IMPACT OF DIGITISATION PROCESSES

on people aged 50+, women, people with disabilities, and people from areas distant from urban centres

Possibilities for support mechanisms for equalisation of opportunities in the labour market

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Streszczenie

Głównym celem przedstawianego opracowania jest diagnoza wpływu procesów cyfryzacji na osoby w wieku 50+, na kobiety, osoby z niepełnosprawnościami oraz osoby z terenów oddalonych od ośrodków miejskich, a także identyfikacja możliwości wsparcia wyrównywania szans badanych grup na rynku pracy. W raporcie zidentyfikowano skalę zachodzących procesów cyfryzacji w Polsce w ujęciu makroekonomicznym, a także dokonano oceny potencjalnego wpływu obserwowanych zmian na badane grupy. Przeprowadzono też badanie CAWI mające na celu określenie zakresu otwartości pracowników z grup defaworyzowanych na zmiany związane z przechodzeniem firm na pracę zdalną, automatyzację procesów produkcyjnych i robotyzację oraz wykorzystywanie nowoczesnych technologii w pracy (w tym m.in.: AI, IoT). Raport kończy się rekomendacjami dotyczącymi rozwiązań w zakresie wyrównywania szans badanych grup na rynku pracy w sferze kompetencji cyfrowych.

Abstract

The main goal of this study is to assess the effects of digitization processes on specific groups, namely individuals aged 50+, women, individuals with disabilities, and those residing in non-urban areas. Additionally, the study aimed to identify potential strategies to promote equal opportunities for these groups within the labour market. The report provides an overview of the current state of digitisation in Poland from a macroeconomic perspective and evaluates the potential impact of these transformations on the aforementioned groups. Furthermore, a CAWI study was conducted to gauge the willingness of employees from disadvantaged backgrounds to adapt to changes associated with remote work, automation of production processes, robotisation, and the adoption of modern technologies such as AI and IoT. The report concludes by presenting recommendations aimed at enhancing digital competencies and fostering equal opportunities for the surveyed groups within the labour market.

CONTENTS

I. Opening remarks

I.1. Objectives of the study

In today's fast-changing world based on digitisation and technological advances, four groups live in particularly precarious and difficult circumstances: people aged 50+, women, people with disabilities, and people living in areas away from urban centres. These groups face common challenges, like adapting to the digital economy, acquiring new skills, or remaining competitive in the labour market, although their experiences of digitisation are shaped by different circumstances and factors.

The main objective of this study is therefore **to diagnose the impact of digitisation processes** on people aged 50+, women, people with disabilities, and people from areas distant from urban centres, as well as **to identify possibilities of supporting** equalisation of opportunities for the studied groups in the labour market.

The following specific objectives have been assumed:

1. Identification of the scale of the ongoing digitisation processes in Poland, along with an assessment of the potential impact of the observed changes on the studied groups.
2. Determination of the extent to which employees from the analysed groups are open to changes related to the transition of companies to remote working, automation of production processes and robotisation, and the use of modern technologies at work (AI and IoT, among others).
3. Development of recommendations for solutions to equalise the labour market opportunities of the studied groups in digital competence.

The European Commission's methodology *DigCOMP 2.2: The Digital Competence Framework for Citizens* has been used, to define contemporary digital competence. According to this approach, digital competence include "confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for social participation… competence are defined as a combination of knowledge, skills, and attitudes..." (Council Recommendation on Key Competences for Lifelong Learning, 2018). Assuming that digital competence encompass three areas: **knowledge, skills, and attitudes,** they were defined – for the needs of the study – as follows:

- **Knowledge** is the awareness of ongoing digitisation processes and their impact on the labour market and members of the examined disadvantaged groups.
- **Skills** mean the baseline level of digital skills of the members of the study groups used in their private and professional lives.
- **Attitudes** refer to the motivation of the examined groups to improve their digital skills. Motivation is closely related to openness to change. Openness to change means the willingness and readiness to accept new ideas, innovations, perspectives, and ways of doing things, while motivation refers to the internal emotional state that drives a person to take action.

The examined groups were subjected to research questions aimed at identifying the three domains that constitute society's digital competence.

In the area of knowledge:

- What is the level of knowledge of people aged 50+, women, people with disabilities, and people from non-urban areas about technological changes in the economy and the labour market?
- Do the examined groups understand the concepts associated with the technological changes taking place?
- Do the examined groups understand the need to work on digital skills to improve employability?

In the area of skills:

- What is the level of digital skills used in the personal and professional lives of the examined groups?
- What are the reasons and circumstances for the lack of digital skills of the examined groups?
- What are the differences in reasons and circumstances for the lack of digital skills between the groups analysed?

In the area of attitudes:

- What is the motivation of the examined groups to do work using new technologies?
- What encourages or discourages the examined groups to work with new technologies?

- What are the concerns and dilemmas associated with working using new technologies among the examined groups?
- What kind of support for improving digital competence do members of the examined disadvantaged groups expect?

The analysis began by examining the unique socio-economic circumstances in which the disadvantaged groups under study operate. Subsequently, recommendations were formulated to explore avenues for supporting the promotion of equal opportunities for these groups within the labour market.

I.2. Scope of primary and secondary research

The research carried out for this report consisted of four parts:

1. Firstly, a comprehensive desk research was conducted, utilising an analysis of existing literature, along with the visualisation of macroeconomic data. This allowed for a deeper understanding of the socio-economic context of digitisation progress in Poland, as well as the situation of marginalised groups and their involvement in digitisation processes.
2. In the next stage, a CAWI survey was conducted with a sample of 223 people on panels of respondents from three organisations: The Confederation Lewiatan (Konfederacja Lewiatan), Wielkopolska Agency for Enterprise Development (WARP, Wielkopolska Agencja Rozwoju Przedsiębiorczości), and a network of NGOs, which handled the distribution of questionnaires to those in the disadvantaged groups.
3. As part of the preparation of the questionnaire for the CAWI survey, individual in-depth interviews (IDIs) were also conducted with 18 non-governmental organisations (NGOs): associations, foundations, and other civic initiatives, and representatives of the local administration, who deal with the support of the examined disadvantaged groups daily. Two large umbrella organisations (with a wide network of contacts) were asked to help reach these organisations:

- Centrum PISOP (https://pisop.org.pl/)
- Sieć Barka (https://barka.org.pl/)

In-depth individual interviews were conducted between 22 February and 27 March 2023 with the following 18 organisations:

- Fundacja Nasza Arka
- Spółdzielnia Wykon
- Fundacja Euroreaktywacja
- Fundacja ORCHidea
- Polskie Stowarzyszenie na rzecz Osób z Niepełnosprawnością Intelektualną (Polish Association for Persons with Intellectual Disabilities Circle) Koło in Poznań
- Pracownia ArtZagroda
- OSP Łuszkowo
- Local social integration group in Krzywiń
- Środowiskowy Dom Samopomocy (Community Self-help Center) in Rawicz
- Leszczyński Ośrodek Wsparcia Ekonomii Społecznej (Leszno Social Economy Support Centre)
- Fundacja Żyrafa-Edukacja Ponad Wszystko
- Stowarzyszenie Wygraj Siebie
- Stowarzyszenie Pro Activ
- Stowarzyszenie Pomocy Dzieciom i Młodzieży Niepełnosprawnej (Association for Disabled Children and Youth) “Światło Nadziei”
- Stowarzyszenie emerytów i rencistów (Association of pensioners) w Orzechowie
- Gminne Przedsiębiorstwo Społeczne (Gmina Social Enterprise) Czerwonak
- Fundacja Niesiemy Nadzieję
- Wielkopolska Fundacja Rehabilitacji (Rehabilitation Foundation)

4. Lastly, the study incorporates expert recommendations from researchers at Poznań University of Economics (Uniwersytet Ekonomiczny w Poznaniu) who specialise in technological advancements, the labour market, education, and different forms of social exclusion.

II. Diagnosis of the scale of digitisation processes taking place in Poland and their impact on people aged 50+, women, people with disabilities, and people from areas distant from urban centres

II.1. Digital infrastructure and digital human capital in Poland

Access to technology, the expertise from using it, the necessary competences, and the motivation to continue learning have become the key capital in the times of pandemic and dynamic technological change. The scarcity of this capital affects the life chances of Poles, as it means limited opportunities to access relevant information, to be effectively educated, to get a job, and to maintain extended social relationships. All aspects of life, such as learning, work, social relationships, shopping, leisure, health, and social life, have become closely linked to the use of digital services. The pandemic has radically accelerated the processes of digitisation. However, many social groups are unable to get to grips with this situation.

