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AI (Artificial Intelligence) Disparities in Work among Transnational Families, and Ethical, Legal, and Social Issues in the United States, Sweden, Mexico, and Japan

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Abstract
This research first addresses recent trends of international migration and labor market in North America, Europe, Latin America, and Asia, in particular the United States, Sweden, Mexico, and Japan after the COVID-19 pandemic. Second, with the introduction of AI (Artificial Intelligence) into the labor market and working environment, there is a risk that certain occupations and duties will be replaced by AI (Artificial Intelligence), that humans will no longer be involved in the replaced occupations and duties, and that such occupations and duties will disappear. The impact on the international business community is discussed. Finally, the study analyzes the ethical, legal, and social issues (ELSI) of AI (Artificial Intelligence) in work.

Keywords: AI disparities in work, Transnational families, Ethical, legal, and social issues, The United States, Sweden, Mexico, Japan

Ⅰ. INTRODUCTION: DEMOGPAPHY OF WORKING-AGE POPULATIONS

According to OECD Data Indicator by the Organisation for Economic Co-operation and Development (Figure 1; OECD, 2024a), the old age dependency ratio is the number of people aged 65 and over per 100 people of working age between 20 and 64. The development of the ratio of the elderly population to working age depends on mortality rates, birth rates, and migration. Most analysts expect this trend to continue as life expectancy in the member countries increases over time, and the number of older people and pensioners increases. This means that it is likely to increase furthermore in the future.

Organisation for Economic Co-operation and Development (Figure 2; OECD, 2023) reviewed that the evolution of the working-age to old-age age ratio depended on mortality rates, birth rates, and immigration. Currently, Japan is demographically the oldest of the member countries, with an old-age to working-age ratio of 55.4 (55 people aged 65 and over for every 100 working-age people defined as 20-64). Finland and Italy also have high proportions of older adults, aged 40 and over. By 2052, the ratio of old-age to working-age is expected to exceed 70 in Greece (70.7), Italy (78.1), Japan (80.0), and South Korea.

In contrast, Colombia (14.5), Mexico (14.2) and Tolquier (14.2) are the youngest countries, based on this indicator, the ratio between old age and working age is calculated, respectively. However, these countries are expected to experience significant population aging in the second half of this century. By 2080, the proportion of older adults is projected to be much closer to the OECD average, compared with an average of 66.1 in Colombia (64.2), Mexico (63.1) and Türkiye (60.9).

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Figure 1 Old-Age dependency ratio by country (OECD, 2024a)

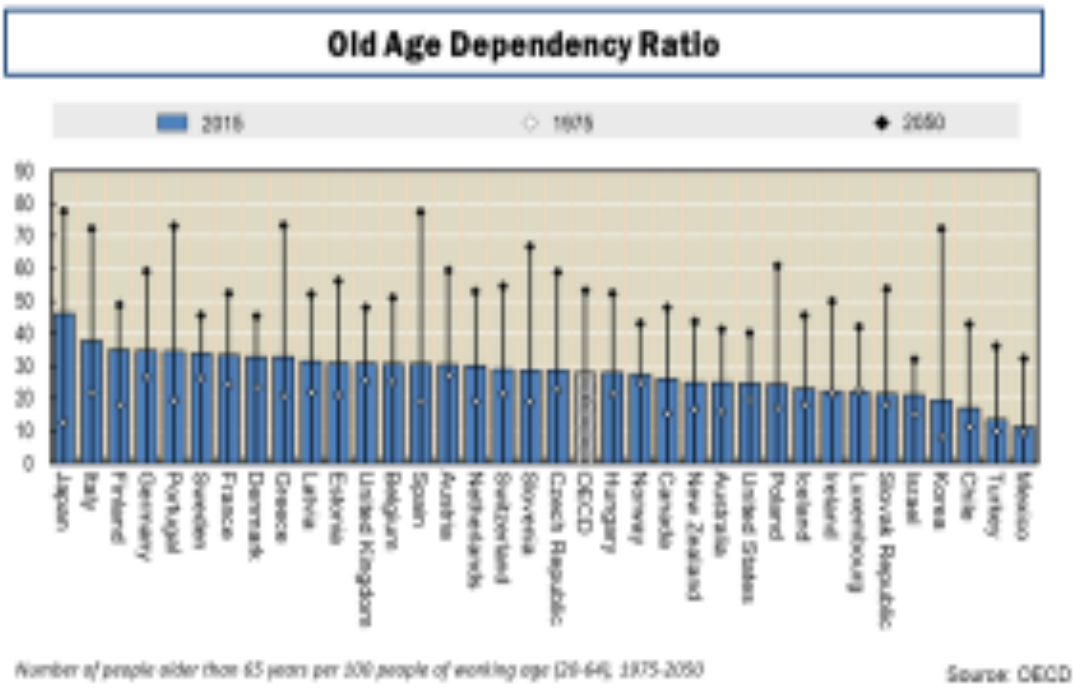
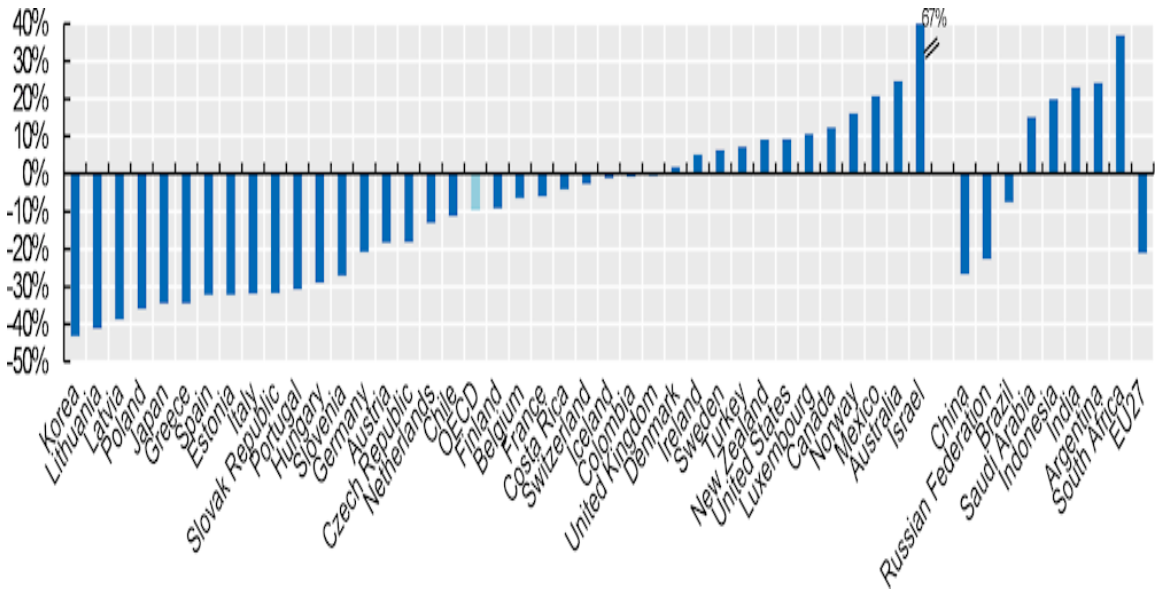


Figure 2 Working-age to old-age ratio by country (OECD, 2023)



Source: United Nations World Population Prospects: The 2022 Revision (2024).

