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ARTIFICIAL INTELLIGENCE
in the Labor Market:
Risks,
Opportunities,
and Policy Responses

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Artificial Intelligence in the Labor Market: Risks, Opportunities, and Policy Responses

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Abstract

Artificial intelligence (AI) is poised to revolutionize industries globally, heralding a potential shift towards the fifth industrial revolution. While AI offers substantial benefits, such as enhanced productivity and efficiency, it poses significant challenges to the labor market, particularly regarding job displacement and threats to workers' rights and welfare. This paper examines the multifaceted impact of AI on employment and explores targeted policy interventions to mitigate its adverse effects.

One of the primary concerns surrounding AI is its potential to displace jobs across various sectors, including manufacturing, services, and creative arts. Unlike previous technological advancements, AI can automate both routine and non-routine tasks, affecting low-skilled and high-skilled workers alike. This challenges the conventional theory of skill-biased technological change (SBTC), which suggests that new technologies predominantly favor high-skilled workers. AI's ability to replace even highly skilled professionals necessitates a shift towards a task-based model, where the impact of AI is evaluated based on the comparative advantage of humans and machines. To address the issue of job displacement, policies such as Universal Basic Income (UBI), wage insurance, and early retirement programs can provide financial support to displaced workers. Additionally, active labor market policies (ALMPs) that focus on reskilling and upskilling the workforce are essential for facilitating a smooth transition in the labor market.

Beyond job displacement, AI poses significant risks to workers' rights and welfare, particularly through enhanced monitoring capabilities. Employers can use AI-driven tools to monitor employee activities extensively, raising concerns about privacy infringement and workplace stress. Furthermore, the integration of AI in human resources management can perpetuate biases if not carefully designed and implemented. AI systems trained on biased data can lead to discriminatory

hiring, promotion, and compensation practices, thereby exacerbating existing inequalities. To mitigate these risks, regulatory frameworks must be established to ensure transparency and accountability in AI-driven decision-making processes. Companies should be encouraged to adopt ethical guidelines that prioritize fairness and inclusivity, while legal protections are needed to safeguard workers' rights in the face of increased surveillance and data usage.

In conclusion, this paper advocates for a comprehensive approach to managing AI's impact on the labor market, emphasizing the importance of collaborative efforts among governments, businesses, and society. By implementing thoughtful policies and regulations, AI can be harnessed as a force for economic progress while ensuring equitable treatment and protection for all workers.

I. Introduction

AI has the potential to become the next general-purpose technology, possibly heralding the onset of the fifth industrial revolution. This technology offers numerous benefits, including the enhancement of worker and firm capacity and productivity. Additionally, AI has the potential to replace humans in certain areas, thereby alleviating human prejudice and bias related to racial, cultural, religious, and gender characteristics, given that machines are inherently objective in their decision-making processes. However, artificial intelligence may present substantial risks to the labor market, workforce, job seekers, and the economy. These risks can be classified into two groups (1) the risks regarding job losses and reduction in earning; the displacement effect (2) the risks on labors' rights, security and welfare.

The risk regarding job losses and reduction in earnings affects workers disproportionately depends on the nature of the jobs and skills of workers themselves. The conventional theory of skill-biased technological change (SBTC) posits that the emergence of new technology will automate certain tasks and generate new ones. However, these new tasks typically favor high-skilled workers, thereby disproportionately disadvantaging lower-skilled workers.[1] This theory seems to apply to AI before the emergence of generative AI as the machine was believed to be incapable of non-routine tasks - which were perceived as human-exclusive. However, as technology progresses it

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[1] Claudia Goldin and Lawrence Katz, *The Race between Education and Technology: The Evolution of U.S. Educational Wage Differentials, 1890 to 2005*, March 2007, https://doi.org/10.3386/w12984.

can even replace jobs– the non-routine job - like those in the creative industry. Moreover, the short-run effect observed from freelance market shows that the technology replaces both highly skilled and average skilled workers almost the same. These developments underscore the need for government intervention to mitigate the adverse effects on the labor market and to discourage firms from excessively automating jobs.

Moreover, the harms AI poses to workers is not limited to job loss but also the risks on their rights, welfare and security. One of these risks stemming from AI-enhanced monitoring software as the technology gives the employers the capacity to excessively monitor their workers and use that data to decide on their promotion or salary, which might violate labor rights and affect their mental health from being constantly observed – in some cases, the monitoring activity goes beyond workplace to observe workers' daily life.[2] Thus, intervention is necessary to prevent firms from excessively monitoring their workers. Another significant risk to labor rights and welfare is the application of AI in human resource management. While AI has the potential to reduce prejudice from human agents and create fairer recruitment processes, these benefits can only be realized if the AI is developed with appropriate data and modeled without bias. Therefore, interventions, regulations, or standards are needed to ensure that the technology is developed and deployed in a fair and transparent manner.

As the general-purpose technology, AI technology can be applied in several business processes, on one hand, the technology could improve the firms' productivity and efficiency, alleviates human bias in recruiting and management, helps employers monitor their workers efficiently to ensure maximized labor productivity. However, these benefits come with a great risk where AI technology will replace humans especially in creative industries and freelance market. It might enhance employers monitoring capacity to the degree that violates workers' rights. Moreover, the use of technology in human resources management might amplify prejudice and bias from inefficient data and AI modelling.

This research examines the potential benefits and detriments of technology in the job market and proposes strategies to mitigate associated risks, ensuring that AI ultimately benefits humans and

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[2] Valerio De Stefano, "'negotiating the Algorithm': Automation, Artificial Intelligence and Labour Protection," International Labour Organization, April 23, 2024, https://www.ilo.org/publications/negotiating-algorithm-automation-artificial-intelligence-and-labour

fosters a positive economic impact. The paper is structured into five sections. The introduction outlines the scope and objectives of the research. The second section provides an analysis of AI capacity in the contemporary markets and its impact on workers. The third section discusses the sound interventions to mitigate AI impact on the job markets. The fourth section discusses AI risks on labor's rights, security and welfare as well as proposing the potential intervention to mitigate such risks. Finally, the conclusion synthesizes the findings and provides concluding remarks.

II. An analysis of job displacement across various sectors

In the earlier era of AI, it is believed that the technology would not replace non-routine tasks since they involve several intricate executions[3], which were exclusive for human. However, as the technology progress, generative AI solutions are introduced to the market which pose a risk on both routine and non-routine tasks.[4] Thus, the circumstances lead to a universal concern regarding job loss from automation – the displacement effect.

