



Role of Automation in the Evolution of Humanity

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Right from the beginning of human existence, in their quest to improve lives, humans always strived hard to develop new tools, processes and machines that complimented/ replaced manual effort. As humanity progressed from the Stone Age to the modern era, civilizations matured, human needs evolved from basic needs to desires, pleasures, convenience, and then to experiences. Hence, the motivation for automation also increased manifold from timely food to larger quantity and variety, higher productivity, lower costs, faster time to market, global reach and exceptional customer experience.

1. Stone Age (till about 8,500 BC)

During the Stone Age, people lived in forests, closer to water bodies where they could get natural food and water easily. Since they did not have storage mechanisms, they had to get food and water at the time of need, which was a big challenge. They started developing various tools to help them in hunting, creating shelter, pulling water from ground etc. to improve their chances of getting food and water when they needed it. These tools were mostly made of stone. This was the beginning of automation!

2. Agricultural Revolution (8,500 BC to 600 AD)

Invention of the plough led to the Agricultural Revolution, which helped humanity produce adequate quantity of food for the growing population of that time. In the beginning, animals, and at times even humans, were used to pull the plough. Over time, many tools and instruments were invented that replaced animal and human

labor and helped develop the entire value chain of farming. The tools were all made of wood or metal. No motorized machines were available during that period. This was the second phase of automation in human progress, and the focus was the quantity and variety of food.

3. Industrial Revolution (1700 AD to 1950 AD)

The invention of the steam engine led to the Industrial Revolution. Discovery of electricity and invention of electric engines accelerated an industrialized economy. Motorized machines were invented, which improved productivity and time to market efficiencies. Materials used in these machines were metallic and machines were mechanical. A large number of textile, manufacturing, automobile, oil and gas, and chemical factories were set up using various motorized machines and tools. During this era many household machines like dish washers, washing machines were invented. All these mechanical machines replaced human labor, thereby improving productivity and efficiencies.

4. Information Technology Revolution (1940 to 2000 AD)

Blaise Pascal developed the mechanical calculator in 1642, Charles Babbage designed a mechanical difference engine in early 1800s for mathematical operations, and during 1830s and 1840s, he also designed the general purpose mechanical computing machine called the "analytical engine", which is the earliest version of today's modern digital computers.

In 1946, University of Pennsylvania developed the first large scale, general purpose

electronic digital computer for the US army. This was the beginning of the IT Revolution.

Faster adaption of IT has revolutionized industry value chains. With massive computing power, IT enabled mass production, order-to-make manufacturing philosophy, and global supply chains, manufacturing moved to countries where the labor and/or raw materials were cheap, thereby reducing the cost of production. This fueled globalization of trade across countries.

During this period machines started moving from mechanical devices to electronic devices made of vacuum tubes in the beginning, and later on, semiconductors and integrated circuits, due to which size and volume of machines went down, and performance went up exponentially.

5. Digital Revolution (2000 to 2010 AD)

The arrival of Internet in the mid-1990s to early-2000s brought in the Digital Revolution. This disrupted many industries like retail, media, entertainment, hospitality with completely different business models, and gave birth to new leaders like Amazon, Google, Facebook, Uber, Airbnb, Netflix etc. in their respective industries.

This revolution brought three major shifts in the way computing platforms were used. Firstly, the shift from enterprise computing characterized by closed proprietary systems, to personal computing with open distributed systems. Secondly, from large centralized enterprise servers to mobile devices (smart phone, iPad, wearables). And finally, the Internet of Things connecting various sensors and devices to the Internet. These shifts democratized and consumerized computing platforms, and converged IT with other industrial

technologies.

These Information and Digital systems were designed with well-defined business processes and logic that flowed sequentially to produce the desired output. While these systems automated operational and repetitive activities, they lacked intelligence and decision support/enabling capabilities.

6. Artificial Intelligence Revolution (2010 to 2020)

Artificial Intelligence domain has been evolving along with Information Technology for several decades. Given its tall ambitions, it has seen hyper optimism and severe pessimism multiple times. However, in the past decade it has again gained momentum due to the advancements in computing power, big data and deep learning. Both enterprises and retail consumers are embracing these tools now. It's applications data science, natural language processing, computer vision, speech recognition etc. are impacting every single industry. According to Andrew NG, a leading AI thought leader, AI is the new electricity, signaling that socio economic impact of AI would be similar to the impact electricity had during industrial revolution. AI would not only enhance effectiveness of decision making in the enterprise, but also transform business process applications by injecting cognitive capabilities, paving the way for Intelligent Enterprise of tomorrow.

7. Conclusion

Automation is as old as humanity is. It has existed in various forms from stone age till date. It continues to improve human life, as underlying technology evolves in many directions.