

Stimulus to Shape the Future: A Long-Term Investigation of Science and Technology in Employment Wages and Workforce Adaptation

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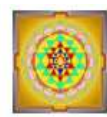
Abstract

Artificial intelligence (AI) and automation are transforming the economy and offer substantial benefits and risks for businesses across the globe. In this article, the authors have done a bit of literature review on the supposed influence of employment and wages via AI and sought to highlight issues concerning job disruption, job destruction, and new skills from the employed force and job market place brought about by AI. AI is revolutionizing industries including manufacturing, finance, healthcare, and retail, augmenting productivity and efficiency while displacing jobs for low and middle-skilled workers. We see labor markets becoming more and more polarized, with growing precarity for low-skilled workers and increased benefit for high-skilled workers. At the same time, the gig economy makes job security and benefits more challenging which strengthens the need for big and large-scale reskilling programs and education system reforms. This would be a positive step, helping society cope with the downsides AI will bring to the job market and working to ensure technological progression works for the betterment of humanity as a whole.

Keywords: Artificial Intelligence (AI) • Automation • Labor Market Disruption • Job Displacement • Workforce Reskilling • Industry Transformation

1. Introduction

Artificial intelligence (AI) and automation have been among the most rapidly embraced transformative technologies in the modern economy to date. While these innovations carry great promise for increased productivity and more innovation, they also present profound issues for labor market flexibility, the nature of the employee-employer relationship and the direction of the work in the future. This article goes in-depth into the disruption of AI in all different industries, the jobs replaced or moved to some other job, and the urgent need for up-skilling and revisiting our education landscapes to keep up with the needs of an AI driven economy. Given the complex effects AI can have on employment, intentional interventions will be necessary to ensure that people can continue to be employed and to look after their health.



2. Artificial Intelligence and Automation: Changing the Landscape of Multiple Spheres and the Labor Market

2.1 Disruption in Industries

It may range from the manufacturing sector to finance, healthcare, and retail, artificial intelligence (AI) and automation are changing the essence of industries. Take manufacturing as an example: automation has been nothing less than a boon to the dormant efficiencies of the industry, eliminating the need for a large human workforce in the more repetitive tasks. Indeed, according to Acemoglu & Restrepo (2020), the sectors with the largest share of low-skilled workers are also the ones that are at the highest risk of job displacement by machines, thereby reducing the demand for low-skilled labor.

AI-based models are used for everything from file storage to complex financial trending and analysis in hospitality. Even though banks are notorious for being conservative by nature, they are emerging one after another in digitization efforts by pushing traditional buttons - Optimization, AI - through various means of efficiency, cost savings and automation. AI-driven analytics enhance patient care by performing analyses faster and more accurately than human practitioners in healthcare. (Topol, 2019). Retail is on the cutting edge with examples of AI already in use for personalized shopping, intelligent inventory management, and deterministic supply chain intelligence (Huang & Rust, 2018).

2.1.1 Manufacturing

Industry manufacturing, which has traditionally heavily employed low and middle-skilled workers, is being reshaped by artificial intelligence and automation. Many manufacturing environments have either robotic arms or some form of automated quality control system that is powered by artificial intelligence, in order to make production more efficient and keep operational costs down. But these technologies also fade the need of man-power, in a monotonous and physical exhausting work. The automotive sector, for example, has witnessed an enormous ascend of automation where robots have increasingly taken over tasks such as welding, painting, or assembly (Frey & Osborne, 2017).

2.1.2 Finance

Similarly, the financial sector has also been disrupted by AI and automation. It applies in anything from algorithmic trading, fraud detection, customer service or voice assistants. There are AI-driven trading systems, which monitor market conditions and execute transactions more quickly -and with greater accuracy - than possibly human traders. With AI chatbots, all you need to do is program it to guide clients around various routes of your app to extract information or take them through your business processes without human intervention. While these technologies provide increased efficiency and customer satisfaction, the demand for human financial analysts and customer relationship managers (Arntz, Gregory, & Zierahn, 2016) may result in a decrease.



2.1.3 Healthcare

AI is making a completely new definition for diagnostics and treatment in healthcare. Artificial intelligence can comb through medical images such as x-rays and MRIs with a much greater degree of accuracy and speed than radiologists, identify patterns and abnormalities that human eyes can't, and therefore make more precise and earlier diagnoses (Topol, 2019). For even more personalized care, this is where AI is used to customize treatments based on an individual's genetic and medical history, also referred to as precision medicine. This method is more effective and less side effects. Similarly, algorithms could predict disease outbreaks and real time tracking of patient health which will help in disease prevention and contribute public health efforts (Topol, 2019).

