Workforce aging and decent work in the era of the digital economy – towards a holistic public policy approach

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ABSTRACT

The aging of populations and the labour force, combined with the process of digitalisation, have a significant impact on labour markets, employment, and labour rights worldwide. Industries and jobs that rely on age-appreciating skills, which improve with age, are positively affected by both aging and digitalisation, since automation compensates for the lower physical abilities of older workers, thereby increasing their productivity. On the other hand, automation threatens physical and routine jobs that require low skills. In this paper, the authors used an empirical approach and inductive method to analyse the simultaneous influence of aging and digitalisation on workforce skills and demand for employees. In the future, governments' efforts to stimulate employment and decent work should include providing high-quality education that prepares the workforce to gain and upgrade creative and social skills. These changes require policy and regulatory interventions to address the issues of skill shifts and the transition towards both digital and green economies, while simultaneously promoting and standing for decent work conditions. This presupposes that businesses introduce and adopt sustainable, dynamic, and inclusive workplace practices. The authors propose the age management mechanism as a human resource tool, as well as its legal counterpart, the age-responsible due diligence approach, for managing the necessary changes.

KEYWORDS

aging workforce, digitalisation, age-appreciating skills, decent work standards, human rights due diligence approach

1 INTRODUCTION

Overall, labour markets are undergoing significant transformations globally, with many workers employed in informal, precarious, and nonstandard forms of work, leading to increasing inequalities (ILO 2019). Unemployment is a major challenge for policymakers, as it is a leading cause of poverty. Therefore, it is crucial to assess how demographic changes and the automation of production will affect future employment needs.

The demographic trend of population aging, which has intensified in the past three decades, is considered one of the major obstacles to economic growth that is expected to strengthen in the future as the participation of the elderly population increases (Acemoglu and Restrepo 2017). The prime reason for the potentially constraining effect of the aging labour force on economic growth lies in its declining productivity, as workers are expected to reach their peak performance in their 40s (Murphy and Welch 1990). According to a 2016 IMF study, Japan's annual total factor productivity was 0.7–0.9% lower between 1990 and 2007, mainly due to a decreasing share of employees in their 40s (Liu and Westelius 2016). The trend of declining birth rates and increasing life expectancy, particularly in highly developed countries such as Japan, Germany, the United Kingdom, Italy, and the United States (United Nations, Department of Economic and Social Affairs, Population Division 2019), is transforming the age structure of the labour force in those countries, consequently changing their economic and foreign trade structures. As some cognitive capacities tend to decline with age, countries with higher aging rates may experience a decrease in both the quantity and quality of those cognitive skills, which could affect industries that rely on them for competitive advantage.

Psychological research has shown that certain abilities, such as language capacities, can improve with age (Cai and Stoyanov 2016). However, other abilities, including speed of information processing, multitasking, memory, capacity to learn new skills and adapt to changes in working processes, and physical abilities like mobility, speed, endurance, and co-ordination tend to deteriorate with age (Phiromswad, Srivannaboon and Sarajoti 2022). The ability to combine knowledge and skills is crucial for each occupation or industry, and understanding how this ability relates to age can help us estimate the effects of an aging labour force on future employment, economic structure, and competitiveness. Another significant factor that has influenced employment in the past two decades is computerisation, which encompasses artificial intelligence (including machine learning and cognitive computing), robots (including service robots, robot-assisted procedures, and robotic process automation), and automation technologies (Coombs et al. 2017).

One of the defining features of this century is the rapidly increasing use of digitalisation in labour operations, which includes the automation of production, the use of robots in services and manufacturing, and the wider use of artificial intelligence and machine learning. In many countries, particularly highly developed ones where labour is more expensive than in developing economies, certain types of jobs have already been widely automated, such as cashiers in supermarkets, bank tellers, and car manufacturing. This has raised concerns around the world that millions of employees could lose their jobs in

the future due to being replaced by machines (Hawksworth, Berriman and Saloni 2018; McKinsey & Company 2017).

The aim of this paper is to elaborate upon the expected simultaneous impacts of the aging population and workforce, as well as automation on future employment and economies. The method applied in this research is multidisciplinary, as the authors discuss the main economic and legal implications of workforce aging and computerisation. Moreover, they try to identify the key elements for improving public policy and regulatory frameworks towards shaping a decent and sustainable working environment. The study has been limited to the European public policy framework and industrialised Western countries' human resources management practices, since population aging and digitalisation are recognised as among the most significant challenges facing societies and economies in the coming decades.

