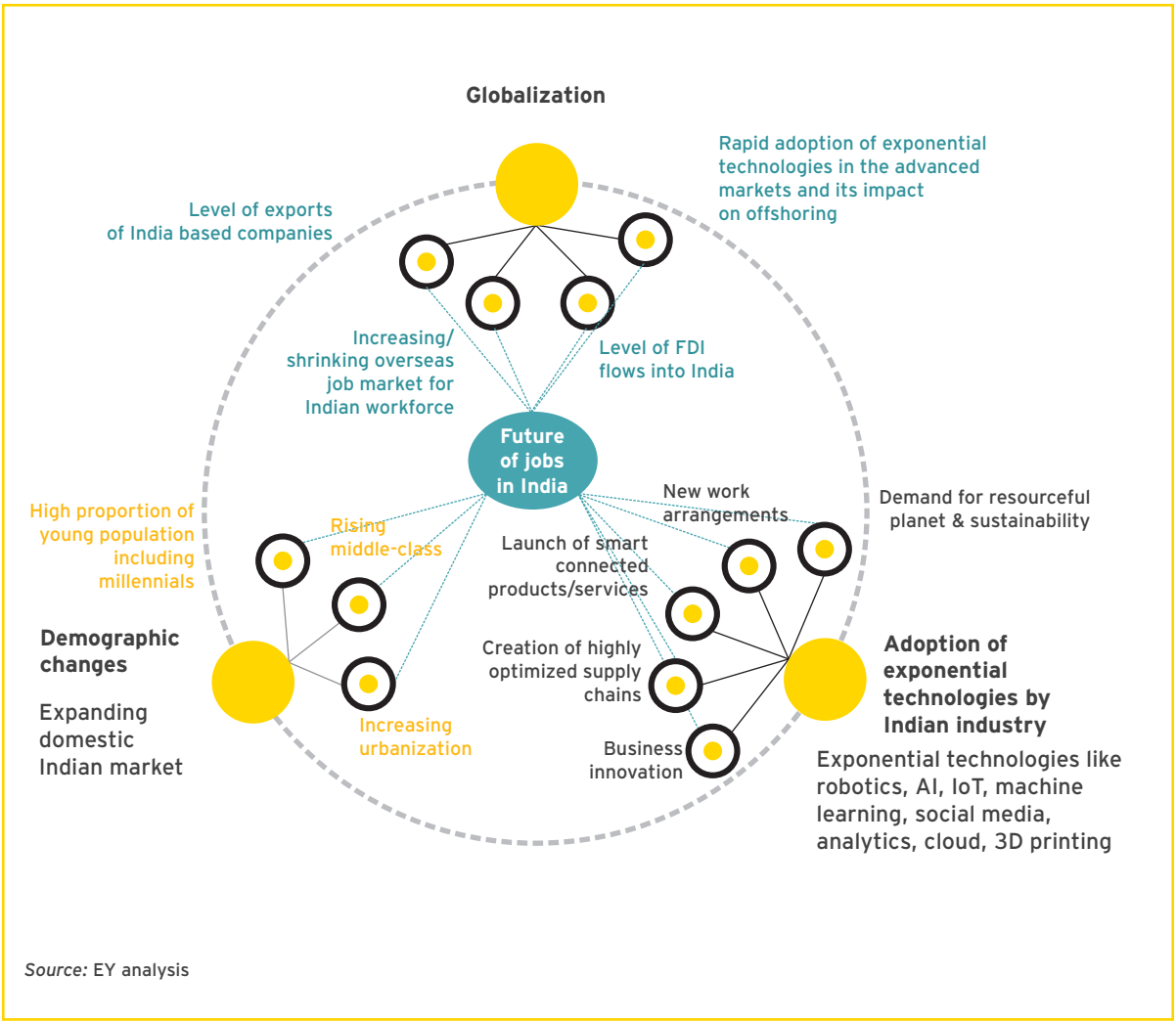
This report took a holistic perspective and analysed the primary causes of disruption and their impact on giving rise to a range of megatrends that are transforming the Indian job landscape. Based on multiple rounds of interactions with relevant stakeholders, the report analysed the fundamental causes of the emerging transformative trends and consequently, identified three **primary forces behind the current disruption: globalization, adoption of exponential technologies by Indian industry and demographic changes.** The interplay of these three primary forces is giving rise to a range of twelve megatrends which are shaping the future of jobs in India. The survey responses indicated **rising middle class, creation of highly optimised supply chains, and launch of smart connected products and services** as the top megatrends significantly impacting the job landscape in India.