Job displacement is one of the major concerns regarding artificial intelligence, since AI can replace human workers in every process of the organization. Moreover, the displacement concerns of human workers are amplified by the development of AI capacities which is shown in figure 1. The figure on the left portrays AI performance in image classification and on the left shows its performance in reading comprehension. As the trend shows, AI performance has been improving since 2012, and has outperformed human benchmarks in around 2018 in both tasks. Nowadays, the most advanced AI can perform almost perfectly in image classification, and far outperform humans in reading comprehension and problem solving. Moreover, one-third of occupations could now be automated and replaced by the machine. (illustrated in figure 2)[5]

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[3] Carl Benedikt Frey and Michael A. Osborne, "The Future of Employment: How Susceptible Are Jobs to Computerisation?," *Technological Forecasting and Social Change* 114 (January 2017): 254–80, https://doi.org/10.1016/j.techfore.2016.08.019.

[4] Paweł Gmyrek, Janine Berg, and David Bescond, "Generative AI and Jobs: Policies to Manage the Transition," essay, in *Generative AI and Jobs: A Global Analysis of Potential Effects on Job Quantity and Quality*, vol. 96, ILO Working Paper (International Labour Organization, 2023), 38–44.
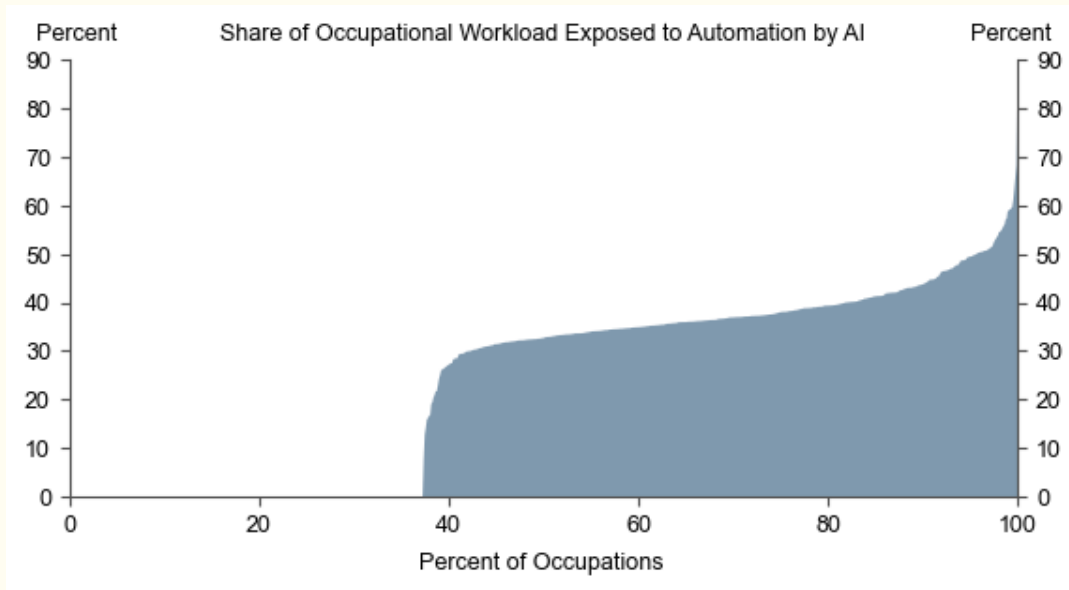
[5] TechTarget, "Generative AI," accessed July 2, 2024, https://www.techtarget.com/searchenterpriseai/definition/generative-AI.

Figure 1 AI Performance vs. Human Benchmark
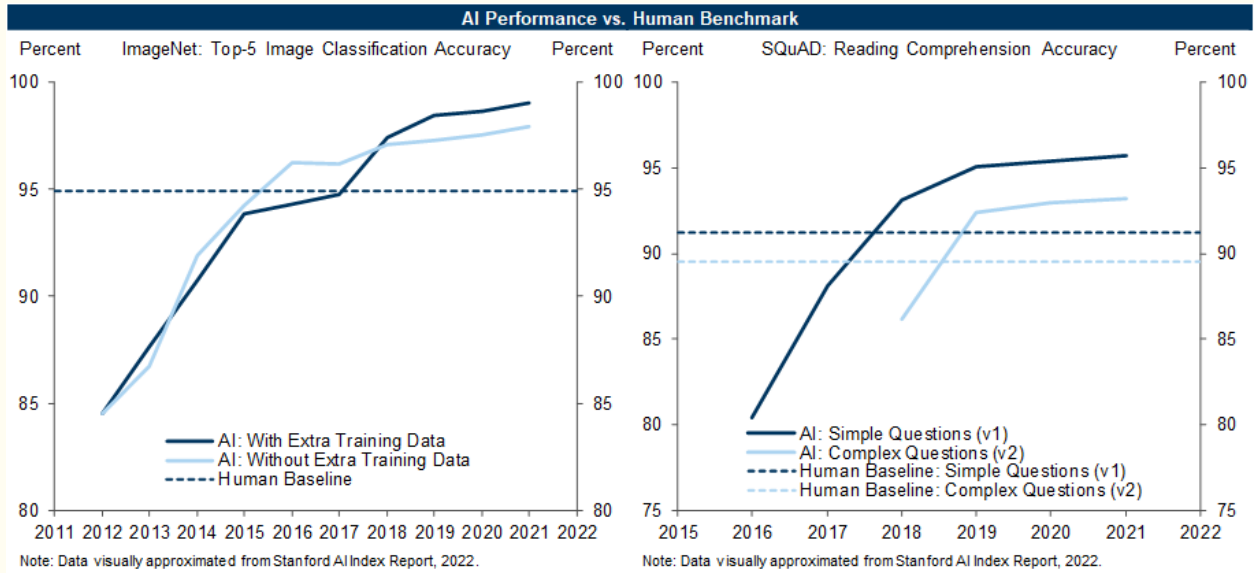
Source: Goldman Sachs Global Investment Research (2023).[6]

Figure 2: Share of Automation and Workload Exposed to automation by AI

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[6] G&S Publishing, " The Potentially Large Effects of Artificial Intelligence on Economic Growth (Briggs/Kodnani)," accessed July 2, 2024, https://www.gspublishing.com/content/research/en/reports/2023/03/27/d64e052b-0f6e-45d7-967b-d7be35fabd16.html.

