Impacts of AI on Employment in the Industrial Sector

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Abstract

This review is an examination of the impact of Artificial Intelligence on Employments in the Industrial Sector. Artificial Intelligence developments and widespread application in practically every industry have had various effects on society and employment. The paper aims at the various sections related to AI, such as basic technical terms, its impact on employment, and wages in the industrial sector, future impact, with a brief overview of its history. AI has numerous positive impacts on the different industrial sectors, from which the paper discusses the impact on the defense, healthcare, and automation industry. The study also explores drawbacks faced by the middle and lower class sector of society, such as unemployment and job polarization, and some economic highlighting effects such as capital accumulation.

The innovation in AI will be very beneficial to the overall development of a nation. However, the people will face some repercussions, such as widening the income gap between rich and poor, capital accumulation, etc.

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1. Introduction

Today, unbelievable advancement has been made in **Artificial Intelligence**. Apple's Siri, IBM's Watson, or Deep Learning show that AI frameworks presently perform services that should be considered intelligent and imaginative. Furthermore, fewer organizations today can manage without Artificial Intelligence, assuming they need to streamline their business or save cash.

The **problem** discussed in this literature is whether advanced AI technology in different domains such as business, healthcare, security, etc., would cause mass unemployment as machinery replaces ground workers. Similarly, the people will face some repercussions highlighting advanced technology, new jobs such as maintenance of machinery, verification of the results or output samples, etc., will arise, which may increase employment. We have also discussed how automation(use of robots) in several industries is causing job polarization and affects productivity.

The problem mentioned above is of **great significance** as it would determine the job types which would expand and the job types which would disappear in the coming years due to the use of AI. The problem also considers why and how different organizations/companies adapt to AI and the Future Impacts of AI in different sectors such as business, economy, healthcare, security, etc. Several possibilities have been predicted in a later section which gives us an idea of the future of AI technology.

The **core aim** for this review revolves around how AI is impacting our day-to-day life, more importantly, social, business, healthcare, security, etc. Furthermore, such a growing impact may be a game-changer in their respective fields. In this review, we will be assessing the above-described domains, criticizing and examining various aspects with the help of individual contextual research papers supporting the context and acting as evidence. Moreover, different concerns will be dug deeper when highlighting the impact on employment due to advanced technology in several industries.

2. History of Artificial Intelligence

To be educated about the historical backdrop of artificial intelligence, it is essential to return to past dates in Milat. (Mijwil, 2015) In the Antiquated Greek period, it is demonstrated that different thoughts regarding humanoid robots have been completed.

The Internet of Things started the fourth modern revolution, now and then alluded to as Industry 4.0. 'Internet of Things' in a show to Proctor and Gamble, quick mechanical advancement and development can undermine employment. Such a worry is not new yet goes back to the 1930s when John Maynard Keynes hypothesized his 'technological unemployment theory' – mechanical change causes cutback of paid positions.

Suppose we look at the effect of technological forward leaps on job markets in past industrial revolutions. For instance, the presentation of automobiles in day-to-day existence prompted a decrease in horse-related occupations, yet new industries likewise arose, with a net positive sway on employment.

Artificial Intelligence started to be utilized in huge ventures with Real-world applications during the 1980s. The following time the light is passed, the artificial intelligence has been adjusted to resolve genuine issues.

3. Social Impacts of AI

Artificial Intelligence has a significant contribution in changing the dynamics of many industries that positively and negatively impact society.

3.1 Defense Industry

The following literature has been taken from '*Artificial Intelligence Applications in Military Systems and Their Influence on Sense of Security of Citizens*'. The study by Marta Bistron and Zbigniew Piotrowski discusses the topics around military systems and AI. As national security is now of greater significance in ongoing geopolitics, AI can significantly secure the people who will face some repercussions that highlight a nation's sovereignty by driving change in three areas: military superiority, information superiority, and economic superiority. The cybersecurity market, object detection, military logistics, and robotics are some industries that will benefit from the use of AI in the defense industry. The enforcement of these fields in the defense sector can decrease the scope of the human workforce in the security sector while increasing employment opportunities in defense research and development.

The following plot compares the use of software, hardware, and services in the Defence market in coming future years [ref]

3.2 Healthcare Sector

The study by the company Deloitte published in October 2020 talks about how AI is playing a significant role in the healthcare sector. AI will have a productive effect on the healthcare sector due to increased efficiency and decreased treatment costs, leading to a higher volume of care delivered. It can increase demand for skilled professionals while also boosting diagnostics, patient engagement, and precision medicine. The world is experiencing a scarcity of healthcare personnel due to population growth, and AI is increasingly being used to fill identified gaps in healthcare services.

The figure shows the lack of healthcare professionals in different states of India [ref]

4. Impacts of AI on employment

Assessment of effects of Artificial Intelligence on employment is crucial to the policies that promote labor employment and ground-level work involving human resources in industrial fields. Technological advancements in the domains of Artificial Intelligence can affect jobs in broadly two ways as postulated by John Maynard Keynes in his ‘technological unemployment theory’ (Keynes 1937):

- By directly displacing the workers from tasks where humans are involved with advanced machinery
- Increasing the demand for labor in industries/jobs arises due to advanced machinery such as maintenance, verifying the outcomes/samples, improving accuracy, etc.