Table 1 Permanent-type migration to selected OECD countries (OECD, 2024b) 1)

Country/	2015	2016	2017	2018	2019	2020	2021	2022	2023	2023-2019 change	2023-2022 change
	Thousands									%	
Standerdized statistics											
United States	1 051.0	1 186.9	1 103.7	1 089.6	1 031.0	581.5	835.4	1 048.7	1 189.8	+13.4	+15.4
U.K.	366.5	351.0	317.7	317.7	356.1	199.9	369.0	488.4	746.9	+52.9	+109.7
Germany	708.1	1 077.9	883.1	656.5	643.3	521.1	533.1	669.0	692.7	+3.5	+7.7
Canada	275.8	296.7	286.5	321.0	341.2	184.5	406.0	437.6	471.7	+7.8	+38.3
Spain	269.6	189.9	212.0	228.0	246.0	198.9	255.6	324.0	364.1	+12.3	+48.0
France	262.3	259.9	260.8	282.6	275.6	219.9	267.4	294.4	297.6	+1.1	+8.0
Australia	227.9	229.4	220.5	195.2	195.7	165.5	170.4	170.9	238.7	+39.7	+22.0
Japan	85.4	97.6	102.1	118.0	139.0	85.0	56.7	144.2	154.8	+7.3	+11.3
New Zealand	54.3	55.3	46.9	44.7	38.1	35.7	35.4	154.3	119.3	-22.7	+213.4
South Korea	65.6	72.9	71.1	76.0	72.5	53.0	48.2	57.8	87.1	+50.9	+20.1
Sweden	120. 5	154.4	132.3	123.1	100.1	80.3	76.0	89.8	87.1	-3.0	-13.0
Mexico	34.4	35.9	32 6	37.0	40.5	58.4	67.7	75.6	69.9	-7.6	+72.4
All OECD countries	4 516.2	5 022.2	4 709.4	4 561.1	4 582.7	3 256.4	4 231.0	5 304.4	5 818.5	+9.7	+27.0

1) Includes only foreign nationals. Data refer to the fiscal year ending in the year of reference for Australia (Jul-Jun) and Ireland (Apr-Mar). For the United States, data refer to fiscal years (Oct-Sep) in 2015 and calendar years from 2016. The inflows include status changes, namely persons in the country on a temporary status who obtained the right to stay on a longer-term basis, and migration within free circulation areas. Series for some countries have been significantly revised. EU averages cover countries stated in the table, excluding the United Kingdom.
2) Adopted from OECD (2024b)

Fertility rates have also fallen significantly, which naturally means that the number of workers entering the labor market will also eventually fall. For example, the fertility rate fell below the average replacement level for the member countries around the mid-1980s, suggesting that the population will decline in the long term. However, there is great uncertainty about how fertility rates will change in the future.

According to the United Nations Population Projections (2024), for the OECD as a whole, the increase in the old-age population to working age ratio will continue to increase at a faster pace, from 31.3 in 2022 to 53.8 in 2052 and 66.1 in 2082. The working-age population (20-64 years) is projected to decline by an average of 11% in the member countries by 2062, or 0.28% per year. South Korea, Latvia, Lithuania, and Poland are expected to see declines of more than 35%, while Greece, Italy, Japan, the Slovak Republic, and Spain are also expected to see declines of more than 30%. Declining working-age population has a significant impact on the financing of pay-as-you-go (PAYG) systems, as it is closely related to the internal rate of return. Even funded pension systems can be affected by labor supply due to a sharp decline in the working-age population, which can reduce output growth and create imbalances.

Ⅱ. RECENT TRENDS OF INTERNATIONAL MIGRATION AND LABOR MARKET

1. International Migration and Labor Market from Global Perspectives

According to the Organisation for Economic Co-operation and Development (2024b), migration flows in 2022, approximately 6 million new permanent immigrants (excluding 4.7 million Ukrainian refugees) reached an unprecedented level. This is the case with the rebound effect following the COVID-19 pandemic, with growing labor shortages due to strong economic recovery and the onset of demographic change in the member countries. In 2023, OECD welcomed 6.5 million new settled migrants, setting a new historic record. Most of the increase in 2023 was due to family migration (+16%), but humanitarian migration (+20%) also increased. After recording an unprecedented increase in 2022, the migration of temporary workers to the member countries also continued to increase.

More than 2.4 million work permits and authorizations were granted in the member countries (excluding Poland), an increase of 16% year-on-year (28% above pre-COVID-19 levels). In Poland, the total number of new work permits (including renewals) decreased by 39% to 835,000 in 2023, excluding Ukrainians who declared work on a contract basis. In addition, the influx of international students continued to increase (up 6.7%), with the number of new applicants expected to exceed 2.1 million by 2023.

The number of new asylum seekers in the member countries also set a new record in 2023, with 2.7 million new applications registered across the countries (an increase of 30%). This surge was primarily driven by the United States. In total, the member countries granted international protection to 676,000 refugees in 2023 (an increase of 15%), the highest level since 2017, including 160,000 new resettled refugees (up 23%), the highest number since 2016. The upward trend in immigrant employment after the pandemic continued until 2023, with the overall OECD employment rate at a historically high level of 71.8% and the unemployment rate at a historically low level of 7.3%. Immigrant employment rates across the 10 OECD countries and the 27 EU countries, including Canada, the United Kingdom and the United States, were at record highs.