2 AUTOMATION, POPULATION AGING, AND GLOBAL WORKFORCE SKILL TRENDS – AN OVERVIEW OF EMPIRICAL FINDINGS

Research by Oxford Economics foresees that approximately 20 million manufacturing jobs on a global scale – representing 8.5% of the employees working in the global manufacturing industry – may be replaced by robots by 2030 (Alcover et al. 2021). According to a study by the Organisation for Economic Co-operation and Development (OECD), nearly half of existing jobs in the 32 countries covered by the research will probably be significantly affected by automation (Nedelkoska and Quintini 2018). More than 66 million workers are employed in jobs with the highest probability of automation (70% probability or higher), with that number representing 14% of total jobs. In addition, 32% of jobs in the 32 observed countries have an above average risk of automation, with the probability ranging from 50% to 70% (Nedelkoska and Quintini 2018). The widespread impact of automation affecting every second job would result in significant changes to how these jobs are performed, leading to a shift in the skills and abilities required.

Frey and Osborne (2017) estimated that almost half (47%) of 702 occupations in the USA are at high risk of computerisation. Furthermore, a study on the influence of automation on employment in Finland and Norway found that approximately each third worker in these two countries is at high risk of computerisation (Pajarinen Rouvinen and Ekeland 2015), while in Singapore it was a quarter (Fuei 2017). A comparable study on the effects of digitalisation on employment predicts that 12% of current jobs will become automated (Schinner et al. 2017).

In the UK, approximately 7% of existing jobs could be affected by automation with a probability of 70% during the next five years. In a 10-year period, the share of jobs impacted by automation would increase to 18% and reach 30% after 20 years (PwC 2021).

Since the processes of population and workforce aging are taking place simultaneously with the computerisation of production, and are among the major forces that affect the labour market, our aim is to analyse their interactions and explore the results of their joint influence on employment and labour in the future. The level of employment at national level and its structure by industries depends on marginal labour productivity. Demand for labour will be

on the rise until the marginal revenue product of labour equals the cost of labour (wages). In that case, companies will cease to employ new workers, since each additionally hired employee brings lower revenue than his/her wage. In addition, other factors remain constant due to the law of diminishing marginal return. The demand for labour can be increased by raising productivity that depends on workforce skills and abilities, and by using more efficient equipment and machines in places where automation plays a significant role.

As Cai and Stoyanov (2016) argue, a country with an above average share of elderly people and workers would turn to production styles where age-appreciating skills are more important than age-depreciating ones. Demographics and the age distribution of the workforce determine the productivity of industries and the economy. An aging workforce is favourable for the development of industries that rely on age-appreciating skills, but is problematic for industries whose productivity declines due to their dependence on age-depreciating skills.

For example, in industries such as construction that rely on age-depreciating skills such as coordination, divided attention, and agility, aging reduces workers' competitiveness and their share in the national economy. On the other hand, the same tendency supports occupations where age-appreciation abilities – such as written or oral communications skills – are important, as is the case with sales representatives, for instance. Cai and Stoyanov (2016) confirmed the effects of aging on industry and occupational structures as well as on countries' competitiveness in their study, which included 86 industries and covered the period between 1962 and 2010.

Some studies focus on activities (job tasks) instead of aggregate occupation levels (Autor, Levy and Murnane 2003). These studies classify tasks into abstract, routine, and manual ones, matching them with the skills they require: cognitive and physical abilities. Arntz, Gregory and Zierahn (2016) analysed the effects of digitalisation on jobs in 21 OECD countries based on task approach and concluded that only 9% of occupations are endangered by automation. They claimed that Frey and Osborne overestimated the effects of computerisation on the labour market, since automation replaces specific tasks within each occupation, rather than the whole occupation.

Further research brought a new approach to evaluating the potential impacts of computerisation on job replacement. Brynjolfsson, Mitchell and Rock (2018) pointed out that there was a difference between ways in which machine learning technology (MLT) and computerisation affected occupations. In two-thirds of occupations, MLT is expected to replace not more than 20% of tasks within those occupations.

When analysing the impact of aging on employment, working abilities can be classified as: age-appreciating cognitive ability, age-depreciated cognitive ability, and age-depreciated physical ability (Phiromswad, Srivannaboon and Sarajoti 2022). The first category refers to skills that typically improve with age, such as verbal abilities and written expression. Age-depreciated cognitive abilities like memory, divided attention, and speed of processing information decrease with ages Physical skills are age-depreciated, since physical abilities such as agility, body coordination, strength, and stamina weaken as individuals get older.