In a rapidly transforming world, the labour market is also changing its ways. Robotisation, artificial intelligence, machine learning, and other technologies are shaping a new way of working. Employees are being forced to acquire digital skills necessary to work with new technologies, but they also need to have numerous cognitive skills to focus on tasks that cannot be handled by artificial intelligence (AI) effectively. It is, therefore, forecast that social-emotional skills and human qualities such as empathy, intuition and creativity will become increasingly important, while AI will take over more and more tasks traditionally performed by humans.

Remote working has also become particularly common during the pandemic. However, this work style also requires the right set of skills. Soft competencies become crucial here, such as cooperation, coping with stress, and the ability to learn quickly and to make decisions. Technical and digital competence only come

second (Mindo, 2022). Continuing to work in a remote or hybrid model, for example, requires employees to have access to the necessary technology.

Adapting to the new trends thus requires first and foremost the provision of adequate technical infrastructure and access to it. According to GUS (Statistics Poland), in 2022, 93.3% households in Poland had access to the Internet at home, an increase of 0.9 percentage points compared to the previous year. However, the level of this indicator varied depending on many factors, such as household type, degree of urbanisation, place of residence, or region. Households with children were significantly more likely to have internet access compared to those without children. The percentage was also slightly higher for large cities compared to smaller towns and rural areas. Furthermore, access to the internet was easier in central Poland compared to the western and eastern parts of the country (GUS, 2022). Such variation shows that internet access in Poland is still not evenly distributed across all social groups and regions. Aiming to reduce these differences may contribute to equalisation of educational and professional opportunities, as well as enable better use of new technologies in everyday life.

One of the challenges is access to broadband, which becomes particularly evident in international comparisons. Of the 27 European Union Member States, Poland – despite progress in this area – ranks 25th in terms of access to digital infrastructure (*connectivity)* (DESI - *Digital Economy and Society Index*, 2022). The scale of Poland's lag in the region is presented in Figure 1.1, which illustrates the country's position to the EU average. The average from 2017 to 2022 has been used because the rate of development of digital infrastructure and other variables that affect the picture of the digital economy and society vary significantly between countries, and in some cases even decrease from one year to the next (e.g., Hungary saw a decline in the human capital index for advanced digital skills between 2021 and 2022).

The position of individual countries in the ranking of digital infrastructure availability is shaped by indicators related to the use of broadband, mobile broadband, and the price level of such services. The problem of broadband access in Poland particularly affects rural areas, where only 32.6% of households had access to FTTP (*Fibre-to-the-Premises*) in 2021 (the DESI 2022 indicator is based on 2021 data). It is important to remember that 40% of Poland's population (15.3 million people as of 31 December 2018) live in rural areas. The average population density in these areas is 50 people per square kilometre, which increases the high cost of building telecommunications infrastructure and

generally causes low attractiveness of this type of investment in rural areas, thus causing the full development of this technology impossible.

In rural areas, only 32.6% of households had access to Fibre-to-the-Premises (FTTP) technology (DESI 2022).

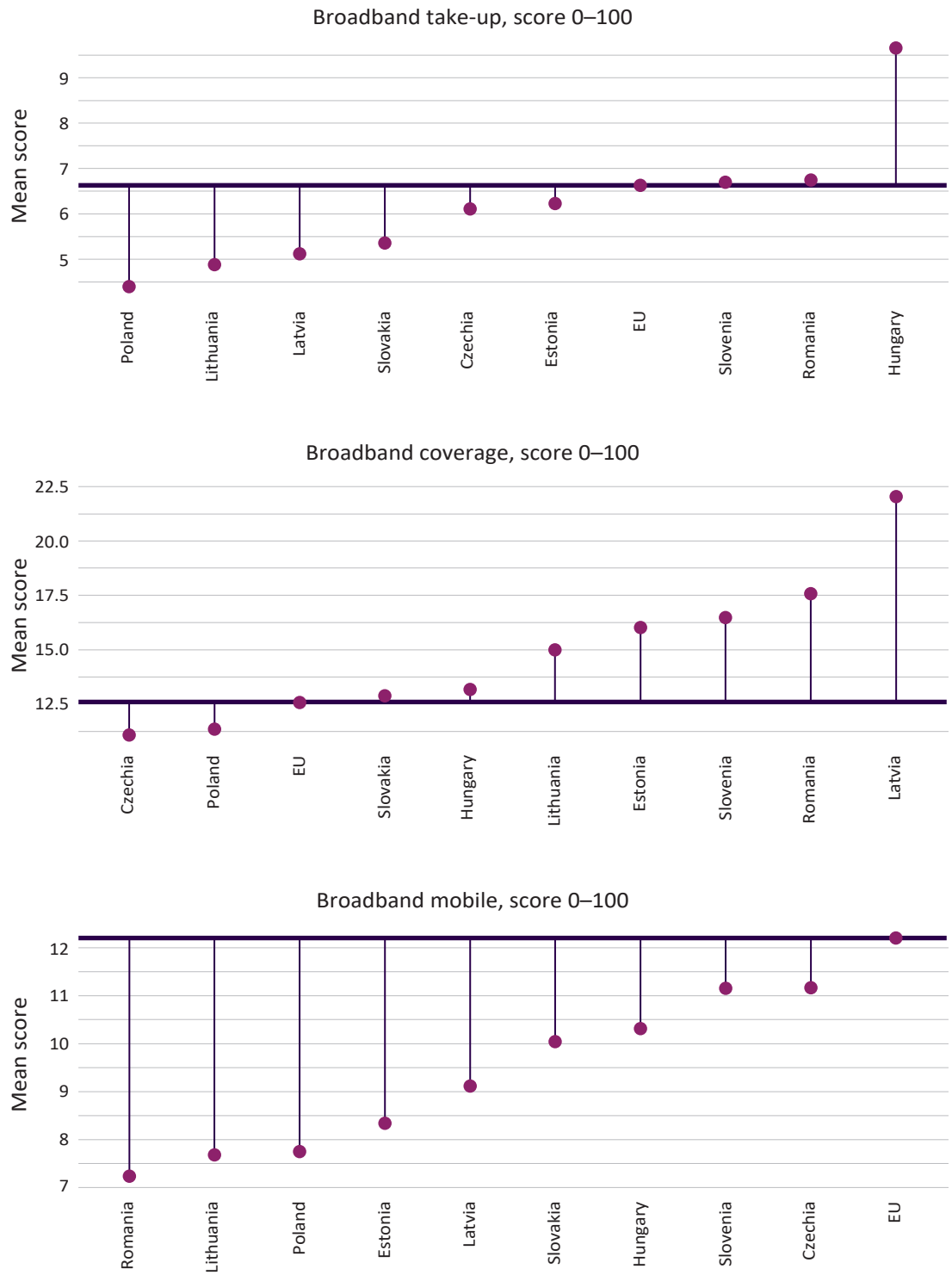
Access to 5G technology is also a challenge. In 2021, only 34.2% of households were using this technology (against an EU average of 65.8%). The availability of 5G technology is even lower in rural areas (DESI 2022). To increase access to broadband and 5G technology, investment is needed to expand telecommunications infrastructure, especially in rural areas. Cooperation between the public sector, the private sector and local communities can improve the situation and thus make Poland more competitive internationally and reduce the digital divide between different regions of the country.

Only 34.2% of households in Poland used 5G technology (against an EU average of 65.8%) (DESI 2022).

Considering the purposes of internet use, according to GUS, the most popular is searching for information about goods and services (declared by 74.3% of people aged 16-74 and 85.4% of regular internet users). The share of email users in the total population is 69.3% in the 16-74 age group and 79.7% among regular internet users. Generally assessing the level of digital skills in the population aged 16-74, GUS reports that 7.3% have a limited level of such skills, 11.4% have a narrow level, 18.8% have a low level, 22.3% have a basic level, and only 20.6% have above-average digital skills (GUS 2022). In international comparisons, Poland ranks 25th in the EU in terms of digital human capital (DESI, 2022). Figure 1.2 showcases the extent of the region's lag in terms of digital human capital levels, presenting Poland's position relative to the EU average for the chosen indicators.