Overall, the report presents a positive outlook for India to utilize the time window of the next 2-3 years to affect large scale reforms in general, technical and vocational education system in mission mode. The report, which was highly acknowledged, has been used as a reference point by various stakeholders such as the government, industry players and academia, in their quest to be prepared for the anticipated disruption.

Study Framework

Based on our analysis, we identified three forces that are primarily steering the transformation of the Indian economy – what we refer to as the **'primary forces'**. These forces are **globalization, adoption of exponential technologies by Indian industry, and demographic changes.**

EY framework for the future of jobs study



Source: EY analysis



Globalization

Globalization has been upending the status quo for centuries. Globalization has accelerated in recent decades, accruing to trade liberalization and emerging market growth. However, phenomenon such as the recent rise of nationalist sentiments in the west, scraping of the Trans-Pacific Partnership (TPP) trade deal, Brexit and so on, are leading to the emergence of a more multipolar world. These trends disrupt existing business models by creating new competitors, reordering supply chains and lowering price points. The next waves – including the emergence of BRICS as a major economic block and a more multipolar world – will augment complexity and require flexible business models to respond to global shifts.



Adoption of Exponential Technologies

Adoption of exponential technologies has been disrupting competitive strategy and business models for centuries. The Industrial Revolution, for instance, eliminated guilds and created massive labour displacement. In our lifetime, successive waves of the IT revolution (PC, online, mobile, social) have democratized data, empowered consumers and spawned scores of new industries. The next waves of technological disruption – the IoT, Virtual Reality (VR), AI, ML, Big Data, Robotic Process Automation (RPA) – are proving themselves to be even more revolutionary.



Demographic Changes

Throughout human history, **demographic changes** have determined evolutionary restructuring. In the decades ahead, relatively higher birth rates will make Asia and Africa engines of economic opportunities. Aging populations will transform and mature everything from health care to real estate in majority of developed nations. Millennial-dominated workforces are reinventing the workplace. Similarly, urbanization is increasing the cities' economic and public policy clout, even as it strains their ability to grow in a sustainable manner. Migration and immigration will also have profound impact on workforces and economic development. All these demographic shifts will require new strategies and business models.

Key Findings

Workforce mix - 2022

9% would be deployed in new jobs that do not exist today

37% would be deployed in jobs that have radically changed skill sets

54% will fall under unchanged job category

Source: EY future of jobs respondent analysis

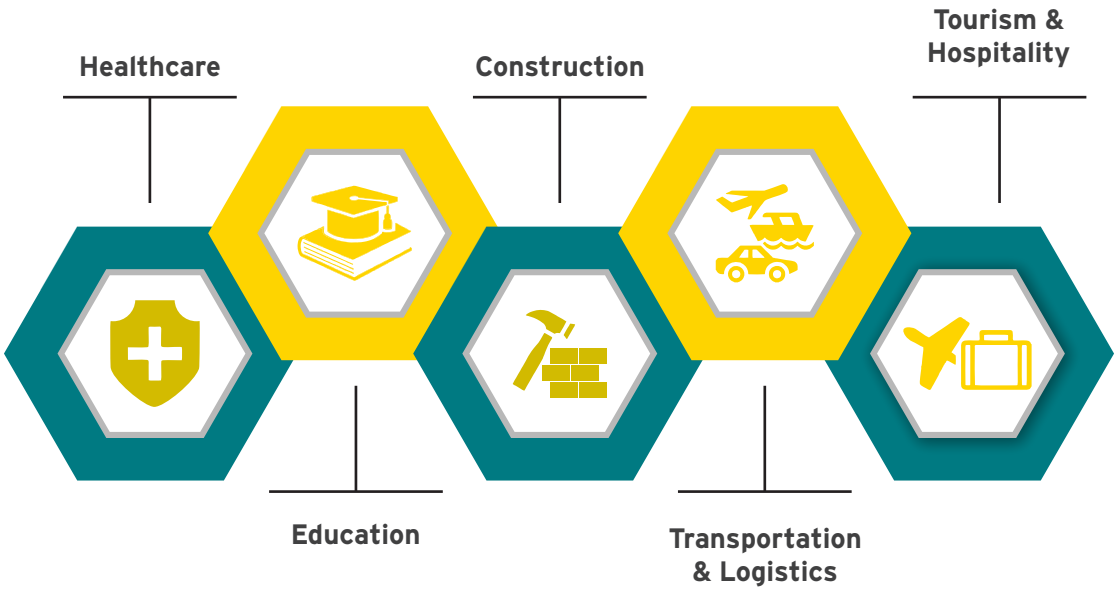
A snapshot of the future of job in the organized sector - 2022

