SKILFUL NAVIGATION:
MAKING AI AND MIGRATION WORK FOR EUROPE

Capturing policy-relevant insights from the first year of the Link4Skills project, this initial version of our policy brief highlights the impact of artificial intelligence (AI) and automation on European labour markets, noting implications for skills development and labour migration. Policy recommendations stemming from this empirical research are provided. Also included is a preview of our AI-enabled Link4Skills Navigator (currently in development) which could become an essential tool in developing evidence-based solutions to Europe's labour market needs.

INTRODUCTION

Labour and skill shortages pose serious barriers to the EU's quest for inclusive and sustainable growth[1]. To help understand and tackle these barriers, the EU-funded Link4Skills research project is investigating ways to strengthen Europe's labour market policies in three areas: AI and automation, up-skilling and re-skilling, and migration. During the initial phase of our project, we have meticulously examined scores of relevant studies on the impact of AI and automation on labour market. This policy brief foregrounds our preliminary empirical results.

It should be mentioned that research in this field is currently hindered by a lack of sufficient public statistics and macroeconomic studies about the impact of AI on the EU labour market. Data is also lacking on the impact of AI on migration to and within the bloc. This limitation is particularly pronounced in comparison to the situation in the USA and China, where data sources are more abundant.

Using AI-supported methodologies in our meta-analysis, we found that automation and AI have dual effects on employment, leading to job displacement in routine, low-skilled roles while fostering job creation in high-skilled, knowledge-intensive sectors. Overall, our analysis shows that the average impact of automation and AI on net employment in the EU is positive at

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[1] European Union Council. *Labour and Skills Shortages in the EU: Mobilising Untapped Labour Potential in the European Union Draft Council Conclusions*. 2024
https://data.consilium.europa.eu/doc/document/ST-15463-2024-INIT/en/pdf.

approximately 1.5–2.0%, with gains in high-skilled jobs partially offsetting losses in low-skilled and manual occupations. Demand for high-skilled migrants in AI-driven sectors has increased by approximately 15-20% over the past decade, while automation and AI have contributed to a 5-10% decline in demand for low-skilled migrants.

Our findings suggest that managing EU labour markets effectively in an increasingly technology-driven environment will require a mix of policies that support workforce adaptability, inclusive skills development, and labour mobility. Concretely, we recommend expanding reskilling and upskilling initiatives, improving credential recognition systems for immigrants, addressing biases in AI systems, and strengthening social safety nets to support displaced workers (see detailed recommendations in following section).

EVIDENCE AND ANALYSIS

Automation and AI: Impact on Employment

According to a 2023 report by the World Economic Forum, more than 75% of companies plan to adopt big data, cloud computing, and AI features within the next five years. The adoption of AI-related technologies is expected to cause significant market disruption, potentially exacerbating skill shortages and highlighting the need for new skills. The European Union is already dealing with a substantial mismatch between labour supply and demand, particularly in STEM[2] fields. Almost half of European

businesses are struggling to recruit people with STEM skills. This is impacting key sectors like healthcare, information technology, and engineering. Our findings indicate that a lack of qualified personnel is an important innovation barrier for high productivity firms, and skill shortages seem to be strongly related to the cancellation of innovation projects.

AI and automation have profound and diverse effects on employment, varying across sectors, skill levels, and geographical contexts. While automation boosts productivity and innovation, its effects on employment are often uneven. In manufacturing sectors, for instance, automation has led to a decline in routine, low-skilled jobs, as seen in a 9.7% drop in manufacturing employment in highly automated regions. Workers in manual and repetitive occupations such as assemblers and plant operators face the greatest risk of displacement, with automation risks reaching 18%.

At the same time, high-skilled jobs experience growth, as firms require workers with technical expertise to operate and maintain automated systems. In service sectors, automation can create opportunities, leading to a 4.7% employment increase as tasks become more efficient, and new roles emerge. This shift highlights the polarizing effect of automation: high-skilled employment increases, whereas low-skilled workers face higher unemployment risks. For example, in Germany, high-skilled job gains offset low-skilled job losses, showcasing how automation transforms the workforce composition without necessarily reducing total employment.

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[2] science, technology, engineering, and mathematics

However, regions with slower adoption of technology face competitive disadvantages, as seen in the 10% employment drop in non-automating firms. These trends underline the need for proactive measures, such as reskilling programs, education reforms, and targeted policies, to help workers transition into new roles and mitigate automation-driven inequalities.

Sectoral and Regional Disparities
Developed EU economies and technologically advanced sectors benefit disproportionately from AI and automation adoption. Regions and industries with lower readiness for technological adoption, particularly in emerging EU economies, experience slower employment growth and higher risks of job displacement. Manufacturing sectors see the most pronounced job losses, while service and knowledge-intensive sectors often gain employment opportunities.