Phiromswad, Srivannaboon and Sarajoti (2022) found that the probability of computerisation was highest for office and administrative support (83.65%), manufacturing (81.81%), and food preparation and serving occupations (78.90%). The first of these occupational groups consists of routine, highly standardised, and predictable tasks, such as creating documents in standard forms and scheduling meetings, which are easy to computerise. In such cases, computers are a much more productive and cost-effective solution than human workers.

The occupations with the lowest chances of being replaced by computers are social service providers (6.91%) and healthcare practitioners (17.05%), since the most important abilities required in these occupations are social intelligence, perception, communication, and empathy (Phiromswad, Srivannaboon and Sarajoti 2022). The study provided examples of occupations where workforce aging was advantageous, such as in fields like legal (58.62), business and financial operations (50.38), and community and social services (49.74). For those occupations, oral comprehension and oral expression are of crucial importance. In these areas, aging employees positively contribute to productivity with marginal revenues being higher than marginal cost. Because of that, workforce aging has a positive effect on employment. At the same time, aging has the highest negative effects in construction and extraction (10.02) and maintenance and repair occupations (16.37). For these occupations, physical abilities that decrease with age are of key importance, as are age-depreciated skills such as time sharing and perceptual speed.

In their 2022 study, Phiromswad, Srivannaboon and Sarajoti concluded that computerisation can enhance the productivity of workers in occupations that require age-appropriate cognitive ability, but whose physical skills decline with age, such as healthcare and social care. Therefore, automation could be beneficial in these industries. When analysing the impact of digitalisation and population aging on the labour market, it is crucial to consider their interactions.

3 WORKFORCE AGING AND SKILL SHIFTS IN THE DIGITAL ERA

Research conducted by Abeliansky et al. (2019) predicted that between 2020 and 2030, 98% of the new job needs for the working-age population (aged 15–64) would be generated in lower-income countries. During the same period, higher-income countries will undergo a 66% increase in their number of older people (65+). As a result, the majority of older workers will likely be employed in highly developed countries that have invested heavily in digitalisation (Acemoglu and Restrepo 2020). However, a Harvard study estimated a low increase (11%) in job needs for those aged 15–24 until 2030 (Abeliansky et al. 2019).

The job replacement effect resulting from automation is strongest for physical, routine jobs that require low skills and are typically intended for younger workers in lower-income countries. This is due to the fact that automation poses a threat to a young workforce of lowly educated people performing routine tasks, who face severe competition in their lower-income countries, as well as automation replacement in higher-income countries.

On the other hand, automation is not expected to have adverse effects on demand for the aging working force in higher-income countries, since it has little impact on jobs requiring

age-appreciating abilities. Computerisation can have a positive effect on the work of aging employees by helping them perform routine tasks, thus making their work more productive. For example, legal assistants are at high risk of being replaced by computers because they perform routine tasks such as searching for documents. However, lawyers who rely on input from their assistants are at low risk of being affected by automation, since the abilities of persuasion and social perceptiveness are of key importance for their work. It can be concluded that routine jobs that consist of precisely defined tasks, such as manufacturing and administrative tasks, could easily be replaced by automation. This is what encourages workers to move from middle-income manufacturing to low-income service jobs, where flexibility and adaptability are more valued (Autor, Levy and Murnane 2003; Goos, Manning and Salomons 2014; Autor and Dorn 2009).

On the other hand, as Frey and Osborne (2017) pointed out, jobs that rely on the following skills are hard to replace with computers: 1) social perceptiveness – referring to awareness of others' reactions and understanding of what lies behind those reactions; 2) negotiation – bringing people together, using management skills to help them work as a harmonious team by reconciling differences; 3) persuasion – influencing people to shift their opinions or behaviour and, 4) assisting and caring for people – providing personal assistance, medical attention, emotional support, or other personal care to colleagues, clients, and patients. Jobs based on the above-mentioned abilities may actually benefit from automation. For example, doctors' jobs could be made more efficient by introducing a data management system that would support their work, thus freeing them from administrative tasks and making them more productive.

