▶ Digitalization and Employment

A Review

Lorraine Charles, Shuting Xia and Adam P. Coutts

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► Preface

The digitalization of the labour market offers rich opportunities, while it also brings important challenges. Opportunities include productivity growth, new market opportunities, new jobs, greater work-life balance, and higher pay. In addition to being an opportunity for economic transition it is also an opportunity for industrial upgrading and for the creation of jobs, including greener jobs and flexible jobs. The challenges include access to social security, association, access to control/inspection of work, health implications, etc. Negative effects of digitalization are associated with income and job insecurity, work intensification, and deterioration of mental well-being. For instance, digital labour platforms provide new sources of jobs and income, but raise challenges for workers' protection, representation and fair treatment. In addition, the ILO's analyses show that in particular, women and youth are often more negatively affected.

This is why the ILO's Centenary Declaration for the Future of Work, which was adopted in 2019, proposed a human-centred approach to new technology in the world of work. While the Declaration stressed the critical importance of "harnessing the fullest potential of technological progress and productivity growth", it specifically called for "policies and measures that ensure appropriate privacy and personal data protection, and respond to challenges and opportunities in the world of work."

This report, that reviews the existing literature on the digitalisation of employment, highlights some of the major challenges and opportunities, and identifies gaps as well as potential topics for future research, is indeed very welcome by the ILO in its pursuit to support its member States to develop fit for purpose gender-responsive employment policies that address the many challenges and opportunities of the ongoing digital transformation.

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▶ Acknowledgements

▶ Executive Summary

Governments are grappling to adequately respond to the rapid pace of labour market change brought about by digitalization and automation as public policies to protect workers lag behind this digital transformation. The COVID-19 pandemic has led to a reconceptualization of the nature of work, the workplace and has accelerated the shift of government services and people's livelihoods on to virtual and digital platforms. Now decision-makers and workers are faced with massive systemic changes that will affect their future working lives and communities.

This report is a scoping review of the publicly available literature which examines the new labour market opportunities brought about by digital transformation. It identifies gaps and potential avenues for future research. It also explores how some policies may be designed to offset the negative impacts of labour market transformation on individuals and communities.

The digitalization of the labour market encompasses a variety of occupations from on-demand logistics services like Deliveroo, to highly skilled software developers working remotely to individuals (or 'influencers') earning via data transactions generated by social media channels and livestreaming services. Digital workers are distributed around the world with an asymmetrical organization of labour. Digital workers are generally young and male. The skill levels of digital workers are heterogeneous, though with greater representation among those who are highly skilled. Overall, digitalization has penetrated almost all major economic sectors and changed the structure of the labour market.

The way that work is conceptualized and how people perform their jobs have been transformed by digitalization. Non-traditional forms of employment relations, such as casual work, have become common. Remote work has become, for some, a new norm and digital entrepreneurship is playing a greater role in economic development and social progress, especially since the COVID-19 pandemic. In addition, e-formality has become an emerging solution to decent work and sustainable development. Yet, despite these efforts, there are widening inequalities across countries, sectors and workers.

In this context, digitalization has posed new challenges to the world of work. First, employment relationships have become increasingly blurred. This has posed significant challenges to social protection that are based on formal employment relations. Second, employees' skill composition is challenged. Labour markets require more advanced digital skills but there is a shortage of digitally skilled workers and a high prevalence of skill mismatches. Third, the quality of jobs is being threatened. While flexibility is widely celebrated by digital workers, it can involve a greater amount of precarious and unpaid work. Moreover, social and professional isolation and work-life imbalance is a downside of this new flexibility. Although digital employment can increase economic inclusion, there is evidence of explicit or inexplicit forms of discrimination based on location, ethnicity, religion, and gender. Furthermore, digitalization potentially creates an unprecedented extension of work surveillance with an exponential rise in the use of smart phones and tracking technologies.

Different social groups are affected differently in the increasingly digital society. Employment outcomes of digitalization between men and women vary significantly. Compared to men, women face more difficulties in the transition across occupations and skill levels. Generally, they are less represented in sectors that require high digital skills and disruptive technical skills. Since digitalization can offer various pathways for economic development and poverty reduction, it is hoped that increased digitalization may enhance job opportunities for young people, refugees and marginal social groups such as ethnic minorities and people with disabilities. However, lack of regulatory controls, lack of infrastructure, digital devices and internet access and inadequate formal education systems make it difficult for them to benefit.

Efforts have been made by various stakeholders to ensure a fair and equal work environment in the digital era at local, national and international level. Some policies have been introduced to ensure the quality of employment concerning occupational safety and health standards, social security, regulation of work time and access to data and privacy. Skills training programmes and initiatives have been launched to target women, young people and marginalized social groups. However, there are still many (regulatory) gaps that need to be addressed, such as cross-border remote working, blurred employment relationships, workers' rights and collective bargaining. Further research is needed to understand the development of digital employment in developing countries, as well as more specific issues, e.g. how emerging technologies such

as Web3, the metaverse, decentralized autonomous organization (DAO) and blockchain will impact the future of work.

► Introduction

Today's world is characterised by increased connectivity, which has led to a rapid digitalization of the economy. The United Nations International Telecommunication Union (ITU) reveals that approximately 63 per cent of the global population were active Internet users in 2021.[1] The COVID-19 pandemic has accelerated the process of digital transformation. It has been estimated that global Internet traffic in 2022 will exceed all Internet traffic up to 2016.[2] Without a doubt, developed economies in particular, are moving towards a fast-evolving, data-driven digital economy.

The diffusion of digital technology into nearly every business and workplace is reshaping the world of work. One of the most prevalent phenomena is that digitalization has been transforming how labour markets function. Although current statistics on the size of the digital workforce are fragmented and the presence and influence of digital workers remains difficult to measure, the picture emerging is sobering. Many governments, the private sector, NGOs/INGOs and civil society actors see a significant developmental potential in digital employment. The Organisation for Economic Cooperation and Development (OECD) reports that almost all its member states (only 4 exceptions out of 38) have a national digital strategy (infrastructure construction, digital skills development, etc.) at the highest level of government.[3] Countries such as Malaysia, Nigeria, Egypt and China also take digitalization as a key developmental strategy at the national level. The existence of these strategies has major implications for work organizations, workers' well-being and working conditions around the world and lays down new challenges for policy interventions.

This report reviews existing literature on digitalization in the context of employment, giving a definition of digital employment and addressing its characteristics in terms of regional distribution, workers' profiles, and sectoral features. It explores how digitalization has transformed the world of work, including the new types of work that have emerged, employment relationships, skills required and job quality. Finally, groups that are at risk of being marginalized in the digital economy are addressed, examining youth, women, minorities, people with disabilities and refugees/displaced people and migrants. The paper highlights some of the current policy responses that have been designed to ensure decent work in the context of digitalization and concludes with identifying gaps that exist and areas that require further research.

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[1] ITU, Statistics, (2021).

[2] UNCTAD, Digital Economy Report 2021: Cross-Border Data Flows and Development for Whom the Data Flow (2021).

[3] OECD, Digital Economy Outlook 2020, (2020).

► 2. Characteristics of digital employment

2.1 Digital economy and digital labour

It is difficult to provide a generally agreed definition of the 'digital economy', as digitalization has penetrated almost all sectors of the economy. The digital economy is thought to encompass a wide range of new ways of incorporating data and the Internet into production processes and business models.[4] The digital economy can be narrowly defined as online platforms and activities that owe their existence to such platforms. In a broad sense, all activities that use digitized data can be regarded as part of the digital economy. If defined by use of digitalized data, the digital economy would encompass an enormous range of economic activities from agriculture to R&D.[5] Considering the rapid development of the digital economy and the pace of innovation, a narrow definition of digital economy may quickly become obsolete.

Broadly speaking, the digital economy 'incorporates all economic activity reliant on, or significantly enhanced by, the use of digital inputs, including digital technologies, digital infrastructure, digital services and data'.[6] Likewise, the digitalization of the labour market can include all variations, from the introduction of some digital software into existing jobs to the creation of new types of fully digital jobs.

Digital labour or jobs in the digital economy encompasses on-demand logistics services like Uber and Deliveroo, micro-work venues such as Amazon Mechanical Turk, data transactions generated by social media channels and online retail portals devoted to one-click consumption, among others. A forthcoming ILO report provides a holistic definition of digital labour:[7] all work that uses, or is made possible by, information and communication technologies (ICT) may be considered "job in the digital economy", or "digital job"—a broad definition that encompasses most jobs in advanced economies. "Digital job" includes careers within the ICT industry, as well as a wide variety of jobs outside the ICT industry that rely on digital skills and take advantage of digital technologies. Digital jobs exist across all sectors and vary in the extent to which they necessitate digital skills and technology. Broadly, they can be divided into three types. First, ICT-intensive jobs that are directly created through the ICT sector and intensively using ICT, such as software engineering or website development. Second, ICT-dependent jobs that cannot be performed without technology, such as online freelancing work, jobs on digital labour platforms (e.g., Uber, Upwork, etc.), or e-commerce platforms. Finally, ICT-enhanced jobs that use digital technologies yet could be performed without ICT, such as accounting, office management, or graphics design, as well as the integration of digital technologies in sectors such as retail, service delivery, hospitality, agriculture, etc.

2.2 Regional characteristics

Since the 1990s, outsourcing, franchising and temporary agency work enabled by the wide permeation of ICTs have been key features of today's labour market. With the outsourcing of work, workers, including digital workers, are distributed around the world with an asymmetrical organization of labour. Increasingly, digital work is outsourced from the global North, and undertaken by people from the global South.[8] This means that the vast majority of the global digital labour platforms hiring digital workers, such as Samasource, CrowdFlower and MobileWorks, Upwork and Fiverr are from high-income countries while its workers reside in low-income countries.[9] ILO research shows that the work is largely outsourced from Australia, Canada, Germany, New Zealand, the United Kingdom of Great Britain and Northern Ireland and

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[4] IMF, Measuring the Digital Economy, (2018).

[5] IMF, Measuring the Digital Economy, (2018).

[6] OECD, Digital Economy Outlook 2020, (2020)

[7] ILO, 'Training Module on Youth Employment in the Digital Economy', (Forthcoming).

[8] Vili Lehdonvirta, et al., 'The Global Platform Economy: A New Offshoring Institution Enabling Emerging-Economy Microproviders', Journal of Management 45, no. 2 (1 February 2019): 567–99.

[9] Graham, M., Hjorth, I., and Lehdonvirta, V., 'Digital Labour and Development: Impacts of Global Digital Labour Platforms and the Gig Economy on Worker Livelihoods', Transfer: European Review of Labour and Research 23, no. 2 (1 May 2017): 135–62.

the United States of America and performed by workers from developing countries such as India, Bangladesh, Philippines and Ukraine (Ukraine data from pre March 2022).[10] This distribution is also supported by the Oxford University's Online Labour Index.[11]

Digital workers now make up a significant proportion of the overall labour force in Eastern European countries. This has increased rapidly in the past decade.[12] In Nordic countries such as Denmark, Sweden, Norway and Finland, the digital shift has contributed to a rising share of digital jobs in various sectors.[13] In the United States of America, the share of jobs that require substantial digital knowledge tripled between 2002 to 2016 from 4.8 to 23 per cent.[14]

The proportion of digital workers in Africa remains low because of relatively poor digital infrastructure. Only 17 per cent of Africa's population can afford one gigabyte of data, compared to 37 per cent in Latin America and the Caribbean and 47 per cent in Asia.[15] In Africa the other main barriers to the digital economy are the lack of digital skills and low ownership of computers among the population.[16] The lack of computers and laptops, which are necessary for meaningful participation in the digital labour market, means that participation in the digital economy is limited to tasks that can be performed on smartphones such as e-hailing and online delivery. This means there are limited opportunities for individuals to engage in more meaningful work such as coding. This also means that lower skilled digital work such as tagging and the categorisation of content is also unattainable for the vast majority of the population.[17]

In Latin America, like in Africa, the proportion of digital workers is also low. This can be linked to socio-economic factors. There is a direct correlation between the completion of upper secondary education and basic proficiency in digital skills. A large share of Latin American adults have very little or no computer experience, ranging from 43.6 per cent in Peru to 25.2 per cent in Chile.[18] Moreover, less than 10% use digital technology for more advanced tasks, such as programming and real-time communications and only one third of workers use computers, smartphones or other ICT tools at work once per week or more.

In the Middle East and North Africa (MENA), lack of digital infrastructure hinders people from participating in the digital economy. Around 66 per cent of individuals in MENA used the Internet in 2020.[19] This is similar to the global average.[20] However, access to the Internet remains highly unequal because of the limited affordability of broadband Internet. Thus, the majority of people in the region access the Internet on a mobile device and the Internet speed is the second-lowest globally after Africa.[21] The high proportion of Internet users in the region using a mobile device has important consequences of both digital skills training and the ability to conduct remote work.

There has been a widening gap between regions in terms of the digital employment landscape. For instance, digitalization is relatively low in ASEAN countries such as Lao People's Democratic Republic and Myanmar where the size of employment in agriculture is significant and the manufacturing sector accounts for only a modest share of GDP.[22] Price level and skills requirements (technical and language) are key factors that

[10] ILO, World Employment and Social Outlook 2021: The Role of Digital Labour Platforms in Transforming the World of Work (2021).

[11] Otto Kässi and Vili Lehdonvirta, 'Online Labour Index: Measuring the Online Gig Economy for Policy and Research', Technological Forecasting and Social Change 137 (2018): 241–48.

[12] Mariya Aleksynska, 'Digital Work in Eastern Europe: Overview of Trends, Outcomes, and Policy Responses', ILO Working paper 32, (2021).

[13] Bertil Rolandsson et al., 'Digital Transformations of Traditional Work in the Nordic Countries', 2020.

[14] Mark Muro et al., 'Digitalization and the American Workforce' (2017).

[15] OECD Africa's Development Dynamics 2021: Digital Transformation for Quality Jobs, (2021).

[16] Research ICT Africa, Digital Labour in Africa: Opportunities and Challenges, (2021).

[17] Mothobi Onkokame, Aude Schoentgen and Alison Gillwald, 'What is the State of Microwork in Africa? A View from Seven Countries, Research ICT Africa, (2018).

[18] OECD, Latin American Economic Outlook 2020: Digital Transformation for Building Back Better, (2020).

[19] Alexander Farley and Manuel Langendorf, 'Covid-19 and Internet accessibility in the MENA Regions: Maximizing Digital Skills and Connectivity for Economic Recovery', Wilson Centre, (2021).

[20] ITU, Measuring Digital Development: Facts and Figures 2021, (2021).

[21] Alexander Farley and Manuel Langendorf, 'Covid-19 and Internet Accessibility in the MENA Regions: Maximizing Digital Skills and Connectivity for Economic Recovery', Wilson Center, (2021).