More than 150 million people living in the member countries were foreign-born in 2023. The United States accepted nearly a third of that number. In the ten years to 2023, the proportion of foreign-born people in the countries rose from 9% to 11%. Permanent immigration to the member countries set a new record in 2023 with 6.5 million new permanent immigrants, up 10% year-on-year and 28% above 2019 levels. Around a third of the member countries had the highest record immigration levels in 2023, particularly the United Kingdom, but also Canada, France,

Japan and Switzerland. Migration of most categories of temporary workers increased in 2023, particularly seasonal migration (up 5%) and working holiday migrants (up 23%), while the influx of intra-company transferees fell by 11% in 2023.

2. International Migration and Labor Market in the United States

The percentage of foreign-born population (49.1 million) to the total population was 14.5% in 2023 in the United States. Of those, 51% was women, and the number of the migrants increased to 19% from the previous year. The United States welcomed 1,049, 000 new immigrants on a long-term or permanent bas (including changes of status) in 2022, and the number of immigrants increased 26% from 2021. The categories of the immigrants included 14% labor migrants, 69% family members (including accompanying family members), and 9% humanitarian migrants. Around 409,000 international students and 821,000 temporary and seasonal labor migrants were allowed to enter the United States. The top three nationalities of newcomers were Mexico, India and China in 2022. India (33,000) increased at highest level among the top 15 countries of origin from 2021.

In 2023, 1,176,000 first-time asylum seekers were welcomed into the United States, a 61% increase in the number of first-time asylum seekers. The applicants at highest level came from Venezuela (185,000), while the second large group was Colombia (128,000), and the third large group was Cuba (99,000). Of those, the largest increase since 2022 was for Colombia (96,000), and the largest decrease was for Cuba (-58,000). Of the 320,000 decisions taken in 2023, 20% were positive. Immigration of U.S. citizens to OECD countries increased by 9% to 109,000 in 2022. Approximately 11% of this group immigrated to Spain, 10% to Canada and 9% to the United Kingdom.

3. International Migration and Labor Market in Sweden

In 2023, in Sweden the percentage of foreign-born population (2.1 million) to the total population was 20.3%. Of those, a half of the foreign-born population was women, and the evolution of the migrants was 46% from the previous year. In 2022, Sweden received 90,000 new immigrants (including changes of status and free mobility) on a long-term or permanent basis, an increase of 18% compared to 2021. The categories of migrants were made up of 36% migrants who benefit from free mobility, 20% labor migrants and 38% family members (including accompanying family members) and 6% for humanitarian migrants. Approximately 9,900 permits were issued to international students at tertiary level and 7,700 to temporary and seasonal labor migrants (excluding intra-EU migration). Furthermore, 71,000 intra-EU deployments were recorded in 2022, an increase of 22% compared to 2021. These temporary workers are typically on short-term contracts. The top three nationalities of new entrants in 2022 were India, Poland, and Germany. Among the top 15 countries of origin, India recorded the largest increase (2,000) and Denmark the largest decrease (53) in inflows to Sweden compared to the previous year.

In 2023, the number of first-time asylum seekers decreased by -32% to around 9,000 people, who mostly came from Syria (900), Uzbekistan (700) and Afghanistan (600). The largest increase since 2022 was for Congolese nationals (100), and the largest decrease was for Ukrainian nationals (-1,400). Of the 19,000 decisions taken in 2023, 27% were positive. Migration of Swedish nationals to OECD countries increased by 4% in 2022 to 21,000. Approximately 19% of this group moved to Spain, 12% to Germany, and 10% to Norway.

4. International Migration and Labor Market in Mexico

The percentage of foreign-born population (1.2 million) to the total population was 1% in 2020 in Mexico. Of those, 49% was women, and the number of the migrants increased to 24% from 2019. In 2022, Mexico accepted 76,000 new immigrants on a long-term or permanent residence basis

(including changes in status), an increase of 12% from 2021. The categories of migrants were made up of 14% labor migrants, 43% family members (including accompanying family members), and 28% humanitarian migrants. Approximately 7,100 permits were issued to international students, and 24,000 were issued to temporary and seasonal workers and immigrants. The top three nationalities for newcomers in 2022 were Honduras, Venezuela, and the United States. Among the top 15 countries of origin, Guatemala recorded the largest increase in inflows to Mexico (2,000) compared to the previous year, while Venezuela recorded the largest decrease (-1,100).

In 2023, the number of first-time asylum seekers increased by 19% to approximately 141,000. Most applicants were from Haiti (44,000), Honduras (42,000), and Cuba (18,000). The largest increase since 2022 was for Haitian nationals (27,000), and the largest decrease was for Venezuelan nationals (-9,400). Of the 55,000 decisions taken in 2023, 37% were positive. Migration of Mexican nationals to OECD countries increased by 27% in 2022 to 165,000. Approximately 84% of this group immigrated to the United States, 5% to Spain, and 3% to Canada.

5. International Migration and Labor Market in Japan

In 2023, in Japan the percentage of foreign-born population (3.1 million) to the total population was 2,5% only. Of those, 50% was women, and the evolution of the migrants was 51% from the previous year. In 2022, Japan allowed 144,000 new immigrants on a long-term or permanent basis (including changes of status), and the number of newcomers increased 150% more than in 2021. The categories of migrants consisted of 55% labor migrants, 41% family members (including accompanying family), and 1% humanitarian migrants. Japan welcomed around 167,000 international students and 224,000 temporary and seasonal labor migrants to work there. The top nationalities of newcomers were China (25%), Vietnam (16%), and South Korea in 2023. Among the top 15 countries of origin, Vietnam recorded the highest increase (104, 000) in flows to Japan, compared to the previous year.

In 2023, approximately 14,000 first asylum applicants increased by 270%, and the applicants mostly came from Sri Lanka (3, 800), Türkiye (2,400), and Pakistan (1,100). Sri Lanka nationals (3,300) increased at highest level since 2022, and Myanmar nationals (26) decreased at highest level. Of the 8,920 decisions taken in 2023, only 15% were positive. Japanese migration to OECD countries increased by 12% in 2022, to 22 000. The top three countries of this group were the United States (19%), Germany (19%), and the Netherlands (8%).

Ⅲ. AI (ARTIFICIAL INTELLIGENCE) DISPARITIES IN WORK

1. AI (Artificial Intelligence) Disparities in Work from Global Perspectives

(1) AI (Artificial Intelligence) Impact on Global Labor Market

As Cazzaniga et al. (2024) discussed, AI (Artificial Intelligence) is set to profoundly change the global economy, with some commentators seeing it as akin to a new industrial revolution.
This is particularly evident in the context of the labor market, where AI (Artificial Intelligence) promises to increase productivity while threatening to replace humans in some jobs and complement them in others. Almost 40% of global jobs are exposed to AI (Artificial Intelligence), and developed countries are at greater risk but are better poised to harness the benefits of AI (Artificial Intelligence) than emerging markets and developing countries.