Goos, Manning and Solomon (2014) highlighted an increasing polarisation of the labour market, with automation affecting low-skill and low-wage jobs in particular. As Bordot (2022) pointed out, the impact of automation was 2.5 times higher for younger workers (aged 25–34) with secondary education or below than for older workers (aged 55–64) with tertiary education. Moreover, robots could replace workers with a medium level of education, thus contributing to the polarisation of the labour market. With automation progressing further, low-skilled workers will get additional incentives to move towards jobs that are based on creativity, social perceptiveness, and social intelligence, as these jobs are less susceptible to automation.

In Europe, the general digitalisation trend is expected to affect the labour force twofold by: a) increasing demand for high-skilled white-collar workers and b) raising polarisation and shortages in the labour market (Eurofound 2021). Changes in the labour market require an adequate employment policy from each country, with the aim of achieving and sustaining high employment rates while simultaneously creating decent working conditions for all categories of workers, particularly the most vulnerable ones.

One of the key instruments in lower-income countries would be to provide high-quality education that would prepare the workforce to gain and upgrade creative and social skills. This means that the creators of public policies should consider the fact that needs for certain skills (for example technological, social and emotional) would be on the rise, while the demand for other skills such as physical and manual ones would

decrease. In higher-income countries i.e. industrialised Western countries with an aging labour force, the government's strategic goals would be to keep older workers healthy and to enable those who would like to stay active within the labour market after the age of 65 to use their age-appreciating abilities. Moreover, governments should support the application of automation in workplaces where age-appreciating skills are the key competitive factor in order to help older workers overcome their disadvantages in specific tasks requiring age-depreciating and physical skills. Thus, policymakers should focus on providing high-quality health and occupational care. Furthermore, legal amendments are needed to allow people to work after 65, and there is a need to create incentives for companies to hire older workers.

4 REVISITING PUBLIC POLICY AND REGULATORY FRAMEWORKS – TOWARDS DECENT WORK AND ECONOMIC GROWTH

The key employment and labour policy interventions that could prepare the existing regulatory framework for the digital revolution and workforce aging can be identified as follows: 1) the development of specific vocational and skills training programs for categories of workers who are the most affected by change, especially younger and older ones; 2) an application of so-called age management practices at the macro (state) and micro (company) level as a measure of corporate sustainability; 3) an improvement of health and safety protection in the workplace; 4) the introduction and implementation of flexible working arrangements, and 5) revision of existing anti-discrimination legislation in terms of setting positive discrimination

measures for older workers, as well as the adoption of specific measures to combat age discrimination practices in workplaces based on prejudice and negative age-related stereotypes, which can be found at individual, organisational and institutional levels.

The above-mentioned interventions serve to meet the targets of the UN's sustainable development goal 4 (SDG4), pertaining to the need for "ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all", as well as of SDG8, which is "decent work and economic growth". The first two interventions (1 and 2) could be classified as policy instruments, mainly related to the broader institutional (1) and organisational practice (2) at the micro and macro level. They are usually applied as soft law rules (mechanisms), while the remaining three (3 to 5) are traditional legal (hard law) instruments in the domain of labour law. However, it is important to note that many labour law scholars have expressed concern about the legitimacy of soft law rules by stressing the negative effects of "a rapid expansion of quasi-legal labour rules, i.e. soft law rules and privatisation/corporatisation/politicisation of labour regulation" that could significantly weaken labour laws (Blackburn 2006: 7). Those concerns relate to the specific nature of labour standards – both hard and soft rules – that are often "framed as open norms with a high level of abstraction" (Kun 2018: 23). However, as has been pointed out in the literature, although soft rules are not legally binding and cannot be enforced in any court, their value lies in the potential to cover legal gaps *in favorem* the protection of basic human and labour rights (Vinković 2013).

In this section, we will discuss soft law interventions (1, 2) as practical and operational tools and potentially effective instruments toward digital and green ('twin') transitions amidst the aging of the workforce. In this respect, we will argue for the method of human rights due diligence as an effective risk management tool for identifying, analysing, and evaluating compliance with basic labour rights in work practices at the organisational level. This method could also be a valuable instrument for dealing with age discrimination issues in the workplace. Due diligence investigation is not strictly legal in nature, but rather an objective assessment of the situation. It presupposes the analyses of the company's operations from the social, political, and economic perspectives, while evaluation focuses on the interpretation of these facts from a human rights perspective (Taylor, Zandvliet and Forouhar 2009). The social perspective also includes the demographic angle, as population/workforce aging inevitably "requires changes in the human resources strategies and labour market policy" (Ciutiene and Railaite 2015: 391). Thus, the human rights due diligence method will be explored in the context of the introduction of the age management practice as a specific tool that follows and supports vocational and skills training programs by providing equal opportunities for training and skills development to all age groups and making employers more adaptable to arising changes.