Artificial intelligence (AI) stands to greatly benefit healthcare by enhancing diagnostic accuracy and providing more personalized treatment paths. But it also worries about job losses. From diagnosing diseases to treatment plans, many of the tasks traditionally completed by doctors and nurses can now be increasingly turned over to AI. This evolving landscape is reshaping the responsibilities of an onprofessional and the competency needed to work effectively in the industry (Topol, 2019).

2.1.4 Retail

In retail, AI and automation are now extremely common to enhance customer experience, monitor inventory, and optimize the supply chain, in a way that entirely changes the way retail operates. AI even predicts consumer behaviour with logistics to know when to stock the product so it is always available and never in overstock. As an example, Amazon takes advantage of AI to manage its logistics system (Huang & Rust, 2018). Yet, AI is a double-edged sword - it poses an existential threat to the workforce due to automation, e.g. checkout systems and AI-powered inventory management systems designed to displace humans.

2.2 Labor Market Dynamics

Integrating AI and automation in the labor market is transforming the labor market into a high-skill-biased one because the high-skill workers benefit and the low-skill workers lose. Although historically, computers have created more jobs than it destroyed, the wave of AI application in non-routine cognitive tasks can cause massive job displacement (Autor & Dorn, 2013). Workers with high skill levels that complement AI technologies might be in high demand at higher wages, while low and middle-skill workers might experience job displacement and wage stabilization up the curve of capability and expertise (Brynjolfsson & McAfee, 2014).

2.2.1 Low-skill and High-skill Labor

The workforce, and especially high-skilled workers, is being reshaped by AI and automation, while low-skilled workers are disadvantaged. These positions range from data scientists to AI



engineers to cybersecurity professionals and are in great demand because they come with higher pay and job security (Manyika et al., 2017). On the other hand, workers with lower and medium skills, carrying out repetitive work could be displaced unless they retrain and add value to society in a post-AI economy, creating further social and economic inequality (Brynjolfsson & McAfee, 2014).

2.2.2 Regional Disparities

There is a regional diversity of jobs that are affected by AI and automation. Places which depend on sectors easily automatable, like manufacturing, or machine/automatable-intensive sectors, like agriculture, will likely suffer the greatest job losses. On the other hand, high-tech firm and university-rich areas may benefit from AI with job growth and economic gains (Acemoglu & Restrepo, 2020). For example, Silicon Valley will benefit from AI, but probably among regions that heavily rely on manufacturing, the Rust Belt is likely to lose jobs.

3. AI-Related Job Loss or Shift

3.1 Job Displacement

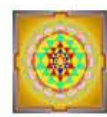
This technology is projected to replace jobs in many sectors. The World Economic Forum, in 2020, estimated that automation would lead to about 85 million job losses by 2025, but that it would simultaneously create 97 million jobs. Even when a job is eliminated, the skills used in those jobs are not always the same ones needed in the new jobs, leading to a bumpy transition. Robots and automated systems have more and more a use in manufacturing leading to less amount of human work on production lines, especially in car manufacturers (Frey & Osborne, 2017). As an example in the service sector, automated customer service telephone systems and AI-powered financial analysis tools are going to replace human in many tasks, enhancing efficiency but diminishing humans in works (Arntz, Gregory & Zierahn, 2016).

3.1.1 Manufacturing

One of the hardest areas that AI and automation will hit is the manufacturing sector. Traditional production methods are being replaced by automated systems such as robotic arms and AI-powered quality control (Frey & Osborne, 2017), human workers are losing their jobs. Robots are more visible in the automotive industry, filling roles for welding, painting, and assembly, diminishing prospects for numerous line workers that helped build those sectors in the past and forcing those left behind to adapt new skills, or new jobs.

3.1.2 Service Sector

Service sector is also revolutionized by AI and automation. Automated customer service systems are merely using software to control and automate a wide range of customer requests as quickly as possible in high speed and with greater precision. Artificial Intelligence-capable financial analysis platforms are superior to human analysts in handling voluminous data in a relatively short time, leading managers to a deeper level of decision. Even as these advances



add efficiency, they begin to take the place of human labor in financial analysis and customer service jobs (Arntz, Gregory, & Zierahn, 2016).

3.1.3 Gig Economy

AI-powered platforms that pair workers with gig jobs on demand. The trade-off is that gig workers have more flexibility but less job security and fewer benefits than traditional employment. AI algorithms create the greatest efficiencies by segmenting tasks to workers which reduces operational costs, however, many workers no longer have job security and social protections (Schwellnus et al., 2019).

3.2 Employment and Labor Market Creation vs. Transformation

3.2.1 New Job Opportunities

AI is also creating newer jobs that require high level of technical expertise. These include roles that are highly valued in the job market such as AI specialists, data scientists, and cyber security professionals. Jobs needed to develop, implement and maintain AI systems, ensure the security of AI technologies, and analyse the Ai- data (Manyika et al, 2017). AI thus brings about jobs it also introduces a set of novel occupations - AI ethics and regulation professionals tasked with ensuring responsible and ethical AI practice.