In developed countries, approximately 60% of jobs are exposed to AI (Artificial Intelligence) due to the prevalence of cognitive task-oriented jobs. New measures of AI's potential complementarity suggest that about half of these could be negatively impacted by AI (Artificial Intelligence), although the remainder could benefit from productivity gains from AI (Artificial Intelligence) integration. Overall exposure is 40% in emerging market countries and 26% in low-income countries. In many emerging markets and developing countries, AI-related disruption may

be less pressing, but they are also less prepared to take advantage of the benefits of AI (Artificial Intelligence). This could further exacerbate the digital divide and income inequality across countries. Unlike previous waves of automation, which hit middle-skilled workers the hardest, the risk of AI (Artificial Intelligence) displacement also extends to higher-wage workers. However, potential AI (Artificial Intelligence) complementarity is positively correlated with income. The impact on labor income inequality will therefore largely depend on the extent to which AI (Artificial Intelligence) displaces or complements higher-income workers. Model simulations show that due to high complementarity, high wage earners can expect a more than proportional increase in their labor income, which may lead to an increase in labor income inequality. This will amplify rising income and wealth inequality resulting from higher capital returns accruing to high-income earners. Countries' choices regarding the definition of AI (Artificial Intelligence) property rights, redistribution, and other fiscal policies will ultimately shape the impact on the distribution of income and wealth. Strong productivity gains can lead to growth and higher incomes for most workers. Due to capital deepening and productivity improvements, AI (Artificial Intelligence) implementation is expected to increase total revenue. If AI (Artificial Intelligence) is a strong complement to human labor in certain occupations and productivity gains are large enough, growth and increased demand for labor could more than compensate for partial AI (Artificial Intelligence) replacement of labor tasks. and incomes are likely to increase along with most of the income distribution.

Cazzaniga et al. (2024) analyzed that workers with college degrees were ready to move from jobs that were at risk of displacement to jobs that were highly complementary. Older workers may be more vulnerable to AI-driven transformation. University graduates have historically found it easier to move from jobs that are now rated as highly replaceable to highly complementary jobs. In contrast, workers with less than secondary education are less mobile. Young workers who are adaptable and familiar with new technologies may also be better able to take advantage of new opportunities, although older workers may struggle with rehiring, adapting to technology, mobility, and training new job skills. To exploit the full potential of AI (Artificial Intelligence), priorities will vary depending on each country's level of development. The new AI Readiness Index highlights that advanced and more developed emerging market countries need to invest in AI (Artificial Intelligence) innovation and integration, while also promoting appropriate regulatory frameworks to optimize the benefits of increased use of AI (Artificial Intelligence). For emerging markets and developing countries that are less prepared, basic infrastructure development and building a workforce with digital skills are paramount. Therefore, social safety nets and the reskilling of AI-vulnerable workers are essential to ensuring inclusion for all economies.

(2) Exposure to AI (Artificial Intelligence)

Georgieff and Hyee (2022) addressed that recent years have seen remarkable advances in AI (Artificial Intelligence), raising new concerns about the impact of technological advances on the labor market, including worker turnover, and that it should be considered the possible link between AI (Artificial Intelligence) and employment in a cross-national context. Georgieff and Hyee (2022) adopted the index takes the AI Occupational Impact Scale (Felten et al., 2019, 2023), which measures the degree to which occupations relied on the most advanced AI (Artificial Intelligence) capabilities and extended it to 23 countries.

While the degree to which occupations were exposed to AI (Artificial Intelligence) varies little across countries on average (Figure 3; Georgieff and Hyee, 2022), differences between occupations tended to be larger. The average score for AI (Artificial Intelligence) exposure by occupation ranges from 0.52 (Lithuania) to 0.72 (Finland) among the 23 countries. In contrast, the national average scores for the 36 occupations range from 0.26 (cleaners and helpers) to 0.87

(business professionals). Even cleaners and helpers, who are most exposed to AI (Finland), are only about half as likely to be business professionals (Lithuania), who are least exposed to AI (Artificial Intelligence). Occupations tended to be slightly more exposed to AI (Artificial Intelligence) in Nordic countries than in Eastern European countries.

Georgieff and Hyee (2022) revealed that occupations with high computer usage, greater exposure to AI (Artificial Intelligence) led to increased employment, and that a relationship between exposure to AI (Artificial Intelligence) and growth in average working hours in occupations with low levels of computer use was negative. One possible explanation is that partial automation through AI leads to direct productivity increases as well as increases in the task composition of work shifting towards higher value-added tasks. These increases in labor productivity and output counteract the direct displacement effect of AI (Artificial Intelligence) automation for workers with superior digital skills. Workers may find it easier to use AI (Artificial Intelligence) effectively and transition to higher value-added tasks that cannot be automated within their occupations. The opposite is true for workers with insufficient digital skills, who may not be able to interact effectively with AI (Artificial Intelligence) and reap the full potential benefits of the technology.