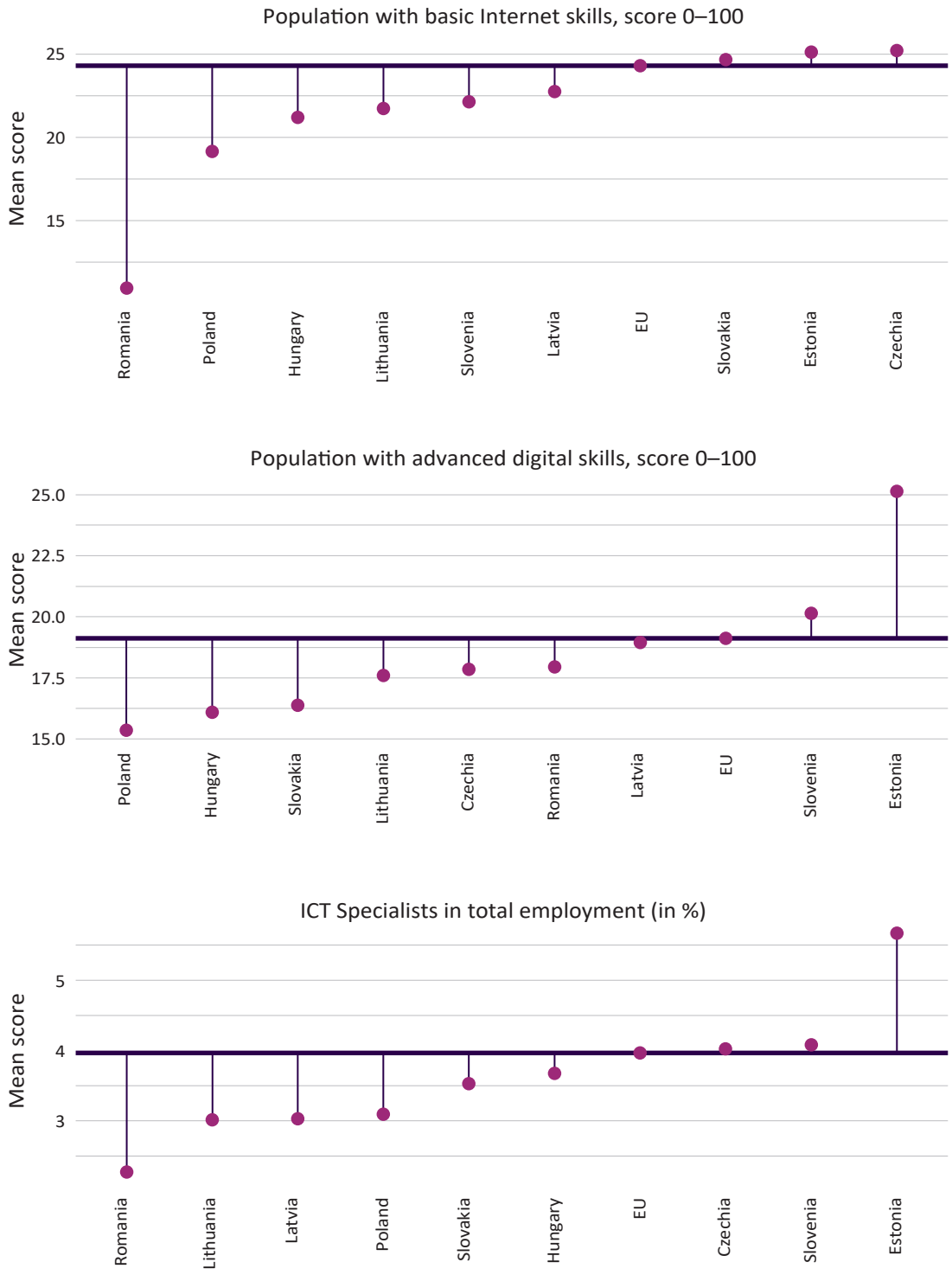
Only 20.6% of Poles have above-average digital skills, with the rest having a limited, narrow, low, or basic level of digital skills (GUS 2022).

Figure 1.1. Broadband internet access in Poland compared to other CEE countries 2017-2022



Source: own elaboration based on (DESI data, 2022).

Figure 1.2: Selected human capital indicators in Poland and other CEE countries 2017-2022



Source: own elaboration based on (DESI data, 2022).

II.2. Diagnosis of the situation of excluded groups and their participation in digitisation processes

According to the OECD's definition, digital exclusion is the phenomenon of social inequalities between individuals, households, businesses, and regions in the level of socio-economic development, related to both access to information and communication technologies and their use in all areas of activity. The literature distinguishes two types (levels) of digital exclusion: "hard" (in terms of access) and "soft" (in terms of use).

> There are two types of digital exclusion: "hard" reflecting access to technology and "soft" reflecting usage. The latter is related to competence and motivational exclusion.

Hard exclusion is the lack of access to network access equipment, software or services, and occurs because physical inaccessibility or limited availability that does not allow full freedom of use (eg lack of bandwidth with sufficient speed or stability of services, or inability to purchase them due to cost). The reasons for access exclusion may be economic, geographical (lack of infrastructure in a locality or region) but may also be due to a lack of adaptation of equipment and/or software to the specific needs of certain users, such as people with disabilities or senior citizens. The second type of exclusion – in terms of use – includes competence exclusion, or inability to acquire, maintain or update skills related to ICT (*Information and Communication Technologies*). Exclusion related to the extent to which technology is used for the various purposes it can serve in the information society is also included here. Finally, "soft" exclusion can be motivational and refer to mental barriers to competence upgrading. It includes a lack of motivation and willingness to learn modern technologies, a lack of confidence in one's own abilities, a fear of novelty, and it also concerns the risks generated using new technologies. According to Helsper, the digital gap is thus related to both access to technology and the motivation, digital skills and digital engagement and performance (work) outcomes that people gain from engaging with ICT (Helsper, 2021).

The situation and groups at risk of digital exclusion:

- From the perspective of network usage data, **the oldest people are the group with the highest digital exclusion** (despite the decreasing scale of the disparity), followed by people with a low level of education and those in a

difficult financial situation. Digital exclusion is also quite clearly correlated with economic inactivity (GUS, 2022).

- One important group of digitally excluded are **women**, especially **over 55 and inactive economically**. According to Eurostat data, the economic activity rate of women in the 55-64 age group in Poland is 44% (Estonia: 77%, Czechia: 65.2%), and the employment rate of women in this age group is only 43.1% in Poland (Estonia: 72.9%, Czechia: 63.3%).
- NIK data shows that **2.5 million people with disabilities (i.e. more than 80%) were neither employed nor looking for work** between 2010 and 2020 (NIK, 2022).
- **The highest percentage of people who have never used the internet live in rural areas**, although rural areas have seen the fastest rate of growth in the proportion of people using the internet regularly in recent years (an increase of 14.8 percentage points between 2017 and 2022). Among all rural residents, the elderly is the group particularly at risk of digital exclusion (GUS, 2022).
- **The percentage of regular internet users in the 55-64 age group nationwide was 75.5%** in 2022 (GUS 2022).
- **68.6% of those with disabilities** had used the internet in 2020, but only 61.3% of them had used it in the last three months, 2.9% between 3 months and 12 months, and 4.4% more than a year ago. This means that **31.4% of the disabled have never used the internet** (GUS 2021).
- Motivational exclusion continues to be the key premise of digital exclusion determining non-use of the internet. **Nearly 66% of those who do not use the internet justify it by a lack of need**, even though (depending on the socio-demographic group) 20%-45% of them have a device at home which provides internet access (Wykluczenie społeczno-cyfrowe w Polsce, 2021). The literature shows that declaring reasons for not using the internet, such as lack of skills or too high costs, are in fact a form of rationalising the decision not to use this service due to lack of motivation.

