Is the Fourth Industrial Revolution the Sustainable Revolution we've been waiting for?

Throughout history, we have seen the development of new technologies that have enhanced the manufacturing industry by making labour more productive and efficient. The most dynamic time of technological advancements began during the late 18th Century, which saw a drastic increase in economic growth and standards of living (Lucas, 2004). This period is often regarded as the start of the **Industrial Revolution**, which saw the transformation of rural agricultural societies into urban industrial entities mainly across Europe and North America.

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Until today we have seen four industrial ages each characterised by its main technological contribution:

1. **Mechanical Revolution** (1760 – the 1850s). Development of the steam engine, coal mining, textile manufacturing and the mechanisation of

labour.

2. **Electrical Revolution** (The 1850s – 1940s). Discovery of electricity, telegraph networks, railroads, and assembly lines which later led to mass production and the inception of manufacturing philosophies such as Scientific Management and Fordism.
3. **Digital Revolution** (The 1950s – 2000). Widespread use of digital electronics, computer systems, automation, and the beginning of the world wide web
4. **Smart Revolution** (Today). Introduction of smart machines such as Artificial Intelligence, Machine Learning, Machine to Machine Communication, Internet of Things, Robotics, and Integrated Systems. (Moore, 2019)

While these technological developments have helped us boost our economy, many are critical about the exploitation of labour and the degradation of the environment in the **pursuit of profit**. Nevertheless, we're now in the Fourth Industrial Revolution (aka Industry 4.0) and have the opportunity to reflect on previous iterations and do things differently if we want to transform the world into a thrivable ecosphere.

Employment Implications

The effect of the Industrial Revolution on the economy and society at large is a highly debated topic among academics. Firstly, many were concerned about the potentially disruptive impact new technologies can cause to stable communities. In the **research,** it is apparent that new technologies create short-run structural unemployment. However, in the long term, other sectors see an increase in new jobs (Lin, 2011).

Lund and Manyika (2017) state that American employment in the agricultural industry dropped from 60% in the 1850s to 5% by 1970s. Likewise, the labour force participation in the manufacturing industry fell from 26% in 1960 to 10% at present. Regardless, overall employment has grown in this time as jobs are created in new sectors such as IT and services.

The majority of the doubts surrounding Industry 4.0 are that the progress of technological developments during this period has been far more substantial than those seen in previous eras. For instance, the mechanisation of labour assisted

workers in completing tasks; today, technologies such as Artificial Intelligence (AI), Autonomous Systems, and Robotics can make humans completely obsolete from the manufacturing process. Therefore, the nature of the current industrial revolution creates legitimate concerns over whether new technologies have a far greater consequence for the society that hasn't previously been experienced.

> *"Currently demonstrated technologies could automate 45 percent of the activities people are paid to perform and that about 60 percent of all occupations could see 30 percent or more of their constituent activities automated, again with technologies available today"*
>
> – *Chui, Manyika, & Miremadi, 2016*

Meaningful Work

While many debate Karl Marx's philosophies, his **criticism** of capitalism was entirely valid. In particular, regarding how work in the industrial age was terrible, with extended hours, low wages, poor sanitation, and no health and safety procedures in place (History Crunch Writers, 2016).

However, technologies from Industry 4.0 can completely reform the workforce into a place that encourages thrivability. For example, the implementation of **AI in various industries** has been increasing and has had a positive impact on transforming the workplace into a better one. Furthermore, these technologies are able to complete repetitive tasks swiftly and accurately, saving businesses time and money from hiring and frees employees from working on mundane tasks (Marr, 2019).

Studies have also shown that the use of productive technologies have caused the average work hour per week to fall by 50% between 1965 and 2003 (Aguiar & Hurst, 2007). Additionally, using automated machines or AI-powered robots to complete dangerous tasks has made the manufacturing industry a safer and more productive workplace (Wattanajantra, 2019). It is evident that the innovations from the 4th Industrial Revolution are not here to replace us but instead free us.