	Workforce that would be deployed in new jobs that do not exist today (projected for 2022)	Workforce that would be deployed in jobs that have radically changed skill sets (projected for 2022)	Workforce that will face an existential threat to their jobs (for 2017)	New job roles
IT-BPM	10%-20%	60%-65%	20%-35%	✦ VFX artist ✦ Computer vision engineer ✦ Wireless network specialist ✦ Embedded system programmer ✦ Data scientist ✦ Data architect ✦ AI research scientist ✦ RPA developer ✦ Language processing specialist ✦ Deployment engineer ✦ 3D modeling engineer ✦ 3D designer ✦ Cloud architect ✦ Migration engineer ✦ Android/iOS app developer ✦ Digital marketing
Automotive	5%-10%	50%-55%	10%-15%	✦ Automobile analytics engineer ✦ 3D printing technician ✦ Machine learning based vehicle cybersecurity expert ✦ Sustainability integration expert
Textiles & apparel	5%-10%	35%-40%	15%-20%	✦ Apparel data analyst/scientist ✦ IT process engineer ✦ E-textiles specialist ✦ Environment specialist ✦ PLC maintenance specialist
BFSI	15%-20%	55%-60%	20%-25%	✦ Cyber security specialist ✦ Credit analyst ✦ Robot programmer ✦ Blockchain architect ✦ Process modeler expert
Retail	5%-10%	20%-25%	15%-20%	✦ Customer experience leader ✦ Digital imaging leader ✦ IT process modeler ✦ Digital marketing specialist ✦ Retail data analyst

Source: EY future of jobs respondent analysis

Future of Jobs in India-2.0

Moving forward FICCI envisages to analyse five more sectors in the second phase of the study. These sectors together form the foundation of India's socio-economic development. The proposed sectors include:



The proposed study will be an endeavour towards analysing the aforementioned five sectors in detail and presenting a holistic perspective on three counts: analysing the major trends impacting the sectors, identifying the key skilling needs, and recommending a strategy towards developing the workforce of the future.

1 Healthcare Sector

Snapshot of the Indian Healthcare Sector

SECTOR OVERVIEW

~USD 160 billion
market size of Indian healthcare sector in 2017

CAGR 16-17% expected during 2017-2022
Sector to reach **USD 372 billion** by 2022

USD 22.41 billion
cumulative FDI inflow from April 2000 to March 2018

2X GROWTH IN GOVERNMENT EXPENDITURE EXPECTED FROM 2017 to 2025

1.2% of GDP in 2017

2.5% of GDP in 2025E

EMPLOYMENT SCENARIO

4th largest employer
Accounting for **4%** of the total employment across sectors in India

1.2 million people employed as of December, 2017 (in organized sector)

Healthcare needs for tomorrow

1.54 million additional doctors and **2.4 million** nurses required by 2025 to meet the growing demand for healthcare

3 million additional beds needed for India to achieve the target of 3 beds per 1,000 people by 2025

~USD 200 billion is expected to be spent on medical infrastructure by 2024

Ayushman Bharat - Government of India's initiative

- **World's largest government funded** health care program
- To cover over **100 million** poor and vulnerable families
- Bringing about a **transformative change** in healthcare by shifting focus from **'healthcare' to 'wellness'**

Two components of scheme

Health and Wellness Centre

- **0.15 million centres** to bring healthcare system closer to doorsteps of millions
- Provision of **all-inclusive healthcare, free essential drugs and diagnostic services**
- **~USD 166** million allocated budget