2.1 Situation of people 50+

Internet use in the 55-74 age group is declared by only 63% of Poles against an OECD average of 78.3% (OECD, 2022). At the same time, GUS reports that 75.5% respondents in the 55-64 age group declare regular use of the internet, with 51% and in the 65-74 age group (GUS 2022). The GUS data also shows that making voice or video calls over the internet in 2022 was declared by

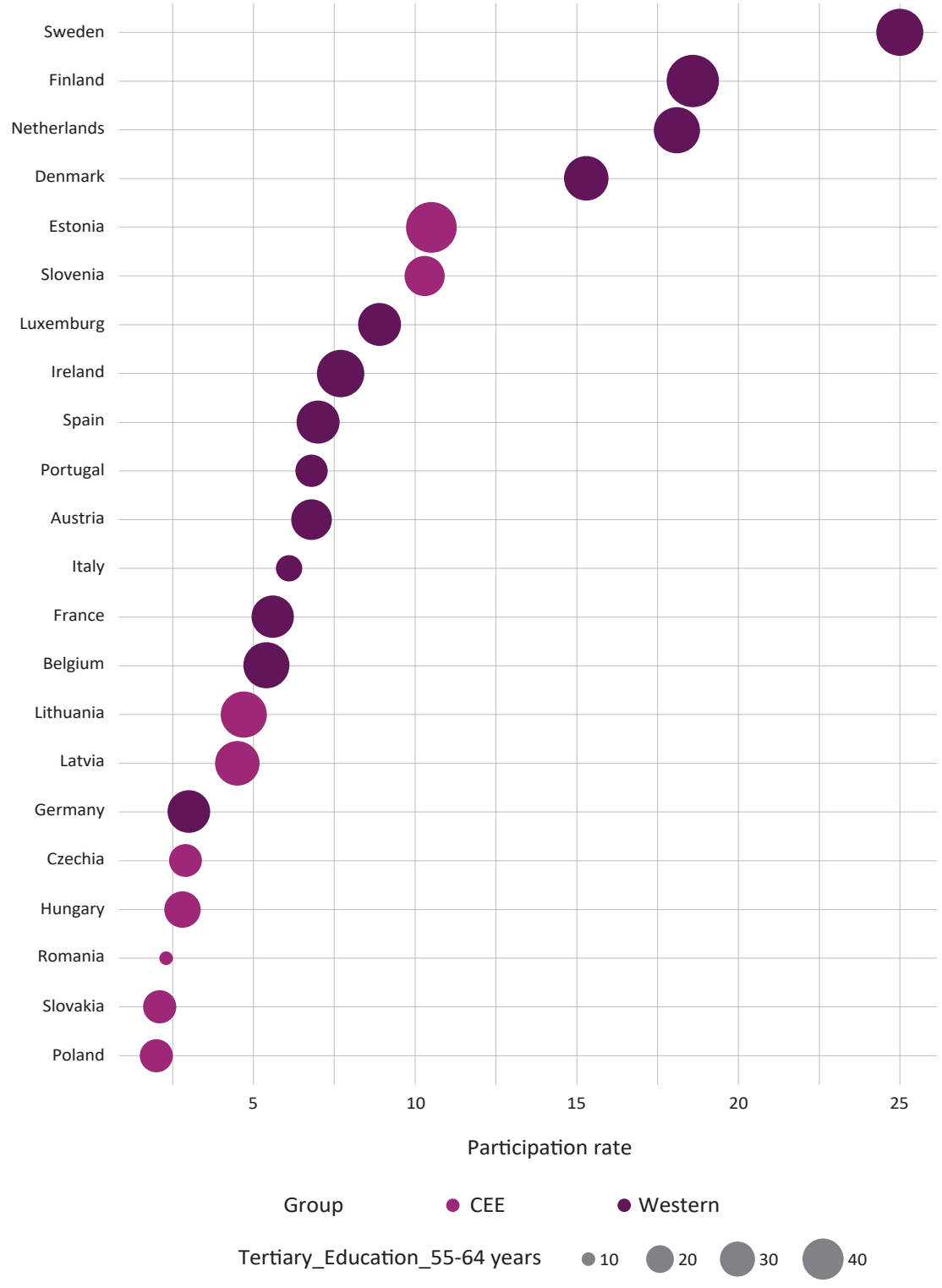
35.7% of the total number of people in the 55-64 age group, with 22.4% in the 65-74 age group; sending and receiving email was reported by 49.9% and 28.1%, respectively, and using social networking sites by 37.0% and 19.7%, respectively.

It appears that one of the biggest problems of people over 50 is the lack of orientation in the possibilities of using new technologies or the internet in everyday life and work, which in turn results in the lack of development of the need to use them. The economic marginalisation of the elderly due to early inactivity in the labour market overlaps with and can be both a cause and a result of social, cultural, information, and media marginalisation. In this case, the inability to use new technologies is a strong determinant of problems in finding a job or retraining, although the great diversity and polarisation of this social group must be accounted for. In a rapidly ageing society, there will be more people with high digital skills in the older cohorts of the labour market.

It is also worth emphasising that the Social Diagnosis of 2013 showed that the main barriers to using new technologies in the group of people over 50 in Poland are not hard barriers, such as access to the internet, but soft barriers, like lack of knowledge, and real needs and skills to use them (Batorski, 2013). A lack of awareness of how the use of technology can help solve problems or develop interests can lead to fear and apprehension (often unfounded) about addiction and data loss, about the security of one's online transactions, and even a belief that the use of new technologies can be harmful to health as a result of dangerous radiation. The consequence is self-exclusion from the world of new technologies, which is often linked to an aversion to any novelty or change. Self-exclusion is also closely linked to the belief that learning only lasts in a person's life until they reach a certain age.

As a result, only 2% of the population aged 55-64 participated in education and training in 2021 (Fig. 2.1.1.), far from the EU target of at least 15% of a given population needing further training for all age groups. For example, 25% of people in the 55-64 age group participate in training in Sweden, with 18.1% in the Netherlands. It is worth noting that only 16% of adults aged 55-64 in Poland have university-level education (Eurostat 2022), the result that further hinders rapid adaptation to technological change.

Figure 2.1.1: Participation of people aged 55-64 in education and training in EU countries



Source: own elaboration based on (Eurostat data, 2021).

Only 2% of the population aged 55-64 participated in education and training in 2021.

Only 16% of adults aged 55-64 in Poland have a university degree, which makes it even more difficult to adapt quickly to technological change.

A lack of willingness to pursue education may also result from the phenomenon of ageism, ie age discrimination. According to the literature, ageism may manifest itself on two levels (Dubanik and Kubacka, 2010): micro (specific person(s)) – includes thinking about and attitudes towards seniors, and macro – reflected in the legal, political, welfare, or educational system(s). Among the most important manifestations of ageism, Szukalski indicates (2015b, pp. 16-18, from Podraza-Myszkowska, 2023) the underestimation of seniors. The process of systematically stereotyping and discriminating against people based on age results in bias in recruitment and hiring, limited access to training and development opportunities, and unfavourable treatment of the elderly in the case of promotions and salaries. Older workers may also be more vulnerable to changes in employment, such as restructuring, downsizing, or automation of work tasks. As a result, older people may often lack access to the knowledge and skills to use modern technology, and may lack the appropriate equipment, latest software, or high-speed internet access that the workplace offers.

2.2 The situation of women

According to Eurostat, the economic activity rate of women in Poland in the 20-64 age group is 70.7% (compared to 82% in Estonia and 76.6% in Hungary). The employment rate of women in this age group is 68.4% in Poland (76.7% in Lithuania, 77.5% in Estonia, 73.5% in Hungary, and 72.1% in Czechia). Women in Poland also do not take up part-time employment. Only 7.4% of women in the 20-64 age group work in this way (in comparison, 61.9% in the Netherlands, 27.2% in France, and in our region, 9.5% in the Czechia or 12.3% in Slovenia) (Eurostat, 2022).

According to Eurostat data, the female labour force participation rate in the 55-64 age group in Poland is 44% and the female employment rate in this age group is only 43.1%.

In terms of digital skills, this is another strongly disadvantaged group in the labour market, which is particularly evident in international comparisons, including with countries in our region (see Figure 2.2.1). The data shows that 13% of women have never used the internet, only 9% of women use online shopping, although 61% use online banking services, 21% of women have digital skills above basic, and 43% have basic or higher skills. Among graduates in technical fields (STEM - *Science, Technology, Engineering and Mathematics*) in the 20-29 age group, there are only 17 women per 1,000 graduates in this type of field, and 1.1% of total employment are women specialising in ICT. The level of digital skills here is linked to the phenomenon of occupational segregation, which refers to the concentration of men and women in different types of occupations, with women tending to be over-represented in lower-paid and lower-status occupations. The lack of female representation in fast-growing and well-paid sectors further exacerbates the sex pay gap.

The difference in average wages between men and women in Poland is estimated at 28%, which means that men earn that much more than women (see Figure 2.2.2). These components (digital skills, representation in STEM fields and the wage gap) form the *Women in Digital Index*. Among the 27 EU countries, Polish women are ranked 24th here (DESI, Women in Digital Index, country profiles, 2022).

The wage gap between men and women in Poland is estimated at 28%.

Women are also reluctant to participate in training. Participation in training in the last four weeks before taking part in the survey, in the 25-64 age group, was declared by only 5.9 per cent of women in 2021 (compared to 41.4 per cent in Sweden and 35.8 per cent in Finland). Women in different age groups are also characterised by varying levels of education. Women with tertiary education in the 30-34 age group represent 57.7% in Poland, 50.5% in the 35-44 age group, 31.7% in the 45-54 age group: and 19.4% in the 55-64 age group (Eurostat, 2022).