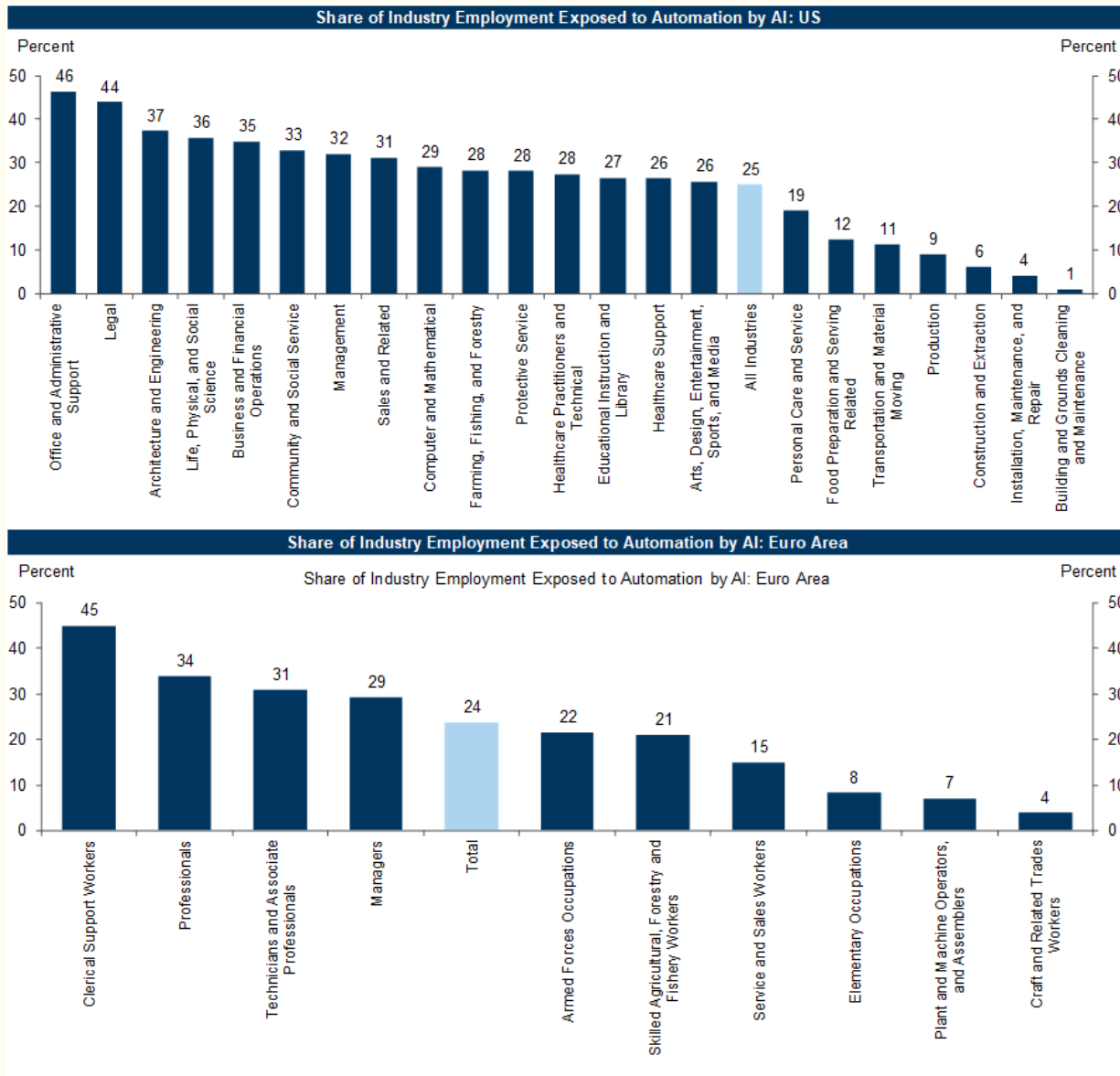Source: Goldman Sachs Global Investment Research (2023).[7]

Moreover, the earlier assumption in which the machine would not be able to replace non-routine tasks – especially those in professional like lawyer, economist, and researcher – seems to no longer be the case. The situation is envisaged in figure 3, By weighting the estimates by the employment share of each occupation in the US Occupational Employment and Wage Survey (OEWS) and aggregating to the industry level, the graph shown estimates that one-fourth of current work tasks could be automated by AI in the US, with particularly high exposures in administrative (46%) and legal (44%) professions and low exposures in physically-intensive professions such as construction (6%) and maintenance (4%).[8] Performing a similar exercise for the European ISCO occupation classification system and using the Eurostat Labor Force Survey (LFS) database yields similar estimates, both in aggregate and across industries.[9]

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[7] G&S Publishing, " The Potentially Large Effects of Artificial Intelligence on Economic Growth (Briggs/Kodnani)," accessed July 2, 2024, https://www.gspublishing.com/content/research/en/reports/2023/03/27/d64e052b-0f6e-45d7-967b-d7be35fabd16.html.

[8] G&S Publishing, " The Potentially Large Effects of Artificial Intelligence on Economic Growth (Briggs/Kodnani)," accessed July 2, 2024, https://www.gspublishing.com/content/research/en/reports/2023/03/27/d64e052b-0f6e-45d7-967b-d7be35fabd16.html.

[9] Ibid.

Figure 3 Share of Industry Employment Exposed to Automation by AI in the US and Euope

Source: Goldman Sachs Global Investment Research (2023).[10]

The larger picture could be portrayed by extending the US and European estimates globally (figure 4), the results show that, in the global scale, eighteen percent of work could be automated by AI.[11]

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[10] G&S Publishing, " The Potentially Large Effects of Artificial Intelligence on Economic Growth (Briggs/Kodnani)," accessed July 2, 2024, https://www.gspublishing.com/content/research/en/reports/2023/03/27/d64e052b-0f6e-45d7-967b-d7be35fabd16.html.

[11] Ibid.

Adjusting for differences in industry composition across countries and assuming that AI does not impact the agricultural sector in Emerging Market economies due to significant technological differences in that industry between emerging market economies and developed market economies, the estimates intuitively suggest that fewer jobs in EMs are exposed to automation than in DMs. The estimations are justified since AI, like other general-purpose technologies, requires substantial complementary technology to function.[12] The complementary technology - for example, high-quality data to train AI, high performance computing hardware to operate the AI or Cloud technology to host the AI - are costly to build, develop and maintain, and this technology might not be reflected in the national account as it is often intangible or immeasurable.[13] These circumstances highlight the technology gap between emerging markets (EMs) and developed markets (DMs), leading to differences in AI adoption. Emerging economies, which often lack complementary technologies, adopt AI more slowly than developed ones. Consequently, the immediate impact on labor in developing countries is smaller. However, this does not imply that jobs in emerging economies are not at risk of automation; rather, job displacement is delayed because these countries are currently unable to invest in the necessary complementary technologies.[14] The effect might be similar in the future if technological differences between emerging economies and developed economies converge.

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[12] Erik Brynjolfsson, Daniel Rock, and Chad Syverson, *The Productivity J-Curve: How Intangibles Complement General Purpose Technologies*, October 2018, https://doi.org/10.3386/w25148.

[13] G&S Publishing, " The Potentially Large Effects of Artificial Intelligence on Economic Growth (Briggs/Kodnani)," accessed July 2, 2024, https://www.gspublishing.com/content/research/en/reports/2023/03/27/d64e052b-0f6e-45d7-967b-d7be35fabd16.html.

[14] Reto Bürgisser, *Policy Responses to Technological Change in the Workplace*, January 25, 2023, https://doi.org/10.31235/osf.io/kwxn2.