[22] ILO, 'Preparing for the Future of Work: National Policy Responses in ASEAN +6', (2019).

determine the global geographical distribution of digital work. Around one third of the EU has experienced heightened job polarization since the start of the new century, especially in capital city regions.[23]

The availability of IT infrastructure also plays an important role. Compared to South and East Asia, Central Asia and sub-Saharan Africa provide a much lower share of labour employed in outsourced work due to fewer skilled workers and inadequate IT infrastructure (broadband, cloud computing and data infrastructure). Beyond technology, factors such as urbanization, deindustrialization and labour-market institutions also determine the various patterns.[24]

Languages influence the regional features of digital employment. In Eastern Europe, there are three geographical dimensions of digital work: national, regional and international digital labour markets.[25] The national digital labour market is mediated by platforms in a specific country, matching locally based clients and workers and operating in local languages. The regional digital labour market is mediated by a common language, such as Russian in the former Soviet bloc countries. There are also regional and local platforms operating in Arabic and Chinese, such as Mostaql.com, the largest Arabic freelancing platform in the Middle East and North Africa, Tasmeem Middle East (tasmeemME), the first regional online network dedicated to promoting and empowering Arab creative talent, Khamsat.com, an online marketplace for digital services targeting the Middle East and North Africa, and Zhubajie.com, China's biggest crowdsourcing platform. Workers active in the international digital labour markets work in English and are matched by American-, British- and Australian-based platforms to clients all over the world.[26]

2.3 The profile of digital workers

Since quantifying the number of digital workers is a difficult endeavour, giving an accurate description of the digital worker is complex. Although the sheer size of the digital economy makes it impossible to make any broad generalizations, there are some rough estimates for platform workers, which may provide some indications of the profile of digital workers as a whole.

Various sources have revealed some commonalities in the profiles of digital workers around the world. They are generally younger compared to the overall labour force. In East European countries, digital workers are on average in their thirties and are highly representative of the younger age group (18-26) in countries such as the Russian Federation and Poland.[27] In China, the profile of digital workers is similar to that of Eastern Europe.[28]

The gender distribution is clear. Male platform workers outnumber their female counterparts. In China, only 30 per cent of online platform workers were female in 2018.[29] This gender distribution is similar to findings from other surveys in countries such as India.[30] However, the rates of female participation on platforms are considered higher in industrialized countries than the rates observed in China. Evidence shows that the gender gap has narrowed in recent years. For example, the share of Russian female digital workers rose from 33 per cent in 2009 to 46 per cent in 2019.[31] Although the proportion of young female platform workers increased rapidly in some countries, men still account for the largest share.[32]

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[23] Eskarne Arregui Pabollet et al., The Changing Nature of Work and Skills in the Digital Age, European Commission, (2019).

[24] Eskarne Arregui Pabollet et al., The Changing Nature of Work and Skills in the Digital Age, European Commission, (2019).

[25] Mariya Aleksynska, 'Digital Work in Eastern Europe', ILO Working Paper 32, (2021).

[26] Daphne Ahrendt et al., 'Living, Working and COVID-19', Eurofound Report, (2021).

[27] Eskarne Arregui Pabollet et al., 'The Changing Nature of Work and Skills in the Digital Age', Publications Office of the European Union, (2021); Mariya Aleksynska, 'Digital Work in Eastern Europe', ILO Working Paper 32, (2021).

[28] Yiu Por (Vincent) Chen, 'Online Digital Labour Platforms in China: Working Conditions, Policy Issues and Prospects', ILO Working Paper 24, (2021).

[29] Yiu Por (Vincent) Chen, 'Online Digital Labour Platforms in China: Working Conditions, Policy Issues and Prospects', ILO Working Paper 24, (2021).

[30] Yiu Por (Vincent) Chen, 'Online Digital Labour Platforms in China: Working Conditions, Policy Issues and Prospects', ILO Working Paper 24, (2021).

[31] Mariya Aleksynska, 'Digital Work in Eastern Europe', ILO Working Paper 32, (2021).

[32] Mariya Aleksynska, 'Digital Work in Eastern Europe', ILO Working Paper 32, (2021).

Digital workers in most European countries are generally highly skilled.[33] Close to 60 per cent of those who provide services on platforms as their main job in these countries have at least tertiary education in 2017.[34] While in the United States and China, skills distribution of digital workers is relatively more even.[35] However, it should be noted that the varied skill levels of the digital platform workers measured may be a result of different survey design and the choice of platforms.

Notably, digital employment provides alternative income-generating opportunities for workers that used to be marginalized in traditional labour markets such as women, individuals with disabilities, migrant workers, refugees and indigenous and tribal peoples, among others.[36]

2.4 Occupational and sectoral features

Research has shown that digitalization has penetrated almost all major economic sectors and changed the structure of labour markets. Although fears of widespread replacement of jobs because of technological breakthroughs exist,[37] a neutral or even positive effect on the net employment and labour productivity has been observed in European and OECD countries.[38] Notably, occupations that are predicted to grow most in the EU-28 by 2030 appear to be disproportionately among those that require a high level of education and intensive skills in social and interpretative tasks, as well as among elementary occupations such as cleaners and food preparation assistants, whereas the share of middle-skilled occupations such as machine operators and metal machinery workers will decline.[39] There is a common assumption in the academic literature and media that digital technologies will have the greatest impact on routine manual jobs involving limited cognitive tasks, and which require low levels of formal education qualification.[40]

Digitalization has led to changes in occupational structures.[41] Occupations that are most likely to be replaced in the next few years encompass data entry clerks, administrative and executive secretaries, accounting and bookkeeping and payroll clerks, accountant and auditors, assembly and factory workers, and business services and administrative managers.[42] More roles will be created in cutting edge industries, such as data analysts and scientists, AI and machine learning specialists, robotics engineers, information security analysts and digital transformation specialists.[43] The emergence of new occupations can also be industry specific such as social media specialists in the consumer sector and FinTech engineers in financial services.[44] The pattern of lower skilled jobs being replaced by those that require more advanced digital skills and technical expertise is clear.

A study of job posting data in five OECD countries (the United States, Canada, Australia, New Zealand, and Singapore) in 2013 showed that the least digitalized jobs became more digital at a faster rate than the most

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[33] Bertil Rolandsson et al., 'Digital Transformations of Traditional Work in the Nordic Countries', Nordic Council of Ministers No. 540, (2020); Mariya Aleksynska, 'Digital Work in Eastern Europe', ILO Working Paper 32, (2021).

[34] Eskarne Arregui Pabollet et al., 'The Changing Nature of Work and Skills in the Digital Age', Publications Office of the European Union, (2021).

[35] Mark Muro et al., 'Digitalization and the American Workforce'; (2020) CAICT, 'Report on the Employment Development of China's Digital Economy: New Forms, New Models, and New Trends' .

[36] Graham, Hjorth, and Lehdonvirta, 'Digital Labour and Development'; Aditi Surie and Lakshmee V. Sharma, 'Climate Change, Agrarian Distress, and the Role of Digital Labour Markets: Evidence from Bengaluru, Karnataka', DECISION: Official Journal of the Indian Institute of Management Calcutta 46, no. 2 (2019): 127–38.

[37] Carl Benedikt Frey and Michael A. Osborne, 'The Future of Employment: How Susceptible Are Jobs to Computerisation?', Technological Forecasting and Social Change 114, (2017): 254–80.

[38] David Autor and Anna Salomons, 'Is Automation Labor-Displacing? Productivity Growth, Employment, and the Labor Share', National Bureau of Economic Research, (2018); Andre Jungmittag, 'Robotisation of the Manufacturing Industries in the EU: Convergence or Divergence?', The Journal of Technology Transfer 46, no. 5, (2021): 1269–90; David Klenert, Enrique Fernández-Macías, and José-Ignacio Antón, 'Do Robots Really Destroy Jobs? Evidence from Europe', Economic and Industrial Democracy, 26, (2022).

[39] Eskarne Arregui Pabollet et al., 'The Changing Nature of Work and Skills in the Digital Age', Publications Office of the European Union, (2021); Carolina Feijao et al., 'The Global Digital Skills Gap: Current Trends and Future Directions', RAND Corporation, (2021).

[40] David Spencer et al., 'Digital Automation and the Future of Work', European Parliament, (2021).

[41] Irene Mandl. 'Employment impact of digitalisation'. EUROFOUND, (2021), 15TH December.

[42] World Economic Forum, The Future of Jobs Report 2020, (2020).

[43] World Economic Forum, The Future of Jobs Report 2020, (2020).

[44] Carolina Feijao et al., 'The Global Digital Skills Gap', RAND Corporation, (2021).

digital occupations.[45] However, occupational changes will take place in varied ways in different countries. In, for example France and the UK, it has been observed that over the first fifteen years or so of the 21st century, occupational distribution was polarized, meaning that the majority of jobs required either advanced digital skills or little to no digital skills, while in other develop countries such as Finland, Spain and Poland, the jobs that have been created were mostly high pay and skill jobs and fewer in low-skilled/paid jobs.[46] In Nordic countries, digitalization in traditional service industries tends to propel moves away from routine manual tasks towards more qualified, communicative tasks.[47] Notably, the overall effect of digitalization on jobs in any industry is indeed influenced by a range of economic-political, distributional and institutional factors.

While most digital automation is considered to take place in manufacturing and agriculture, business leaders in the logistics, retail, finance and accounting sectors are also fully aware of the potential impacts of digitalization.[48] A recent study by Aleksynska found that the three types of occupations that are exposed the most to the greatest amount of digitalization in eastern Europe are IT (software and technology development), content writing (editing and translating, etc.), and the creative and multimedia industry (design, work with photos and videos).[49]

In Nordic countries with well-developed digital infrastructures, stable welfare arrangements and strong social partners, digital transformation has been found to exert different effects on employment in different industries.[50] Sectors such as retail, banking, manufacturing and other tangible goods production, digitalization have reduced employment growth and increased labour productivity in Nordic countries. Moreover, digitalization, in these countries, has increased employment in service industries and has thus contributed to rising female employment. The high demand for services, especially in high-skilled service occupations, has driven rising employment in high-skilled jobs while making workers in lesser skilled routine jobs face more uncertain job prospects.

According to a World Economic Forum (WEF) report which highlights the most in-demand jobs in the United States in 2021, alongside a call for more healthcare professionals of every stripe in the wake of the coronavirus pandemic, roles in areas such as artificial intelligence are growing rapidly.[51] LinkedIn also predicts that there will be 150 million new technology jobs globally in the next five years, and data scientist and data engineer roles in the US are growing by 35 per cent annually.[52] With growing concern over racial and gender equity, 2020 also saw a 64 per cent increase in the hiring of workplace diversity experts. The focus on technology aligns with findings from LinkedIn on the top 10 most in-demand jobs for 2021, all of which relied heavily on digital capabilities, including software development, data analytics, digital marketing, and graphic design.

[45] APEC, APEC Closing the Digital Skills Gap Report: Trends and Insights; Perspectives on the Supply and Demand of Digital Skills and Degree of Digitalization, (2020).

[46] Eskarne Arregui Pabollet et al., 'The Changing Nature of Work and Skills in the Digital Age', Publications Office of the European Union, (2021); Rolandsson et al., 'Digital Transformations of Traditional Work in the Nordic Countries', Nordic Council of Ministers No. 540, (2020).

[47] Bertil Rolandsson et al., 'Digital Transformations of Traditional Work in the Nordic Countries', Nordic Council of Ministers No. 540, (2020).

[48] David Spencer et al., 'Digital Automation and the Future of Work', European Parliamentary Research Service, (2021).

[49] Mariya Aleksynska, 'Digital Work in Eastern Europe ', ILO Working Paper 32, (2021).

[50] Bertil Rolandsson et al., 'Digital Transformations of Traditional Work in the Nordic Countries', Nordic Council of Ministers No. 540, (2020).

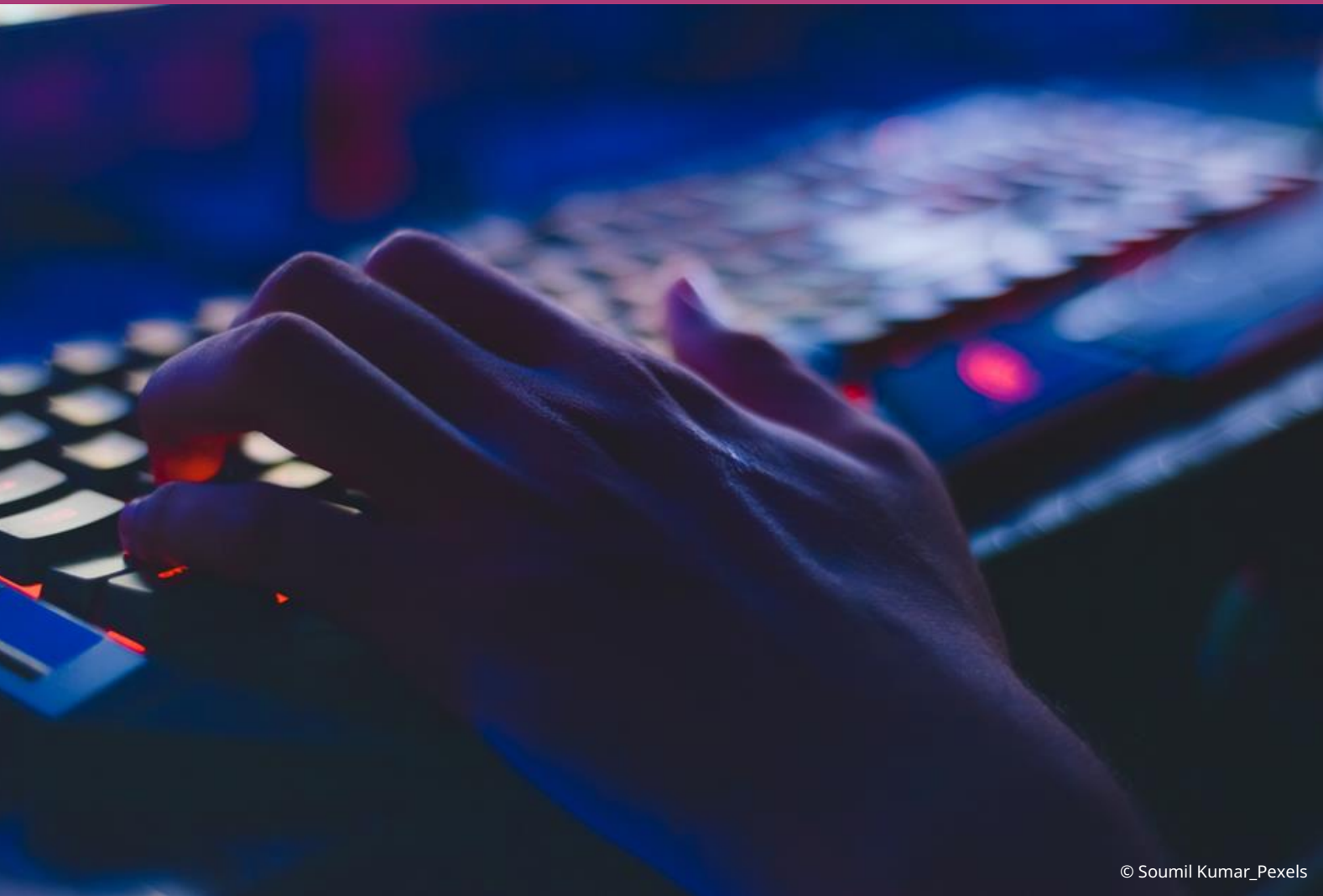[51] WEF, The Most in-Demand Jobs for 2021, (2021).