National Health Protection Scheme
(Pradhan Mantri Rashtirya Swasthya Suraksha Mission)

- Healthcare coverage upto **USD 7,000 per family** per year for secondary and tertiary care
- Over **500 million people** to be covered
- **~USD 1.4 billion** allocated budget

Key Emerging Trends

Higher penetration of mobile phones has spurred increasing usage of **mHealth apps** such as Mobiwebtech, Mobisoft Infotech and Peerbits, which are facilitating easy remote diagnosis and treatment through disease and drug intake tracking with analysis, reminders and notifications

Telemedicine in Indian healthcare landscape has been a disruptive business model, wherein major hospitals like Apollo, AIIMS, Narayana Hrudayala have adopted telemedicine services and entered into a number of PPPs

Telemedicine market in India is expected to rise at a CAGR of 20% during FY2016-FY2020, reaching **USD 32 million** by 2020

Increase in medical expenses around the world has led to India emerging as a preferred destination for **medical tourism**

As of April 2017, medical **tourism market** in India was **USD 3.0 billion** in size and is expected to double to reach USD 6 billion by 2018 due to the easier norms for medical visa approvals

Introduction of **National Health Stack (NHS)** by Government of India would interlink the continuum of healthcare across primary, secondary and tertiary care. This will enable interoperability of data and portability of insurance cover

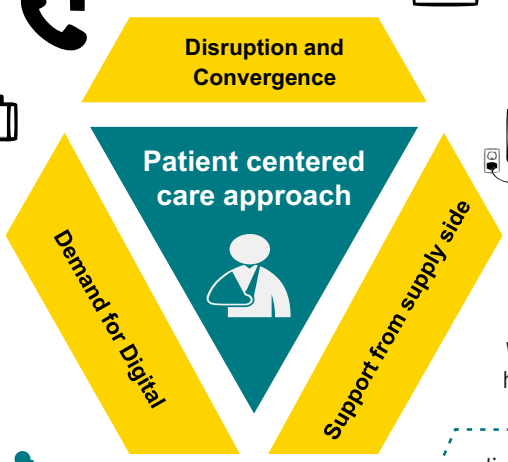
Adoption of **IoT** enabled platforms is supporting players with a new foundation for gaining insights into operational management across organizational verticals thus enabling optimization of assets and reduction of operational costs

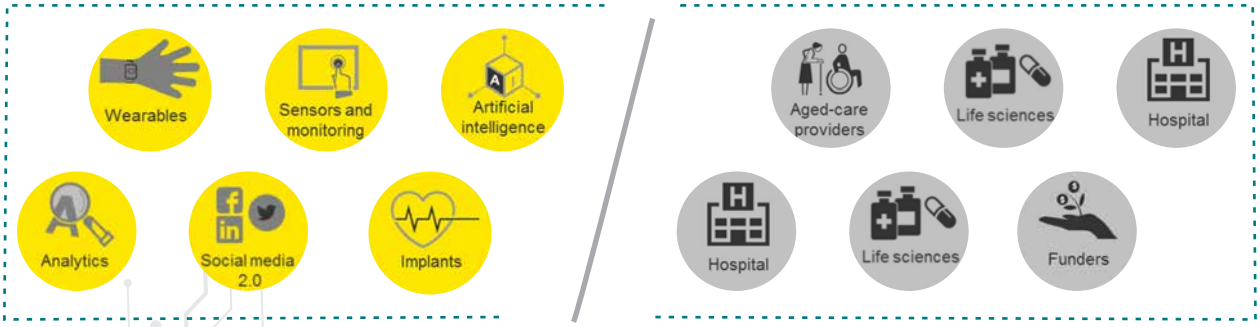
With the rise of Internet of Medical Things (IoMT), **mobile and wearable devices** are being used to identify the risk factors and provide preventative treatment to the patients

Healthcare providers in India are looking at deploying the **Blockchain** technology, enabling transparency, reduction of administrative costs and improvement in interoperability of data

Electronic Health Record (EHR) promises to offer reliable access to patient's complete healthcare information to enable diagnosis of problems at an early stage. It would also provide information such as new medication or upcoming diseases

