

## 4<sup>TH</sup> INDUSTRIAL REVOLUTION AND ECONOMIC CHANGES

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**Abstract:** Throughout history, mankind has been progressing at ever faster rates, creating structures and tools that allow it to live easier and more comfortable life and build ever more complex and advanced tools that continue the process of technological evolution at ever faster rates allowed by the previous generation of tools, this has been famously named as Law of Accelerating Returns by Ray Kurzweil. Thus one may naturally assume, after understanding all of this, that technology follows an exponential path. Though true on average, this is not strictly true at every moment in history, in fact it was more untrue in the past. Every now and then, a disruptive technology or group of disruptive technologies, all relying on each other for greater efficiency and economic realization, creating rapid progress, at its height forming double exponential progress, and then subsiding into slow or no progress, creating an average exponential path. These periods of heightened progress often leads to both greater economic growth and, unintuitively, to greater number of economic crises, as shall be discussed later. These periods are called industrial revolution and many scientists, entrepreneurs, futurists and visionaries believe that we are in the beginning of one.

**Keyword:** Industrial revolution, exponential change, stock bubbles, productivity,

### HISTORY

The first industrial revolution happened in the late 1700s and early 1800s, powered by the creation of steam engine, mechanization of production and greater specialization of labor. It led to the formation of middle class, widespread adoption of education and paradigm shift from use of colonization as driver of prosperity to that of consumerism and large scale trade. It thus led considerable reduction of war. The second industrial revolution happened in late 1800s to early 1930s was powered by coming of electricity and creation of applications made possible by it. It saw further automation of production, ever greater specialization of labor, and enormous productivity increases brought by it. It led to further widening of middle class and increase in consumeristic mentality. Furthermore, the efficiencies brought by electricity in production lines and supply chains allowed for personal automobile revolution to take place, further amplifying the amount of technological change seen during this period. The third industrial revolution saw the rise of digital technology and internet,

first making headways into the corporate sector in early 1960s and then to consumer products, starting in early 1960s to early 2010s. It led to greater democratization and globalization of information production. It also led to greater efficiency in information storage supply chain management and robotics design and function. The reducing time period between industrial revolutions, further goes to show how law of accelerating returns is progressing humans, on average, at exponential rates.

### WHY CALL IT FOURTH INDUSTRIAL REVOLUTION ??

Now, one may question that why should we consider the current era fourth industrial revolution and not the ongoing continuation of third industrial revolution? There are several reasons that justify the differentiation. One of them is that every industrial has a or a set of disruptive technologies that mostly come at the start of a revolution, that progress tremendously throughout the revolution and create application unimaginable before the

growth of the technology. Though the technologies which will shape the future are still not clear, technologies like blockchain, ai, quantum computers etc are showing promise. These are technologies that were either not present at start of 3<sup>rd</sup> industrial revolution or were not progressing very fast. Another point to note is that there was a gap, albeit a small one, between the 3<sup>rd</sup> industrial revolution to the 4<sup>th</sup> industrial revolution in early 2010s to mid 2010s, where smartphones had come and progressing but not at the rate of change seen between late 1990s to late 2000s. One may question that is a very small gap, but then it comes to mind that the law of accelerating returns is at play and rapidly progressing the world at ever faster rates, which means it would be natural for the time between different industrial revolutions to drop drastically.

### **THE ECONOMIC BUBBLE**

Throughout the 3 industrial revolutions, we have seen a substantial increase in both frequency and intensity of economic crises, why is this? This is because people may become over optimistic in the short run. For example, in the late 1990s, people believed that the internet would change everything by the start of 21<sup>st</sup> century, though having a significant impact on the world by 2000, it was not able to keep up to the expectations of the people. This is not to say that the internet did not fulfill or even outperform the expectations of people in the following decade, but it had underperformed the expectations in the short run. These high expectations had led to a rapid rise in stocks of internet companies, which collapsed after the realization that these expectations are overhyped. The rapid rise and soon after rapid fall of stock price shocked the economy and almost created a global recession in 2001. This is not unique to 3<sup>rd</sup> industrial revolution but similar situations have occurred in the other 2 industrial revolutions. The question that comes to mind is, if this will happen in 4<sup>th</sup> industrial revolution. On one hand, history may repeat itself and a stock bubble may form, just like it did in the last 3 industrial revolutions. But the small gap between the industrial revolution means that people may have not forgotten the lessons of dotcom bubble and may invest cautiously, this time around. However it must be noted that the companies leading the revolution were mostly in Britain in 1st and 2nd

industrial revolutions and in US in 3<sup>rd</sup> industrial revolution. But this time, though China and US are leading the way, a lot of countries are progressing and trying to be part of the revolution. Furthermore new generation of technologies empowered by Blockchain are reducing the barriers to entry in the investment market, this means that more of the population would have the ability to invest and will likely do so in hopes of becoming rich. This will allow for greater amount of capital raising as a large number of people investing only little amounts of money would still amount to a lot, but it may also be recipe for disaster. This was seen in China after government reduced the barriers to entry to stock market in early 2013, the stock market exploded, but collapsed soon after in mid 2014, the government took rapid action and was able to stabilize the economy. This shows the risk of unexperienced people entering the investment sector. Even then though, the barriers to entry were not as low as blockchain are now making them, leading to a higher chance of irrational valuation and making the market more volatile.

### **THE PRODUCTIVITY DEBATE**

The first 2 industrial revolutions saw massive increases in productivity. But the productivity increase in 3<sup>rd</sup> industrial revolution is up to debate. Though traditional productivity measures show a no or even a decrease in productivity since the late 1990s. But the newer measures, which include free services and information production show huge increases in productivity. This may indicate that economy has fundamentally changed and traditional measures of productivity no longer apply to it. Yet, many debate that is not true but that productivity has actually declined. As the debate continues, we must look to 4<sup>th</sup> industrial revolution. Would it show an increase in productivity? Would the productivity show in the traditional measures, new measures including free services and information production, or would have to invent newer measures due to fundamentally changed economy? Nobody knows. For example, should the creation of new ideas be factored into productivity, if yes, how should quality of ideas be measured? how should we decide what is a new idea and what is an iteration of an old idea?, should diseases prevented by genetic engineering be included in healthcare productivity? should 3d printed objects be

taken into account in manufacturing productivity? All of this is still upto debate.

### **CONCLUSION**

It is clear that the 4<sup>th</sup> industrial revolution has now started. It will have consequences for the economy and society as a whole. It also poses several challenges such as creation of economic bubbles, newer methods of measuring productivity, regulations on new technologies, difficulty in implementation of these regulations due to nature of the new technologies and rapid changes to corporate structures as centralized corporations compete with

decentralized governance models to attract workplace. It is clearly a promising revolution with its risks and benefits, its success depends on how we manage its risks and reap its benefits for the betterment of society.

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