The development of specific vocational and skills training programs at the level of member states has been grounded on the first principle, i.e. "Education, training and life-long learning" highlighted in the European Pillar of Social Rights (EPSR), and launched by the European Commission in 2017.

The training programs aimed to integrate social standards into the EU's economic policies, specifically in relation to the twin transition to the green and digital economy. In 2020, the commission introduced a Proposal for a council recommendation on vocational education and training (European Commission 2020a). The aim of this proposal is "to support both youth employability and adults in need of continuous up- and reskilling", with a focus on sustainable competitiveness, social fairness, and resilience.

In the proposal, the most important action in implementing the national vocational and training policy framework is the establishment and promotion of centres of vocational excellence. The role of the centres is to drive a transition from sectors that are in decline to new growing sectors by enabling skill development, with a special focus on the inclusion of vulnerable workers, such as people with disabilities, low-skilled adults, and ethnic and racial minorities, including Roma and migrant workers. The centres must be embedded in national skills strategies.

Furthermore, the EU policy initiative that supports lifelong learning and the development of national skills strategies as part of the European Skills Agenda for sustainable competitiveness, social fairness, and resilience was also introduced in 2020 (European Commission 2020b). Measures that support access to up- and reskilling programs for all categories of workers in order to generate new job opportunities for unemployed and short-term engaged workers had to be included in national skills strategies in the context of the digital and green transition. The Agenda followed and relayed on the Proposal for a council recommendation on vocational edu-

cation and training (2020), particularly pointing to the establishment of centres of vocational excellence, by emphasising that young and older workers were most affected by the twin transition. This presupposed the engagement of all relevant actors: public bodies, educational and training providers, employment agencies, social partners, and research organisations. The Agenda also stressed the importance of introducing tools to identify skill gaps and particular measures to address up- and reskilling in the organisation at both macro (state) and micro (company) levels.

In relation to the previous point, age management represents one of the potential tools for maintaining workers' employability, improving employee health and safety, and achieving better work results. It also offers opportunities to upgrade flexible working time practices (Pedro et al. 2020). There is no universally accepted definition of age management in the literature. The researchers considered it in terms of active aging policy strategies, using it as a tool to combat discrimination at the national or macro level or as a company-level strategy for the employment of older workers (Fabisiak and Prokurat 2012). Ciutiene and Railaite (2015) define age management as "a set of measures of mitigating the consequences of aging," which is the prevailing definition among academics. In a broader sense, it is considered to be a part of human resource management or a public policy initiative.

Walker (2005) considers the introduction of age management through collective bargaining, pushing it toward the issue of labour law consideration. Barnett, Spoehr and Parnis (2008) go further and offer a more comprehensive and integrated definition of the age management concept. Their definition includes assessments of risk factors and analysis of the working capacities of all workers, not just older ones, by applying a holistic approach that encompasses health, education, and training issues. Having said that, Pedro et al. (2020) presented an overview of research studies on age management practices. Most of the studies address the issue of workplace health promotion, while only one study, conducted in the Netherlands, investigates the efficacy of human resource practices for improving sustainable employment. Besides health, that study also considers the issues of knowledge transfer, lifelong learning, and career development. This indicates that too little attention has been paid to education and training in recent age management practices, highlighting the need for a comprehensive and holistic approach to the subject.

Accordingly, the human rights due diligence method could be a valuable risk management approach in this regard. By employing a due diligence approach, age management practice could gain additional value and provide efficiency and universality by assessing the exercising of all basic labour rights for workers throughout their entire life course, not just in old age, in terms of decent working conditions and anti-discrimination. The concept of human rights due diligence correlates to the concept of age management in an operational and technical sense. Both concepts presuppose two processes. The first one is the investigation of the facts, such as the characteristics of work organisation including the structure of human resources. The second process is the evaluation of the facts in terms of the relevant standard of care, which includes human and labour rights standards (Taylor, Zandvliet and Forouhar 2009).