Environmental Impact

One of the biggest undisputable criticisms of the industrial revolution is the impact on the natural environment. For instance, industrial societies in the early 19th century relied heavily on whale oil as the primary source of fuel to light up towns and homes (Butts, 2019). Whales were hunted close to extinction until the discovery of coal in the 1880s. While coal might have saved the whales, it came at the cost of our climate and health.

The negative outcome of **air and water pollution** on both the natural environment and human health is clear, and it was evident that something needed to be done regarding this. Consequently, support for the **environmental movement** grew during the early industrial eras in response to the increasing pollution caused by factories (Revkin, 2018). The Clean Air Act was one of the earliest pieces of legislation that was implemented during the industrial era to control air pollution (Environmental Protection Agency, 2017). However, this wasn't enough, and the negative impact of the early industrial revolutions are still **recorded** today.

Sustainable Innovation

Innovations from this Industrial Revolution are now starting to address the problems of previous eras. Above all, we are seeing an increased focus on reducing wastages, resource efficiency, emission reduction, sustainable energy, and social welfare. For instance, a paper by the World Economic Forum (2018) highlights the various sustainable advantages from new production systems which includes:

- **Advanced Remanufacturing Systems (Augmented Workforce, Cobotics, and Digital Track-and-trace)**. Encourages product recycling, for example by making it more cost-effective to process returns, disassemble products, and sort materials for remanufacturing.
- **Green Materials (Microfibre technologies, Bio-based plastics, and 3D Printing)**. Developments in biotechnology are creating more sustainable alternatives to plastic and leather.
- **Advanced Agriculture (Automation, Internet-of-things, Machine Learning)**. Optimises farming to gain maximum yield with the least

amount of resources which will be beneficial in addressing food shortages while preserving the ecosystem.

- **Factory Efficiency (Dark automated factories, smart warehousing, and additive manufacturing)**. Will see increased energy efficiency, increased productivity, shorten supply chains, and reduces the consumption of non-renewable materials.
- **Traceability (Blockchain, Sensors, and Data Tags)**. Allows consumers to obtain verifiable information about the supply-chain, therefore creating more trust and transparency. It will also enable manufacturers to eliminate low-value processes and facilitate remanufacturing or recycling programs through reverse logistics.

> *The innovations of the Fourth Industrial Revolution (4IR) hold great potential for improving management and governance of the global environment and delivering the systems change required to create clean, resource-secure and inclusive economies.*
>
> *(World Economic Forum, 2020)*

Green Policies

Technology can only do so much when it comes to addressing problems created by previous eras; that is to say, the main push needs to come from us. One study by Berry and Rondinelli (1998) found that more corporations today are adopting environmental protection policies to be more competitive in today's world economy. Though, the shift towards **green policies** has primarily been driven by increased pressure from various stakeholders. For example, the development of the internet has given customers and environmental protection agencies a more prominent voice; consequently, corporations are held more accountable for their actions today. Moreover, governments are being forced to implement stricter penalties for malpractice resulting in investors and business partners asking for more corporate social responsibility from organisations to protect their assets.

The Sustainable Revolution

In conclusion, one could argue that the first three Industrial Revolutions were more of evolutions which saw a gradual change and upgrade in technologies

across multiple industries with the same goal in mind, profit. However, the Fourth Industrial Revolution is perhaps the first revolution that we are experiencing where we see change happening from how we define work to reconsidering what is valuable to society.

> *"We are at the beginning of a revolution that is fundamentally changing the way we live, work and relate to one another."*
>
> *(Schwab, 2017)*

Transform Your Business

The emerging technologies from the fourth industrial revolution present unique challenges and opportunities for **all of us involved**. Nevertheless, if you are someone that wants to learn more about how you can transform your business for the better, do check out the ***THRIVE* platform**. It's the perfect example of a tool that is harnessing the core values of Industry 4.0 by utilising machine learning and predictive analytics to rank sustainability performance, identify areas of improvement and transforms your businesses into a Thrivable one.

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