[52] LinkedIn, Jobs on the rise in 2021, (2021).

► 3. The digital transformation of the labour market

Digital technologies do not simply affect the volume of jobs: they also transform the way that work is conceptualized and how people perform their jobs. The World Economic Forum (WEF) estimated that, by 2025, 85 million jobs may be displaced by a shift in the division of labour between humans and machines, while 97 million new roles that are more adapted to the new division of labour between humans, machines and algorithms may emerge.[53] By 2025, humans and machines will spend equal time on tasks at work. Therefore, for many workers, the principal effect of digitalization will be felt through changes in the nature and content of work within a transformed work environment.

The impact of digital change on work and employment are multifaceted. This section will focus on how digitalization will promote new forms of work, bring changes to employees' skill sets, job quality, gender inequality at work, vulnerable people and refugees.

3.1 New forms of work

3.1.1 Digitalization and employment relations

Digitalization is facilitating non-traditional forms of employment which provide greater flexibility. New patterns of employment such as ICT-based mobile work and digitally-enabled forms of self-employment are gaining traction around the world. Non-traditional forms of employment, or non-standard employment, refer to the forms of work that 'falls out of the realm of the full time, indefinite work and as part of a subordinate and bilateral employment relationship'.[54] Casual work, whereby workers do not have regular and systematic work schedules, such as employee-sharing schemes,[55] is a typical example. In casual work, a worker is jointly hired by a group of employers. This form of work is widespread in the EU and other regions as a result of digitalization.[56] It is estimated that global demand for online freelancing has been growing by 11 per cent annually within the last five years.[57] In EU countries, while most workers are still on permanent full-time contracts, since 2001, there has been a growing trend for people to work part-time or on temporary arrangements.[58] Additionally, high-skilled solo entrepreneurs have experienced rapid growth. Self-employed workers without any employees doing professional, scientific and technical activities have expanded by over 35 per cent since 2008 in the EU, despite the fact that most of the own-account workers are still in low-value-added sectors.[59] Although this trend can be attributed to a wide range of interrelated factors such as demographic shifts, labour market deregulation and global competition among others, digital technology is a key influence.

The classification of employment relations becomes less straightforward as a result of the new forms of employment. Short-term work contracts are becoming increasingly common. One fifth of all dependent employees in EU countries were in temporary employment in 2018 and jobs are increasingly short-lived.[60] Despite increasing job insecurity, stagnant wages and increasing 'gig work', ICT technologies and digital

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[53] WEF, The Future of Jobs Report 2020, (2020).

[54] ILO, Non-Standard Employment Around the World, p.7, (2016).

[55] ILO, Non-Standard Employment Around the World, p.7, (2016).

[56] Eskarne Arregui Pabollet et al., 'The Changing Nature of Work and Skills in the Digital Age', Publications Office of the European Union, (2021).

[57] Fabian Stephany, 'How Big Is the Online Labour Workforce? Our Data-Driven Approach to This Tricky Question', Investigating the Construction of Labour Markets, Institutions and Movements on the Internet (blog), 2021.

[58] Eskarne Arregui Pabollet et al., 'The Changing Nature of Work and Skills in the Digital Age', Publications Office of the European Union, (2021).

[59] Eskarne Arregui Pabollet et al., 'The Changing Nature of Work and Skills in the Digital Age', Publications Office of the European Union, (2021).

[60] Eskarne Arregui Pabollet et al., 'The Changing Nature of Work and Skills in the Digital Age', Publications Office of the European Union, (2021).

labour platforms have enabled more accessible and cost efficient job search and job matching.[61] It has been noted that, as more workers become 'freelancers' or 'gig workers', the traditional employment relationship is being severely challenged and it becomes difficult for workers to act collectively because they do not have a common employer.[62] The "gigification" of jobs in the economy[63] has been accelerated by the COVID-19 pandemic, reshaping the lives of workers and communities.

Non-traditional employment arrangements or the blurring of the employment relationship often take advantage of the grey areas associated with labour protection. This is particularly so for platforms. Although most of the platforms only directly hire fewer than 50 employees, excluding some big platform companies such as Uber, they mediate work for tens of thousands who are classified as freelancers, self-employed individuals and independent contractors with little employment protection, even though their work sometimes more closely resembles that of an 'employee'.[64] The exchange of work for a wage is regarded as a commercial exchange rather than an employment contract.[65] Workers classified as self-employed or independent contractors cannot enjoy many employee benefits such as certain forms of leave (e.g. maternity leave), working time, and rates of remuneration.

Workers in many of these non-traditional forms of work are more likely to experience wage penalties, have fewer opportunities to receive employer-sponsored training, and a higher risk of transition into unemployment.[66] Yet, this may not necessarily be the case for highly skilled individuals who work as freelancers or contractors, who are compensated at a premium because of their digital and technical expertise.[67] In general, digital work is often seen as a continuation of the informalization trend.

This issue of misclassification has long been discussed in publications and has drawn some attention from policymakers and various social actors. Today's governance of the labour market still largely centres on standard employment relations. Expectations of continuous, full-time work continue to be at the heart of policy design. Career breaks are penalized. Because of the transformation in the world of work, there is a renewed urgency to reconfigure labour law beyond the standard employment relationship. Aleksynska identified three types of policy responses in this aspect: bring digital work under the scope of existing regulations; ensure fair competition with workers in traditional forms of employment; and improve formalization and better tax compliance of digital workers.[68]

It is crucial to incorporate digital workers with non-standard employment relations into existing regulatory frameworks. There is some progress at national level. In the mid 2010s, Romania adopted a series of criteria to determine the legal nature of the work relationship, re-examining the employment status of its self-employed workers who accounted for 40 per cent of the labour force.[69] Moreover, the UK Supreme Court ruled on 19 February 2021 that Uber drivers should be recognised as 'workers' and be entitled to paid holidays, the minimum wage, sick leave and a pension.[70] However, digital workers' employment status is still unregulated in many countries where fragmented national regulations are common. Currently, countries around the world are adopting very diverse juristic approaches to determine the employment status in question.

In response to the legal uncertainty, EU institutions have worked to address these challenges. For instance, the European Parliament issued a 'Draft report on fair working conditions, rights and social protection for

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[61] OECD, *OECD Employment Outlook 2019: The Future of Work,* (2019).

[62] David Peetz, *The Realities and Futures of Work*, ANU Press (2019).

[63] Abigail Gilbert et al., 'The Amazonian Era: The Gigification of Work', Institute for the Future of Work, (2021).

[64] Mark Graham, Isis Hjorth, and Vili Lehdonvirta, 'Digital Labour And Development: Impacts Of Global Digital Labour Platforms and the Gig Economy on Worker Livelihoods', *Transfer*, 23 (2017): 135-162.

[65] ILO, *Non-Standard Employment around the World: Understanding Challenges, Shaping Prospects*, (2016).

[66] ILO, *World Employment and Social Outlook 2021: The Role of Digital Labour Platforms in Transforming the World of Work* (2021).

[67] APEC, *APEC Closing the Digital Skills Gap Report: Trends and Insights; Perspectives on the Supply and Demand of Digital Skills and Degree of Digitalization*, (2020).

[68] Mariya Aleksynska, 'Digital Work in Eastern Europe: Overview of Trends, Outcomes, and Policy Responses', ILO Working paper 32, (2021).

[69] Mariya Aleksynska, 'Digital Work in Eastern Europe: Overview of Trends, Outcomes, and Policy Responses', ILO Working paper 32, (2021).

[70] Sarah Butler, 'Uber Drivers Entitled to Workers' Rights, UK Supreme Court Rules', The Guardian, (2021).

platform workers – new forms of employment linked to digital development'.[71] ILO's Global Commission on the Future of Work also called for the establishment of a 'Universal Labour Guarantee' that is applicable to all workers.[72] However, the progress of this strategy has, so far, been relatively modest.

Realising the difficulty of extending employment benefits and social protection to all digital workers, some politicians have called for broadening the scope of rights beyond employment to social citizenship or to personal work relations. For example, a working paper by Countouris proposed a 'Universal Work Relation' framework which covers not only employees by traditional standard employment relations, but also those who are in 'less subordinate, continuous or formalized personal work relations' that are currently excluded from the scope of labour law.[73] In addition, some political leaders are advocating for a Universal Basic Income (UBI) to protect the fluctuations of digital workers' below minimum-wage incomes and the rights of individuals who are not classified as employees. Pilot programmes are underway in Wales, Finland, Kenya and Iran to assess the viability of UBI.[74]

3.1.2 Social protection

Social protection is regarded as a universal human right which is necessary for economic and social development and progress. It includes healthcare, education services (fee waivers), sickness and unemployment benefits, child and family benefits and old-age pensions. The aim of social protection is to reduce and prevent social risks, including maternity, sickness, disability, employment injury, unemployment and expenditure, throughout the life cycle for everyone, particularly those who are poor, vulnerable and marginalized. However, only 46.9 per cent of the global population were effectively covered by at least one social protection benefit and less than one third of the working-age population were legally covered by comprehensive social security systems that include a full range of benefits in 2020.[75] Gaps in the coverage of social protection systems are particularly significant in Africa, the Arab States and Asia.[76]

Social protection is usually provided by the state (this is of-course depending on the political and economic situation in the country – there are significant differences between countries in this regard) through domestic resources, either contributions or tax finance.[77] Broadly speaking, the system includes four types: social assistance, social insurance, social care services and labour market programmes.[78] As for labour market policies and interventions, related social protection schemes are usually provided through formal employment relations. Since digitalization has led to the proliferation of alternative work arrangements, new demands on social protection have been created and existing policy configurations are not readily met.[79] For instance, a greater availability of non-standard employment contracts can create strong incentives for workers or employers to reduce costs by opting out of social support provisions. This can undermine the foundations of risk sharing and lead to a declining reach of social protection.

Existing discussions and publications on digital workers' social protection are mostly concentrated on platform workers in the gig economy. This may be due to the fact that their employment relations are mostly controversial and they face a similar situation as those working in the informal economy (that in some countries absorbs the largest part of the labour force) and marginal groups such as refugees and migrants. It is believed that current social protection systems are not well equipped to address the challenges associated with digitalization. Significant gaps in social security coverage amongst digital crowdwork

[71] European Parliament, 'Draft Report on Fair Working Conditions, Rights and Social Protection for Platform Workers- New Forms of Employment Linked to Digital Employment', Committee on Employment and Social Affairs, European Parliament, (2019).

[72] ILO, *Work for a Brighter Future – Global Commission on the Future of Work,* (2019).

[73] Nicola Countouris, 'Defining and Regulating Work Relations for the Future of Work', ILO Working Paper, (2019).

[74] David Deans, What is a universal basic income? What are the Welsh plans?, BBC, (2022)

[75] ILO, World Social Protection Report 2020-22, ILO Flagship Report, p19, (2021).

[76] ILO, *World Social Protection Report 2020-22*, ILO Flagship Report, p19, (2021).

[77] United Nations, *Promoting inclusion through social protection: Report on the world social situation 2018*, (2018).

[78] Becky Carter, Keetie Roelen, Sue Enfield and William Avis, Social Protection Topic Guide, K4D, (2019).

[79] OECD, *Systemic Thinking for Policy Making: The Potential of Systems Analysis for Addressing Global Policy Challenges in the 21st century*, (2020).

platform workers have been found.[80] Where such coverage exists, it is often provided through the workers' previous or additional jobs, or indirectly through their spouse or other family members.[81]

Some innovative ways to address the gaps in social protection provision have been documented.[82] Some countries have extended current programmes to digital workers who are not covered by social protection schemes. Argentina, Cabo Verde and China have set up universal or nearly universal pension schemes while Uruguay and Ukraine (before the war) have achieved universal maternity coverage.[83] Nevertheless, there remain significant coverage gaps. The ILO Centenary Declaration for the Future of Work calls for policies and measures that respond to the challenges and opportunities relating to the digital transformation of work.[84] Unless appropriate measures are taken to close such social protection gaps for digital workers, both economic and social progress are at stake.

3.1.3 Collective bargaining

Collective bargaining has long sought to balance the unequal relationship between employers and individual workers. Through collective action, workers are enabled to have an effective influence on their employment and working conditions. However, the nature of the digital economy does not adhere to the conventional notion of collective bargaining, challenging workers' ability for collective organization. In the digital economy, work is performed independently, with digital workers classified as independent contractors, who often work in isolation and over geographically expansive regions. This means that the typical employer-employee relationship is no longer relevant because digital workers might work for multiple 'employers', aggregated on a digital platform performing work which is often short term or task-based. Consequently, digital workers, although representing a tiny percentage of the overall workforce, have become a special group with no clear mechanism for collective bargaining. Other challenges include regulations which have not kept pace with changes in technology, work in multiple jurisdictions and conflict with competition law. [85]

Some efforts have been made in a handful of countries, mainly in Europe and the United States, to promote an enabling environment for workers to organize and collectively bargain in the digital economy, though there is still no consensus for an effective system for digital workers. Unions are attempting to use a legal strategy to address worker misclassification claims, develop associations and alliances and push for legal and regulatory reform at multiple levels to promote bargaining rights for crowd- and platform-workers. [86] One of the objectives of these initiatives is to create industry standards and operating rules. Another important source for geographically dispersed workers to foster collective action is online forums. These online spaces, though loosely structured, can engage workers and act as a part of broader mechanisms to assist in outreach and engagement. Moreover, worker centres have emerged as a new type of institution advocating for worker rights, mainly in the United States. [87] They operate independently within a limited geographical scope and serve people in non-standard forms of employment. However, these initiatives have more limitations than progress and cannot fundamentally address the problem. The novelty of the digital economy means that collective bargaining has yet to be fully established. Ensuring collective bargaining rights and increasing representation opportunities for digital workers require legal and policy reforms and needs a multi stakeholder approach.

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[80] Christina Behrendt, Quynh Anh Nguyen and Uma Rani, _Social Protection Systems and the Future of Work: Ensuring Social Security for Digital Platform Workers_, ILO working paper, (2019).

[81] Christina Behrendt, Quynh Anh Nguyen and Uma Rani, _Social protection systems and the future of work: Ensuring social security for digital platform workers_, ILO working paper, (2019).

[82] ILO, _Reaching Universal Social Protection: A Review Of National Strategies And Policies_, (2021).

[83] Christina Behrendt and Quynh Anh Nguyen, _Innovative Approaches for Ensuring Universal Social Protection for the Future of Work_, ILO Future of Work Research Paper Series, (2018).

[84] ILO, _ILO Centenary Declaration for the Future of Work_, (2019).

[85] Hannah Johnston and Chris Land-Kazlauskas, _Organizing On-demand: Representation, Voice, and Collective Bargaining in the Gig Economy_, ILO Conditions of Work and Employment Series No.94, (2019).

[86] Hannah Johnston and Chris Land-Kazlauskas, _Organizing On-demand: Representation, Voice, and Collective Bargaining in the Gig Economy_, ILO Conditions of Work and Employment Series No.94, (2019).