Figure 4: Share of Fulltime Equivalent Employment Exposed to automation by AI
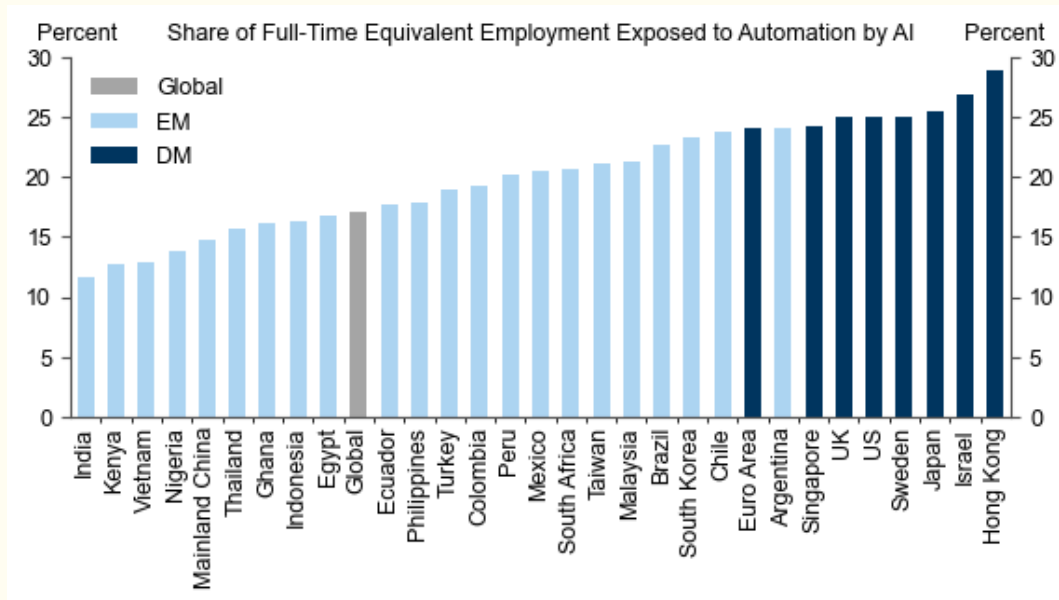
Source: Goldman Sachs Global Investment Research (2023).[15]

The following section provides a detailed analysis of the effects of AI on the labor market, focusing on three key sectors: manufacturing, services, and creative arts.

Manufacturing Sector

The Manufacturing sector has undergone huge manpower shifts over the last few centuries. During the Industrial Revolution, the transition of hand production methods into more efficient machines increased the output and profits, which also created more jobs in factories that are much higher paying than working as traditional farmers.[16] The demand in the market shifted from manual labor in the fields into skilled workers who are trained to operate machinery instead.[17]

With the rapid scientific discoveries, widespread use of electricity and upgraded logistics infrastructure during the Second Industrial Revolution, or the Technological Revolution, factories

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[15] G&S Publishing, " The Potentially Large Effects of Artificial Intelligence on Economic Growth (Briggs/Kodnani)," accessed July 2, 2024, https://www.gspublishing.com/content/research/en/reports/2023/03/27/d64e052b-0f6e-45d7-967b-d7be35fabd16.html.

[16] Mokyr, Joel. 1992. "The Years of Miracles: The Industrial Revolution 1750–1830." In The Lever of Riches, 81-112. Accessed June 5, 2024. https://doi.org/10.1093/acprof:oso/9780195074772.003.0005.

[17] Ibid.

started replacing their workforce and old machines for the higher efficiency assembly lines for production.[18] While it takes less manpower to produce the same amount of goods, the use of assembly lines did create new job demands for interchangeable parts related to the operation and maintenance of said machines.[19] The boom in production has also saturated the market at first, but the expansion of the export market created even more profit for the manufacturers.[20] There was a huge disruption in the job market with the introduction of new technology and conversion of the industry, but eventually the market adapts and course-corrects, be it the local or the export market.

The integration of AI into the manufacturing industries, however, could have a significant impact as AI can automate processes, learn and adapt to the input of new data, and work almost endlessly could lead to the creation of fully automated factories than do not require frequent human presence.[21]

Service Sector

AI manifested by machines that exhibit aspects of human intelligence is increasingly adopted in various service industries and is a major source of innovation.[22] Examples include cleaning and assistant robots for homes, healthcare, hotels and restaurants, customer service virtual bots at kiosks or remote connections to assist in self-service,[23] big data AI applications used to replace portfolio managers,[24] and social robots used to replace human assistants in any services which require direct interaction with customers.[25] These developments have made people declare that we

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[18] Squicciarini, Mara P "Devotion and Development: Religiosity, Education, and Economic Progress in Nineteenth-Century France." The American Economic Review 110, no. 11: 3454-3491., November, 2022 https://doi.org/10.1257/aer.20191054.

[19] Ibid.

[20] Deane, Phyllis, and W. A. Cole. 1963. "British Economic Growth, 1688–1959." Business History Review 37, no. 3 (January 1): 281-283. Cambridge University Press, England. https://doi.org/10.2307/3112242.

[21] "Fully Automated Factories: The Future Of Manufacturing?", OEE systems, Accessed June 5, 2024, https://www.oeesystems.com/knowledge/fully-automated-factories-future-manufacturing/

[22] Ming-Hui Huang, Roland T. Rust, "Artificial Intelligence in Service," Journal of Service Research 21, no. 2 (February 5, 2018): 155–72, https://doi.org/10.1177/1094670517752459.

[23] Donna Fluss, "The AI Revolution in Customer Service," Customer Relationship Management, January 2017, 38.

[24] "Why Is AI More Objective Than Portfolio Managers?" Stokex. Accessed June 13, 2024. https://stokex.com/news/why-is-ai-more-objective-than-portfolio-managers/.

[25] García-Haro, Juan Miguel, Edwin Daniel Oña, Juan Hernandez-Vicen, Santiago Martinez, and Carlos Balaguer. 2020. "Service Robots in Catering Applications: A Review and Future Challenges." Electronics 10, no. 1: 47. https://doi.org/10.3390/electronics10010047.

are in the fourth industrial revolution in which technology is blurring the boundary between the physical and digital on the road to singularity.[26]

Despite being a major source of comfort, efficiency and innovation, AI clearly threatens to take over a huge portion of the pie in the service industries' job market, and the competition will only get tougher following the severe job displacement from the manufacturing sector to the service industries.[27] Generally, many has considered that service jobs, even low-skilled ones, are more difficult to automate due to their heavy reliance on contextual understanding and spontaneous interactions compared to the more logical and procedural manufacturing jobs.[28] However, this may soon no longer be the case. Experiments on whether robots can be competent managers shown that although a human counterpart has more perceived authority, nearly half of the participants are fine with following directives and instructions from a virtual entity.[29] A significant percentage of the tasks performed by professionals in high-paying jobs, such as portfolio managers, physicians, and senior managers, can be automated by using relevant data models, whereby increasing efficiency and reducing human error.[30]

This AI advancement has sparked the attention of multidisciplinary research institutes. The service disciplines tend to focus on applications of intelligent technology,[31] services enabled by various technologies, [32] and service technologies. [33] Their research has shown that the advance of

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[26] Schwab, Klaus. "The Fourth Industrial Revolution: What It Means and How to Respond." 2016. *World Economic Forum*. Accessed June 16, 2024. https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/

[27] Buera, Francisco J., and Joseph Kaboski. 2012. "The Rise of the Service Economy." American Economic Review 102, no. 6 (June): 2540-2569.