(3) Government AI Readiness

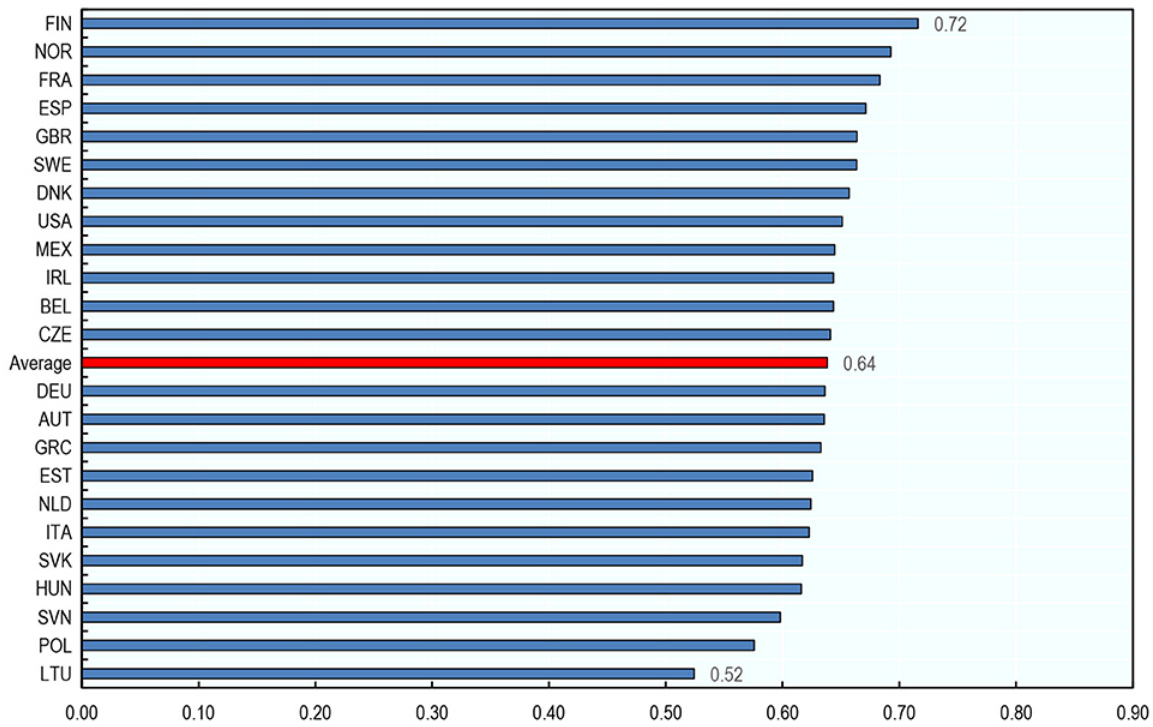
According to Oxford Insights (2025), the Government AI Readiness Index (2024) has become a trusted resource for policymakers, adopted as an official benchmark by national governments and referenced by leading organizations such as the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2025) and the G20. This recognition strengthens commitment to supporting government efforts to leverage AI (Artificial Intelligence) for the public good. The 2024 Index assessed the AI (Artificial Intelligence) readiness of 188 countries at a time of increasing complexity as governments face evolving public needs and challenges such as economic uncertainty, climate risk, and rising inequality. AI (Artificial Intelligence) has played a key role in not only managing technology but also improving government performance.

The 2024 Index examined 40 indicators across three pillars: Government, Technology Sector, and Data and Infrastructure. It highlighted progress, identified gaps and provided actionable insights for policymakers working to integrate AI (Artificial Intelligence) into public service delivery. At the heart of the 2024 Index there was a question: “How prepared are governments to deploy AI (Artificial Intelligence) in public service delivery?” By answering this question, the Index supported evidence-based decision-making and provided practical tools that enabled policymakers to unlock the potential of AI (Artificial Intelligence) and better serve populations around the world. AI (Artificial Intelligence) strategies were on the rise again, gaining momentum across low- and middle-income countries.

North America remained the best-performing region (a regional average: 82.60) on the Index, with the United States (87.03) ranking first and Canada (78.18) sixth globally. The United States significantly outperformed the global average (47.59) in all pillars, showed particular strengths in Governance and Ethics (91.14), Innovation Capacity (92.48), and Technology Sector Maturity (83.8), and exhibits an advanced AI (Artificial Intelligence) ecosystem.

Western Europe continued to perform well on the index, with France (79.36) topping the 2023 regional rankings. The region dominated the world top 10 with the United Kingdom (78.88), the Netherlands (77.23), Germany (76.90) and Finland (76.48), with Sweden ranked seventh in Western Europe. The region's average score is 69.56, higher than the World average (47.59) for all pillars. Western Europe performed particularly well in Data and Infrastructure (regional average: 81.91). Most Western European countries consistently scored above the global average in all pillars, except San Marino, Liechtenstein, and Andorra.

Figure 3 Cross-country differences in exposure to AI for given occupations (Georgieff & Hyee, 2022) 1)



1) Data source: Programme for the International Assessment of Adult Competencies (OECD, 2025) and Felton et al. (2019, 2023)

2) 23 Countries: FIN(Finland), NOR (Norway), FRA (France), ESP (Spain), GBR (The United Kingdom), SWE (Sweden), DNK (Denmark), USA (The United States of America), MEX (Mexico), IRL (Ireland), BEL (Belgium), CZE (Czechia), DEU (Germany), AUT (Austria), GRC (Greece), EST (Estonia), NLD (The Netherlands), ITA (Italy), SVK (Slovakia), HUN (Hungary), SVN (Slovenia), POL (Poland), LTU (Lithuania)

East Asia ranked as the third best-performing region in the index, with two of the world's top three countries, Singapore (84.25) and South Korea (79.98), and Japan ranked third in East Asia. The region's performance was well above the global average (47.59) in all pillars. Its distinct strength lies in Government (regional average: 84.71), demonstrating a strong governance

framework and strategic AI (Artificial Intelligence) vision. Data and Infrastructure (regional average score: 69.72) reflected robust data availability and infrastructure readiness, while Technology Sector (regional average: 44.61) showed the need for further investment in innovation and AI (Artificial Intelligence) maturity. Nevertheless, China's performance in the index may have been affected by limited data availability and reduced access to relevant information.

Latin America and the Caribbean showed steady progress in AI (Artificial Intelligence) readiness, led by Brazil (65.89), Chile (63.19), and Uruguay (62.21). These were the only three countries in the region to rank in the world's top 50. Brazil led the region in Government (74.51) and Data and Infrastructure (78.38). But Technology Sector (Brazil: 44.78) highlighted the need for further investment in technology development. Although Latin America and the Caribbean still lagged the global average, there was increasing focus on digital government initiatives. In Mexico, the new government informed plans to create Agency for Digital Transformation and Telecommunications (ATDT) to accelerate the digital formation to improve public services.

2. AI (Artificial Intelligence) Disparities in Work in the United States

In the United States, the Pew Research Center analyzed federal employment data (O*Net Ver27.3, Current Population Survey: IPUMS) and found that 19% of American workers were in jobs that were the most exposed to AI (i.e., budget analysis, tax preparers, and data entry keyers, etc.) in 2022, in which the most important activities would be either replaced or assisted by AI (Artificial Intelligence) (Kochhar, 2024). The Pew Research Center also identified that 23% of workers had jobs that were the least exposed to AI (i.e., firefighters, childcare workers, and pipelayers, etc.), in which the most important activities were farther from the reach of AI (Artificial Intelligence). Other workers, nearly six-in-ten in all, were likely to have varying levels of exposure to AI (Artificial Intelligence).