The following figure shows the future demand in the different job profiles [ref]

4.1 Impact of automation/robotics

Articles in this literature focus on the United States (Acemoglu and Restrepo 2017; Mann & Püttmann, 2017), Germany (Dauth et al., 2017), and international evidence (Graetz and Michaels, 2018 use data on 17 countries). Robotics has the potential to lead to essential cost reductions improving the financial resources of industries. Robots can reduce human error in terms of calculations, accuracy, precision, etc. Automation can be quickly introduced to specific tasks which can be easily structured and programmed. The replacement of ground workers with automated machines has negatively impacted the earnings and occupation of the workers. A majority of them include low-educated and middle-educated workers in manufacturing industries, which robots have replaced. Automation leads to the migration of ground workers to some other industrial domains such as service industries.

The above plot shows the probability of replacement of human workforce with automation/robots in different jobs [ref]

4.2 Job Polarization

Job polarization refers to a decline in the number of 'middle-education jobs' (requiring an upper secondary education or vocational qualification) along with an increase in 'high-education jobs' (requiring a higher education) and 'low-education jobs' (requiring limited formal education qualification). The mechanism through which digitalization causes job polarization has been explained using a ‘task-based’ economy model (Autor, Levy & Murnane, 2003, Acemoglu & Autor, 2011). In various nations, digitization has reduced many experts’ agreement with labor costs due to the number of clerks, machine operators, assemblers, and other vocations. The reason is that Artificial Intelligence technology was incorporated into the subset of core job tasks previously performed by middle-skilled workers, causing mass unemployment.

4.3 Productivity Effects

This literature includes Acemoglu & Restrepo (2016, 2017b, 2017c), Aghion, Jones, and Jones (2017), Bessen (2017), Caselli & Manning (2017), among others. Goods and services whose production is automated these days become cheaper and increase in quality. Automated production increased work hours, but it also increased the consumption of resources. It leads the consumer to demand more products, either from automated sectors. Consequently, demand for labor also increases.

4.4 Capital Accumulation

This literature includes Acemoglu & Restrepo (2016, 2017b, 2017c), Aghion, Jones, and Jones (2017), Bessen (2017), Caselli & Manning (2017), among others. In the near term, capital remains stable, but automation increases capital needs. The capital remains fixed as it takes time to produce new machines and deploy them, limiting the impact of automation on productivity. More machines may be manufactured and deployed in the long run, lowering capital and production costs. As a result, the productivity effects grow stronger.

5. Future Impacts of Growth in AI

AI is growing rapidly, and we may soon see it used across many industries. As a result of the research work (Kayid, 2020), there are many ways artificial intelligence could affect many businesses in the future. With the growing technology, industrial work would require fewer human resources, and it would create unemployment. Many experts agree that several industrial sector jobs will be automated in the next five to ten years. However, it would also be costly for a company to become fully automated as labor costs are far less than the maintenance of machines.

From a job perspective (Smith & Anderson, 2014), technology might displace certain types of work, but it has created jobs in general. Responding to this, we will create new work altogether and make the most of human potential. Our relationship with work will be more precisely characterized thanks to technology, which will free us from everyday drudgery. We are not effectively preparing ourselves for future challenges, and our economic and political structures cannot address them. In nature and the real world, many tasks can be described by mathematical models, and AI assists us in doing so efficiently.

AI has also been thoroughly examined from the public's perspective, which significantly impacts the field's future. AI has initiated rapid innovation in easing human work, making education accessible, transportation more efficient, healthcare safer, decision-making smarter, and entertainment more intriguing. On the other hand, the general mass finds huge concerns over losing control over its growth, decreasing labor and unorganized jobs, military implications, and most importantly, unethical uses of data and its applications. There is an increasing perception that AI systems built in this field will prove highly harmful to humanity, devoid of any control.

Trustworthy AI systems with ethical standards are the way to move forward. Developing AI requires users to trust that the deployed technology adheres to the five ethical principles: beneficence, non-maleficence, autonomy, justice, and explicability. While advancement in AI has its concerns, the economic, social, and humanitarian benefits are worth making an organized framework to suppress the negative aspects of its growth.

6. Results

Besides playing an essential role in several manufacturing industries, AI is rapidly becoming more prominent in the industrial fields related to military and healthcare equipment. The utilization of this technology in the agreement to labor many experts' defense and health sectors decreases the scope of the human workforce in these sectors. However, it also increases the scope of employment related to research and development sectors.

In the current scenario, the automation of all manufacturing industries is not possible due to the expensive cost of machinery and their resources. In the extended run, automation will replace the ground workers in nearly all manufacturing industries. The price of the manufactured product will tend to decrease due to the cheap availability of the product. The loss caused due to human-errors will be reduced, but the maintenance of the machinery would be a difficult task.

Adaptation to AI technology will cause an increase in job polarization, and 'middle-educated' jobs will be at the highest risk, promoting the 'high-educated' jobs and the 'low-educated' jobs. 'Middle-educated' people can adapt to their own business. The sudden rise in engineering jobs is majorly due to the high demand for AI technology in various sectors. Already, there have been several examples where AI technology replaced skilled workers' jobs by introducing automatic manufacturing industries. We tend to use manufactured products as they are cheaply available and durable, which will continue to happen. Soon, we may see the applications of AI technology in almost every industry.