Gutterman (2022) introduced the age-responsive human rights due diligence concept by arguing for the integration of age issues into due diligence. This approach could serve as a starting point for the intersection of the age management concept in human resources and due diligence concept in law. The age-responsive human rights due diligence concept should be understood as a process in which employers develop action plans for identifying, preventing, and mitigating adverse human rights impacts associated with their internal operations and their business relationships, including those related to the transition towards a green and digital economy. Special attention should be paid to recruitment procedures, training, and career opportunities.

The impact of business operations on exercising basic labour rights in a transition process to a low-carbon economy could be further assessed by employing the Decent Work Check mechanism. The Decent Work Check was developed in 2008 by the WageIndicator Foundation, a global non-profit organisation that collects, analyses, and shares information about working conditions and labour standards across the globe. The mechanism works on a double comparison model, consisting of two separate procedures that follow one another. In the first stage, national laws are compared with international labour standards, and in the second stage, workers compare their real working conditions with national law standards; this information is gathered through face-to-face surveys. Workers then compare their own scores at both national and international levels.

The Decent Work Check is known as a *de jure* mechanism focusing on employment and labour regulation to inform workers of their rights throughout their entire employment across the whole employment life cycle. In the context of implementing the age-responsive human rights due diligence concept, the Decent Work Check mechanism could be applied to workers of various age groups to identify their actual work situation by classifying them in various age groups, aiming to identify their real work situations, and specifying the current legal mechanisms in national law. In the subsequent stage, the results would be compared and evaluated in terms of universal international (decent work) standards. The test should be applied separately for all determined age groups.

On the other hand, in the context of the workplace digitalisation process, it seems that vocational and skills training programs are of great importance for helping workers of all ages keep their jobs. Therefore, Dworschak and Zaiser (2014) presented two scenarios to describe the changing role of digitalisation in work organisation: 1) the automation scenario, where new technology completely guides the working process. Here, highly skilled workers are responsible for installing, modifying, and maintaining the technology, while workers with poor skills are being replaced by robots; and 2) tool scenarios, where highly skilled workers guide the technology that supports workers – who remain responsible for decision-making and problem-solving – while 'new' tasks focus much more on enhancing communication, collaboration, and creativity in the workplace. This means that the focus will be on highly skilled workers regardless of age. According to Schinner et al. (2017), many studies have confirmed that for relatively simple tasks, such as tasks that require low cognitive load, age is not relevant. On the other hand,

in the time of the digital revolution, simple, repetitive job will mostly be performed by robots and highly automated artificial intelligence. However, when the centres of vocational excellence are set out in the national skills strategies as soft law instruments, policymakers need to consider the influences of aging processes on knowledge, as well as on working capacities (physical and mental) in different economic sectors, including inter-individual differences that are more noticeable among older workers than their younger counterparts.

5 CONCLUSION

The processes of population and workforce aging, as well as emerging technological innovations such as artificial intelligence, industrial robots, and machine learning will continue to develop rapidly in the future. Societal, demographic, and technological changes, particularly those related to increasing age diversity within the labour market and the automation of production, are expected to affect businesses and influence economic growth, as well as decent work standards. Therefore, the increasing longevity will certainly pose some challenges to policymakers, requiring them to offer an alternative, more inclusive policy framework for older workers.

Besides macro-level policy interventions, employers need to adopt new and adapt old practices to suit the changing age distribution of workers in order to achieve a just, twin transition. The transition process will require managers to employ additional tools to ultimately address the issues of discriminatory practices related to age at the company (micro) level. The empirical evidence shows that automation will affect low and medium-skilled workers, pushing

them to find new incentives and move towards jobs that are based on creativity, social perceptiveness, and social intelligence. Notably, the impact of computerisation on the labour market is different, as automation replaces specific tasks within each occupation rather than the whole occupation. The highest replacing effect of automation on the labour market would be for routine, highly standardised, and predictable tasks, such as administrative ones. On the other hand, it's much less likely that social service providers and healthcare practitioners will be replaced by computers, as the social abilities required for these occupations – social intelligence, perception, communication, and empathy – cannot yet be replicated by machines.

Digitalisation will have a positive impact on employment in occupations that require age-appreciating cognitive abilities and where physical skills decline with age. In these cases, workers can benefit from automation, as it can increase their productivity rather than replace them. However, the job replacement effect of automation is strongest for physically demanding, routine, and low-skilled jobs intended for the younger working-age population in lower-income countries. The automation process poses a threat, particularly to young workers who aren't highly educated and perform routine jobs.