[87] Hannah Johnston and Chris Land-Kazlauskas, _Organizing On-demand: Representation, Voice, and Collective Bargaining in the Gig Economy_, ILO Conditions of Work and Employment Series No.94, (2019).

3.1.4 Digital entrepreneurship

Digital entrepreneurship refers to entrepreneurial pursuits through the use of technological platforms and other information communicating equipment.[88] It expands on the traditional notion of entrepreneurship and includes a set of participants who are constantly evolving and are highly diverse. Hence, digital entrepreneurship can fall within many categories of business such as marketing, sales, products, distribution, stakeholder management and operation. One important feature is that digital entrepreneurs rely on digital media tools and information technology in the pursuit of their entrepreneurial activities. On a practical level, digital entrepreneurship opens up new possibilities ranging from the high-tech, including tech entrepreneurs such as Tope Awotona, the founder of Calendly, to those that can be grasped by anyone who has the basic skills of entrepreneurship, such as finding new customers online, prototyping new business ideas, and improving business ideas based on data. Thus digital entrepreneurs cover a wide spectrum of people from leaders of tech giants to traders who operate e-commerce businesses.

It is believed that digital entrepreneurs will play a vital role in economic and social transformation, especially after the COVID-19 pandemic.[89] This is because digital entrepreneurs have the resilience to cope with business difficulties through digital tools and innovation to maintain growth. For instance, immediately after the outbreak of COVID-19 in China, when stores were forced to close, merchants from a wide range of industries turned to Taobao Live, an online livestreaming platform in China, to reach their consumers online to maintain sales. The pandemic has accelerated the digital transformation across almost every sector and some changes to consumer behaviour are likely to remain. For instance, the digital services that people used during the pandemic, such as online marketplaces, cashless payment, contactless delivery and livestreaming, have become ubiquitous. These digital solutions created by entrepreneurs amidst the challenges of COVID will lead the process of economic recovery.

Digital entrepreneurship also opens up more employment opportunities to various groups. This is achieved not only through cutting edge technologies, such as artificial intelligence, chatbots, voice search, augmented and virtual reality,[90] but also through e-commerce, which largely reduces an individual's cost of becoming an entrepreneur. E-commerce refers to the buying and selling of food and services, or the transmitting of funds or data, over the Internet. Widespread use of e-commerce platforms such as Amazon, eBay, Alibaba and Shein has contributed to substantial growth in online retail. On average, the online share of total spending rose from 10.3 per cent in 2019 to 12.2 percent in 2021.[91]

E-commerce has the potential to overcome market barriers and create entrepreneurial opportunities by lowering the asymmetry of information and increasing economic efficiency, particularly in developing countries. In China, one of the largest and fastest-growing e-commerce markets in the world, more than 5 per cent of total employment is via e-commerce.[92] Grass-root entrepreneurs in rural areas in China thrive via e-commerce platforms.[93] The Vietnamese government is actively helping ethnic minorities and women from remote and mountainous areas through e-commerce.[94] Digital solutions are used to support entrepreneurs and farmers in advertising their products and finding customers beyond their localities. Entrepreneurs also receive training that covers many essential skills, from product development and certification to contract management, market research and marketing strategies. However, to promote digital entrepreneurship, investment in basic digital infrastructure needs to be stepped up and tailored digital literacy training is also necessary to support digitally marginalized groups.

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[88] Joshua Antonizzi and Hanlie Smuts, The Characteristics of Digital Entrepreneurship and Digital Transformation: A Systematic Literature Review, Responsible Design, Implementation and Use of Information and Communication Technology, (2020).

[89] Brain A. Wong, How Digital Entrepreneurs Will Help Shape The World After The COVID-19 Pandemic, World Economic Forum,(2020).

[90] Mariusz Soltanifar, Mathew Hughes and Lutz Göcke, Digital Entrepreneurship: Impact on Business and Society, Springer, (2021).

[91] Joel Alcedo, Alberto Cavallo, Bricklin Dwyer, Prachi Mishra, and Antonio Spilimbergo, Pandemic's E-commerce Surge Proves Less Persistent, More Varied, IMFblog, (2022).

[92] World Bank, E-Commerce Can Boost Job Creation and Inclusive Growth in Developing Countries, (2019).

[93] World Bank, E-Commerce Can Boost Job Creation and Inclusive Growth in Developing Countries, (2019).

[94] Giorgia Demarchi and Susan Shen, Vietnam: Making The Most Of Entrepreneurship And Digital Marketing For Ethnic Minorities And Women, World Bank Blogs, (2022).

3.1.5 Remote work

Digitalization not only facilitates employers to contract out work, but also enables workers to be more mobile, working remotely as employees or freelancers. Telework or working from home/anywhere has become a new norm. Approximately 5.4 per cent of employees between the age of 15 and 64 in the EU worked from home in 2019.[95] The figure for people working from their homes at least a few days a week was 9 per cent. It is estimated that 37 per cent of dependent employment in the EU is currently teleworkable.[96] Among the self-employed, working from home was considerably more common. Almost 36 per cent of the self-employed were sometimes or usually working from home in the EU-27 in 2019.[97] In the United States, 17 per cent of employees worked from home 5 days or more per week before the COVID-19 pandemic.[98] Digitalization and remote work are often interrelated. It is found that the more digital skills an occupation requires, the more common it is for remote work to be offered.[99]

Notably, the COVID-19 pandemic has brought telework to a tipping point, as more and more enterprises and institutions have introduced this work arrangement as a norm. A global survey suggested that digitalization of supply chains as a result of the pandemic has been brought forward by three to four years, whereas the proportion of digital or digitally-enabled products has been accelerated by seven years.[100] At the same time, the workforce has had to adjust to the rapid use of digital solutions and become remote workers. As a result, the proportion of people working from home has increased disproportionately. While the exact number of remote workers is unclear, some estimates can give a rough picture. Eurofound found that nearly 40 per cent of employees telework full time because of the pandemic.[101] Another survey suggested that an average of 52 per cent of employed workers worldwide worked from home at some point since the beginning of the pandemic.[102] The figure varied by country. In Japan, Hungary and South Korea around 26-37 per cent, whereas in Colombia, India, South Africa, Peru and Malaysia, the number is more than 65-74 per cent.[103] In Sweden, two thirds of white collar workers have worked from home since the onset of the pandemic in 2020.[104]

Remote working is increasingly seen by both employers and employees as a 'new norm' in labour market relations. An analysis by the World Economic Forum reported that over 80 per cent of employers plan to rapidly digitalize working processes and will potentially move 44 per cent of their workforce to operating remotely.[105] An analysis of job advertisements in five countries (Australia, Canada, New Zealand, the United Kingdom and the United States) in 2020 found evidence of an increase in job vacancies involving remote working arrangements.[106] There is also an increase in demand for remote working arrangements from employees and job seekers in Europe.[107] However, in-person time with colleagues is also valued. The office is seen as a place for in-person collaboration and team building whereas digital channels are where work happens. To accommodate different needs, many companies are introducing a hybrid work model, with 66 per cent of employers around the world redesigning their workplaces to accommodate hybrid work arrangements.[108]

[95] Eurostat, How Usual Is It to Work from Home? (2020).

[96] Statista, Top Earning YouTube Stars 2021, (2022).

[97] European Commission, Telework in the EU before and after the COVID-19: Where We Were, Where We Head To, (2020).

[98] Matteo Sostero et al., 'Teleworkability and the COVID-19 Crisis: A New Digital Divide?', European Commission, (2020).

[99] APEC, APEC Closing the Digital Skills Gap Report: Trends and Insights; Perspectives on the Supply and Demand of Digital Skills and Degree of Digitalization, (2020).

[100] McKinsey, How COVID-19 Has Pushed Companies over the Technology Tipping Point – and Transformed Business Forever, (2020).

[101] Daphne Ahrendt et al. 'Living, Working and COVID-19'. Eurofound, (2021).

[102] Ipsos, The COVID-19 Pandemic's Impact on Workers' Lives: 28-Country Ipsos Survey for the World Economic Forum, (2020).

[103] Ipsos, The COVID-19 Pandemic's Impact on Workers' Lives: 28-Country Ipsos Survey for the World Economic Forum, (2020).

[104] Cecilia Bjursell, Ingela Bergmo-Prvulovic, and Joel Hedegaard, 'Telework and Lifelong Learning', Frontiers in Sociology 6 (2021).

[105] WEF, The Future of Jobs Report 2020, (2020).

[106] OECD, An Assessment of the Impact of COVID-19 on Job and Skills Demand Using Online Job Vacancy Data, (2021).

[107] Eurofound, Living, Working and COVID-19, (2020).

[108] Microsoft, The Next Great Disruption Is Hybrid Work – Are We Ready?, Microsoft (2021).

Large differences in the prevalence of teleworking exist between sectors. IT and knowledge-intensive sectors are more prepared to implement telework on a large scale than any other sectors.[109] This is because the digital revolution has vastly expanded workers' ability to transmit, manipulate and store information. Social tasks, such as after-sales service, are also increasingly provided remotely as the ease of digital communications increases, but often with a loss of quality in the service.[110] Manual or physical task-based occupations are the most difficult to digitalize. Since remote working relies heavily on digital skills to perform cloud computing and online collaboration, the high-skilled and high-income professionals and managers can more easily transition to it.[111] Overall, workers with strong digital skills are also better positioned to work remotely.

Countries such as Sweden, Finland and the Netherlands had more than 30 per cent employees working from home in 2019 while in other EU member states, the figure was less than 10 per cent.[112] One of the contributing factors is the varied industrial structure. Moreover, remote work is not evenly distributed among workers. It is found that access to remote work is considerably more widespread among well-paid individuals in the EU.[113] The median earnings per month of managers and professionals are, on average, more than twice those of workers who have to work on-site, such as assemblers, plant and machine operators.[114] During the pandemic, the social inequality between those who could and could not work at home and varying levels of capacity between different teleworkers became more apparent.[115]

During the pandemic the focus was on employees moving from the office to the home, with less attention being paid to those who have long been part of the distributed (or remote) workforce. Even prior to COVID, companies had existed which had no office, were location independent and had been hiring global talent. This type of working provided a sort of virtual mobility for employees who were globally distributed, yet worked for companies who were headquartered (often without a physical office) in the U.S. and Europe. Gitlab for example promotes itself as an 'all remote' company. The 1000+ employees of Gitlab are located in more than 60 countries and can work from anywhere and at any time they want through asynchronous coordination.[116]

This geographic flexibility helps remote first and hybrid companies to absorb workers globally. However, there are various legal issues and challenges which have yet to be fully addressed. For companies within the EU, while hiring talent resident in the EU does not require the implementation of any particular immigration process, there are implications for tax, social security rights and working conditions. Addressing this issue in either national legislation, regional or global revel is a huge challange.[117] It looks likely that the number of workers whose employment is not determined by their location will continue to increase. Whether these are digital annotators, digital freelancers or professionals working remotely for remote first companies, this phenomenon will have a significant impact on the way that employment relations are conducted. It has become crucial to re-conceptualize employment relationships to transcend national borders. A global system is needed to accommodate this virtual mobility that benefits both employees and employers.

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[109] European Commission, *Telework in the EU before and after the COVID-19: Where We Were, Where We Head To*, (2020).

[110] European Commission, *Telework in the EU before and after the COVID-19: Where We Were, Where We Head To*, (2020).

[111] ILO, *Working from Home: Estimating the Worldwide Potential*, (2020); Sostero et al., 'Teleworkability and the COVID-19 Crisis', European Commission, (2020).

[112] European Commission, *Telework in the EU before and after the COVID-19: Where We Were, Where We Head To*, (2020).

[113] European Commission, *Telework in the EU before and after the COVID-19: Where We Were, Where We Head To*, (2020).; Sostero et al., 'Teleworkability and the COVID-19 Crisis', European Commission, (2020).

[114] Matteo Sostero et al., 'Teleworkability and the COVID-19 Crisis', European Commission, (2020).

[115] Matteo Sostero et al., 'Teleworkability and the COVID-19 Crisis', European Commission, (2020).

[116] Prithwiraj Choudhury et al., 'GitLab: Work Where You Want, When You Want', *Journal of Organisation Design* 9 (2020): 23.

[117] Caroline Froger-Michon, 'Working Remotely Abroad: What Are the New Challenges for Employers and Employees?', (2021).

3.1.6 Transition from unpaid to paid (digital) work

Digitalization is generating new ways of employment such as 'internet-based virtual work, on-demand work through online platforms, crowd working' and other new forms of revenue-generating work.[118] The new forms of worker are conceived **as 'playbour', 'heteromated labour' or 'prosumer'**.[119]

Playbour	Heteromated	Prosumer
Playbour is a term to describe forms of labour carried out in or around computer games and popular culture more generally.	Heteromated labour refers to the low cost or free labour in computer mediated networks.	A prosumer is an individual who both consumes and produces.

These terms refer to users of social media who are nudged to provide individual preference information which is used for targeted ads, thus becoming unpaid labour that contributes to corporate profits. The content created by users of social media platforms such as Facebook, YouTube and TikTok generates huge amounts of revenue for these platforms and are often not paid or paid very little. On the other hand, some content creators make their living through these social media platforms. For instance, creators on YouTube are paid via ads based on the number of views of their videos and subscribers. According to YouTube's monetization policies, a content creator can apply for monetization once they hit 1,000 subscribers and 4,000 watch hours over the past year. Once YouTubers build their audiences, they can also look beyond ads for revenue, such as to launch their own merchandise.[120] The top 10 Youtubers (or 'influencers') made about 30.5 million US dollars on average in 2021.[121]

In addition to social media, some other ways to generate earnings have emerged, such as through livestreaming. For example, the Korean livestream service, Mukbang, where a host eats while interacting with viewers. As in street performance, the viewers often offer voluntary donations, and the host shows entertaining gratitude in response. Similar livestreaming platforms are expanding quickly around the world, such as the Chinese vlogging platform Xigua and American video livestreaming service Twitch, where hosts narrate themselves while playing games, sing at the request of the viewers, or just sit and study in silence. There is also the controversial London-based content-sharing platform OnlyFans, which became popular with sex workers during the pandemic. Broadcasters on these platforms can make money by getting payment from viewers, landing paid partnerships with brands, selling products, or having viewers pay a fee to become a subscriber or channel member.

3.1.7 E-formality

A large proportion of the global workforce make their living in the informal economy. According to ILO estimates, more than 60 per cent of workers are employed in the informal sector.[122] The informal economy refers to all economic activities by workers and economic units that are not covered or insufficiently covered by formal arrangements and does not include illicit activities.[123] Forms of informality include unregistered enterprises, registered enterprises conducting a portion of their work on an undeclared basis, informal self-employment, unregistered employment, under-declared employment and dependent self-employment.[124] The size of the informal economy is a concern because of its negative impacts on workers' rights, the

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[118] Gérard Valenduc, 'New Forms of Work and Employment in the Digital Economy', in *The Deconstruction of Employment as a Political Question: 'Employment' as a Floating Signifier*, ed. Amparo Serrano-Pascual and Maria Jepsen (2019), 63–80.

