

NASSCOM White Paper

HOW CAN INDIA MASTER THE FOURTH INDUSTRIAL REVOLUTION (4IR)?

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REFLECTING ON INDIA'S GROWTH THROUGH THE INDUSTRIAL REVOLUTIONS

The industrial revolutions have been one of the most significant 'game-changing' periods in Indian history. Each of them have opened the country to new technologies, new style of thinking, new jobs and opportunities. India had resounding success as a textile manufacturing nation in the first industrial revolution. Asia's first ever steam-powered cotton mill in the country made the Indian textile industry internationally competitive¹. The second industrial revolution witnessed India's first ever steel mill. The Tata Iron and Steel Company Limited (Tata Steel) was established in Bombay on 26th August 1907².

It was these two revolutions that paved the path for development of heavy industries, R&D institutions and Universities for higher technical education. Thereafter, the country welcomed the third industrial revolution with a pool of IT experts, computer engineers and scientists. Their availability as inexpensive, skilled professionals with competent English proficiency allowed them to be outsourced and make a significant contribution to the Silicon Valley³. All the leading US technology companies today; Microsoft, IBM, Intel and XEROX are present in India and 34%, 28%, 17% and about 13% respectively are Indians. Also, 36% of scientists at NASA are Indians⁴. Do we need better proof?

4IR – OUR BIGGEST OPPORTUNITY



The 4IR, marked by a fusion of technologies, and blurring the lines between the tangible, biological and automated worlds, is here, making it very clear that talent, more than capital has become the pivotal factor of production. This is the biggest opportunity for India to become the 'talent capital of the world', through her demographic capability.

Silicon Valley had to bring in the finest minds from across the globe to help it become a world leader in science, technology and innovation. India already has an opportunity to become the leader in digital talent. First, the Indian IT industry is steadily shifting towards offering end-to-end digital technologies, creating the job opportunities that will fuel the desire of Indian youth to build digital capabilities⁵. Second, with a median population age of less than 30⁶, more young people live in India than in any other country who have a remarkable technical aptitude, and their numbers are increasing for decades to come. They are joining the workforce at a rate of about 1 million per month. All these bright minds are anxiously waiting for the right opportunity to prosper.

Let us take a look at the factors that put India in a unique position to take advantage of the 4IR:

1 A LARGE STEM POOL

There is a high demand for STEM (Science, Technology, Engineering, and Mathematics) skills, as organizations require people who have a good understanding of how to use automation tools and make sense of Big Data⁷. Fortunately, 29.2% of world's STEM graduates are in India⁸ (In 2017-18, close to 2 million students graduated with STEM⁹). These students can be easily trained to work in jobs created by the new technologies.

2 DIGITALLY SKILLED TALENT POOL

More than 8,100 firms in India, with a digitally skilled talent pool of about 500,000 are offering digital solutions. This accounts for approximately 75% of the global digital talent¹⁰. About, USD1.6 billion is spent annually on their training and increased R&D spend¹¹.

3 AN EXPLOSION OF ENTREPRENEURIAL CAPABILITY

India is ranked as the 3rd largest tech based start-up hub in the world with more than 5,200 start-ups in the country, and many of these are working on very niche technologies, like, Artificial Intelligence and Big Data Analytics (which employs about 24,000 people across India¹²), Block chain and Robotics¹³. This far, the start-up sector has been able to attract around USD4 Billion in investment¹⁴.



LESSONS FROM HISTORY AND ELSEWHERE

The previous IT revolution saw cross-border migration of a highly talented Indian tech workforce and students, in search of better employment opportunities, quality higher education and professional training institutes. The net outflow of digital skills has enabled India to be a global provider of tech talent but also led to brain drain. Learning from the past and what other countries have done, India can retain its best talent. Some ideas on how can this be achieved:

1. A SWIFT-FOOTED EDUCATION AND SKILLING SYSTEM:

The good news is that efforts made on the higher education and training front have helped India rise by 6 points in the Global Competitiveness Index ranking (2018) to 75th position. This pillar measures enrolment in secondary educational institutions, quality of education as well as on-the-job opportunities for up skilling, among other things¹⁵. Nonetheless, there is a dire need for our schools, higher educational institutions and skilling system to respond to 4IR by becoming more innovative and creative. What does this mean?

- Students will need early exposure to analytical-thinking, STEM and Data Sciences to adapt themselves to a data-driven and experimentation-oriented world. Countries, such as, Estonia and the UK have already introduced coding classes as early as age five, in response to this.
- Alongside main education, there will be a need to focus on developing soft skills, like creativity, initiative, critical thinking, empathy, attention to detail, resilience and flexibility, which is important for the 'new collar' jobs of the future¹⁶.

2.PROMOTE ENTREPRENEURSHIP AND INNOVATION:

There is an urgent need for promoting innovation, incubation, and a start-up spirit in educational institutions, by increasing focus on design thinking and practical approaches to learning. Higher Education Institutes across China have created new schools dedicated to innovation. The number of incubators has increased by 18% with 20% more space. Financing for innovation and entrepreneurship within and out of university has reached RMB 1.02 billion and RMB 1.28 billion respectively¹⁷. Innovation in our educational institutions can be promoted by¹⁸:

- a. Setting up Tinkering labs similar to Atal Tinkering Labs, in every educational institution.
- b. Making Entrepreneurship at a minimum, a minor elective for undergraduates.
- c. Setting up incubation centers, mentoring clubs and acceleration programs in educational institutions.

3. INCREASING R&D SPEND:

An increased effort towards R&D is a true measure, of the capability to innovate. Although India's R&D spend has grown to 0.8% of the GDP, much more needs to be done. Lessons can be drawn from Israel and Korea, one of the most innovative countries in the world, with a consistently high R&D spend (4.2% and 4.3% of GDP respectively)¹⁹.

While Israel is known as a 'start-up nation' when it comes to tech companies, with more start-ups per capita than anywhere outside Silicon Valley²⁰, Korea is leading the way in batteries, autonomous cars, new fuel cars such as hydrogen fuel cell vehicles, biologies, the internet of things and 5G to name a few²¹. It is one of the most innovative countries in the world, covering everything from a large number of tech companies to a big pool of science and engineering graduates.



CONCLUSION

By 2050, India will represent almost 18% of the global working age population. More than 100 million newcomers are expected to enter the workforce by 2022²². As can be seen by some of the work that other countries are doing, an enhanced collaboration among Industry, Government and Academia is critical for closing the skill gap and preparing for the future of work. Each of them has an important role to play. If India responds to the rapid disruptions with a sound and sustainable strategy by finding ways to address its own complex problems through technology-led innovation, it will easily become the solution provider to the world, where the challenges are a subset of what our country grapples with, and perhaps, the India model will then become the replicable model for the rest of the world.

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