Older workers with a high level of education will be significantly less affected by automation, and are less likely to be replaced by industrial robots. However, it is necessary to adjust the working environment and conditions under which older workers operate to meet their needs, taking into account the diversity of skills among older workers of the same age. Thus, in higher-income countries, i.e. industrialised Western (EU)

countries with an aging labour force, the government's strategic goals are to keep older workers healthy and enable those who want to stay active in the labour market beyond the age of 65 to use their age-appreciating abilities. Governments should support the process of automation in workplaces where age-appreciating skills are a key competitive factor, in order to help older workers overcome their disadvantages in specific tasks that require age-depreciating physical skills.

The authors advocate for a human rights due diligence approach to be applied to workers of different age groups, which corresponds to Gutterman's (2022) age-responsive human rights due diligence concept. They suggest that this approach could gain further legal validity by using the Decent Work Check mechanism to assess compliance with universal decent work standards at both national and company levels.

The question that remains open relates to the legal instrument that should be employed to tackle these changes: should policymakers opt for a hard or soft law approach when creating rules? When faced with uncertainty about how best to implement a novel concept, both governments and businesses tend to prefer soft law instruments. The uncertainty is expected to continue to have a significant impact on business productivity in future. Parella (2020) points out the role of soft law mechanisms as "an opportunity for business organisations to learn new practices through soft law by giving them time to experiment with best practices". According to the prevailing views in academia and practice, the age-responsive human rights due diligence concept could initially be introduced as a soft law mechanism. However, in recent years, much more attention has been given to human rights due diligence as an emerging mechanism that contributes to the prevention of corporate human rights abuses, stressing its "huge potential to become part of legislation" (McCorquodale and Nolan 2021).

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Starenje radne snage i dostojanstven rad u eri digitalne ekonomije – ka holističkom javnopolitičkom pristupu

SAŽETAK

Starenje stanovništva i radne snage u kombinaciji sa sve intenzivnijim procesom digitalizacije sve više utiču na zaposlenost, uslove rada, kao i na ostvarivanje i delotvornu zaštitu prava na radu i u vezi sa radom. Delatnosti i poslovi zasnovani na veštinama koje se unapređuju sa godinama imaju koristi od procesa starenja i digitalizacije, s obzirom na to da automatizacija kompenzuje slabljenje fizičkih sposobnosti do kojih dolazi kod starijih radnika, čime se pak povećava njihova produktivnost. S druge strane, proces automatizacije preti da zameni radnike koji obavljaju rutinske, odnosno repetitivne, tj. manuelne poslove koji traže nizak stepen znanja i veština. Stoga bi napori kreatora javnih politika, u budućnosti, a vezano za podsticanje i obezbeđenje sigurnosti zaposlenja, kao i osiguranja dostojanstvenog rada za sve kategorije radnika, a posebno one vulnerabilne, trebalo da idu u pravcu stvaranja uslova za inkluzivnije i inovativnije obrazovanje, na način koji omogućava da radnici steknu potrebna znanja, odnosno kreativne i socijalne veštine. S tim u vezi, javnopolitički i normativni okvir koji podržava, te predstavlja odgovor na društvene, odnosno demografske, kao i tehnološke promene treba da se zasniva na obaveznosti adresiranja pitanja dokvalifikacije i prekvalifikacije u smislu usvajanja novih znanja i veština shodno potrebama tržišta rada, a vezano za tranziciju ka zelenoj i digitalnoj ekonomiji, uz istovremeno promovisanje i osiguranje dostojanstvenih uslova rada i života radnika. Osim toga, na mikro nivou, odnosno na nivou radne organizacije tj. poslodavca, neophodno je promovisanje tzv. održive, dinamične i inkluzivne organizacione i radne prakse. Stoga, autori u ovom radu ukazuju na značaj primene mehanizma tzv. menadžmenta, odnosno upravljanja starenjem radnika (eng. *age management*) kao efikasnog instrumenta u oblasti ljudskih resursa, odnosno njegovog pravnog pandana, *due diligence* pristupa ljudskim, odnosno radnim i socijalnim pravima, kao potencijalno adekvatnim, na holističkom pristupu zasnovanim metodama upravljanja nastupajućim promenama.

KLJUČNE REČI

starenje radne snage, digitalizacija, veštine koje se unapređuju starenjem, standardi dostojanstvenog rada, due diligence (dužna pažnja) pristup ljudskim pravima