AI powered robots like IBM Watson are getting deployed in health care delivery as Surgical Assistants and in research including genomics, drug discovery, oncology and stem cell therapy. Robots and AI would assist as Care Managers for rehabilitating patients, caring of elderly patients, and measuring and delivering medication





2 Education

Snapshot of the Indian Education Sector

SECTOR OVERVIEW

USD 91.7 billion market size

Schools: **1.52 million** (FY2016)
Universities: **850** (FY2018)

Students enrolled (FY2016)
Schools: **260.2 million**
Higher Education: **33.3 million**

FDI inflow of **~USD 1.67 billion** between 2000-2017

Digital Learning market **USD 2 billion** (2016)
Expected to reach **USD 5.7 billion** (2020)

18.2 million individuals employed in the sector as of FY2018

Key Emerging Trends

2018 India's Education landscape of the future is characterized by blurring of boundaries 2030

Levels of education	Higher education and industry	Geographies	Education spaces	Teacher-student interaction
Move to a culture of lifelong learning	Rise in industrial contribution to educational development	Increase in global education delivery and accreditation	Limited face-to-face interaction between students and teachers, with rise of online learning	

Increasing use of technology

- Increased use of **big data** to analyze student information and customize online content
- Digital platforms weaving path for **MOOCs** such as edX, Udemy, Coursera, **SWAYAM (MHRD's platform where online course are offered by premier institutes such as IITs, IIMs, etc.)**
- Hightened internet penetration leading to the emergence of **mobile-Education** (mEducation), which has the potential to **revolutionize India's vast network of rural and semi-urban school network, that are currently facing challenges** in quality teachers and infrastructure
- Blockchain technology has given way for **microcredentials and badges.** Microcredentials have grown in popularity among both brick-and-mortar institutes and digital education platforms such as **Coursera, edX,** etc.
- **Gamification and simulation based** teaching-learning ecosystem is emerging leveraging the strengths of technologies such as Augmented Reality, Virtual Reality. E.g. **Google Cardboard, Microsoft HoloLens and Eon Reality**
- AI based **facial recognition** softwares like **SAFR** are being deployed in schools for analysing students' behaviour for better monitoring
- Data driven decision making is redefining education management and administration through **enabling creation of class schedules, maintaining student attendance, processing grades and report cards**
- Learning outcomes are getting supplemented by technological tools such as **AI and RPA** that are being utilized in assessment softwares such as **eLumen, WEAVEonline and EvaluationKIT**

Megatrends driving the Indian Education Sector

- Setting up of **satellite campuses and student exchange programs** by foreign universities
- Broadening geographical presence to include **socioeconomic groups with low participation**
- Increasing collaboration with industry, to boost the **research and development** initiatives

Expanding net of education

- **Tutoring in the K-12 market** is emerging as a major segment, which is expected to grow from **USD 8 billion in FY2011 to USD 26 billion in FY2020**

Emergence of tutoring market

3 Construction

Snapshot of the Indian Construction Sector

SECTOR OVERVIEW

9% contribution to GDP

Growing at a **CAGR of 15.7%** to reach **USD 738.5 billion** by 2022

2nd largest employer
44 million workers employed

USD 24.8 billion cumulative FDI inflow from April 2000 - March 2018

Key Emerging Trends

TECHNOLOGICAL TRENDS

IoT

Increasing use of IoT devices in Smart Buildings for collecting and analysing data from sensors to understand signals and patterns, deploy **real-time solutions, cut costs, prioritize preventative maintenance, and prevent unplanned downtime**

Building Information Modelling (BIM)

Indian firms such as HCC, Tata Project have initiated use of **BIM** to **establish transparency in design, costing, and progress visualization; to improve on-site monitoring of materials, labor, and equipment productivity;** e.g. use of BIM by Nagpur Metro Rail Corporation, IBIS Hotel Chennai

Robotics

Off-the-shelf robotic applications are getting utilized to work in **parallel to manual labours** at construction sites e.g. **WALT** a robot developed by Hyderabad based Endless Robotics can **paint walls about 30 times quicker than a human**

OTHER EMERGING TRENDS

Smart City Mission

India's 'Smart City' mission is implementing a vision of advanced and modern urban localities by **leveraging Cloud Computing, Big Data, Mobility and IoTs.**