[119] Julian Kücklich, 'Precarious Playlabour', The Fibreculture Journal, (2005); Hamid R. Ekbia and Bonnie A. Nardi, *Heteromation, and Other Stories of Computing and Capitalism*, Acting with Technology (2017); Valenduc, 'New Forms of Work and Employment in the Digital Economy' in *The Deconstruction of Employment as a Political Question: 'Employment' as a Floating Signifier*, ed.Amparo Serrano-Pascual and Maria Jepsen (2019), 63–80.

[120] Chris Welch, YouTube Tightens Rules around What Channels Can Be Monetized, *The Verge* (blog), (2018).

[121] Statista, Top Earning YouTube Stars 2021, (2022).

[122] ILO, *More than 60 per cent of the World's Employed Population are in the Informal Economy*, (2018).

[123] ILO, *R204- Transition from the Informal to the Formal Economy Recommendation*, (2015).

[124] Colin C Williams, 'E-formalization in Europe', ILO working paper, (2021).

development of sustainable enterprise, the environment and public revenues.[125] Given the magnitude and the challenges associated with the informal economy, there is an urgent need to make the transition to formalization with integrated approaches that can bring more robust results. E-formalization, with the potential for harnessing new technological progress to achieve decent work and sustainable development, becomes an emerging solution.[126]

'E-formalization' refers to the application of new technology in public initiatives, programmes and policies to facilitate the transition to formality.[127] It is believed that e-formality initiatives can potentially make the transition to formalization easier, thus providing workers with access to decent work. Much progress has been made in applying e-formalization tools in high-income countries (the case of Estonia is often quoted[128]).[129] Many middle and low-income countries, such as Cambodia, China, and the Philippines, have adopted e-formalization initiatives. An important first step is to develop e-government to improve the relationship between people and their government and deliver public services more effectively.[130] By definition, e-government is the use of ICT to improve the activities of public sector organizations.[131] E-government strategies are often linked to wider national development frameworks that implicitly support formalization. In Europe, the eGovernment Action Plan 2016-2020 was adopted to accelerate the digital transformation of governments. A new digital strategy was introduced in 2020 to expand accessible and human-centric digital public services and administration for European citizens and businesses.[132]

The e-government strategies include advanced technology application to public employment services. The use of information and digital technologies have facilitated more personalized services and accurate job matching.[133] It also includes delivery of government support secured remotely and in a more coordinated way during the COVID-19 pandemic.[134] Building upon e-government services, European countries adopted four types of e-initiatives to address the transition to formality: 1) using measures such as developing registers of workers and businesses and advancing data mining tools to improve the chances of detection; 2) building new sanction systems to facilitate formalization; 3) providing various supply-side and demand-side incentives to improve the ease and benefits of operating formally; and 4) raising awareness through different means such as electronic notice of advisory inspections.[135] In Asia-Pacific, specific policy interventions to address transition to formality through the increasing adoption and integration of technology cover four broad areas: productivity, regulations, incentives and enforcement.[136] In Estonia, the 'world's most digitally advanced society', about 98 per cent of tax declarations are completed online and in a matter of minutes, and 98 per cent of companies are registered online. These businesses can file their annual report and update their data through the e-Business Register.[137] Notably, the COVID-19 pandemic has accelerated e-formalization and the adoption of innovative, information-intensive and connectivity-based e-initiatives for tackling the informal economy, such as the disbursement of cash payments, health and safety information and stimulus support measures.[138]

E-formalization, however, faces many challenges, especially in developing countries. Inadequate physical infrastructure, such as the lack of more advanced technologies and an inadequate electricity supply, can

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[125] ILO, *R204- Transition from the Informal to the Formal Economy Recommendation*, (2015).

[126] ILO, *New Technologies and the Transition to Formality: The Trend Towards E-formality*, Working Paper No.247, (2018).

[127] Colin C Williams, *'E-formalization in Europe'*, ILO working paper, p.8, (2021).

[128] Susan Divald, 'E-Estonia: A Digital Society for the Transition to Formality', ILO Report, (2021); ILO, *Is Asia Ready for E-fomalization?* (2021).

[129] Juan Chacaltana and Vicky Leung, 'Transitioning to the Formal Economy Through Technology: The Trends Towards E-formality', ILO, (2019).

[130] UNDESA, E-Government Survey 2016: E-Government in Support of Sustainable Development, (2016).

[131] Colin C Williams, 'E-formalization in Europe', ILO working paper, p.2, (2021).

[132] European Commission, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, 2030 Digital Compass: the European way for the Digital Decade*, (2021).

[133] ILO, Global report: Technology adoption in public employment services, catching up with the future, (2022).

[134] ILO, Global report: Technology adoption in public employment services, catching up with the future, (2022).

[135] Colin C Williams, 'E-formalization in Europe', ILO working paper, (2021).

[136] Tejeshwi Nath Bhattarai, 'Emerging Trends in the Use of Technology as a Driver of the Transition to Formality: Experiences from Asia and the Pacific', ILO working paper, (2018).

[137] Susan Divald, 'E-Estonia: A Digital Society For The Transition To Formality', ILO working paper, (2021).

[138] Sriani Kring and Vicky Leung, 'Renewing the Social Contract through E-formalization in the World of Work', ILO Working Paper, p.2, (2021).

impede the e-formalization process. There is also a need for strong digital ecosystems and virtual infrastructure such as digital identification systems. However, an estimated one billion people have no basic identity credentials, the majority in sub-Saharan Africa and South Asia.[139] Furthermore, the inability to process big data into valuable information, the intractable digital divides within a country and the lack of digital skills among populations impede the e-formalization process in many developing countries.[140] For instance, the digital divide between persons, unequal access to web-based services and fragmented digitalization progress bring significant challenges to a sustainable and effective delivery of public employment services, especially in low-middle income countries.[141] To unlock the potential of technologies that support shifts to formalization, comprehensive, multi-policy approaches are needed, including universal access to the Internet and digital tools, promoting digital skills, enhancing social protection mechanisms, supporting financial inclusion and improving the business environment.

3.2 Skills

Since digitalization has altered the nature of work, it poses many challenges to workers' skills. Rapid digitalization makes digital skills a necessary part of a worker's toolkit. Digital skills, according to the European Digital Competence Framework, refer to 'the confident, critical and responsible use of, and engagement with digital technologies for learning, at work, and for participation in society'.[142] These skills cover a wide range of sectors, including information and data literacy, processing and management, communications and collaboration through digital means, digital content creation, etc.[143] A study by APEC classified digital skills into two categories: 'baseline digital skills, such as the use of spreadsheet software and computer literacy, and specific digital skills, such as programming languages, industry or occupation specific platform familiarity'.[144] The former is the foundation for more advanced skills. Both types of digital skills are in high demand.

Labour markets are already requiring more digital skills. In the United Kingdom and EU countries, more than three quarters of job openings require digital skills.[145] In countries such as Australia, Canada, New Zealand, Singapore, and the United States, seven out of ten of all job postings in 2019 were in digital occupations.[146] An increase in demand for a digitally competent workforce has been observed in China, Indonesia, Malaysia and Mexico.[147] A study by the International Finance Corporation (IFC) has also revealed that more than 230 million jobs in Sub-Saharan Africa will require digital skills by 2030.[148] Meanwhile, the process of digitalization and automation has been accelerated by the COVID-19 pandemic. It is estimated that 38 per cent of companies have already accelerated automation and digitalization, but to a varied extent across countries.[149] Employers in Austria, Costa Rica, France, Germany, Greece, Guatemala, Italy, Japan, Mexico, Panama and Switzerland are more likely to automate compared with those in China, Czech Republic, India, Israel, Portugal, Slovenia, Spain, and the United Kingdom.[150]

However, there is a shortage of digitally skilled workers around the world. It is found that 57 per cent of the enterprises in the EU reported difficulties finding ICT specialists in 2018.[151] Around 30 per cent of the EU's

[139] Sriani Kring and Vicky Leung, 'Renewing the Social Contract through E-formalization in the World of Work', ILO Working Paper, p.2, (2021).

[140] Sriani Kring and Vicky Leung, 'Renewing the Social Contract through E-formalization in the World of Work', ILO Working Paper, p.2, (2021).

[141] ILO, Global report: Technology adoption in public employment services, catching up with the future, (2022).

[142] European Commission, European Digital Competence Framework for Citizens (DigComp), (2019).

[143] Carolina Feijao et al., 'The Global Digital Skills Gap', RAND Corporation, (2021).

[144] APEC, APEC Closing the Digital Skills Gap Report: Trends and Insights; Perspectives on the Supply and Demand of Digital Skills and Degree of Digitalization, (2020).

[145] European Commission, Digital Economy and Social Index (DESI) 2020-Human Capital, (2020).

[146] APEC, APEC Closing the Digital Skills Gap Report: Trends and Insights; Perspectives on the Supply and Demand of Digital Skills and Degree of Digitalization, (2020).

[147] APEC, APEC Closing the Digital Skills Gap Report: Trends and Insights; Perspectives on the Supply and Demand of Digital Skills and Degree of Digitalization, (2020).

[148] MPG, Skills Revolution Reboot: The 3Rs-Renew, Reskill, Redeploy, (2021).

[149] IFC, Digital Skills in Sub-Saharan African: Spotlight on Ghana, (2019).

[150] IFC, Digital Skills in Sub-Saharan African: Spotlight on Ghana, (2019).

[151] European Commission, Digital Economy and Social Index (DESI) 2020-Human Capital, (2020).

active labour force has no or only moderate digital skills.[152] Similar trends are found in other countries such as Brazil, China, Indonesia and Mexico.[153] The gap between supply and demand of digitally skilled labour force is also significant in Sub-Saharan Africa.[154] In the Gulf Cooperation Council (GCC) countries, although there is a growing trend towards more skills, professionals with emerging technologies such as big data, analytics, cybersecurity and cloud computing remain scarce.[155] Most of the skills that GCC professionals possess are soft or rather vague in nature. Closing the digital skills gaps has been taken as the priority of most business leaders from across regions and industries.[156]

The Covid-19 pandemic, through the impact of lockdown, has made the skill gap more apparent, which directly impacts on digitalisation. People with low skills have been more impacted by the pandemic, and women have been more impacted than men.[157] Closing the digital skills gaps has been taken as the priority of governments and business leaders from various regions and industries.

In addition to the digital skills shortages, there are also skills mismatches, especially in the finance and ICT sectors.[158] It is estimated that 40 per cent of workers in the EU in 2018 considered that their skills were underutilized and nearly a third of college graduates felt that they were overqualified for their job.[159] According to the WEF estimate, around 40 per cent of workers will require reskilling for up to six months.[160] Consequently, developing workers' digital skills is highlighted in order to meet the challenges stemming from changing technologies and new ways of working.[161] Alongside digital skills, employees need non-cognitive skills such as soft skills, human literacy and socio-emotional skills to adapt to the digitalized workplaces.[162]

Governments around the world are actively supporting their citizens in the digital transformation by training more skilled digital workers. For instance, Dubai launched the One Million Arab Coders Initiative in 2017.[163] The initiative provides a platform that offers free exceptional programmes for individuals interested in developing their digital skills. By teaching them coding, the initiative aims to empower one million young Arabs with essential future skills. Egypt also implemented the Digital Egypt strategy in 2021 to establish an all-encompassing digital society. To upskill its workforce, the Egyptian Government plans to train 200,000 digital workers with a budget of EGP 1.1 billion during the financial year 2021/2022.[164] As an essential component of its digital strategy for a digital economy, the United Kingdom attaches great importance to providing everyone with access to the digital skills they need.[165] In addition to ensuring that adults in England who lack core digital skills have free access to the basic digital skills training they need, the UK Government plans to deliver coding in the National Curriculum and help more young people to develop specialist skills.

There is no framework that allows workers to demonstrate their digital skills so that employers can determine their level of digital competence. Initiatives have been proposed to develop a commonly agreed standard that helps workers to communicate their skill sets acquired formally or informally, but obstacles

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[152] Eskarne Arregui Pabollet et al., 'The Changing Nature of Work and Skills in the Digital Age', Publications Office of the European Union, (2021).

[153] Carolina Feijao et al., 'The Global Digital Skills Gap', RAND Corporation, (2021).

[154] IFC, 'Digital Skills in Sub-Saharan African: Spotlight on Ghana'.

[155] Strategy &, Empowering the GCC Digital Workforce: Building Adaptable Skills in the Digital Era, (2021).

[156] McKinsey, How COVID-19 Has Pushed Companies over the Technology Tipping Point – and Transformed Business Forever, (2020).

[157] ILO, Digital Skills and the Future of Work: Challenges and Opportunities in a Post COVID-19 Environment, (2020)

[158] Cedefop, 'Insights into Skill Shortages and Skill Mismatch: Learning from Cedefop's European Skills and Jobs Survey' (Luxembourg: European Centre for the Development of Vocational Training, 2018), https://doi.org/10.2801/897740 ; Eskarne Arregui Pabollet et al., 'The Changing Nature of Work and Skills in the Digital Age', Publications Office of the European Union, (2021).

[159] Cedefop, Insights into Skill Shortages and Skill Mismatch, (2018).

[160] WEF, The Future of Jobs Report 2020, (2020).

[161] Eskarne Arregui Pabollet et al., 'The Changing Nature of Work and Skills in the Digital Age', Publications Office of the European Union, (2021).

[162] Eskarne Arregui Pabollet et al., 'The Changing Nature of Work and Skills in the Digital Age', Publications Office of the European Union, (2021); Anand Sivaraman, 'Soft Side of Digital Transformation: The Connected Employee', South Asian Journal of Human Resources Management 7 (2020): 121–28.

[163] Arabcoders, One Million Arab Coders, (2017).

[164] MCIT Egypt, ICT Sector Achievements in 2021, (2021).

[165] UK government, UK Digital Strategy, Policy Paper, (2017).

remain, since current frameworks are quite dispersed.[166] In 2017, the European Commission launched a project of 'European Skills, Competences, Qualifications and Occupations' (ESCO) to describe, identify and classify professional occupations and skills relevant for the EU labour market.[167] The purpose is to offer a 'common language' on occupations and skills that can support job mobility in the ever-growing digital labour market across Europe. Moreover, the digital skills gap is mimicked by the digital skills measurement gap.[168] A comprehensive and comparable global assessment of digital skills is needed to better upskill the labour force.

3.3 Job quality

3.3.1 Flexibility?

The transformation of work brought by digitalization poses both opportunities and challenges to the quality of jobs.[169] While the flexibility of digital work is often celebrated by those that need it, this narrative tends to ignore those who are excluded from accessing decent work, including people who are not able to work full time or at fixed times.

Women in both developed and developing countries are often more likely to remain active in the labour market after childbirth if they are offered flexitime and remote working arrangements.[170] A survey by the Future Forum shows that schedule flexibility has a dramatic positive impact on employees' productivity and well-being.[171] Employees who can work on a flexible timetable are more productive and significantly less stressed. They even report being better connected to the people and information they need to get the job done.