Workers with a bachelor's degree or higher (27%) were more than twice as likely to be most affected than those with only a high school diploma (12%). Women (21%) are more likely to be exposed to AI (Artificial Intelligence) than men (17%). This is due to the difference in the occupations of men and women. Asian American (24%) and Non-Hispanic European American (20%) workers had higher exposures than African American (15%) and Hispanic American (13%) workers. Workers in the most exposed jobs earned an average of $33 per hour, compared to $20 per hour in the least exposed jobs (Kochhar, 2024).

According to Kinder et al. (2024), the release of ChatGPT-3.5 at the end of 2022 captured the world's attention and highlighted the incredible ability of generative AI (Artificial Intelligence) to generate a variety of content that appears to be human-generated, including text, video, audio, images, and code. With this release and the many eye-catching breakthroughs that have followed in its wake, questions about what these rapidly evolving generative AI (Artificial Intelligence) technologies mean for jobs, workers, and livelihoods now and in the future since the new models are anticipated to be much more powerful. Many American workers are concerned that generative AI (Artificial Intelligence) will have a significant negative impact on employment over the next 20 years. However, despite these widely shared concerns, there is little agreement on the nature and scale of the potential impacts of generative AI (Artificial Intelligence) and how, or even whether, to respond. Fundamental questions remain unanswered.

Kinder at al. (2024) revealed from data analysis that exposure levels for occupational groups reflected the percentage of tasks in major occupational groups for which LLM can reduce time to completion by 50% or more. Several areas included computer and mathematical work (75.1%), office and administrative support (60.4%), business and financial operations (52.1%), and architecture and engineering (48.7%) were relatively high levels of exposure. In contrast, low-exposure tasks contained construction and extraction (5.6%), building and grounds cleaning and

maintenance (12.1%), production (12.9%), installation, maintenance, and repair (13.3%), and farming, fishing, and forestry (13.4%).

A closer look at the impact of generative AI (Artificial Intelligence) exposure showed how LLM exposure varies by occupations' pay level. As a result, in most cases, high-income occupational groups such as computer work, management, engineering, and business finance roles were predicted to have higher exposure to ChatGPT-4 and other LLMs. Additionally, the size of the bubbles representing different occupational groups changes depending on the number of current employees in those jobs. This means that some very large occupational groups, such as business, management, and healthcare jobs, could be highly exposed to generative AI (Artificial Intelligence). This also predicts that the technology will have a far-reaching impact on the labor market.

Kinder et al. (2024) concluded that generative AI (Artificial Intelligence) was rewiring how many of us work and earn a living. But as technology advances, the future of work will no longer be determined solely by technological capabilities. Employers, policymakers, civil society, and technologies will determine whether generative AI (Artificial Intelligence) realizes its potential to unlock new possibilities for workers and broaden shared prosperity, or to acknowledge concerns about exacerbating inequality and harm. It is up to the public and civil society to choose.

3. AI (Artificial Intelligence) Disparities in Work in Sweden

Berman et al. (2024) examined that the implementation of AI (Artificial Intelligence) in the Swedish Public Employment Service (PES), focusing on the concept of trustworthy AI (Artificial Intelligence) in public decision-making. Despite Sweden's advanced digitalization efforts and widespread application of AI (Artificial Intelligence) in the public sector, their research showed that there was a gap between theoretical goals and practical outcomes, especially in the context of AI (Artificial Intelligence) trustworthiness. Based on the analysis of Institutional Theory, Resource-Based View (RBV), and Ambidexterity Theory, while AI (Artificial Intelligence) promised to improve decision-making efficiency, the reality was marred by issues of transparency, interpretability, and stakeholder engagement. The opacity of the neural networks used by the agency to assess job seekers' support needs and the lack of comprehensive technical understanding among PES administrators have made it difficult to achieve transparent and interpretable AI (Artificial Intelligence) systems. Economic pressures for efficiency often overshadowed ethical considerations and the need for stakeholder engagement, leading to decisions that may not be in the best interests of job seekers.

Berman et al. (2024) proposed recommendations to increase the trustworthiness of AI (Artificial Intelligence) in public services, emphasizing the importance of stakeholder involvement, especially the involvement of job seekers in the decision-making process. They advocated a more delicate balance between the use of advanced AI (Artificial Intelligence) technologies and leveraging internal resources such as skilled human resources and organizational knowledge and also highlighted the need to improve the AI (Artificial Intelligence) literacy of both administrators and individuals to effectively advance the integration of AI (Artificial Intelligence) into public decision-making processes.

According to Ronnblom et al. (2023), Sweden has developed as a "world leader" in gender equality over the past few decades. In parallel with this development, politicians have also launched ambitious plans aimed at establishing the country as a "world class," in terms of digitalization. International research showed women and racialized groups were underrepresented in design processes. AI (Artificial Intelligence) facial recognition systems were built with white male faces as the norm, and digital tools reproduced racial injustice.

Ronnblom et al. (2023) analyzed how gender equity was articulated and was filed with excellence in national policies on AI (Artificial Intelligence) and digitalization. They also discussed

gender equity mainstreaming to challenge systems of privilege in the AI (Artificial Intelligence) systems in the public sector. The analysis revealed that gender equity was turned into a lack of knowledge and information, and that the AI (Artificial Intelligence) systems did not lead to understanding of gender equity and related to gender power relationships.

4. AI (Artificial Intelligence) Disparities in Work in Mexico

Valverde (2024) reported that Mexico had the lowest exposure to generative AI (Artificial Intelligence), with only 19% of jobs in the country exposed to this technology, compared to OECD country average of 26%. States such as Quintana Roo, Mexico, and Nuevo León were the most at-risk occupations, as regions with high concentrations of industries such as education, Information and Communication Technology (ICT), and finance were most exposed to generative AI (Artificial Intelligence), and the exposure level reached up to 23.4%.

Generative AI (Artificial Intelligence) has transformed the labor market by automating activities traditionally performed by humans in areas such as content generation, data analysis, and complex problem solving. Unlike previous automation technologies that primarily affected industry and daily tasks, generative AI (Artificial Intelligence) focuses on advanced cognitive tasks. El Economista (2025a) reported that traditional automation had particularly affected industrialized states such as Coahuila and Aguascalientes, while generative AI (Artificial Intelligence) has particularly affected highly industrialized states such as Nuevo León, and Jalisco, and has brought about a new paradigm. Regions that were more industrialized and urbanized, such as Nuevo León, had a larger impact on the adoption, while states with a lower concentration of technology industries, such as Guerrero, had a reduced impact. Exposure to generative AI (Artificial Intelligence) also varied widely depending on the level of urbanization. In urban areas, generated AI (Artificial Intelligence) impacted 32% of workers, while in rural areas the impact decreased to 21% (El Economista, 2025b).