Under this 100 Smart Cities are envisaged to be developed by 2020

Government Priority

Schemes like **Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Heritage City Development and Augmentation Yojana (HRIDAY), Pradhan Mantri Awas Yojna, Bharatmala, Delhi Mumbai Dedicated Freight Corridor** are providing major growth thrust to the sector

Green Infrastructure

Rapid degradation of environment has given rise to development of **eco-friendly** end-to-end construction mechanisms, from materials, methods to equipment, with parameters of reduced carbon footprint, energy efficiency and water conservation

4 Transportation and Logistics Sector

Snapshot of the Indian Transportation and Logistics Sector

Roads & Highway Segment

- The road network of India is one of **largest in the world** spanning over a total **5.6 million kms in FY2018**
- More than **65% of freight and 80% of the passenger traffic** in the country is handled by roads
- The market for roads and highways is projected to exhibit a **CAGR of 36.16% during 2016-2025**
- During FY2018, Government allocated **USD 10.97 billion** for development of national highways
- Overall annual freight traffic in the country is estimated to reach **~13,000 billion tonne km**, whereas, overall annual passenger traffic is estimated to reach **~168,000 billion** passenger km by 2030

Railway Segment

- India has the **4th largest rail freight carrier network** and the **largest passenger carrier network** in the world
- Indian Railway runs **13,329 trains** carrying **~22.4 million** passengers daily
- **Single largest employer** in India employing close to **1.3 million** people
- Capital expenditure on railways has been pegged at **USD 22.85 billion** in FY2018
- Passenger traffic is expected to advance to **15.20 billion** by FY2020 from **8.29 billion** in FY2018
- Freight traffic carried by Indian Railways increased by **55.7%** from Fy2007 - FY2018

Aviation Segment

- India is the **9th largest civil aviation market** in the world
- Aviation industry is expected to witness **USD 15.52 billion** worth of investments in the next five years
- By 2020, passenger traffic at Indian airports is expected to increase to **421 million from 308.75 million in 2017-2018**
- The industry witnessed a **13.4% growth in the Foreign Tourist Arrival in 2017-2018**
- The domestic aviation passenger traffic grew year-on-year by **18.28% in FY2018,** while the international aviation passenger traffic grew year-on-year by **10.43% in FY2018**

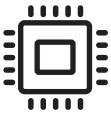
Ports & Shipping Segment

- India is the **16th largest maritime country** in the world
- Total investment in Indian ports by 2020 is expected to reach **USD 43.03 billion**
- In Q1 FY2019, cargo traffic increased **3.91% year-on-year** to **174.02 million tonnes**
- The industry boasts of a **fleet strength of 1301 vessels**
- Freight capacity of the industry is expected to increase to **1,451 million tonne** by FY2018 end from 965 million tonne from **FY2016**

Key Emerging Trends



Augmented Reality is getting used in Warehouse Planning, Pick-and-Pack Services and Last Mile Delivery, has shown significant improvements in productivity by shortening the learning curve, better workflow before implementation in warehouses and by providing constant picking validation that updates in real-time



IoT is enabling real time integration of data across supply chain partners for real time tracking

e.g. integrated devices with real time analytics and predictions



Robots and Automated Guided Vehicles are already solving picking and sorting challenges in the warehouses

Kiva, Butler are the workforce of warehouse of future



Social media and mobile applications are being used to generate one-on-one interaction with customers to obtain feedback and provide customer services.

e.g. Mobile ride sharing applications leveraged by users to carpool



Big Data analytics is being leveraged for long-term demand forecasts, transportation fleet capacity optimisation, planning and yield management

e.g. analytics is being used to identify carriers that have capacity to accommodate additional freight / passengers



Government's initiatives such as **BharatMala, SetuBharatam, SagarMala, Eastern Dedicated Freight Corridor** and **Western Dedicated Freight Corridor** will significantly fasten and organize the movement of freight traffic



Robust growth in the e-commerce market is providing a major thrust to the logistics business in India. **Third-party logistics (3PL)** is experiencing a rapid growth backed by this rise in e-commerce sector and logistical efficiencies brought in by **GST implementation**