In the 55-64 age group, only 19.4% of Polish women have a university degree.

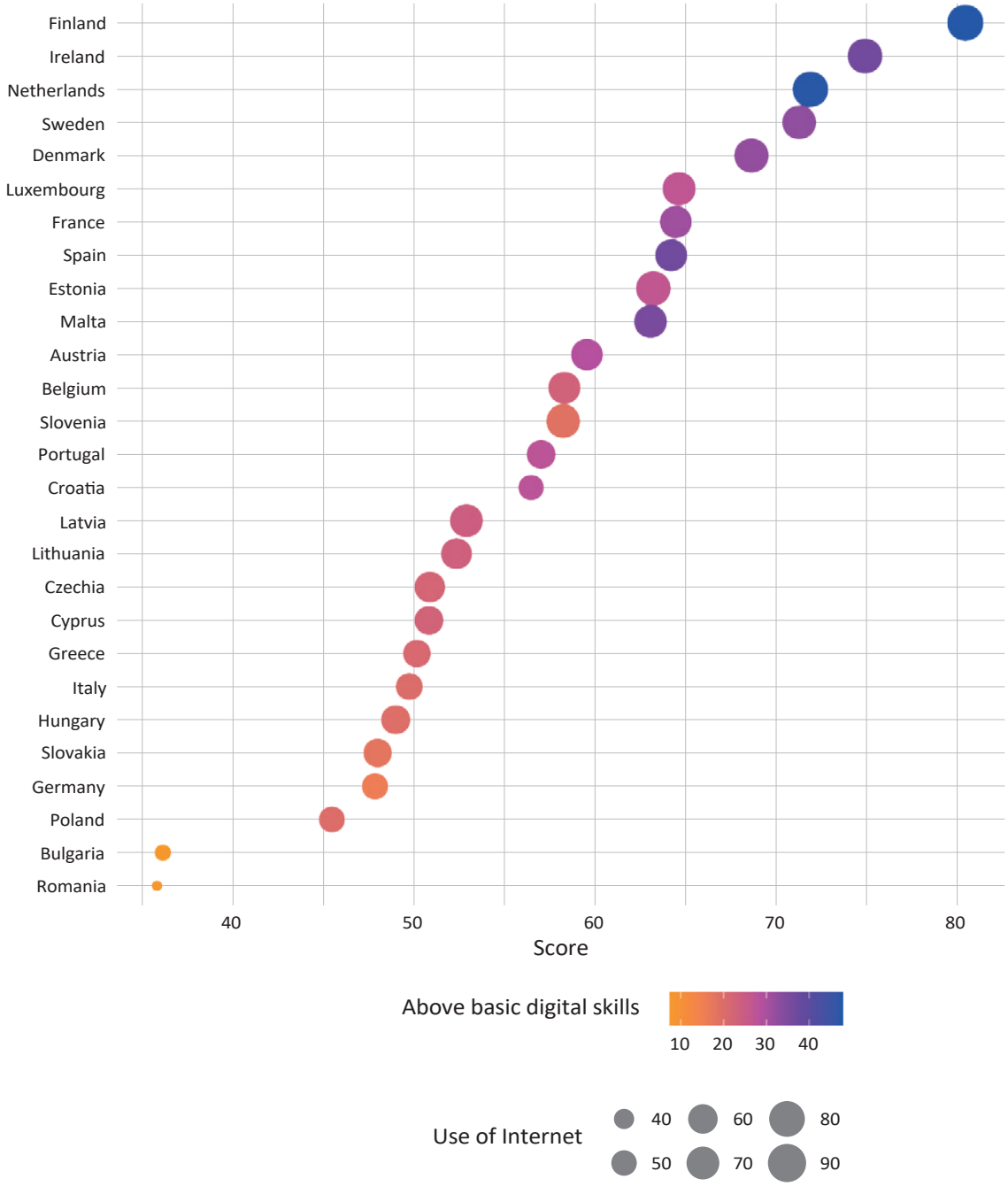
In Poland, there are still strong sex role stereotypes that influence the perception of women as a group who should not deal with technology or who should have limited access to it. It is also common for women to be involved in the home and raising children, which takes time away from learning. Employers may also hold subconscious biases against women that lead to unequal treatment in hiring, promotion, and access to training. This is confirmed by research carried out by Kantar (November 2021), for example, on behalf of the BRPO on legal awareness in the context of equal treatment and an analysis of the importance of combining family and work roles to achieve real sex equality. According to this research, 32% of respondents had experienced a situation in their environment where a female candidate was asked about family plans during a job interview. Overall, women were also more likely to feel discriminated against based on their sex than men (29% of women versus 3% of men) (BRPO, 2022).

Women also feel more strongly about the work-life balance dilemma. The disproportionate burden of domestic responsibilities in a traditional society can make it difficult for women to reconcile their professional and personal lives, leading to reduced working hours, career breaks and even complete withdrawal from the labour market. Consequently, women's career trajectories may deteriorate, limiting their long-term career development and earning potential.

Remote or hybrid working could be a solution here, but currently less than half of companies in Poland provide their employees with the possibility to work remotely (25%) or hybrid (18%) (Talentplace, 2022). Various studies indicate that technology integration in companies is insufficient (DESI, 2022). In the age of remote working, the technologies available in an organisation are to a significant extent responsible for the efficiency of the work carried out, which should be compatible with each other and easy to use. Professionals or people in non-managerial positions were most likely to speak positively about the degree of digitisation of the organisation (58%). With higher position in the organisation's hierarchy, this percentage decreased, with 43% of respondents working as top executives agreed with the statement that their organisation is highly digitised (Deloitte, 2022).

Only 25% of companies in Poland provide the opportunity for remote work, and 18% for hybrid work (Talentplace 2022).

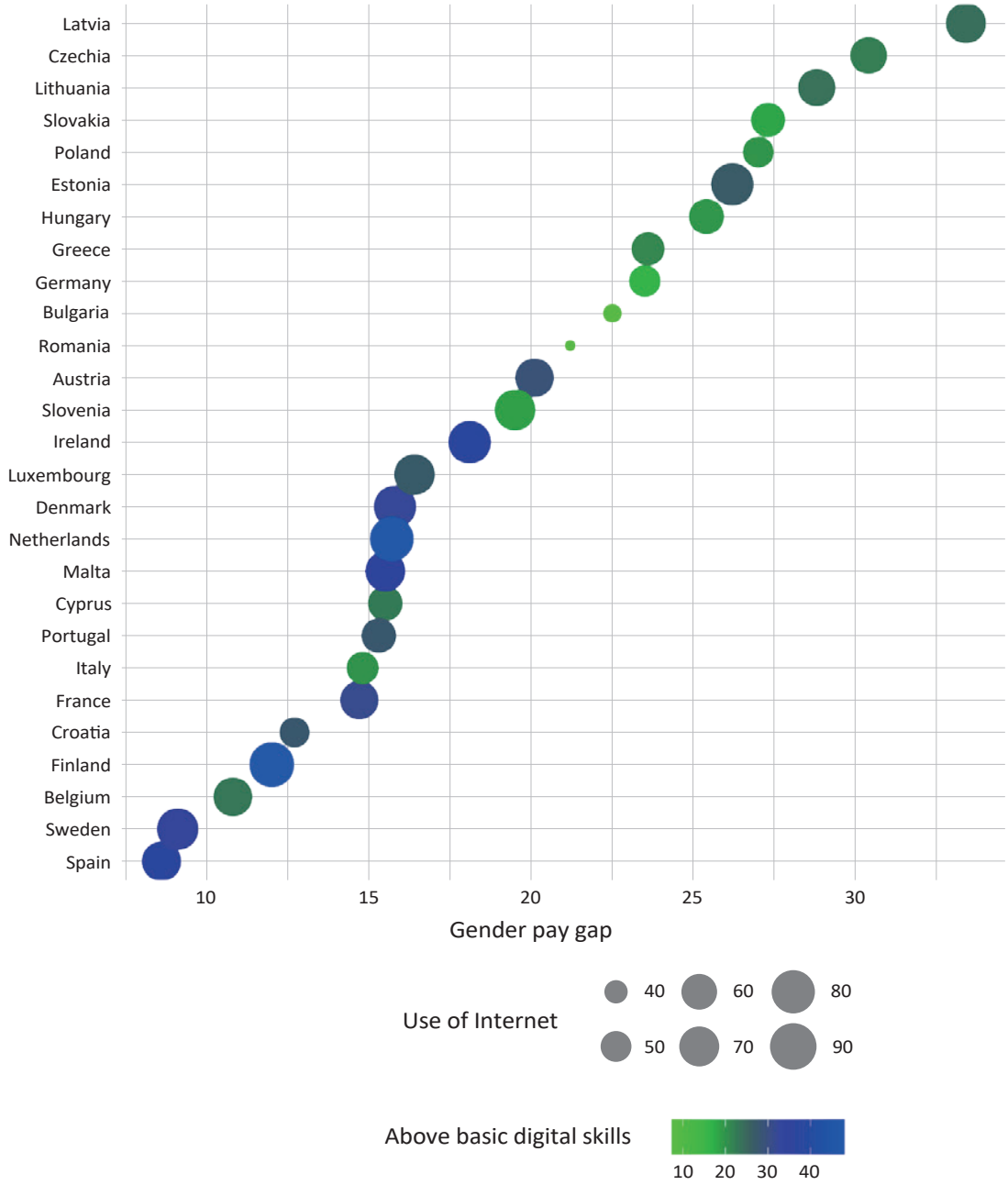
Figure 2.2.1: Women in the digital in EU countries