Valverde (2024) suggested that generative AI (Artificial Intelligence) has provided solutions to common challenges such as labor shortages and aging populations, complementing human capabilities and improving operational efficiency in multiple areas. In Mexico, the ICT, education and financial industries are positioned to lead this technological transition, however investments in technological infrastructure and specialized training programs are still needed to ensure its continuity. Regions with low initial exposure such as Guerrero will benefit from specific strategies to incorporate AI (Artificial Intelligence) technology and improve worker inclusion. At the same time, more industrialized regions face the challenge of managing the impact of technology on high-skilled occupations and the transition to new labor models.

5. AI (Artificial Intelligence) Disparities in Work in Japan

The 2023 Communications Usage Trends Survey (2024) by the Ministry of Internal Affairs and Communications revealed that the percentage of IoT (Internet of Things) and AI (Artificial Intelligence)-introduced companies to the total companies was only 16.9%, although the number increased from 14.9% in 2021, and most Japanese companies were far behind in introducing AI (Artificial Intelligence). The objectives of companies that introduced IoT and AI (Artificial Intelligence) included improvement of operational efficiency (86.0%), improvement of customer service (35.1%), business optimization (26.8%), business continuity (17.6%), new business (11.3%), and others (5.2%).

According to Sumida (2023), in a questionnaire survey conducted by the Japan Center for Economic Research, only 15% of workers answered that their companies had introduced AI (Artificial Intelligence), although 22% introduced AI (Artificial Intelligence) among companies with 100 or more employees in Japan. The analysis also reported that small and medium-sized

companies were not considered an introduction of AI (Artificial Intelligence), especially in restaurants, transportation, and construction industries. Small and medium-sized enterprises were not enough for professional knowledge, highly skilled human resources, funding, data management and maintenance, and a governance system. In terms of age groups, those in their twenties were most positive about the introduction, but the percentage of middle-aged and older respondents in their forties to sixties who responded positively declined to less than 50%.

Based on the data analysis. Sumida (2023) proposed three recommendations; 1) The Japanese Government could actively disseminate AI information such as the economic effects of AI (Artificial Intelligence) implementation and success stories of other companies; 2) Companies that have already introduced AI (Artificial Intelligence) need to establish specialized departments and professional personnel within the company to centrally manage AI-related data to increase the economic effects of AI (Artificial Intelligence); and 3) By setting up AI (Artificial Intelligence) education systems for employees and an evaluation systems for AI (Artificial Intelligence) skills, companies can not only increase the economic effects of AI (Artificial Intelligence), but also increase employees' understanding of AI (Artificial Intelligence) and motivation.

Ⅳ. ETHICAL, LEGAL, AND SOCIAL ISSUES OF AI IN WORK

AI (Artificial Intelligence) disparities in work and labor market have globally raised ethical, legal, and social issues (ELSI). Celi et al. (2024) discussed the status of AI (Artificial Intelligence) in clinical medicine to account for disparities in populations and data sources. AI (Artificial intelligence) offers the potential for advanced clinical prediction and decision-making in healthcare, but models trained on relatively homogeneous datasets and populations that are poorly representative of the underlying diversity, limiting generalizability, and introducing bias into AI-based decision-making. Their review revealed that most databases were from the United States (40.8%) and China (13.7%), and that the most represented specialty was radiology (40.4%), followed by pathology (9.1%). The first authors were data experts (statisticians) rather than clinicians (59.6% and 53.9%, respectively). and most first/last authors were male (74.1%).

Celi et al. (2024) also found that the United States and Chinese datasets and authors were disproportionately represented in clinical AI (Artificial Intelligence), with nearly all the top 10 databases and author nationalities coming from high-income countries. AI (Artificial Intelligence) techniques were most used in image-rich specialties, and authors were predominantly male and had non-clinical backgrounds. They concluded that developing technological infrastructure in data-poor regions and short-term approaches was key to ensuring that clinical AI (Artificial Intelligence) was meaningful to a broader population and to avoid global AI (Artificial Intelligence) perpetuation. They also suggested that diligent external validation and model recalibration was important prior to clinical implementation not to expand health inequalities.

According to the U.S. Department of Labor (2024), former President Biden leveraged AI (Artificial Intelligence) to protect workers from risk while fostering innovation, advancing opportunity, and transforming the nature of many jobs and industries. As part of this effort, the AI Executive Order directed the Department of Labor to develop AI Principles and Best Practices for Developers and Employers when using AI (Artificial Intelligence) in the workplace. They guide the development of how businesses leverage AI (Artificial Intelligence) technology, creating a roadmap for employees and employers while ensuring that workers benefit from new opportunities and being protected from the potential harms.

Table 2 Artificial Intelligence and worker well-being: Principles and Best Practices for Developers and Employers (The United States Department of Labor, 2024) 1)

Principles	Best Practices
1) Centering Worker Empowerment:	Workers and their representatives, especially those from underserved communities, should be informed of and have genuine input in the design, development, testing, training, use, and oversight of AI systems for use in the workplace.
2) Ethically Developing AI:	AI systems should be designed, developed, and trained in a way that protects workers.
3)Establishing AI Governance Human Oversights:	Organizations should have clear governance systems, procedures, and human oversight, and evaluation processes for AI systems for use in the workplace.
4) Ensuring Transparency in AI Use:	Employers should be transparent with workers and job seekers about the AI systems that are being used in the workplace.
5) Protecting Labor and Employment Rights:	AI systems should not violate or undermine workers' rights to organize, health and safety rights, wage and hour rights, and anti-discrimination and anti-retaliation protections.
6) Using AI to Enable Workers:	AI systems should assist, complement, and enable workers, and improve job quality.
7) Supporting Workers Impacted by AI:	Employers should support or upskill workers during job transitions related to AI.
8) Ensuring Responsible Use of Workers' Data:	Workers' data collected, used, or created by AI systems should be limited in scope and location, used only to support legitimate business aims, and protected and handled responsibly.

1) Created from the United States Department of Labor AI Principles for Developers and Employers (2024)

In recent years, unions and employers have come together to collectively bargain for new agreements that put sensible and worker-protective guardrails around the use of AI (Artificial Intelligence) and automated systems in the workplace. To provide common guidelines for AI

(Artificial Intelligence) developers and employers across the country, the Department of Labor followed the direction of former President Biden's Executive Order, "Artificial Intelligence and Worker Well-Being: Principles and Best Practices for Developers and Employers" was published, incorporating opinions from workers, labor unions, researchers, academics, employers, and developers, etc., and holding public hearings to develop and utilize safe, secure, and reliable AI.