3.2.2 Job Transformation

AI actually has a much more transformative effect than that as AI just transforms and changes current jobs instead of replacing them. For instance, in the case of healthcare, AI helps doctors in understanding patient data and in devising treatment procedures, it helps healthcare providers to pay attention to much complicated and subtle elements of patient care (Topol, 2019). AI-assisted analysis tools in finance help human analysts become better to focus on strategic and creative work. In retail business sector, stock and supply chain are managed by AI systems, that automate and make faster the operations of retail, so that retail personnel can focus on customer service and personalized marketing.

4. Moving Education Beyond Reskilling and Repositioning

4.1 Reskilling Initiatives

Reskilling programs needed to address implications of AI on employment AI era demands that governments, educational institutions, and private organizations offer training programs to their workers. To demonstrate the scale of the challenge such transformative and disruptive changes would bring, the McKinsey Global Institute calculates in 2018 that automation would require reskilling 14 percent of the global workforce to change occupational categories by 2030. A curriculum for successful programs must include the basics of digital literacy, training in critical thinking as well as deeper skills in the mechanics of computer science. Workers can



transition to new job roles with coding boot camps and AI and data science courses. Artificial-intelligence (AI) driven labor market also consider importance of soft skills, including adaptability, problem solving and emotional intelligence (Bessen, 2019)

4.1.1 Government Initiatives

This makes it important to have government support for reskilling programs. Governments must invest in education and skills through the financing of professional education, apprenticeships and lifelong learning National reskilling programs can help workers who have been displaced by automation by providing them with training, career counseling, and job search assistance. For instance, governments that provide tax incentives, subsidies to businesses that invest in education and employee training (OECD, 2019)

4.1.2 The Role of the Private Sector

Furthermore, reskilling initiatives are an integral part of private institutions as well. Existing courses and in-house training are the main methods used by a number of companies, whereas other firms partner with educational institutions or provide funding for education to employees. This is even more so as tech companies also provide training in AI and data science which assist employees to gain the necessary skills required to work with AI technologies (Manyika et al., 2017).

4.2 Education Systems Adaptation

This AI-centric economy will require the education of future generations and we need to think about these kinds of things from now. AI and digital technologies must be integrated into the curriculum from a young age. Establish a strong foundation in science, technology, engineering and mathematics [STEM] within schools. Higher education institutions should provide programs in AI, machine learning, and data sciences backed by theoretical knowledge and practical experiences. Bakhshi, Downing, Osborne, & Schneider (2017) suggest that such partnerships between academia and industry can ensure that the curriculum appropriately prepares the graduates for the labor market requirements.

4.2.1 K-12 Education

The K-12 curriculum should include AI and digital technologies version of the skills that students will need for their future jobs. This position requires basic coding and computer science knowledge, and good critical thinking and problem-solving skills. According to Bakhshi, Downing, Osborne and Schneider (2017), efforts to promote STEM education and supply more sophisticated courses in computer science, robotics and data science could help to educate students in preparation for AI jobs.

4.2.2 Higher Education



Colleges and universities need to prepare students for jobs that will be created, including AI. Specialized programs in AI, machine learning, and data sciences should be provided through university and college training programs that offer both theoretical and practical (lab based) skills. Furthermore, industry has an essential role in building academia-industry partnership focusing on the curriculum and labor market, to provide training programs, coop, industry-sponsored projects, and internships (Manyika et al., 2017)

4.3 Lifelong Learning

We need to learn throughout our lives if we are to keep up with the rapid technological change. The AI economy has no place for workers who do not upgrade their skills constantly. Opportunities for continued education and professional growth cultivate a culture of lifelong learning. From the perspective of government, learning throughout life can be promoted by offering tax deduction or subsidy for training course (OECD 2019)

4.3.1 Employer Support

Employers help facilitate lifelong learning through continued education and career development opportunities. In-house training; online courses; workshops; tuition reimbursement programs to help employees keep their skills current and advance their careers (Manyika et al., 2017).

4.3.2 Government Support

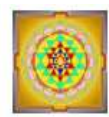
Lifelong learning can be promoted by governments through subsidies, apprenticeships and training schemes. A national lifelong learning program can assist workers in changing roles by training, counseling, and job insertion services. In collaboration with employers and educational authorities, governments can also develop apprenticeship curricula that closely adhere to labor market needs (OECD, 2019).

5. Conclusion

However, determining the overall effects of AI on employment and wages is anything but a simple science. AI and automation are creating new ways for people to be productive and creative, but this also makes some positions irrelevant, while at the same time increasing income inequality. The authors argue for a comprehensive approach, including workforce reskilling and education-system adjustment, to ensure workers have the skills needed in the new economy. Or to put it another way: governments, educational institutions and private companies need to work together now to deal with these problems early on, so that the good that comes out of AI is as widely shared as possible.

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