Note: Country position illustrated based on the Women in digital index 2022 (scores ranging from 0 to 100). Internet users are the percentage of women aged 16-74 who use the internet regularly (at least once a week). Having above-average digital skills is the percentage of women aged 16-74 with above-average skills in five areas: information, communication, problem solving, digital content creation and security.

Source: own elaboration based on (Eurostat and DESI data, 2022).

Figure 2.2.2. The gender wage gap in EU countries



Note: Wage gap measured as the difference between men's and women's average gross hourly wage rates expressed as a percentage of men's average gross hourly wages. Internet users is the percentage of women aged 16-74 who use the internet regularly (at least once a week). Having above-average digital skills is the percentage of women aged 16-74 with above-average skills in five areas: information, communication, problem solving, digital content creation and security.

Source: own elaboration based on (Eurostat and DESI data, 2022).

2.3 Situation of people with disabilities

The Statistics Poland (GUS) data from the 2021 census gives a figure of 5,448,000 people with disabilities, which indicates an increase by 751,000 people from the previous (2011) census. The census survey methodology defines people with disabilities as the stock of people with legal and biological disabilities. People with a legal disability include those with a certificate of disability or a certificate of incapacity to work. This group is 3,471,000 persons, representing 63.72% of all people with disabilities. On the other hand, people with a biological disability include those who do not have a certificate, but feel they have a disability due to their health condition. This group is overwhelmingly made up of older people. For demographic reasons, it is biological disability that will increase in the coming years. In 2021, 1,976,000 people were declared to have a biological disability. When analysing the sex structure of people with disabilities, 54.90% are women. Undoubtedly, these figures are a consequence of the increase in the average life expectancy of women compared to men.

> The number of people with biological disabilities increased by 26.2% and those with legal disabilities by only 10.8% between 2011 and 2021. Biological disabilities will be a challenge for Poland in the context of an ageing population.

For many years, the economic activation of people with disabilities has been a huge problem in Poland. NIK data show that between 2010 and 2020, as many as 2.5 million people with disabilities, i.e. more than 80%, neither had a job nor were looking for one (NIK, 2022). In terms of the inactivity rate of persons with disabilities, Poland ranks 5th in Europe. Between 2010 and 2020, this rate was – in the case of persons with disabilities – almost twice as high as for the entire population of persons over 15 years of age. Despite significant financial outlays, especially from the Labour Fund, the European Social Fund and PFRON, employment rates of people with disabilities in 10 years increased only by about 2.3%, i.e. from 14.4% in 2010 to 16.7% in 2020. At the same time, data from GUS shows that there was a 1% increase in the number of employed people with disabilities in medium and large enterprises in 2021 compared to 2020.

> Employment rates for people with disabilities have only increased by around 2.3% over 10 years (2010-2020).

Table 1. The number of people with disabilities.

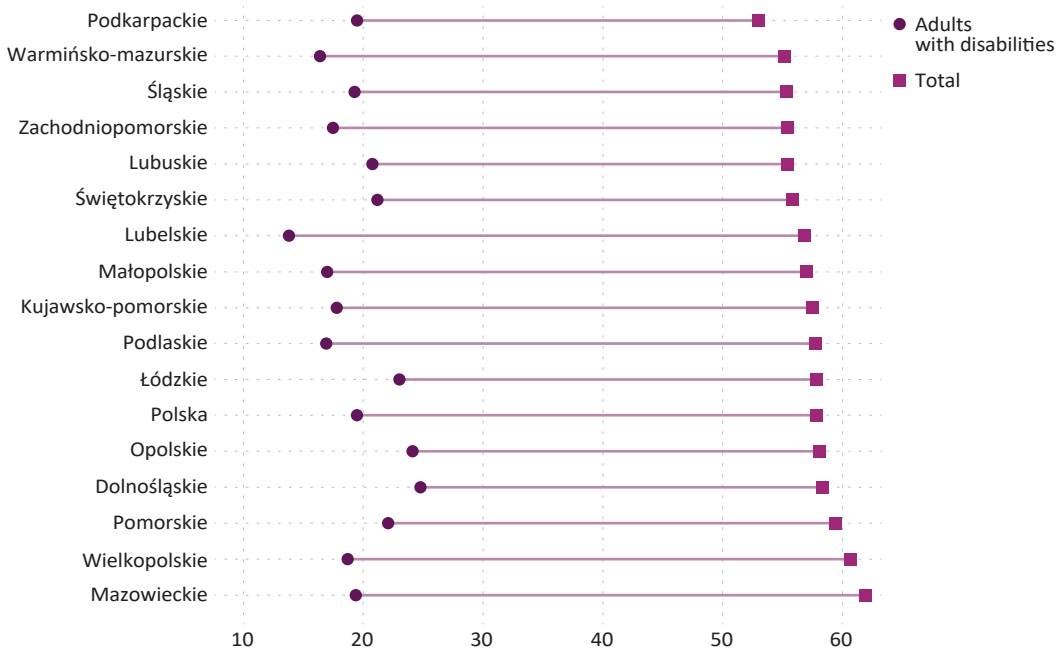
Group	2011		2021	
	Number (thousands)	(%)	Number (thousands)	(%)
Total population	38,512	100	38,036	100
Persons with disabilities	4,697	12.20	5,448	14.32
of which:				
Legal disabilities	3,131	66.67	3,471	63.72
Biological disabilities	1,566	33.33	1,976	36.28
Women	2,530	53.87	2,991	54.90
Men	2,167	46.13	2,457	45.10

Source: own compilation based on 2011 and 2021 census data.

Figure 2.3.1 showing the differences between the total labour force participation rates and disabled people by voivodship in 2021: the highest labour force participation rates of people with disabilities were in the dolnośląskie, opolskie, łódzkie, pomorskie, świętokrzyskie, lubuskie and podkarpackie voivodships. The lowest, however, was in the lubelskie voivodship. The employment rate is similar in individual voivodships (see Figure 2.3.2.).

Analysing the structure of employment of people with disabilities by PKD section in 2021 (Figure 2.3.3), we can see that most people worked in administration and support services. On the other hand, on average, every fourth person with a disability worked in manufacturing. 10.4% of people with disabilities worked in health care and social assistance, with the predominance of health care activities. In contrast, only 7.3% of people with disabilities worked in public administration and defence and social security. The lack of participation of people with disabilities in the labour market and their limited representation in the PKD sections may also be due to stereotypes about people with disabilities in terms of their qualifications. Employers often formulate unfounded fears about the productivity, reliability or costs associated with employing people with disabilities, leading to less interest in employing this type of worker. This can result in the marginalisation of people with disabilities and a lack of representation in various sectors of the labour market.

