

## End of Jobs

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A friend who was an office head once told me a poignant story about his steno when a vendor had come to his office to demonstrate the use of a speech recognition software that would allow a note to be dictated directly to the computer. After the vendor had left, the steno asked him, "Sir, does that mean my services are no longer needed?" Stenographers are no longer recruited in any office.

In 2014, a writing software called Quill was developed by an American Company that could convert numerical data into a written story, accomplishing within seconds what it took experienced analysts weeks of synthesis and analysis of huge volumes of financial data. In 2014, the Associated Press began publishing a large number of articles about US corporate earnings most of which were written not by humans but by robot journalists. These are increasingly getting better, sharper, and more analytical.

All work can be divided into four types: routine jobs that require the same task repeated over and over again as opposed to non-routine jobs, and cognitive jobs that require the use of brains as opposed to manual jobs that mostly requires the use of our bodies. Routine labour stagnated way back in 1990, having been replaced by technology, and many manual jobs followed suit. In the 21st century cognitive and non-routine jobs are being automated at an increasing pace, with exponential progress in developing robots that can learn by themselves. The future world will be one in which machines can perform all the four types of jobs at a fraction of the cost of human labour. It is creating the spectre of a jobless growth for our youth. In 2013 study on the impact of computerization upon jobs, Oxford scholars Carl Frey and Michael Osborne found that algorithms for big data had started to penetrate higher cognitive domains like pattern recognition and to substitute labour in a wide range of non-routine cognitive tasks. Computers have already started replacing jobs in easy-to-automate areas like transportation, logistics, production, services, sales, and construction. Harder domains will also be captured during the next wave of computerization, putting at stake jobs in management, science, engineering, and even arts. They predicted that nearly half of all American jobs will be lost to automation by 2033. It will probably be faster.

Advanced robots are now being produced with enhanced features, mobility and dexterity, allowing them to perform a much broader range of tasks requiring superior cognitive skills. Demands for industrial robots are increasing exponentially -their worldwide sales in 2015 touched 225,000 - 27% higher than in 2014. This is sending shockwaves across industries and occupations, impacting wages and educational requirements for jobs.

The periodic slump in the demand for skilled labour is nothing new in human history. In the nineteenth century, manufacturing technologies substituted for skilled labour through simplification of tasks by introducing the electricity-driven, partly-automated assembly-line production system. As a result, real wages stagnated while output per worker expanded due to increased efficiency. In response, the educational system became highly specialized, imparting complex skill-sets that, aided by the phenomenal expansion of transportation networks and the consequent increase in market size for the products,

increased productivity manifolds, which in turn led to a rise in real wages and improvement in the living standards in industrial societies after the middle of the nineteenth century.

Computer and internet revolution of the twentieth century again dented middle-income jobs, requiring higher levels of education for recruits and giving an unprecedented spurt to innovation and creativity. Productivity increased with the replacement of labour by technology in some industries, attracting more companies to enter those industries and in turn forcing more automation, job-contraction and lowering of wages. Industries that could not be automated shifted to low cost low wage countries, like Bangladesh and Vietnam. But alas, tasks that were hitherto considered non-susceptible to computerisation are now increasingly being taken over by the computers, e.g., textiles and footwear. German sportswear firm Adidas opened its first automated factory last year and revealed the robot-made Futurecraft shoes. As Nicholas Carr, author of "The Glass Cage: Automation and Us" said, "Jobs that used to be very complex, idiosyncratic and interesting start to look more like computer operator jobs, just putting in data and interpreting screen readouts." Computerisation is no longer confined to low-skill and low-wage occupations it once used to be.

The emerging portends are truly ominous. Truck driving is a popular job in USA - it is easily available, pays decently and has so far remained immune to automation. But no longer. Google, Uber and Tesla are all working on self-driving vehicles, and once operational, it will immediately send to 3.5 million drivers and 5.2 million additional personnel instantly out of jobs. Uber is already testing self-driving cars on the roads of San Francisco and so is Google (Self Driving Cars now known as Waymo, way to mobility). The ultimate goal is to replace all human drivers with robots threatening millions of drivers' jobs.

If this is not scary enough, consider the following: The e-commerce giant Amazon now has 30,000 fulfillment robots working in its warehouses worldwide; it expects to replace all employees who perform repetitive tasks with machines in not-too-distant a future. The Shanghai-based Cambridge Industries Group, one of China's leading suppliers of telecoms equipment is replacing two-thirds of its 3,000-strong human workforce with robots, eventually creating energy efficient 'dark factories' where robots would work in darkness to save power. Hardware store Lowe's just deployed a series of autonomous retail service robots called 'Lowebots' at 11 stores in the San Francisco Bay area; these multilingual bots are performing customer service and inventory management functions. Pizza Hut has just opened a concept store in Shanghai with robot waiters, which welcome customers, show them to their seats, take orders and serve drinks. Walmart is testing warehouse drones that fly around its distribution centers monitoring inventory levels and flagging up low stock or missing items. Many of the world's major companies spanning practically all sectors, like Nestle, SNCF, Foxconn, Marriott Hotels, ING, DHL, Nissan, Fidelity Investments, Zara etc., are transferring bulk of their workloads to robots.

In January 2016, the World Economic Forum had brought out a report on "The Future of Jobs". It predicted that the Fourth Industrial Revolution, brought about by artificial intelligence and machine-learning, robotics, nanotechnology, 3-D printing, genetics and biotechnology, will cause widespread disruption to business models and labour markets over the next five years, with enormous changes in the skillset requirement in the new age, costing a net loss 5 million jobs in 15 of the world's largest economies,

including Australia, Brazil, China, France, Germany, India, Italy, Japan, Mexico, South Africa, Turkey, UK and USA, plus the ASEAN and GCC groups, which together account for 65% of the global workforce. These are conservative predictions and the disruptions caused will vary widely across industries. It is only in this context that economists are arguing for decoupling income from work for providing a universal basic income to all to immunize the human workers against the negative effects of automation. Switzerland, Finland, the Netherlands, and Canada and even India are toying with this idea, the costs and benefits of which are right now being assessed.

As technology continues invading the labour market, education and businesses must get ready for upskilling, reskilling and collaborating rather than talent hunting. Tools made us human, and the tools we now have, artificial intelligence and computers, are the most powerful tools ever invented. In our networked age, innovation, adaptability and speed would be essential for survival, to equip our youth with a new set of cognitive skills combined with creative and social intelligence to work alongside robots. Mere cognitive skills aren't enough in the robot economy. As Geoff Colvin asserts in his book, "Humans Are Underrated", the new age industry needs empathy, people who can understand what the client or customer really feels and wants, which require social skills and creativity which robots don't have, not as yet. And that requires new curriculum and pedagogy for our schools, colleges and universities, something we are not yet ready for. We may be the fastest growing economy, but the growth is going to be jobless as it has been in recent years, and governments can't do much. In the days to come, the clamour for reservation in government and private sector jobs is only going to be louder and more contagious, not only from Patels, Jats, Marathas and Ahoms, but from all communities, backward or forward alike.

Our educators and policy makers – do they ever listen to Bob Dylan,

"Yes, how many times can a man turn his head/ Pretending he just doesn't see?/ The answer my friend is blowin' in the wind /The answer is blowin' in the wind."