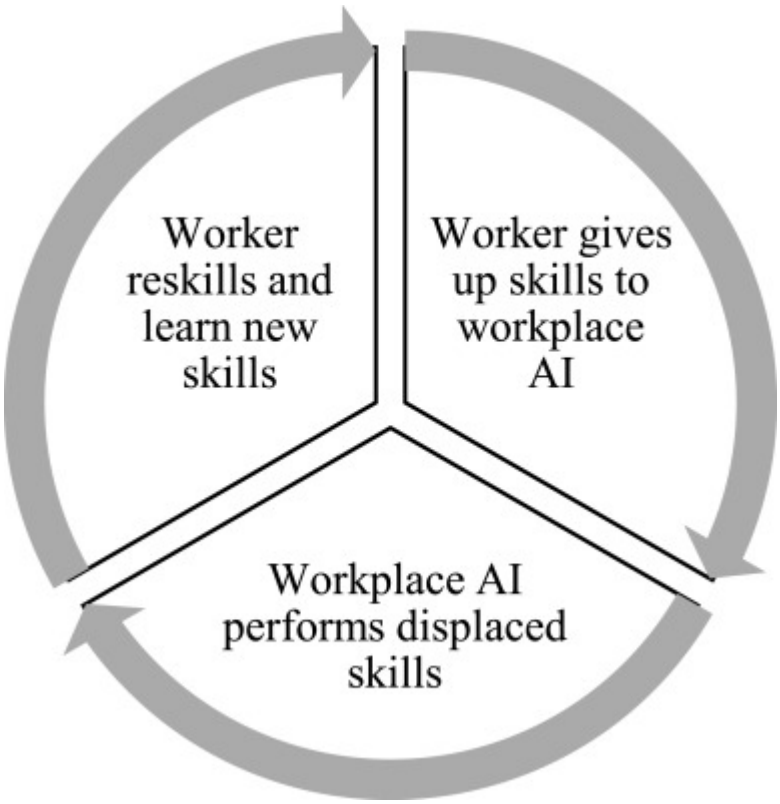
The Department's AI Principles for Developers and Employers (Table 2, 2024) include: 1) Centering Worker Empowerment; 2) Ethically Developing AI (Artificial Intelligence); 3) Establishing AI (Artificial Intelligence) Governance and Human Oversight; 4) Ensuring Transparency in AI (Artificial Intelligence) Use; 5) Protecting Labor and Employment Rights; 6) Using AI (Artificial Intelligence) to Enable Workers; 7) Supporting Workers Impacted by AI (Artificial Intelligence); and 8) Ensuring Responsible Use of Worker Data.

The best practices per each principle are as follows. 1) Centering Worker Empowerment refers to “Workers and their representatives, especially those from underserved communities, should be informed of and have genuine input in the design, development, testing, training, use, and oversight of AI (Artificial Intelligence) systems for use in the workplace.” 2) Ethically Developing AI (Artificial Intelligence) defines “AI (Artificial Intelligence) systems should be designed, developed, and trained in a way that protects workers.” 3) Establishing AI (Artificial Intelligence) Governance and Human Oversight embraces “Organizations should have clear governance systems, procedures, human oversight, and evaluation processes for AI (Artificial Intelligence) systems for use in the workplace.” 4) Ensuring Transparency in AI (Artificial Intelligence) Use refers to “Employers should be transparent with workers and job seekers about the AI (Artificial Intelligence) systems that are being used in the workplace. 5) Protecting Labor and Employment Rights defines “AI (Artificial Intelligence) systems should not violate or undermine workers' right to organize, health and safety rights, wage and hour rights, and anti-discrimination and anti-retaliation protections.” 6) Using AI (Artificial Intelligence) to Enable Workers enlightens “AI (Artificial Intelligence) systems should assist, complement, and enable workers, and improve job quality. 7) Supporting Workers Impacted by AI (Artificial Intelligence) leads to “Employers should support or upskill workers during job transitions related to AI (Artificial Intelligence).” 8) Ensuring Responsible Use of Worker Data addresses “Workers' data collected, used, or created by AI (Artificial Intelligence) systems should be limited in scope and location, used only to support legitimate business aims, and protected and handled responsibly.”

Ziar et al. (2023) demonstrated that workplace AI (artificial intelligence) can improve organizational efficiency, enable faster, more informed decision-making, and enable innovative products and services. There is a wealth of information about what value AI (artificial intelligence) brings to the workplace, and research on how workers and AI (artificial intelligence) can coexist in the workplace is evolving. To understand the trajectory of academic research, it is important to explore new themes and research questions. The most important research question of this study was how workers coexist with AI (artificial intelligence) in the workplace.

As a result of their literature review, Ziar et al. (2023) identified four themes. 1) Workers' distrust of AI (Artificial Intelligence) in the workplace stems from their perception of AI (Artificial Intelligence) as a threat to their jobs. 2) Workplace AI (Artificial Intelligence) facilitates worker-AI (Artificial Intelligence) interaction by enhancing worker capabilities. 3) The coexistence of AI (Artificial Intelligence) and workers requires the technical, human, and conceptual skills of workers. 4) Workers require continuous reskilling and upskilling to contribute to a symbiotic relationship with AI (Artificial Intelligence) in the workplace.

Figure 4 Skills framework for worker-AI coexistence (Ziar et al., 2023)



Shoss and Ciarlante (2023) investigated whether there was a tendency to work, in which people living in more unequal societies viewed advanced technologies (i.e., AI and robots) as a greater threat to society, while they were often discussed as a cause of social inequality. Based on their research that social inequality increased concerns about status hierarchies and future resource acquisition, they predicted that workers in more unequal societies were more likely to view AI/robots as a greater threat (e.g., AI and robots will destroy jobs).

Utilizing the Eurobarometer 87.1 dataset, Shoss and Ciarlante (2023) revealed that country inequality, operationalized via the Gini index, was positively correlated with the perception that AI (Artificial Intelligence) and robots posed a general threat of job loss. These associations were confirmed when controlling people's perceptions of technology threat to their personal job, technology skills and interests, and demographic variables. In addition, their findings were robust across different operationalizations of inequality, including the Human Inequality Index and people's subjective perceptions of current and future inequality in their country. These results advance theory on inequality and suggest that broader contexts of objective and subjective variables play a key role in how people view disruptions related to AI (Artificial Intelligence) and robots in the workplace.

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