[28] Autor, David H., and David Dorn. 2013. "The Growth of Low-Skill Service Jobs and the Polarization of the US Labor Market." American Economic Review 103, no. 5: 1553-1597.

[29] Young, James, and Derek Cormier. 2014. "Can Robots Be Managers, Too?" Harvard Business Review, April 2. Accessed June 13, 2024. http://blogs.hbr.org/2014/04/can-robots-be-managers-too/

[30] Chui, Michael, James Manyika, and Mehdi Miremadi. "Four fundamentals of workplace automation." Accessed June 17, 2024. https://roubler.com/wp-content/uploads/sites/60/2016/11/Four-fundamentals-of-workplace-automation.pdf

[31] Rafaeli, Anat, Daniel Altman, Dwayne D. Gremler, Ming-Hui Huang, Dhruv Grewal, Bala Iyer, A. Parasuraman, and de Ruyter Ko. 2017. "The Future of Frontline Research: Invited Commentaries." Journal of Service Research 20, no. 1: 91-99.

[32] Huang, Ming-Hui, and Roland T. Rust. 2013. "IT-Related Service: A Multidisciplinary Perspective." Journal of Service Research 16, no. 3: 251-258.

[33] Geum, Youngjung, Moon-Soo Kim, and Sungjoo Lee. 2017. "Service Technology: Definition and Characteristics Based on a Patent Database." *Service Science* 9: 147-166. https://doi.org/10.1287/serv.2016.0170.

technology should lead to predictable outcomes such as wide-scale acceptance and adoption of self-service technologies,[34] higher optimal productivity and the potential for exponential growth.[35]

The economic and scientific disciplines focus more on the impact of AI on human labor and jobs, such as the use of deep learning for more accurate disease detection compared to medical practitioners,[36] the augmentation effects of AI on jobs related to knowledge and education,[37] digital technologies and infrastructure that's inseparable from modern day life,[38] the growth of low-skill service jobs in the labor market due to automation,[39] and workplace redefined by AI integration.[40] Reports from these studies shown that while AI seems to have limitless potential in improving and advancing the quantity and quality of various services, it is slowly but surely replacing service jobs instead of just improving its quality.[41] This should give us enough motivation to explore more completely and rigorously the way AI will improve and reshape service.

Creative Arts Sector

There are conflicting views about the role of AI in the creative industries. To some, it is an opportunity while to others it is a threat. There is a chance that some individuals could lose their jobs as a result of AI generative models. It would essentially allow companies to employ artists to work for a period of time, train an AI in replicating it, and using the AI to replace the artists.[42] It

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[34] Meuter, Matthew L., Amy L. Ostrom, Robert I. Roundtree, and Mary Jo Bitner. 2000. "Self-Service Technologies: Understanding Customer Satisfaction with Technology-Based Service Encounters." *Journal of Marketing* 64, no. 3: 50-64.

[35] Rust, Roland T., and Ming-Hui Huang. 2014. "The Service Revolution and the Transformation of Marketing Science." Marketing Science 33, no. 2: 206-221.

[36] Leachman, Sancy A., and Glenn Merlino. 2017. "Medicine: The Final Frontier in Cancer Diagnosis." Nature 542 (February): 36-38.

[37] Davenport, Thomas H., and Julia Kirby. 2015. "Beyond Automation." Harvard Business Review, June: 59-65.

[38] Brynjolfsson, Erik, and Andrew McAfee. 2016. *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*. New York: W. W. Norton & Company.

[39] Autor, David H., and David Dorn. 2013. "The Growth of Low-Skill Service Jobs and the Polarization of the US Labor Market." *American Economic Review* 103, no. 5 (2013): 1553-1597.

[40] Chui, Michael, James Manyika, and Mehdi Miremadi. "Four fundamentals of workplace automation." Accessed June 17, 2024. https://roubler.com/wp-content/uploads/sites/60/2016/11/Four-fundamentals-of-workplace-automation.pdf

[41] Rust, Roland T., and Ming-Hui Huang. 2014. "The Service Revolution and the Transformation of Marketing Science." Marketing Science 33, no. 2: 206-221.

[42] Nagaratnam, A., K. Muralidhar, Mohammad Farzana, and P. Mounica. 2019. "Artistic Style Transfer Using Deep Learning." *IJARIIT* 5, no. 2.

would be difficult for the artists to challenge the company in court as their artwork made while employed by the company could belong to the company.[43] On the other hand, AI is a valuable tool for less artistic people to create something that is innovative be it in music, painting, or even poetry.

At the same time, Generative AI poses ethical and legal issues, such as the impact of AI on human creativity, the authenticity of AI-generated content, the ownership and rights of AI-created works, and the potential misuse or abuse of AI technology. The recent news about OpenAI using an AI voice called "Sky" which eerily resembles Scarlett Johansson for the new ChatGPT-40 AI model only proves the capability of AI in replication and replacement.[44] Considered the first AI-generated film in the world, The Frost is a 12-minute film in which every shot is generated by an image-making AI called DALL-E 2, based on a script written by a human.[45] It is also capable of making movies by animating the still images.[46] It is obvious that it would not be long before AI started making full blockbuster films at a fraction of the cost since it would not need to hire expensive actors and supporting personnel.

There are several concerns which are quite justified regarding labor displacement effect as AI technology could replace some of the semi-skilled and even skilled jobs. It might create more jobs in the long-run, but AI-related skills might be challenging to develop, especially for the workers who are unfamiliar with the technology and the older workers. Moreover, the new jobs created by AI technology tend to favor individuals with relevant skills, highlighting the need to upskill and reskill the existing workforce.

III. Protection toward adverse labor market shocks

In theory, AI will not thoroughly replace human labor, it will undoubtedly replace some jobs, but it will also enhance productivity and, in the long run, create more jobs and opportunities. Thus, the impact of technology on employment and the job market is ambiguous,[47] it depends on which of

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[43] "Who Owns the Copyright to My Business Artwork?", VB Designs. Accessed June 12, 2024, *https://www.vbdesigns.com.au/who-owns-the-copyright-to-my-business-artwork/*

[44] " ChatGPT suspends Scarlett Johansson-like voice as actor speaks out against OpenAI." *The Guardian*, May 20, 2024. Accessed June 11, 2024. https://www.theguardian.com/technology/article/2024/may/20/chatgpt-scarlett-johansson-voice.