Warehousing of the Future



Last Mile Delivery Innovations



Intelligent Tracking



Intelligent Fleet Management

5 Tourism and Hospitality Sector

Snapshot of the Indian Tourism and Hospitality Sector

SECTOR OVERVIEW

USD 230 billion market size
9.4% contribution to GPD

Expected to reach **USD 424 billion** by 2027

44 million workers (as of 2016)
9.3% of the total jobs in India

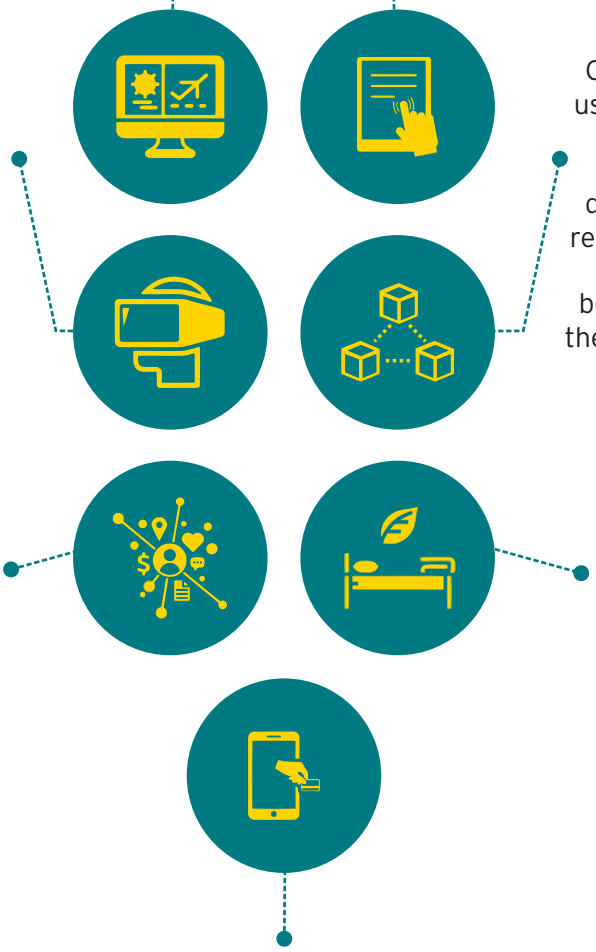
Foreign Tourists Arrival: **8.8 million**
Domestic Tourists Visits: **1.6 billion** (2016)

Key Emerging Trends

RPA is increasingly being embraced as a tool for business travel management in the booking reservation system 24 hours and 7 days

AI based Guest Management System is being deployed to provide personalized experience to customers regarding their tastes or consumption by accessing real-time information

Hotels and multiplexes are including amenities like **Augmented Reality** to allow tourists to engage in a close to real life experience through multimedia resources characterizing the destination



Companies have started using private **Blockchain** to handle internal processes and manage distribution of hotel and restaurant inventory, and other assets. Also, it is being used to streamline their loyalty management programs

Big data is being used by the hospitality industry players, exploiting analytics for targeted marketing of their services through data collected via social media channels

India is emerging as the preferred destination for **Medical Tourism** as it offers advanced facilities, skilled doctors, and low cost of treatment to foreign patients

E-Tourist Visa, launched by the Government of India, has resulted in increase in the number of tourist visas issued in the country to a large extent. The arrivals through e-visa have increased by **57.2% to 1.69 million during FY2017**

Approach and Methodology for the next Phase

Phase	Impact Assessment	Strategic Foresight	Validation
Details	✦ Perform deep dive, quantitative and qualitative analysis to identify the impact of the megatrends on the Indian economy ✦ Review the existing research done in the area of future of jobs in India and other countries ✦ Conduct the secondary data collation and analysis to find the quantitative impact on job numbers over the next 5 years	✦ Identify and finalize the groups of top leaders and employers in selected sectors for the study ✦ Develop survey questionnaire and conduct primary survey for each of the 5 sectors based on the Future of Jobs framework ✦ Analyse the information collated through primary surveys to study the impact	✦ Validation of study analysis and findings (obtained through primary and secondary research) with industry associations, thought leaders, etc. ✦ Arrive at various risks that might exists in the future , analyse the steps taken by other countries to mitigate these risks and recommend on how various sector leaders, policymakers, etc. should take steps for risks mitigation
Output	**'Future of Jobs in India – 2.0'**		

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