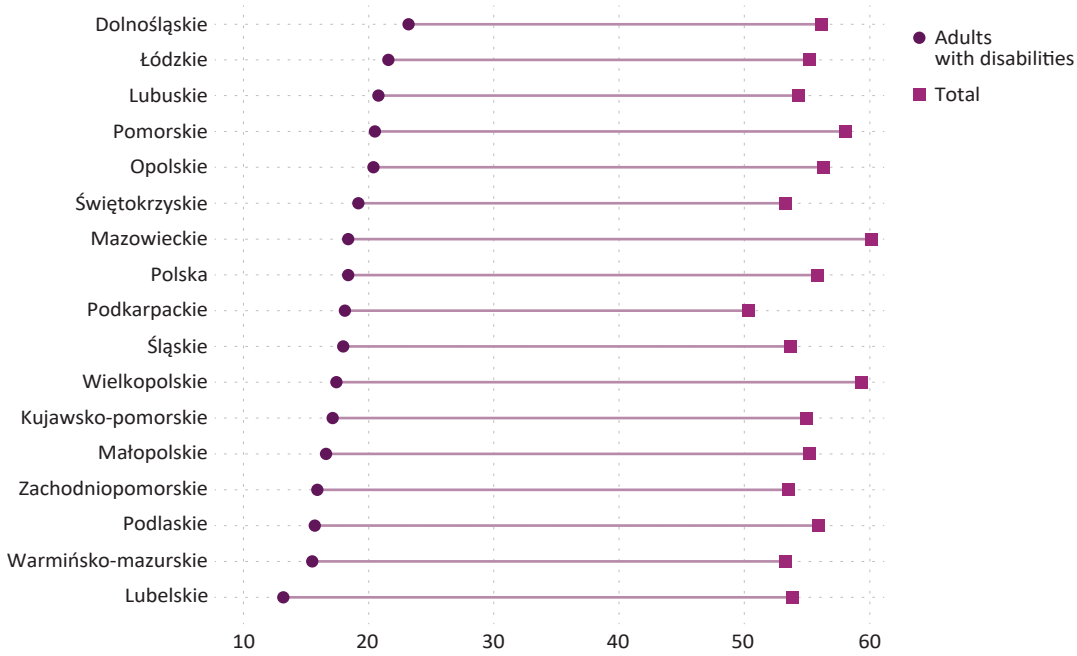
Figure 2.3.1 Labour force participation rate in 2021



The labor force participation rate for individuals aged 15-89 years in 2021

Source: own elaboration based on (GUS data, 2021).

Figure 2.3.2 Employment rate in 2021



Employment rate of individuals aged 15-89 in 2021

Source: own elaboration based on (GUS data, 2021).

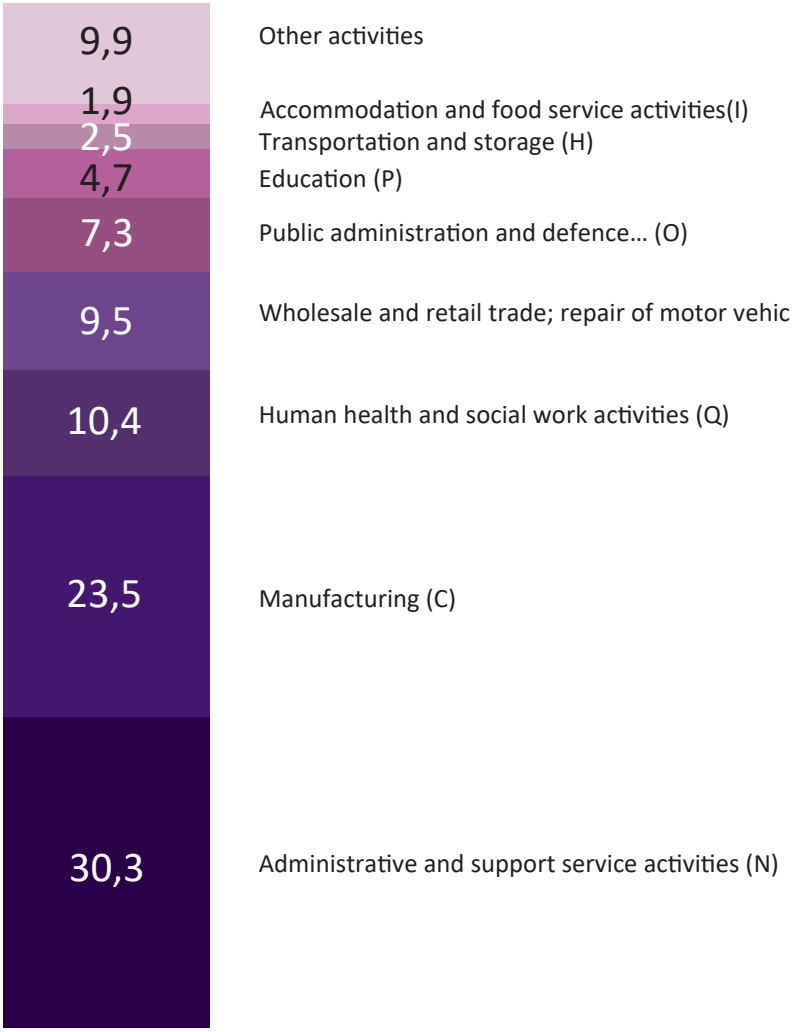
The largest number of disabled people worked in administration and support services.

In the context of labour force participation, a reference should be made to the education of people with disabilities. In 2021, education for young people with special educational needs at the secondary level was provided mainly in special schools. The largest share was accounted for by those aiming to train skills in a specific occupation: special preparatory schools and special first-degree vocational schools. All special schools educated 29,400 people. In addition, 23,700 students with special educational needs were educated in branches, including 38.5% at general secondary schools, 31.6% at technical schools and 29.2% at industry schools of the first degree. The total number of children and young people in special education at the secondary level was 53,200 and accounted for 3.2% of their total number. There were 240 students with special educational needs in post-secondary education, mainly in special schools (87.9%). On the other hand, in the academic year 2021/22, 19,900 persons with disabilities were educated in universities (1.7% of the total number of students) and 5,400 persons graduated (1.8% of the total number of graduates). Among doctoral students, 4.1% were persons with disabilities (600 persons).

The largest number of jobs offer for the disabled in relation to the total number of offers was recorded in four powiats: moniecki, kętrzyński, oławski and gołdapski (over 1/3 of all offers).

A particular problem is also the lack of job offers for people with disabilities. Regional distribution of the ratio of job offers for them to the total number of jobs offer is shown in Figure 2.3.4. The largest number of jobs offer for people with disabilities at the end of 2022 was available in large voivodship cities, such as Warszawa, Wrocław, Katowice, Kraków, and Poznań. However, considering the relation of the number of jobs offer for people with disabilities to the total number of offers, the largest number – more than 1/3 of all offers – was available in powiats: moniecki, kętrzyński, oławski, and gołdapski. The lack of demand for work of people with disabilities is often related to the lack of people willing to do the job for objective and subjective reasons. A key issue here is the accessibility and adaptation of workplaces, public spaces, and transport systems to the needs of people with different types of disabilities. As a result, people with disabilities may face physical barriers that hinder their

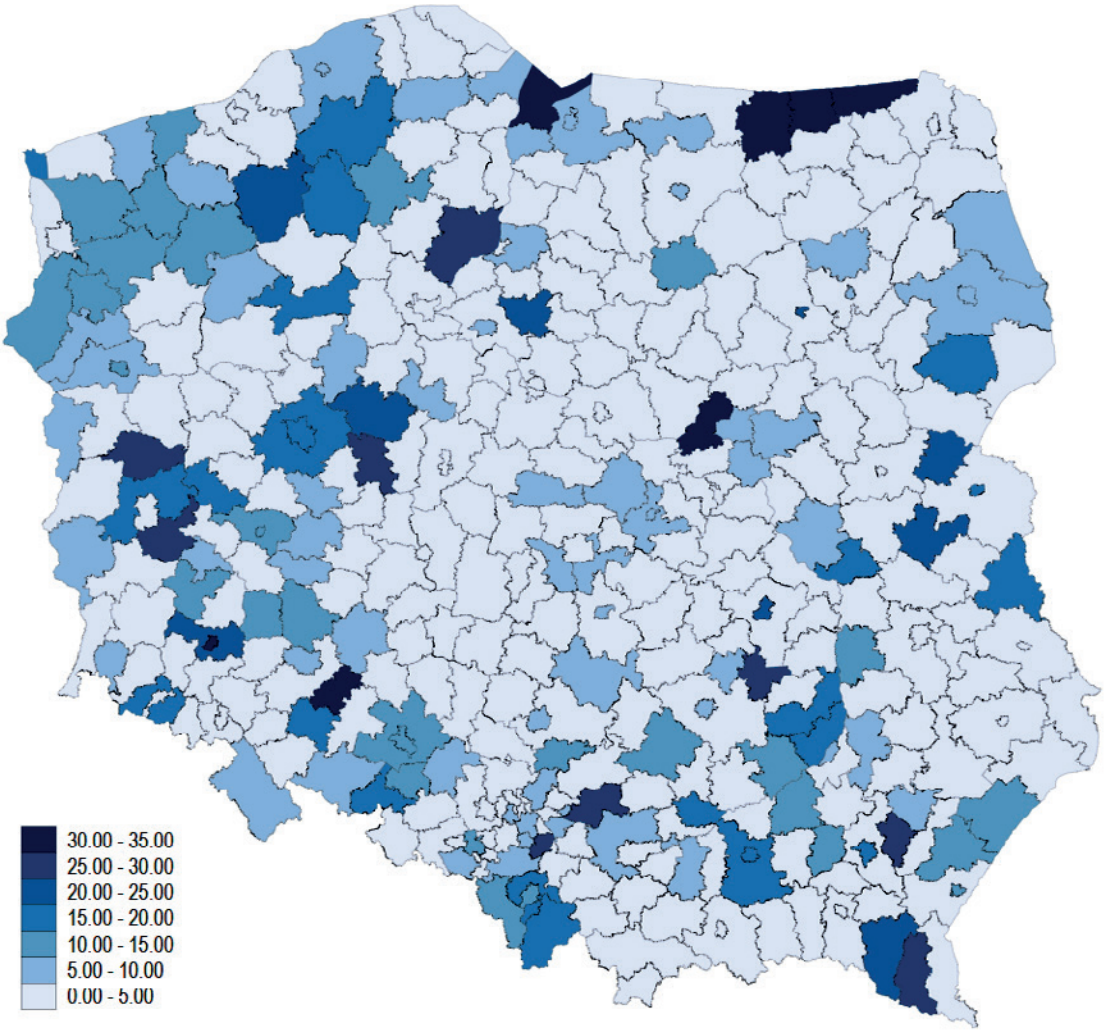
Figure 2.3.3. Employment structure of people with disabilities in 2021