[45] "DALL-E 2." *OpenAI*. Accessed June 10, 2024. https://openai.com/index/dall-e-2/

[46] Ibid.

[47] Prithwiraj Choudhury, Evan Starr, and Rajshree Agarwal, "Machine Learning and Human Capital Complementarities: Experimental Evidence on Bias Mitigation," *Strategic Management Journal* 41, no. 8 (April 7,

these effects is larger. From the theory of skill biased technological change (SBTC),[48] where the emerging technology leads to an increase in highly skilled workers demand, college graduated and above, while low-skilled workers demand decreases leading to different impact between two groups. However, in the case of AI, the conventional skill-biased technological change (SBTC) theory may not fully explain the impact of technology, as AI has the potential to replace even highly skilled workers, such as lawyers and accountants. [49] Thus, SBTC has evolved into a task-based model, where job displacement arises from how AI alters the nature and process of work. AI creates new tasks while automating others based on whether humans or machines have a comparative advantage in performing them, regardless of task complexity. [50] However, since the actual size of automated tasks and new tasks could not be observed yet, it is too early to deem the machine a threat or boon.

Some of the short-term empirical evidence of AI impact on job market could be observed in the freelance market since it is a spot market, and almost all these freelancers' working history are recorded online. As a spot market is usually moving rapidly, some of the early impact could be observed. The study examines the impact of ChatGPT on writing-related freelance jobs, and the impact of DALL-E 2 and Midjourney on freelancer working in creative industries. The findings suggest both monthly earnings and monthly jobs of freelancers in both markets have decreased since generative AI was introduced to the market. [51] The displacement effect in freelancer market seems to be in line with the process of fair competition – new technology comes into the market, it is cheaper compared to human workers, so the firm chooses to make use of that technology.

2020): 1381–1411, https://doi.org/10.1002/smj.3152.; Shakked Noy and Whitney Zhang, "Experimental Evidence on the Productivity Effects of Generative Artificial Intelligence," *SSRN Electronic Journal*, 2023, https://doi.org/10.2139/ssrn.4375283.
artificial intelligence," Available at SSRN 4375283.

[48] Claudia Goldin and Lawrence Katz, *The Race between Education and Technology: The Evolution of U.S. Educational Wage Differentials, 1890 to 2005*, March 2007, https://doi.org/10.3386/w12984.

[49] "The Impact of Artificial Intelligence on the Future of Workforces in the European Union and the United States of America," The White House, December 15, 2022, https://www.whitehouse.gov/cea/written-materials/2022/12/05/the-impact-of-artificial-intelligence/.

[50] Daron Acemoglu and David Autor, "Skills, Tasks and Technologies: Implications for Employment and Earnings," *Handbook of Labor Economics*, 2011, 1043–1171, https://doi.org/10.1016/s0169-7218(11)02410-5 ; Daron Acemoglu and Pascual Restrepo, "Automation and New Tasks: How Technology Displaces and Reinstates Labor," Journal of Economic Perspectives 33, no. 2 (May 1, 2019): 3–30, https://doi.org/10.1257/jep.33.2.3.

[51] Xiang Hui, Oren Reshef, and Luofeng Zhou, "The Short-Term Effects of Generative Artificial Intelligence on Employment: Evidence from an Online Labor Market," SSRN Electronic Journal, 2023, https://doi.org/10.2139/ssrn.4544582.

However, Generative AI like ChatGPT, DALL-E 2 and Midjourney relies heavily on training data – which some of them are produced by these freelancers, whose jobs have been replaced and experience decrease in earning. Consequently, the government, lawmakers and policy makers should take this into consideration and mitigate the effect.

Regulations to prevent AI from stealing work online should be revised and enforced when it comes to AI stealing creations online. Even with the Digital Millenium Copyright Act (DMCA), it is unable to prevent AI developers from using digital media from sources such as Youtube to train their generative AI models.[52] WIPO understood that AI artwork made from such infringements are getting harder to identify, even with laws that specifically target AI artwork.[53] Setting up regulations on the AI developer themselves is perhaps the answer which could help reduce unlawful use of stolen content to create new content, even though there are no concrete answers if such regulations could be effective.[54] If this issue could not be resolved, it won't be surprising if the online content creation market gets taken over by AI as well.

The effect of AI on employees could be observed using job vacancies data, the study by Daron Acemoglu et. al. (2020) examine impact of AI on the labor market by examine non-AI related job posting in AI-exposed firms – the firm which can involve AI in their production. The findings suggest that establishment hiring in these firms decrease especially in the AI-surged period (after 2015).[55] Moreover, AI-exposed establishments not only reduce its non-AI jobs and overall employment, but they also add new skill requirements, mostly AI-related, to the new job posting.[56] Another study[57] finds that AI impact on overall employment is unclear, but it raises demand in AI-related skills and workers specialized in using the technology. This evidence emphasizes the importance of both new workers and existing workers to learn to live and utilize AI to survive the job market. Consequently, the regulator should focus on encouraging and facilitating as many

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[52] "Why Copyright Law Is Failing to Protect Content Right Holders Against Generative AI," AIJourn, accessed July 2, 2024, https://aijourn.com/why-copyright-law-is-failing-to-protect-content-right-holders-against-generative-ai/.
[53] "Blockchain and Intellectual Property: A Game-Changer?," WIPO Magazine, May 2017, accessed July 2, 2024, https://www.wipo.int/wipo_magazine/en/2017/05/article_0003.html.
[54] "AI Regulation Is Coming," Harvard Business Review, September 2021, accessed July 2, 2024, https://hbr.org/2021/09/ai-regulation-is-coming.
[55] Daron Acemoglu et al., Ai and Jobs: Evidence from Online Vacancies, December 2020, https://doi.org/10.3386/w28257.
[56] ibid
[57] Daron Acemoglu et al., Daron Acemoglu et al., *Automation and the Workforce: A Firm-Level View from the 2019 Annual Business Survey*, November 2022, https://doi.org/10.3386/w30659.

workers as possible to develop the skills required in AI era, while developing a measure to cushion adverse labor market shocks.[58]

As discussed above, the impact of AI on the labor market, particularly its displacement effect on low-skilled workers, appears to be imminent. Hence, policies need to be implemented to mitigate these issues. One of the most prominent policies is Universal Basic Income (UBI), which has been advocated by many tech entrepreneurs and companies as a way to address the social impact of job displacement caused by AI.[59] UBI might be able to curb financial troubles of people who lost their jobs, but the inflation caused by UBI implementation alone could dispel any benefits it has, unless regulations are made to limit the prices of essentials, which would lead to another problem in production as markets will shift when there is not enough profit, and the list of nuances goes on.[60] Apart from UBI, there are several less prominent compensation polices options including early retirement, wage insurance, job guarantee, negative income tax schemes to facilitate transition in labor market.[61] However, these policies are often costly and might discourage workers from re-skilling and re-entering labor markets.[62]

The AI adopting business might need to come up with training program to support the transition in labor market. To support this process, the government or policy maker could subsidize the business in delivering these programs, this is known as Active labor market policies (ALMPs) which are widespread in Europe, especially Scandinavian countries[63]. These policies often emphasize life-long learning, upskill and reskill training, which are more sustainable. However, given the task-based nature of AI impact, these learning and training programs might need to be tailored according to industry-specific and country-specific trends. This intervention could be

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[58] McKinsey Global Instute, *A Future that Works: Automation, Employment and Productivity*, January 2017.; Valerio De Stefano, "'negotiating the Algorithm': Automation, Artificial Intelligence and Labour Protection," International Labour Organization, April 23, 2024, https://www.ilo.org/publications/negotiating-algorithm-automation-artificial-intelligence-and-labour.