However, the option to undertake work from any place and at any time enabled by digital technology can involve social and professional isolation with limited access to organizational resources.[172] Moreover, it is claimed that flexible arrangements of space and time generates independence, interdependence and dependency that challenge orders of work-life balance.[173] Workers with caring responsibilities are vulnerable to adverse impacts, including taking on new forms of unpaid work and the increased blurring of work-life boundaries.[174] In reality the flexibility is sometimes severely constrained by other factors as well, such as low pay and lack of available work, especially for platform workers.[175]

3.3.2 Income and working conditions

Workers' experience in digital employment regarding obtaining work, performing tasks and receiving income is heterogeneous, and working conditions vary considerably across digital workers. Research shows that many of the newly created jobs during the digitalization process are irregular or low-paid ones in the retail industry and logistics, such as warehouse and delivery workers for Amazon.[176] Job quality has raised some important considerations. Many of these workers in developing countries are in poor working

[166] WEF, *Building a Common Language for Skills at Work: A Global Taxonomy*, (2021).

[167] European Commission, *What Is ESCO?*, (2019).

[168] ILO, *Changing Demand for Skills in Digital Economies and Societies: Literature Review and Case Studies from Low- and Middle-income Countries*, (2021).

[169] Janine Berg, 'Protecting Workers in the Digital Age: Technology, Outsourcing and the Growing Precariousness of Work', SSRN Scholarly Paper (2019); Melissa Gregg and Rutvica Andrijasevic, 'Virtually Absent: The Gendered Histories and Economies of Digital Labour', *Feminist Review* 123 (2019): 1–7.

[170] Heejung Chung and Mariska van der Horst, 'Women's Employment Patterns after Childbirth and the Perceived Access to and Use of Flexitime and Teleworking', *Human Relations* 71 (2018): 47–72; Minh Hieu Nguyen and Jimmy Armoogum, 'Perception and Preference for Home-Based Telework in the COVID-19 Era: A Gender-Based Analysis in Hanoi, Vietnam', *Sustainability* 13 (2021): 3179.

[171] Future Forum, 'Winning the War for Talent in the Post-Pandemic World', (2021).

[172] Bjursell, Bergmo-Prvulovic, and Hedegaard, 'Telework and Lifelong Learning', *Frontiers in Sociology,* 6(2021): 2297-7775.

[173] Lizzie Richardson, 'Coordinating Office Space: Digital Technologies and the Platformization of Work', *Environment and Planning D: Society and Space* 39 (2021): 347–65.

[174] IFOW, *Remote Working and Covid-19: What Is Work and What Is Personal*, (2020).

[175] David Spencer et al., 'Digital Automation and the Future of Work', European Parliamentary Research Service, (2021).

[176] *Coyle, D. Precarious and Productive work in the digital economy. National Institute Economic Review, 240(1). (2017).*

conditions, that include low wages, insecurity, inadequate occupational safety and health, uncertainty, etc. It is also the case that repetitive and menial tasks are performed by highly educated workers in the digital economy in developing countries.

The earnings of digital workers vary. In Eastern Europe, earnings from digital work are quite attractive.[177] Digital workers in these countries, whether taking a digital job as a complementary or main source of income, receive better pay than salaried workers working for the local companies.[178] On the other hand, digital workers can experience a downward spiralling of wages. The rise of digital work means that labour is brought out of the bound of locations. Since some digital work can be done from anywhere at any time, workers are competing globally and they have little bargaining power.[179] Employers can easily expand the pool of potential workers and terminate contracts without prior warning and at no cost. This reduces the workers' bargaining power in relation to employers and exerts downward pressure on labour prices. Such a situation gives digital workers a feeling of disempowerment and insecurity, since the fragmentation of work prevents them from strengthening their position through acts of solidarity. There are also longstanding concerns about financial security due to the unreliable incomes affiliated with digital work. This is especially so for platform workers. Some surveys also suggest that up to about one third of platform workers' working time is unpaid.[180]

3.3.3 Working time and work intensity

Digitalization has varied effects on individuals' working time. The mass adoption of mobile devices has enabled a constant connectivity with work which not only brings flexibility over managing work and effective communication, but also the possibility of a lengthening of working time.[181] An increasing number of high-skilled workers in Western Europe and North America work very long hours while younger workers are more likely to be underemployed.[182] In response to COVID-19, many countries have encouraged telework and introduced staggered hours at national or workplace level.[183] Those working as independent contractors or on gig-work platforms, however, face a strict time discipline, with customers and clients dictating work-time. They also often need to work irregular hours in response to employer or client demands. Furthermore, many of them need to work considerable unpaid hours.

Digital exhaustion has also become more common. A survey conducted by Microsoft showed that more than half of remote workers feel overworked, 39 per cent of them feel exhausted, and 20 per cent of them say their employers do not care about their work-life balance.[184] In addition, the digital intensity of workers' days has increased substantially, with the number of hours and average time spent on zoom/digital meetings and chats rising considerably between 2020 and 2021. Young people (aged between 18 and 25) have struggled the most in the digital era. These people are more likely to be single and early in their careers, making them more likely to be affected by isolation and to struggle with motivation at work. Moreover, teams are more siloed in a digital world of work. Workers' interactions with distant networks have diminished. This could lead to a negative impact on innovation. However, companies have come up with ways to replicate the innovation and the social cohesion of the office by using technology. Meetings using virtual reality (VR) and on the Metaverse is one way that companies are trying to replicate co-located settings.

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[177] Mariya Aleksynska, 'Digital Work in Eastern Europe', ILO Working Paper 32, (2021).

[178] Mariya Aleksynska, 'Digital Work in Eastern Europe', ILO Working Paper 32, (2021).

[179] Graham, M., Hjorth, I., and Lehdonvirta, V., 'Digital Labour and Development: Impacts of Global Digital Labour Platforms and the Gig Economy on Worker Livelihoods', *Transfer: European Review of Labour and Research* 23, no. 2 (2017): 135–62.

[180] Mariya Aleksynska, Anastasia Bastrakova, and Natalia Kharchenko, 'Work on Digital Labour Platforms in Ukraine: Issues and Policy Perspectives', Report 27, (2018); Janine Berg et al., 'Digital Labour Platforms and the Future of Work: Towards Decent Work in the Online World', ILO Working Paper (2018); Yiu Por (Vincent) Chen, 'Online Digital Labour Platforms in China: Working Conditions, Policy Issues and Prospects', ILO Working Paper 24, (2021).

[181] David Spencer et al., 'Digital Automation and the Future of Work', European Parliamentary Research Service, (2021).

[182] Aaron Benanav, *Automation and the Future of Work,* (2020); Anna S Burger, 'Extreme Work Hours in Western Europe and North America: Diverging Trends since the 1970s', *Socio-Economic Review* 18 (2020): 1065–87.

[183] ILO, ILO Monitor: COVID-19 and the World of Work. 1st-0th editions (2020-22).

[184] Microsoft, *The Next Great Disruption Is Hybrid Work – Are We Ready?* (2021).

3.3.4 Discrimination in digital work

Although digital employment can increase economic inclusion, empirical research has revealed that there are also explicit or inexplicit forms of discrimination based on location, ethnicity, religion, gender, etc.[185] Research reveals that a considerable proportion of workers on digital labour platforms experience discrimination or harassment.[186] For instance, workers from certain developing countries may be excluded from performing tasks with high pay because of discrimination. The algorithms which mediate their work are not transparent. Therefore, the equity of digital platforms, such as Upwork, has been questioned with indications that not everyone can compete equally, with evidence that non-Western individuals are disadvantaged in task selection,[187] often with blatant displays of preference for Western workers.[188] Some inherent structural problems also play a role, particularly for women, concerning exposed to insecurity, violence and harassment.

Transparency issues can bring challenges to fairness at the workplace. A survey showed that a majority of digital workers under algorithmic systems are not at all confident that they understand the data collection process and how their data would be used to evaluate their performance.[189] Workers also felt less able to question or challenge the introduction of these technologies.[190] Complaints related to limited/unfair resource distribution and unjustifiable shutdown of their account are also common amongst digital workers on platforms.[191]

3.3.5 Surveillance and control

Digitalization potentially creates an unprecedented extension of work surveillance with an exponential rise in the use of smartphones and tracking technologies such as Fitbit and other wearable trackers. Moreover, algorithmic systems are being used across the economy to control fundamental aspects of work. Control of task allocation, performance supervision and productivity assessment through algorithms has been increasingly used, not only by digital labour platforms, but also in traditional sectors such as logistics, manufacturing, or white-collar occupations. For instance, employees' mood or fatigue in the workplace can be easily identified through AI-powered sentiment analysis of voice or facial expressions.[192] Underperforming workers identified by the standards set by algorithm may not receive any tasks at times or even be dismissed. Such employee monitoring can lead to high levels of stress and anxiety and raise public concerns over social behaviour control.[193] For example, the data-driven HR application of employee data collected through surveillance has raised issues about profiling and discrimination.[194] The adoption of algorithmic systems also raises concerns over the intensification of workload and the erosion of human judgement, skill and agency.[195]

Despite the above-mentioned aspects, other dimensions of job quality in digital employment also call for attention: concept of workplace; blurring of reporting lines; representation of workers' interests; and, more generally, the meaning of work and solidarity. Current evidence suggests that as digitalization accelerates,

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[185] Graham, M., Hjorth, I., and Lehdonvirta, V., 'Digital Labour and Development: Impacts of Global Digital Labour Platforms and the Gig Economy on Worker Livelihoods', *Transfer: European Review of Labour and Research* 23, no. 2 (2017): 135–62.

[186] ILO, 'World Employment and Social Outlook 2021: The Role of Digital Labour Platforms in Transforming the World of Work'; Spencer et al., 'Digital Automation and the Future of Work', European Parliamentary Research Service, (2021).

[187] Niels Beerepoot and Bart Lambregts, 'Competition in Online Job Marketplaces: Towards a Global Labour Market for Outsourcing Services?', *Global Networks* 15, no. 2 (2014): 236–55.

[188] Graham, M., Hjorth, I., and Lehdonvirta, V., 'Digital Labour and Development: Impacts of Global Digital Labour Platforms and the Gig Economy on Worker Livelihoods', *Transfer: European Review of Labour and Research* 23, no. 2 (2017): 135–62.

[189] Abigail Gilbert et al., 'The Amazonian Era: The Gigification of Work', Institute for the Future of Work, (2021).

[190] Abigail Gilbert et al., 'The Amazonian Era: The Gigification of Work', Institute for the Future of Work, (2021).

[191] Yiu Por (Vincent) Chen, 'Online Digital Labour Platforms in China: Working Conditions, Policy Issues and Prospects', ILO Working Paper 24, (2021).

[192] Phoebe V. Moore, Martin Upchurch, and Xanthe Whittaker, 'Humans and Machines at Work: Monitoring, Surveillance and Automation in Contemporary Capitalism', in *Humans and Machines at Work: Monitoring, Surveillance and Automation in Contemporary Capitalism*, ed. Phoebe V. Moore, Martin Upchurch, and Xanthe Whittaker, Dynamics of Virtual Work (2018), 1–16.

[193] Karen Yeung and Martin Lodge, eds., *Algorithmic Regulation,* New York: Oxford University Press, (2019).

[194] Spencer et al., 'Digital Automation and the Future of Work', European Parliamentary Research Service, (2021).

[195] Abigail Gilbert et al., 'The Amazonian Era: The Gigification of Work', Institute for the Future of Work, (2021).

standards in the core aspects of decent work are diminished. Since decent work is more than employment but work that promotes dignity, autonomy, equality and has fair pay and good job quality, greater efforts should be made to promote decent work in a digitalized era.

Some attempts to ensure the quality of employment of digital workers have been made in many countries. Such efforts concern occupational safety and health standards, social security, regulation of working time and remuneration and access to data and privacy.[196] Some European countries, among them France and Belgium, have enshrined in law that employees have the right to disconnect from any digital system or tool used for professional purposes.[197] Nevertheless, since the phenomenon of digital work is still quite new, regulation of working conditions has so far been rather disparate. Most nations, if there are any discussions at all, are still at a proposal stage. For instance, regulatory responses on working conditions of digital workers are absent in almost all Eastern European countries. Only in the Russian Federation is a law being discussed about regulating working conditions for digital workers, such as limiting working hours in the transport sector.[198]

Efforts have also been made to empower digital workers through data protection provisions. One example is the EU's General Data Protection Regulation (GDPR), a privacy and security law which was put into effect in 2018. The GDPR imposes obligations on organizations anywhere, if they target or collect data related to people in the EU. It is argued that the GDPR can provide workers with collective bargaining power through digital platforms to improve their working conditions.[199] Another example is the Non-Personal Data Governance Framework in India. This Framework was introduced in 2019 and gives communities collective user rights over community data to maximize welfare and restrict data monopoly.[200]

While the permeation of digitalization is having a significant impact on work arrangements, the digital labour market has evolved significantly in work diversification and sophistication. To date, regulatory responses to the rapidly changing labour markets and, in particular, to digital employment, are still scarce. Digital employment takes various forms and transcends the boundary of locations; it thus requires innovative regulatory responses. The ILO Constitution and ILO instruments clearly set out the principle that the standards of decent work are applicable to all workers irrespective of their contractual status. However, there is still a long way to go to achieve that goal.

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[196] United Nations, *Digitally Enabled New Forms of Work and Policy Implications for Labour Regulation Frameworks and Social Protection Systems*, (2021).

[197] Caroline Froger-Michon and Christopher Jordan, Switching on to Switching off: Disconnecting Employees in Europe? (2018).

[198] Mariya Aleksynska, 'Digital Work in Eastern Europe', ILO Working Paper 32, (2021).

[199] Uma Rani and Parminder Jeet Singh, 'Digital Platforms, Data, and Development: Implications for Workers in Developing Economies', *Comparative Labour Law and Policy Journal* 41, no. 1 (2019): 263–87.