Demographic Impacts
Younger, highly skilled workers benefit most from AI and automation, as these technologies create demand for advanced skills and roles requiring human-AI collaboration. Older and low-skilled workers face heightened risks of job displacement and wage suppression, exacerbating inequalities in the labour market.

Wage and Productivity Effects
Automation and AI contribute to productivity growth and wage increases in high-skilled sectors but widen income inequalities by reducing wages for low-skilled workers. Wage gaps between high- and low-skilled workers are a

persistent issue, highlighting the need for targeted policy interventions.

Addressing skills shortages in the EU through migration

It is important to determine whether a labour market sector suffers from skill gaps or skill shortages. Skill gaps may relate to a problem in recruitment where some employers may not offer appropriate conditions including pay, career opportunities, an inclusive workplace, or further learning opportunities. By contrast a skill shortage relates to broader social, demographic and educational issues such as a lack of younger workers, a shortage of skills across the population, and an inability of the education and training system to prepare workers for filling those shortages. Immigration can be a solution for addressing both skills gaps and skills shortages. In the former case, though, the potential for displacing local workers or keeping wages down is higher than in the latter, where immigration may be seen as a sustainable strategy for injecting both new demographic cohorts and new skills profiles in a given national economy.

Migration can be regarded as a primary solution for countries facing labour shortages. This is particularly true in digital occupations as reflected in the strong employment growth in this sector among third-country nationals (TCNs) in the EU. Between 2011 and 2021 the number of TCNs working in digital occupations in the EU more than tripled (see figure 1).

Figure 1: Growth of third country nationals (TCNs) employed in digital, green and other occupations in the EU, 2011-2021

Source: Eurostat LFS 2011-2021, JRC elaboration (https://joint-research-centre.ec.europa.eu/jrc-news-and-updates/labour-migration-whats-it-countries-destination-and-origin-2024-06-12_en)

During the 2000s, countries increasingly recognized the crucial role of skilled migrants in enhancing their competitive edge and driving innovation within the knowledge economy, leading to intense global competition to attract skilled workers from around the world (Oishi, 2014). Countries such as such as Spain and Germany are focusing on facilitating legal migration through such measures as adjusting admission conditions, increasing quotas, and streamlining immigration procedures and processes (International Migration Outlook 2023).

Recently, signing bilateral agreements and mobility partnerships with selected target countries has become a popular strategy among several OECD countries. Examples within the EU include Portugal, Germany, and Austria which actively recruit migrant workers from India, Morocco, and other countries.

Demand for skilled migrants is continuing to rise, particularly in digital and green sectors, where their expertise is vital for addressing skill shortages and supporting economic transitions. Conversely, low-skilled migrants face declining opportunities, wage stagnation, and systemic barriers, including biases in AI-driven recruitment and limited access to reskilling programs.

Impact of AI and Automation on Labour Migration to the EU

AI and automation are transforming labour markets, creating a demand for high-skilled migrants in sectors such as technology, digital industries, and green transitions. Routine and low-skill jobs, traditionally filled by migrants, are

increasingly at risk of displacement due to automation.

Labour Market Polarization

Automation deepens labour market segmentation in the EU: high-skilled migrants benefit from new opportunities in AI-driven industries, while low-skilled migrants face reduced job prospects, wage stagnation, and limited upward mobility. Polarization is particularly pronounced in urban areas where AI and automation dominate labour markets.

Employment and Skill Utilization

Skilled migrants play a critical role in filling skill shortages, especially in automation-resilient roles, yet barriers like skill mismatches and credential recognition limit their full potential. Low-skilled migrants remain trapped in low-wage, routine occupations, struggling to transition into automation-resistant jobs.

Regional and Global Comparisons

In the EU, demographic challenges, such as an aging workforce, drive the need for skilled migration to support digital and green transitions. Non-EU regions like the U.S. and China show similar trends: skilled migrants thrive in AI- intensive sectors, while unskilled workers face displacement and stagnation. Within the EU, growing demand for TCNs in digital and green sectors has quadrupled over the past decade, reflecting the EU's reliance on skilled migrant workers.

Systemic Barriers and Challenges

As noted in the EU's 2024 AI Act [3], AI-driven recruitment and hiring systems can reinforce biases and are classified as "high risk". Such systems "may perpetuate historical patterns of discrimination", the act states, "for example against women, certain age groups, persons with disabilities, or persons of certain racial or ethnic origins or sexual orientation." Furthermore, low-skilled migrants have been found to have limited access to reskilling and retraining programs, thus exacerbating their vulnerability.