[59] International Labour Organization, Global Wage Report 2012/13: Wages and Equitable Growth, accessed July 2, 2024, https://www.ilo.org/media/416031/download.

[60] Francisco Long Pettersson, Universal Basic Income: An In-Depth Analysis of Economic Impacts on Inflation, Funding, and Labour (June 1, 2023), http://dx.doi.org/10.2139/ssrn.4647940.

[61] ibid

[62] ibid

[63] ibid

extended to formal education – high-school level and below – to facilitate the long-run transition in the labor market.[64]

Other options are steering policies which often involve taxation schemes and legislation, to encourage pro-worker innovations. One option is to outright tax more heavily on the firm adopting AI to replace workers, while levy less tax on firm using AI to augment existing workers. This taxing scheme might discourage firms from automation,[65] but it might hinder technology adoption and stall economic growth.[66] Apart from taxation, the labor protection legislation could determine the displacement effect since the labor-substitution decision depends primarily on comparing cost between hiring and replacing human workers.[67]

As discussed in this section, the displacement effect stemming from AI could be, and tend to be, substantial, but it could generate more tasks too. However, whether it generates more tasks than it replaces, and vice versa, could not to determined yet. Nevertheless, the interventions too mitigate the impact in the transition period are vital to smoothen the process. It needs compensation policy to cushion the shocks especially in the older workers since they might not have time to improve and develop new skills. The investment policies, i.e., life-long learning and education reform, are vital in preparing the existing labors to survive AI era and ensure that the AI will benefit society in the long run. Finally, some steering policies, too, are required to ensure that AI adoption is developed in the right direction and prevent excessive automation.

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[64] ibid

[65] Reto Bürgisser, *Policy Responses to Technological Change in the Workplace*, January 25, 2023, https://doi.org/10.31235/osf.io/kwxn2.; Daron Acemoglu and Pascual Restrepo, "The Wrong Kind of Ai? Artificial Intelligence and the Future of Labour Demand," *Cambridge Journal of Regions, Economy and Society* 13, no. 1 (December 18, 2019): 25–35, https://doi.org/10.1093/cjres/rsz022.

[66] Daniel Susskind, A World without Work: Technology, Automation, and How We Should Respond (New York: Picador, 2021).

[67] Ibid.

IV. AI risk on labors' welfare

AI technology not only increases firms' productivity in its management and production process, but it is also applied to labors' monitoring and human resources management. Consequently, it might affect labor's safety and welfare, which will be discussed in detail as follows:

(1) AI technology on labors monitoring

The use of artificial intelligence to monitor labor is one of the most controversial AI applications in business. On one hand, Organizations can develop processes for monitoring algorithms, compiling high-quality data and explaining the findings of AI algorithms.[68] Leaders could even make AI a part of their company culture and routine business discussions, establishing standards to determine acceptable AI technologies.[69]. While these systems offer significant benefits for employers aiming to boost productivity, compliance and security, they also raise critical ethical and legal considerations. According to ILO Employment Working Paper 246[70] AI application in labors' monitoring pose various concerns especially when it almost crosses the border of excessive monitoring. For example, there is an AI solution developed exclusively to monitor remote workers by monitoring their keyboard activity, computer screen, application usage and take image of the workers from their computer webcam.[71] Moreover, some companies use IoT devices to monitor workers' out-of-work activities, and some employers use technology to monitor their social media activity[72]. These real-world examples show that AI technology is indeed beneficial to the firm in making sure its employees are working according to its expectations, but excessively monitoring the workers might pose adverse effect both on labor welfare and stress out the workers which will undermine their productivity.[73] Thus, an intervention might be vital to keep the firm from applying its AI-enhance tool to excessively monitor its workers.

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[68] Ibid.

[69] Ibid.

[70] Ibid

[71] Valerio De Stefano, "'negotiating the Algorithm': Automation, Artificial Intelligence and Labour Protection," International Labour Organization, April 23, 2024, https://www.ilo.org/publications/negotiating-algorithm-automation-artificial-intelligence-and-labour.; Crossover website https://www.crossover.com/worksmart/#worksmart-productivity-tool

[72] Ibid

[73] Sian Moore and L.J.B. Hayes, "The Electronic Monitoring of Care Work—the Redefinition of Paid Working Time," *Humans and Machines at Work*, October 7, 2017, 101–24, https://doi.org/10.1007/978-3-319-58232-0_5

There are some interventions put in place to combat such issues. The Swiss Labor Law, particularly in Article 328 of the Swiss Code of Obligations (CO) and Article 26 of Ordinance 3 to the Employment Act (EmpO 3), prohibits the use of monitoring or control systems to monitor the behavior of employees in the workplace.[74] It also states that where monitoring or control systems are necessary for other reasons, they must, in particular, be designed and installed in such a way as not to affect employees' health and ability to move around normally without being under constant surveillance.[75] Companies should also hold the responsibility in informing the workers of the existence of such system.

(2) AI technology on human resources management

AI has been applied to human resources management and recruitment processes in the hope that the technology will eliminate human agents' bias and prejudice on racial, gender or cultural features of candidates and workers. The machine is much more straightforward[76] since it is programmed to base their decision on predetermined goals – such as improving productivity and maximizing firms' profit – and make a decision solely on the data about those candidates. Similarly, the technology, too, is embedded in HR management where it decides to promote, demote or lay out the workers based on workers' performance data (which is also related to labor monitoring discussed in (1)). Consequently, as the machine make its decision solely on how it is programmed to decide, then it should alleviate the long-standing bias and prejudice from human agents.[77]

However, this might not be the case since the AI developers – those who teach, design, choose a data, train and model the technology – might be biased in their design. The bias could be intentional or unintentional. On one hand, the developers might model AI to emphasize more on racial features, disability, or other socioeconomic factors which makes the AI prefer one group of candidates over the others. On the other hand, the AI might be designed to base their predictions