[200] PRS, *Expert Committee Report on Non-Personal Data Governance Framework*, 2020.
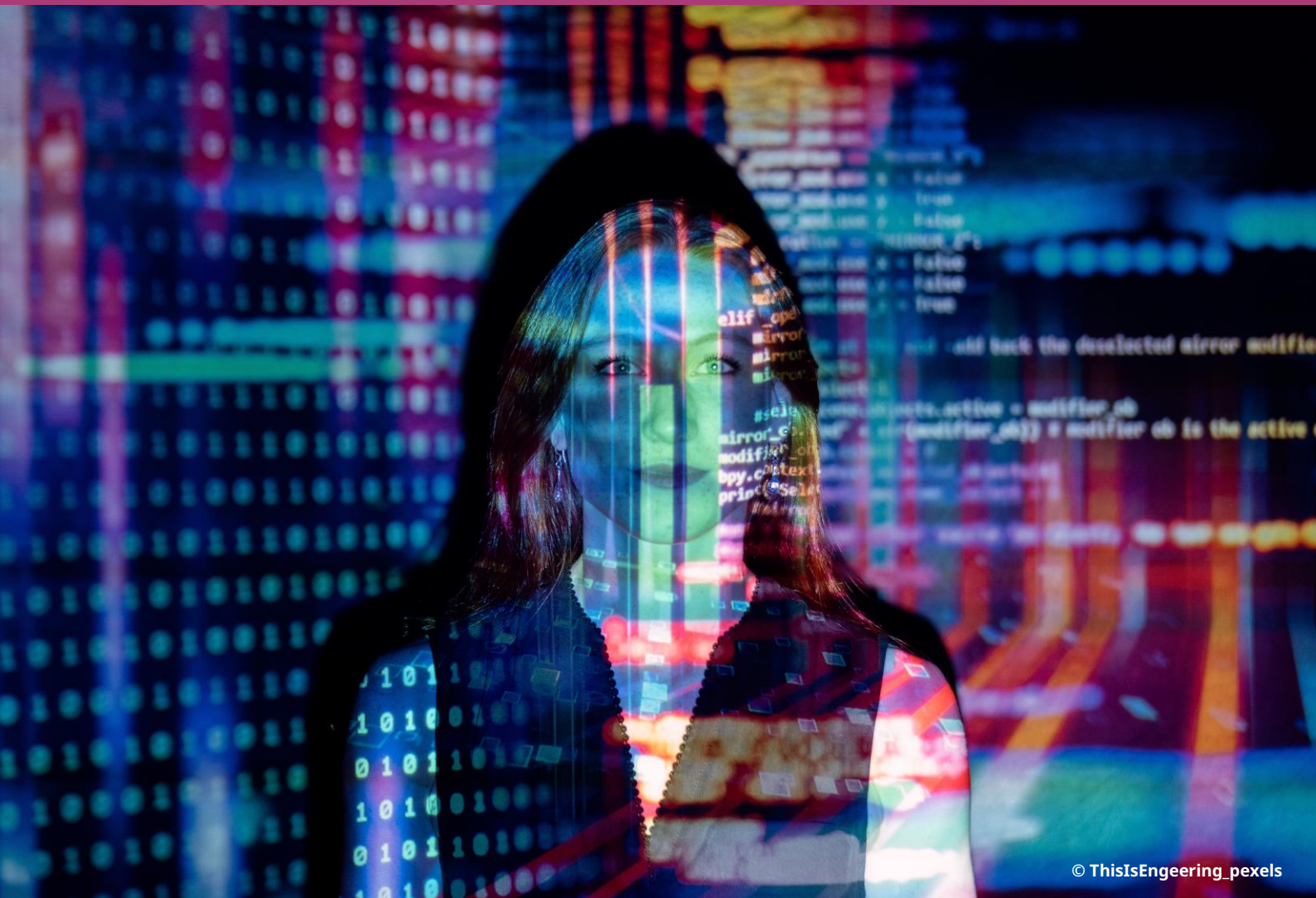
► 4. Women

Current studies suggest that both men and women could face equal job displacement and potential gains due to digitalization. Around 20 per cent of the female and male workforce in ten countries could lose their jobs to automation and a roughly similar proportion of new jobs will be created for both genders, assuming their shares of sectors and occupations hold.[201] Yet, there are strong gender-based differences in employment within occupations and sectors. Thus, employment outcomes of digitalization between men and women could vary significantly, because the jobs that they typically hold are affected to a different extent. It is found that, compared to men, women could be marginally better placed to capture potential job growth brought about by digitalization because of expected robust job growth in sectors where they are well represented, particularly healthcare and social assistance, manufacturing, and the retail and wholesale trade.[202] However, a reduction in demand for male workers in certain sectors may cause displaced men to increasingly compete for jobs with women, exerting downward pressure on wages. Women may, therefore, leave the labour market more readily than men when faced with this situation.

As jobs are lost and gained, women and men will need to transition across occupations and skill levels, but women are in at a greater disadvantage in making such transitions. It is found that computerization has shifted employment towards jobs for women that are less routine and more social. Estimates have shown that 40 to 160 million women globally will need to transfer to new jobs by 2030, often to higher-skilled ones.[203] If they are unable to make the move, they will be very likely to leave the labour market, making gender inequality in work worse. Deep-rooted obstacles make it hard for women to make such transitions because more of their time is allocated to unpaid care work. Many other factors also seriously hinder women's job shifts, such as physical safety, infrastructure and legal challenges, and less access to digital technology and participation in STEM fields than men.

Generally, women are less represented in sectors that require high digital skills. Severe under-representation of women is more likely in sectors that require disruptive technical skills. According to the WEF Global Gender Report 2021, in 2020, only 14 per cent of the cloud computing workforce were female, and only 20 per cent and 32 per cent for data and AI workforces respectively.[204] In 2020, 81.5 per cent of ICT specialists employed in the EU were men against 18.5 per cent women.[205] Further gender gaps are likely to be driven by occupational segregation in emerging roles. Without opportunities for re-employment and re-development into emerging roles, the share of women in the labour market could shrink further.

An important reason that underpins the serious gender imbalance in the ICT sector is the unequal skill sets possessed by the two sexes. A UNESCO report shows that females are 25 per cent less likely than men to acquire digital technology knowledge for basic purposes, such as using simple arithmetic formulas in a spreadsheet, 4 times less likely to learn computer programming and 13 times less likely to register a technology patent.[206] Despite at least two decades of interventions, the digital skills divide appears to be growing, with the largest gap in parts of South Asia and Sub-Saharan Africa.[207] In countries such as the United Kingdom and the United States, the percentage of females holding programming and software development jobs has decreased significantly in recent decades. Similar trends have also been observed in other high-income countries, including Australia, New Zealand and South Korea. Patriarchal cultures, the stereotype of technology as a male domain and a biased social and educational environment are the main factors of the gender gap in digital skills. Interestingly, women are more likely to be drawn to ICT occupations in nations

[201] Anu Madgavkar et al., 'The Future of Women at Work: Transitions in the Age of Automation', McKinsey Global Institute, (2019).

[202] Anu Madgavkar et al., 'The Future of Women at Work: Transitions in the Age of Automation', McKinsey Global Institute, (2019).

[203] Anu Madgavkar et al., 'The Future of Women at Work: Transitions in the Age of Automation', McKinsey Global Institute, (2019).

[204] WEF, Global Gender Gap Report 2021, (2021).

[205] Eurostat, ICT Specialists in Employment, (2021).

[206] UNESCO, I'd Blush If I Could: Closing Gender Divides in Digital Skills through Education, (2019).

[207] Abigail Gilbert et al., '.The Amazonian Era: The Gigification of Work'.

with low levels of gender equality compared to their counterparts in more gender equal nations.[208] This may be because ICT jobs give a clear path to financial independence in these countries.

Women also lag behind men in access to digital facilities. Globally, men are 33 per cent more likely than women to have an internet connection, and the gap widens when looking at women in low-income, urban communities.[209] It is vital to equip women and girls with more digital skills because these skills are no longer optional, but rather, as digitalization accelerates, a prerequisite for full participation in society. Empowering women digitally is also vital for addressing gender bias issues. New business models in the digital economy have been shown to perpetuate gender bias. For instance, Amazon's recruiting engine was found to downgrade women when reviewing job applicants' resumés.[210] Since technology reflects the values of its developers, enabling women to become digital creators and work at the frontiers of technology will help prevent bias and make the digital space more accommodating for both sexes.

Traditional social norms that limit women's career development also affect women's performance at work in the digital age. Even in gender-blind situations, women are more disadvantaged because of their caring roles. Studies have shown that when companies are hybrid, as opposed to fully remote, men are disproportionately in the office and visible, and this has a negative impact on women's progress.[211] Moreover, analysing information on two million tasks on Amazon Mechanical Turk between 2015 and 2017, Adams-Prassl found that women earned 20 per cent per hour less on average because childcare and domestic production constrain women's ability to complete their tasks quickly.[212] Women are also more likely to face a rigid work schedule due to caring responsibilities when working at home, and this may lead to burnout and attrition. However, the expansion of flexible working may contribute to gender equality. A study on dual-earning parents in the United Kingdom during the lockdown shows that, although working mothers carried a disproportionate burden through the pandemic, fathers who worked from home did more housework and childcare during the lockdown period than before.[213] The flexible working arrangements, together with changed existing work cultures and gender norms, may help reduce some of the gender inequalities at home and at work.

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[208] UNESCO, *I'd Blush If I Could: Closing Gender Divides in Digital Skills through Education* (2019).

[209] Anu Madgavkar et al., 'The Future of Women at Work: Transitions in the Age of Automation', McKinsey Global Institute, (2019).

[210] Jeffrey Dastin, *Amazon Scraps Secret AI Recruiting Tool that Showed Bias Against Women*, (2018).

[211] Herminia Ibarra, Julia Gillard, and Tomas Chamorro-Premuzic, 'Why WFH Isn't Necessarily Good for Women', *Harvard Business Review*, (2020).

[212] Abi Adams-Prassl, 'The Gender Wage Gap on an Online Labour Market: The Cost of Interruptions', CEPR Discussion Paper No. DP14294, (2020).

[213] Heejung Chung et al., 'Covid-19, Flexible Working, and Implications for Gender Equality in the United Kingdom', *Gender & Society* 35,2 (2021): 218–32.

▶ 5. Youth

Youth unemployment as well as underemployment and working poverty among youth is an enormous challenge for the future of the world of work. The ILO estimates that around 67.6 million young people aged 15 to 24 years (13.6 per cent of the youth labour force) were unemployed in 2019.[214] The youth unemployment rate was projected to increase by 0.1 percentage points in 2020 and a further 0.1 percentage points in 2021. In Northern Africa and in the Arab States, youth unemployment rates were considerably higher. Furthermore, a large share of youth are not in employment, education or training (NEET). Globally, one-fifth of young people had NEET status in 2019, which suggests that they were neither gaining experience and income in the labour market nor enhancing their skills through formal education.[215] The consequences of unemployment can be more severe for youth than for adults. Extended periods of unemployment experienced at a young age can result in lower lifetime earnings.[216] Hence, there is a general need to help young people engage in the labour market.

Since digitalization can offer various pathways for economic development and poverty reduction, it is hoped that increased digitalization may enhance job opportunities for young people. Skilled youth, especially in countries such as those in the Middle East and North Africa where youth unemployment rates are high, may access gig opportunities across the world through digital platforms, while unskilled young people may earn a living through some sharing economy platforms such as ridesharing app Careem.[217] Young people can earn higher hourly wages doing digital jobs such as crowdworking due to the higher returns to experience accruing to younger crowd-workers.[218] However, the reality is that most young people in these countries find it difficult to compete with their counterparts globally because of traditional laws, bureaucratic controls, and lack of the necessary digital skills.

The digital transformation implies disruptive changes to business models across industries, which alters the nature of work and the skills young people need to effectively enter the labour market. While young people are typically labelled as 'digital natives', the majority of them may not possess adequate job-relevant digital skills. Compared to adults, young people are on average no more likely to be employed in high digital intensity sectors, yet this group includes a high proportion of skilled workers with high levels of education.[219] Lack of digital connectivity is an initial barrier to acquiring the digital skills that young people need. According to a joint report by UNICEF and the ITU, 63 per cent of young people aged 15 to 24 years do not have access to an Internet connection at home during the COVID-19 pandemic.[220] Access to the Internet differs significantly based on a country' economic strength. About 87 per cent of children and young people can access the Internet at home in high-income countries, but the figure for low-income countries is only 6 per cent.[221] Investment on broadband infrastructure expansion can create 24 million new jobs overall, mostly in low- and middle-income countries. 6.4 million of these new jobs are projected to be taken by young people.[222] Moreover, young people's access to the Internet and their digital skills development often depend on their parents' income level and living standards. Thus, the inequality in levels of home Internet connection (and

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[214] ILO, *Global Employment Trends for Youth: Technology and the Future of Jobs*, p.33, (2020).

[215] ILO, *Global Employment Trends for Youth: Technology and the Future of Jobs*, p.37, (2020).

[216] World Bank, *Digital Jobs for Youth: Young Women in the Digital Economy*, (2018).

[217] Nader Kabbani, How will digitalization affect youth employment in MENA? Brookings, (2021); OECD, *Africa's Development Dynamics 2012: Digital Transformation for Quality Jobs*, (2021).

[218] Niall O'Higgins and Luis Pinedo Caro, 'Crowdwork for young people: Risks and opportunities', ILO Working Paper 50, (2022).

[219] ILO, *Global Employment Trends for Youth 2022*, Forthcoming.

[220] UNICEF and ITU, *How Many Children and Young People have Internet Access at Home? Estimating Digital Connectivity during the COVID-19 Pandemic*, (2020).

[221] UNICEF and ITU, *How Many Children and Young People have Internet Access at Home? Estimating Digital Connectivity during the COVID-19 Pandemic*, (2020).

[222] ILO, *Global Employment Trends for Youth 2022*, Forthcoming.

hence digital skills development) between young people who live in rural areas and their urban peers is quite large (41 per cent vs. 25 per cent).[223]

Furthermore, in most countries, education systems do not adequately prepare youth for work in the digital economy. School curriculums often do not include digital literacy training and there are considerable differences in students' digital skills.[224] This makes it difficult for young people, especially those with socio-economically disadvantaged backgrounds, to learn digital skills and engage with technology beneficially via formal means. Moreover, vocational training is more likely to lead to employment in jobs that are at risk of automation, which means that current vocational training programmes need to be modernized quickly to help young trainees adapt to the changing demands of the digital economy.[225] Young people who go through such education seem to make their career choice based on personal preference alone, without taking into account the labour market situation.[226]

There has been some support from various stakeholders to connect young people with digital job opportunities. For example, Samasource provides microwork opportunities in Kenya, Uganda and India with an explicit target of youth, particularly youth without formal work experience.[227] Rural, low-income young people in India have benefited from the IT training centres run by iMerit.[228] Solutions for Youth Employment (S4YE), a multi-stakeholder coalition, has provided various programmes and innovative ways that help connect young people to digital job opportunities. YouthForesight, a knowledge platform jointly hosted by the Global Initiative on Decent Jobs for Youth (DJY) and Generation Unlimited (GenU), aims at providing more affordable and accessible courses on vocational and managerial skills.[229] Over 15,000 students from 191 countries have benefited from the training opportunities since its launch in 2019.

The ILO supports countries to develop and implement youth employment policies and programmes to promote decent work and inclusive digital, demographic and de-carbonisation transitions and to reduce NEET rates. However, more policy support is required to loosen regulatory constraints, reduce the infrastructure gap, modernize the education system and improve training for young people.

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[223] UNICEF and ITU, *How Many Children and Young People have Internet Access at Home? Estimating Digital Connectivity during the COVID-19 Pandemic*, (2020).

[224] European Parliament, *Rethinking Education in the Digital Age*, p.8, (2020).

[225] ILO, *Global Employment Trends for Youth: Technology and the Future of Jobs*, p.68, (2020).

[226] Juan Chacaltana and Sukti Dasgupta, *Is the Future Ready for Youth? Youth Employment Policies for Evolving Labour Markets,* (2021).

[227] World Bank, *Digital Jobs for Youth: Young Women in the Digital Economy*, (2018).

[228] World Bank, *Digital Jobs for Youth: Young Women in the Digital Economy*, (2018).

[229] Youth Foresight, https://www.youthforesight.org/.