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[3] European Parliament and Council. *Regulation (EU) 2024/1689 of 13 June 2024 Laying Down Harmonised Rules on Artificial Intelligence and Amending Certain Union Legislative Acts (Artificial Intelligence Act)*. Official Journal of the European Union, L 168, 12 July 2024. Available online

EU POLICY RECOMMENDATIONS

Strengthen capacity of EU labour market to adapt to AI and automation, maximizing employment opportunities and mitigating effects of displacement.

- Develop policy measures proactively to address the challenges of automation and AI, including workforce reskilling programs, education reforms, and targeted support for vulnerable groups.

- Bridge digital divides and improve technological readiness, particularly in emerging EU regions. This is essential to ensure inclusive and equitable labour market transitions.

- Balance technological advancements with workforce adaptation to address skill shortages while mitigating labour market inequalities. Develop labour market adaptation strategies in parallel with tech advancement strategies.

- Expand targeted reskilling and upskilling programs, including for migrants, to help adapt to AI-driven labour markets. Develop job placement initiatives.

- Reduce biases in AI systems to ensure equitable employment opportunities.

- Strengthen social safety nets to support displaced workers.

- Improve credential recognition and skill verification for skilled migrants.

- Encourage public-private partnerships to facilitate workforce transitions and address labour market mismatches.

THE LINK4SKILLS NAVIGATOR: AI-ENABLED SUPPORT FOR EVIDENCE-BASED POLICYMAKING

Robust data systems and evidence-based policies can support inclusive growth and meet the evolving demands of the digital economy. Policymakers working to address these challenges may benefit from an AI-enabled modelling tool currently being developed by the Link4Skills project. This tool, known at this stage of development as the Link4Skills Navigator, will be our project's main deliverable. Work on the navigator is proceeding apace. A mock-up (low resolution prototype) can be seen here on the Link4Skills website. The main features of the Navigator are described below.

About link4Skills Navigator
https://link4skills.eu/index.php/publications/#navigator

The Link4Skills Navigator is an AI-Assisted Skill Navigator developed to address global skill shortages, with a special focus on the EU. It functions as a participatory expert knowledge-based system, analysing skill gaps and flows across continents (Europe, Africa, Asia, and the Americas) and offering tailored solutions for re/up-skilling, AI & automation, and migration strategies. Designed for policy and decision makers, analysts, scholars, and recruitment companies/employers, it integrates data analytics and stakeholder inputs to facilitate fair and effective skill partnerships, ensuring equitable skill exchanges between origin and destination regions.

What will the Link4Skills Navigator offer policymakers?

The Link4Skills Navigator will host comprehensive information to support policymakers in addressing skill shortages and optimizing labour market strategies. This knowledge-based expert system will guide stakeholders in making informed decisions to foster fair and effective skill utilization.

Key features include:

1. **EU Labor Market Analysis**:
   Data on skill shortages, gaps, and labour demands across the EU.

2. **Scenario Modelling:**
   "What-if" analyses to simulate potential outcomes:
   o Upskilling or reskilling the existing EU population, including migrant populations, with a special focus on inactive women.
   o Increased adoption of automation and AI in labour-intensive sectors.
   o Stimulating fair skilled migration to the EU from non-EU countries.

3. **Skill and Talent Partnership Inventory:**
   A repository of practices and frameworks for skill exchanges and partnerships between regions.

4. **Migration Skill Corridor Data**:
   Detailed data on skill supply and flows in selected 26 global migration skill corridors, including insights into both sending and receiving ends, helping to assess and design equitable partnerships.

About Link4Skills

Link4Skills is an EU-funded research and project addressing the global challenge of skill shortages and mismatches through innovative, sustainable solutions that foster fair skill utilization and exchange across continents.

Focusing on Europe, Africa, Asia, and America, the project seeks to bridge the gap between skill supply and demand by facilitating re/up-skilling, promoting automation, and encouraging migration as policy options.

Link4Skills is creating an inclusive, participatory policy decision-making environment by integrating a diverse range of stakeholders, including EU decision-makers, inter-governmental institutions, national and subnational decision-makers, employers organizations, employees organizations, and civic society co-development institutions.

Project Coordinator: Professor Izabela Grabowska

This policy brief was designed and drafted by Link4Skills consortium member Terry Martin (Science-Policy Interface Agency - SPIA). The main findings and recommendations are drawn from project deliverable 2.3 (Sowa, K., Przegalinska, A., Bezat-Jarzebowska A., Grabowska, I. (2024). *Meta-analysis on AI, automation, skills and migration*, Warsaw: Kozminski University). Consortium member Maegan Hendow served as "critical friend", offering valuable guidance during the drafting process.

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