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[74] "Employment and Labour Laws and Regulations in Switzerland," Global Legal Insights, accessed July 2, 2024, https://www.globallegalinsights.com/practice-areas/employment-and-labour-laws-and-regulations/switzerland/.
[75] Ibid.
[76] Cowgill, Bo. "Bias and Productivity in Humans and Algorithms: Theory and Evidence from Résumé Screening". Research paper. Columbia Business School. 2020
[77] Peter Cappelli and Nikolai Rogovsky, "Artificial Intelligence in Human Resource Management: A Challenge for the Human-Centred Agenda?," International Labour Organization, April 23, 2024, https://www.ilo.org/publications/artificial-intelligence-human-resource-management-challenge-human-centred-1.

and decision making only on productivity and efficiency, which makes the AI dismisses all the disability candidates.[78]

Moreover, AI systems are trained using data that is assumed to reflect the potential and performance of workers or candidates without bias. However, the European Economic and Social Committee contends that such data can be easily manipulated and may, in fact, perpetuate cultural, gender, and other forms of prejudice.[79] Big data consists of sophisticated records of past actions. For example, hiring algorithms often base their scoring on historical decisions made by HR departments. If these past decisions have consistently rated male candidates higher than female candidates, the algorithm's scoring mechanism may replicate this bias, resulting in gender-biased outcomes.[80] As a result, AI systems must be explainable and transparent, enabling affected parties to review and verify that the decisions are not biased.

As discussed above, the use of AI in HR management has the potential to reduce human prejudice and bias. However, it is crucial that these systems are designed appropriately and trained on carefully selected data. Therefore, companies utilizing third-party AI tools in their HR departments should be subject to legal and regulatory scrutiny to prevent adverse effects on the economy and labor welfare. In May 2022, the U.S. Equal Employment Opportunity Commission (EEOC) Chair, Charlotte Burrows, emphasized the commission's particular interest in developing guidance to protect people with disabilities from bias in AI tools.[81] As she noted, as many as 90 percent among Fortune 500 companies are using some form of automated or AI-powered tools to screen or rank candidates for hiring, leading to a renewed focus on understanding the complete algorithm of the AI tool.[82] This renewed focus underscores the importance of transparency and accountability in AI systems to ensure fair and equitable treatment of all candidates. Additionally, it highlights the need for ongoing human oversight to safeguard against potential biases and to ensure that AI-driven hiring practices align with broader societal values and legal standards.

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[78] ibid

[79] European Economic and Social Council, *Artificial intelligence – The consequences of artificial intelligence on the (digital) single market, production, consumption, employment and society* (own-initiative opinion) 31 May 2017, JO C 288, 31.8.2017, p. 43.

[80] Cappelli, Peter. 2019. "Your Approach to Hiring Is All Wrong". Harvard Business Review, May– June 2019.

[81] Loeb & Loeb LLP, "Recent Updates on Discrimination and Privacy Implications of Technology in the Workplace," accessed July 1, 2024, https://www.loeb.com/en/insights/publications/2022/08/recent-updates-on-discrimination-and-privacy-implications-of-technology-in-the-workplace.

[82] Ibid.

The EOCC stressed that any use of software for any employment purposes should comply with the federal civil rights laws.[83] Moreover, one of the major concerns regarding the algorithmic decision making by AI is its transparency and explainability – namely, the candidates and workers affected by such decisions needed to be informed why the decisions are made and in what basis – to mitigate the adverse effects of the algorithm. Thus, the United States enacted the Algorithmic Accountability Act of 2023, which mandates that companies using automated decision-making tools assess the impact of the technology and report their findings to the government. The government will maintain and publish a database of critical decisions automated by firms, allowing involved parties to review and contest these decisions.[84]

V. Conclusion

AI has the potential to revolutionize industries and become the next general-purpose technology, potentially ushering in the fifth industrial revolution. While technology offers significant benefits, such as enhanced productivity and efficiency, it also presents substantial risks to the labor market, including job displacement and threats to workers' rights and welfare.

Job displacement due to technological disruption is not a new phenomenon, and it often leads to the creation of new jobs, sometimes even surpassing the number of jobs lost to automation. However, if the transition is not supported by appropriate policies, some workers may become discouraged and exit the workforce, while others may struggle to re-enter the job market due to an inability to develop new skills. Therefore, targeted interventions are necessary to facilitate this transition. For older workers who cannot acquire new skills, compensation policies such as early retirement or job insurance should be implemented. For those who can adapt, active labor market policies (ALMPs) are essential for providing reskilling and training programs. Finally, to prevent excessive automation by firms, steering policies, such as taxation regimes that incentivize pro-worker technologies and legislation that restricts mass layoffs, are crucial.

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[83] Equal Employment Opportunity Commission (EEOC), "Artificial Intelligence and the Workplace," accessed July 2, 2024, https://www.eeoc.gov/ai.

[84] Algorithmic accountability act of 2023 summary accessed August 6, 2024, https://www.wyden.senate.gov/imo/media/doc/algorithmic_accountability_act_of_2023_summary.pdf.

The benefits of AI can only be fully realized if it is developed and implemented responsibly. This includes ensuring that AI systems are trained on unbiased data to prevent the perpetuation of existing prejudices related to race, gender, culture, and other socio-economic factors. Ethical guidelines are crucial in this context, particularly those that emphasize transparency, explainability, and human oversight. These guidelines help ensure that AI systems operate fairly and that their decisions can be reviewed and contested by affected parties.

In the realm of human resources, AI has the potential to reduce human bias and enhance efficiency in hiring and management processes. However, this potential can only be realized if AI systems are designed to be transparent and fair. To address issues of excessive surveillance, companies should implement strict policies that limit the extent of monitoring to what is necessary for productivity and compliance, ensuring that workers' privacy is respected. Additionally, regular audits by independent bodies should be conducted to ensure that surveillance practices are not infringing on workers' rights.

To combat biased decision-making in hiring and promotions, it is essential to use diverse and representative datasets for training AI systems. Moreover, AI tools should be supplemented with human oversight to interpret and contextualize AI-driven recommendations. Implementing a system where AI decisions are reviewed by diverse panels can help mitigate biases. Furthermore, transparency in AI decision-making processes should be mandated, allowing candidates and employees to understand how decisions are made and to challenge them if necessary.

Regulatory scrutiny is essential for ensuring that AI technologies are used responsibly. Laws such as the Algorithmic Accountability Act of 2023 in the United States are steps in the right direction, mandating that companies assess and report the impacts of their AI tools. Such regulations help maintain a database of critical automated decisions, promoting accountability and allowing for the review of potentially biased or unfair outcomes.

Additionally, the potential use of AI agents to monitor and ensure compliance with ethical standards should be explored. AI can be a powerful tool to oversee other AI systems, ensuring they operate within the set guidelines and identify any deviations that may require human intervention.

In conclusion, while AI holds tremendous promise for advancing human civilization, its implementation must be carefully managed to mitigate risks and ensure that its benefits are equitably distributed. Governments, businesses, and society must work together to establish robust ethical and regulatory frameworks that guide the development and deployment of AI, safeguarding the interests of workers and promoting a fair and just economic environment.

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