► 6. Groups at risk of being marginalized in the digital economy

6.1 Refugees and irregular migrants

Refugees and irregular migrants represent a unique group because of their limited access to formal employment in their host communities. Refugees' right to work is enshrined in the United Nations 1951 Refugee Convention, which clearly states that refugees should be given the same treatment as any foreign national in the same circumstances. While this does not guarantee equal access to employment, States are encouraged to give sympathetic consideration to allow refugees the same rights as nationals.[230] In many cases, despite being signatories to the Convention, States' policies are restrictive towards refugee employment.[231] According to the United Nations High Commission for Refugees (UNHCR), 70 per cent of refugees live in countries that place restrictions on their right to work.[232] While the advent of digitalization has presented opportunities for refugees to broaden their employment possibilities, because of restrictions placed on them, they are not equally positioned to benefit from it.

A UNDP report, "Migrant Union - Digital Livelihoods for People on the Move", identified over one hundred existing online education and training initiatives and broad pathways to digital work that had the potential to open new opportunities, markets, and networks for displaced people.[233] This number has only increased with the normalization of digital work due to COVID-19. The growth has also been due to the realisation that digital work is uniquely well-suited to the situation, skills, and needs of refugees, as employers value skills in this sector over certification.[234] Digital work has the advantage that it allows mobility or further displacement, as jobs are not necessarily linked to a particular location and can take advantage of the regulatory "grey area" of informal sectors, such as protectionist policies that prevent refugees from accessing the local economy. Many countries, therefore, provide digital skills training for refugees, such as the ReDI School in Germany and the World Food Programme's Digital Skills Training in Lebanon.[235] A number of the refugee graduates from such schools successfully find a job in the host nation, some find work remotely and others have been relocated via labour mobility schemes.

The opportunities for refugees and irregular migrants in the digital livelihoods are significant, yet initiatives are not operating at scale. This stagnation is due in part to supply and demand barriers, including obstacles such as digital infrastructure and internet access, inadequate identification systems for refugees, lack of universal recognition of qualifications and skills, but also inconsistent and ineffective links between jobs and displaced people. Moreover, access to financial services is a huge challenge for many displaced people, who often lack identification documents that are accepted by financial institutions. These challenges make it difficult for displaced individuals to access digital work. As an ILO report concluded, strengthening the connection between digital skills training and employers, while integrating the work of multiple actors, such as governments, international organizations, the private sector, and workers' organizations, more deeply into the design and implementation of digital livelihood programmes could improve employment outcomes.[236]

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[230] UNHCR, *Convention and Protocol Relating to the Status of Refugees* (2010).

[231] Roger Zetter and Héloïse Ruaudel, '*Refugees' Right to Work and Access to Labour Markets – An Assessment*', World Bank Global Program on Forced Displacement (GPFD) and the Global Knowledge Partnership on Migration and Development (KNOMAD) Thematic Working Group on Forced Migration, (2016).

[232] UNHCR, *Livelihoods and Economic Inclusion*.

[233] UNDP, *The Migrant Union - Digital Livelihoods for People on the Move*, (2019).

[234] Ben Mason, '*Tech Jobs For Refugees: Assessing The Potential of Coding Schools For Refugee Integration In Germany*', Migration Policy Institute, (2018).

[235] ILO, *Towards Decent Work for Young Refugees and Host Communities in the Digital Platform Economy in Africa: Kenya, Uganda, Egypt*, (2021).

[236] ILO, *Digital Refugee Livelihoods and Decent Work - Towards Inclusion in a Fairer Digital Economy*, (2021).

It is hoped that digital work could lead to decent work for displaced populations, characterized by improved employment prospects compared to the informal, precarious and often exploitative jobs in their host countries. Digital work could allow greater access to, and better opportunities for, work for displaced populations in ways that take advantage of the legal grey area presented by online work in many refugee hosting countries, where refugees are excluded from local employment. Yet, this means that most digital work, particularly online gig work, digital freelancing and e-commerce, which is more easily accessible to displaced individuals, is also almost always informal and can be precarious.[237] Studies have shown that gig work and digital freelancing for displaced populations do not necessarily adhere to standards of decent work for refugees, as recurring experiences of precarity of work seem to be the norm.[238] Nevertheless, the opportunity for displaced people to engage in this sector, despite it often being informal, is significant, and often better than their chances of finding a job (either formal or informal) in their host communities.

There is a clear paradox here. The UNHCR, while advocating for decent work, equal rights to work and formal work for refugees,[239] recognises the tension between the aspiration to the highest standards of full protection and full rights enshrined in the human rights principles and the Refugee Convention versus the reality of informal work for refugees and nationals who are largely based in countries where informal work is common or even predominant. While informality is often equated to precarious and exploitative work, a phenomenon which is certainly evident in the digital space, for those who have a certain level of skill and possess networks, this "informal" work can be decently paid and certainly not exploitative. It can also be argued that as the alternative would be informal (or even formal), low-skilled and low-paid work in the host economy, digital work is perhaps more decent and preferential. What is needed is advocacy aimed at (and pressure on) host governments that have restrictive policies for refugee employment in the local labour market to recognise that there are significant potential benefits of embracing the digital economy and allowing refugees legal access.

6.2 Ethnic minorities

Digital technology is believed to be able to help disadvantaged groups, such as ethnic minorities, to gain direct access to employment through online recruiting platforms that enable them to work remotely. The notion of an ethnic minority is different globally; here we use the U.S. as an example.

In the U.S., the term "minority" usually refers to four major racial and ethnic groups: African Americans, American Indians and Alaska Natives, Asians and Pacific Islanders, and Hispanics. These groups are currently underrepresented in high-level digital occupations. A study by Brookings found that Blacks in the United States were overrepresented in medium-digital occupations such as office and administrative support, as well as low-digital level jobs such as transportation and grounds maintenance.[240] Hispanics are significantly underrepresented in high-level digital technical, business and finance occupational groups and somewhat underrepresented in medium-level positions.[241]

There are significant gaps in the ownership and use of digital devices among these people. Less privileged people are more likely to suffer from digital divide. Research found that exposure to the Internet at work is strongly associated with home adoption. Yet Hispanic and Black workers in the U.S. are far less likely than Whites to be exposed to the Internet on the job — even when they are employed in the same kinds of jobs.[242] There is a gap of 6 to 8 percent of home-internet adoption between Hispanic, Black and Native American households and White households after accounting for differences in income, education, age and other

[237] Arne L. Kalleberg, 'Precarious Work, Insecure Workers: Employment Relations in Transition', *American Sociological Review* 74, no. 1 (2009): 1–22; Gina Neff, *Venture Labour: Work and the Burden of Risk in Innovative Industries*, The MIT Press (2012); ILO, *Digital refugee livelihoods and decent work - Towards inclusion in a fairer digital economy*, (2021).

[238] Philip Rushworth and Andreas Hackl, 'Writing Code, Decoding Culture: Digital Skills and the Promise of a Fast Lane to Decent Work among Refugees and Migrants in Berlin', *Journal of Ethnic and Migration Studies* 0 (2021): 1–17.

[239] UNHCR, *Livelihoods and Economic Inclusion*.

[240] Muro et al., 'Digitalization and the American Workforce', Brookings, (2017).

[241] Muro et al., 'Digitalization and the American Workforce', Brookings, (2017).

[242] S. Derek Turner, *Digital Denied: The Impact of Systemic Racial Discrimination on Home-Internet Adoption*, (2016).

factors.[243] Thus, it is crucial to reduce the gap and help people of minority groups to better engage in the digital economy.

Indigenous and tribal people across the world are also excluded from the digital economy. One of the many reasons that indigenous people remain confined to the informal economy because of non-recognition of traditional skills.[244] Digital transformation is worsening their labour market status. Few indigenous workers obtain well-paid jobs in the formal economy and are trapped in low-skilled occupations. Efforts should be made to ensure indigenous people access to adequate education, skills and training, eliminate discrimination and remove barriers associated with language and geographies.

6.3 People with disabilities

People with disabilities comprise 15 per cent of the world's population and about 80 per cent of them are of working age.[245] However, people with disabilities are often discriminated against in the labour market and their labour rights are frequently denied. To help disabled people eliminate barriers to decent employment, the ILO has proposed a disability-inclusive strategy.[246] One approach that has been suggested is to build an inclusive digital labour market with the view that the digital economy has the potential to provide better access to employment opportunities for people with disabilities.[247] This is particularly relevant due to the increase in remote work.

However, many disabled people lack the required skills and digital tools to benefit from digital employment. They generally possess lower levels of education and training compared to the rest of the labour force. Only 29.4 percent of disabled people aged 30 to 34 in Europe completed tertiary education in 2018, compared to 43.8 per cent of their counterparts without disabilities.[248] People with disabilities in developing countries might be even more disadvantaged than those in developed nations.

There are significant gaps between disabled people and the rest of the population in terms of access to the Internet and digital devices such as smartphones. For instance, in Mexico, there is a 37 per cent disability gap in smartphone ownership.[249] If disabled people do not acquire the skills and/or the access to digital facilities, they will be left behind. Thus, reskilling and upskilling people with disabilities and providing them with affordable digital tools are crucial to ensure that they can access quality digital jobs.

[243] S. Derek Turner, *Digital Denied: The Impact of Systemic Racial Discrimination on Home-Internet Adoption*, (2016).

[244] ILO, Implementing the ILO Indigenous and Tribal Peoples Convention No. 169: Towards an Inclusive, Sustainable and Just Future, (2019).

[245] ILO, *Disability and work*.

[246] ILO, *ILO Disability Inclusion Policy and Strategy 2020-2023*, (2021).

[247] ILO, *An Inclusive Digital Economy for People with Disabilities*, (2021).

[248] ILO, *An Inclusive Digital Economy for People with Disabilities,* (2021).

[249] ILO, *An Inclusive Digital Economy for People with Disabilities*, p.14, (2021).

►7. Conclusions

To sum up, the diffusion and penetration of digitalization into of the economy has fundamentally changed the organization of work. The way that work is organized and performed, the skills that are required to do the work, the employment relationships, the social protection system, the formalization of informal sectors and job quality has significantly been altered. The COVID-19 pandemic has also accelerated this digital transformation. However, not everyone has been affected equally. While digitalization has held out the promise of democratizing work and providing opportunities for many, less represented groups, such as women, ethnic minorities, people with disabilities and refugees, have lagged behind in terms of digital opportunities. Moreover, many of the low- and middle-income countries do not have the infrastructure and resources to catch up with the high-income countries.

Indeed, new income-generating opportunities have arisen, but there are also many challenges which urgently need policy interventions at both national level and worldwide.[250] Many countries, and indeed regions, have struggled to adapt their legislation to this rapid transformation. In this concluding section, we explore some of the gaps and suggest some areas for further research.

7.1 Gaps

The rapid pace of change in the labour market that is occurring due to digitalization is not always immediately followed by measures to protect workers and employers through national and international labour regulation and other instruments. From this review, some areas have been revealed that constitute significant gaps:

- ► Challenges for businesses competing in the digital space

  - o Businesses, in particular small businesses, and businesses in developed economies, face challenges in their introduction into the digital economy.

  - o In addition, many operating in the informal economy, that are already in a difficult position, might face increased challenges.

- ► Global inequality

  - o The Global South is lagging behind the Global North in terms of connectivity and digital skills. Unless this is addressed, it will further exacerbate economic inequality.

- ► Cross-border remote working

  - o Immigration regulations on non-nationals, non-residents and individuals with other immigration status (such as refugees) working for companies outside of their jurisdiction are not always clear. While the digital nomad visa (in places such as Estonia, Barbados and Spain) has made some regulations explicit, national or international regulations do not exist to accommodate this new way of working.

  - o Even when immigration controls do not apply, such as hiring remotely across the EU, working remotely for a company in a different tax jurisdiction brings implications for tax, social security rights and working conditions. This has not been addressed by national legislation in many countries.

- ► Blurring of employment relationships

  - o Digital workers, and this includes those working via location-based and online platforms as well as those working freelance on long-term contracts for employers not in their country of

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[250] Nida Broughton and Kitty Ussher, 'Venturing Forth: Increasing High Value Entrepreneurship', Social Market Foundation, (2014).

residence, are often classified by their employers as contractors even though their working arrangements resemble that of an employee.

o This misclassification of their employment means that they do not receive benefits and protections to which they should be entitled, such as minimum wages, working hours, medical cover, social protection and protection for other associated risks.

o Employment arbitration in the case of employment disputes is also complicated. In these cases, it is unclear how they are covered by national employment regulations.

► Digital skills gap

o As the digital transformation of jobs accelerates and more lower-skilled jobs are replaced by those requiring higher skills, those with lower levels of education are increasingly excluded. Upskilling and reskilling become imperative if the economy continues to grow. While most governments include digitalization in their national policies, there is little evidence of widespread support to address the digital skills gap, particularly in low-income countries.

o Education systems are also responsible for addressing the skills gap by ensuring that young people leave school with the digital skills required by the economy. To date, most national curriculums, even in high-income countries, do not reflect the skills needed for the digitalized economy.

► Workers' rights, including collective bargaining

o The new forms of work require self-organization and active commitment on the part of employees to solving problems. However, management and organizational structures remain largely top-down and employees have hardly any say because they are dispersed around the world (or city – in the case of local platforms for example).

o Current channels of collective bargaining have not met the needs of workers in the digital economy due to the blurred nature of the employer-employee relationship and the unstructured nature of their work. Important steps should be taken to ensure their right to freedom of association and collective bargaining.

► Inequality in the digital economy

o Digitalization has increased opportunities for women, especially mothers, to remain in the workforce, by taking advantage of remote working or hybrid arrangements. Yet, this has not resulted in the progress expected and women are still falling behind. Regulations that would allow remote work from being 'feminized' are necessary to ensure that women do not fall further behind are absent. Gender, ethnic minorities and disabled people inequality in ICT remains much in evidence. Incentives are needed at national level to support and promote women entering the sector.

o Youth are often incorrectly perceived to be digital natives. However, their ability to participate in the digital economy is dependent on the socio-economic status of their family. It is, therefore, crucial to ensure young people's equal access to digital infrastructure, Internet connectivity and skills. Traditional higher education and training need to be transformed to adapt to the changing requirements of the digital world.

o The digital economy has increased the opportunities for refugees and irregular migrants to access jobs, particularly if they are hosted in countries with poor employment prospects. However, without the right to work (or even the right to remote work), they remain restricted to the informal economy without social protection and often in precarious conditions, no different to being employed in their host community.

o Minority groups are often excluded from the digital economy due to, among other, lack of skills, as well as access to digital infrastructure and connectivity. Policies to address these barriers, (access to education, devices) should be updated.

7.2 Future research questions

► Digital labour studies have largely focused on western countries in Europe and the U.S. More research is needed on digital labour in emerging economies and politically fragile settings.

► How will emerging technologies such as Web3, the metaverse, decentralized autonomous organization (DAO) and blockchain impact the future of work?

► Who are the winners and losers in the digital transformation of the labour market in terms of the impacts on people's skills, mental health and wellbeing as well as community social cohesion?

► How do we protect those who find themselves left behind in the digital transformation of work? In particular women and young people.

► What changes to existing systems of education and social protection are needed for reskilling and upskilling people to adapt to current and future labour demands?

► How are employers navigating national policies and legislation to hire workers globally?

► How can digitalization support productivity improvements and benefit MSMEs and those operating in the informal economy?

► How are governments amending their policies to attract global digital talent and create more decent jobs through digitalization?

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