Source: own elaboration based on (GUS data, 2021).

access to employment opportunities, training, and services necessary for their professional development. Employers may also be unaware of, or reluctant to provide reasonable adjustments such as modified workstations, flexible working conditions (according to Eurostat, only 5.1% of the total employment of people in Poland aged 20-64 work part-time) or assistive technologies that enable people with disabilities to perform their job duties effectively. In addition, in the case of jobs requiring digital skills, people with disabilities are a heterogeneous group due to their abilities and skills in using new technologies. The reasons for this are also objective and subjective. Objective reasons include financial constraints in accessing appropriate equipment or digital inadequacy for the level of disability. For example, people with visual disabilities need specific

Figure 2.3.4. Ratio of job offers for the disabled to total offers at the end of 2022



Source: own elaboration based on (GUS data, 2022).

digital solutions, such as magnification or magnifying-reading software, to enable them to fully access the digital world. People with hearing disabilities, including deaf people who use Polish sign language, also need specific digital resources. A separate group is made up of people with intellectual disabilities whose degree of disability will require support in the use of digital devices or the use of *easy-to-read* text (ETR for short). Subjective reasons include a lack of desire for education or fear of new technologies. As a result, among people with disabilities, only 68.6% use the internet regularly (GUS 2021).

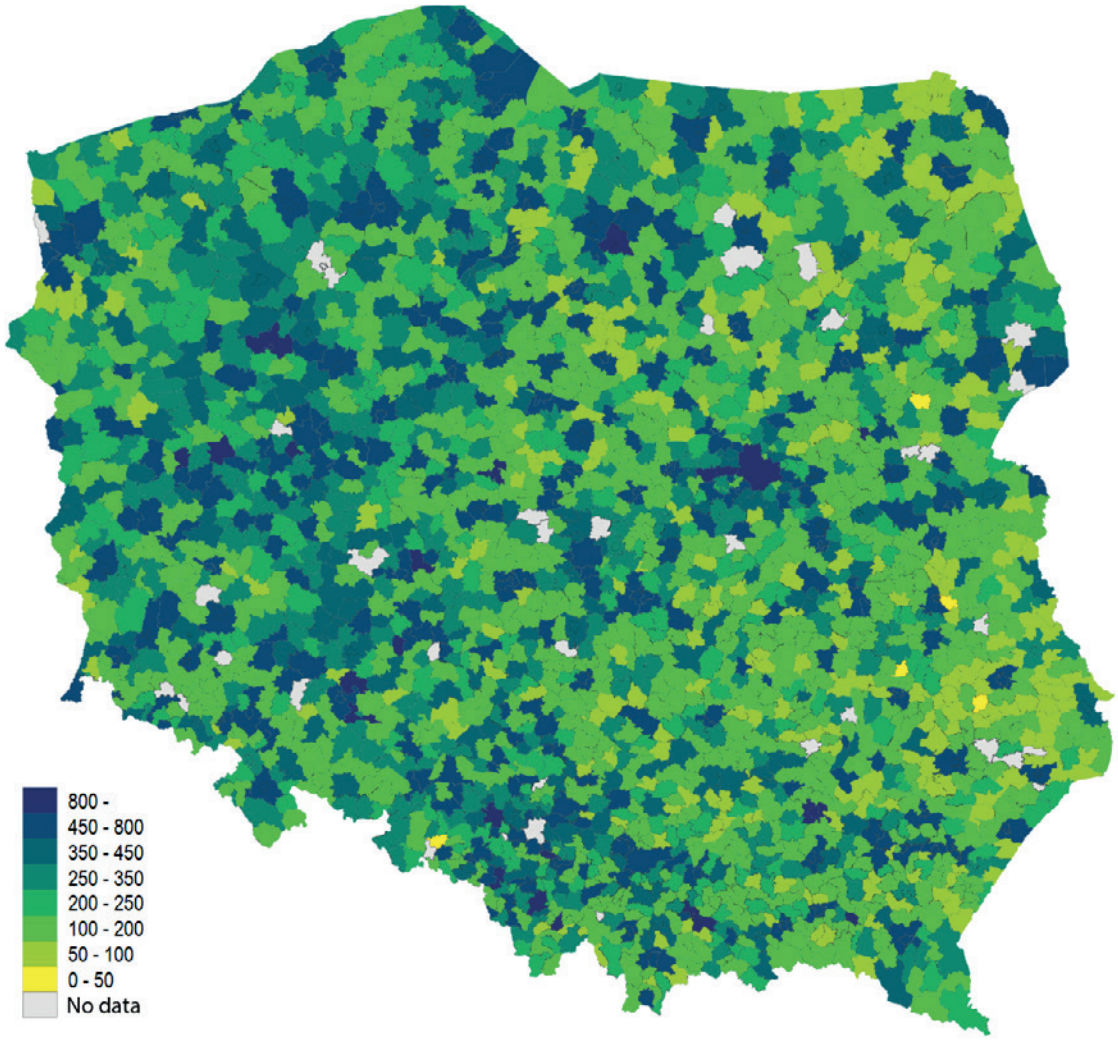
31.4% of people with disabilities **had never used the internet** (GUS 2021) and 7.3% had used the internet between three months and over a year previously and had no need to use it more often (GUS 2021).

Digital inaccessibility is currently being addressed by the introduction of the Web Accessibility Guidelines (WCAG) 2.1, which includes a wide range of recommendations for making web content more accessible. Implementation of these guidelines will make digital content more accessible to a wider range of people with disabilities, including blind and partially sighted people, deaf and hard of hearing people, people with mobility impairments, speech impairments, light sensitivity, people with complex disabilities, and some people with learning disabilities and cognitive limitations; but will not meet the needs of every user with a disability. These guidelines apply to the accessibility of web content on desktops, laptops, tablets, and mobile devices. The implementation of the guidelines will also often make web content more usable for users in general. *The Act* of 4 April 2019 on the *Digital Accessibility of Websites* and *Mobile Applications of Public Entities* is the first piece of legislation to make digital content accessible to people with disabilities. Perhaps such accessibility will influence the use of qualified employment, which means creating additional jobs for people with disabilities in the public sector.

2.4 Situation of people living in areas remote from urban centres

When analysing the Polish area in terms of local labour markets, a clear regional polarisation in their development is apparent, measured by the number of totals employed per 1,000 people of working age (Figure 2.4.1). The reasons for this polarisation stem from existing urbanisation and the lack of balanced regional development. The DESI results also indicate deficiencies in the uptake of innovation. The Polish economy is still mainly based on the industrial sector and low value-added services. Many regions are also predominantly dominated by small and medium-sized enterprises, which are slower to adapt to change. Another problem is the ageing population and the lack of awareness of this social group of the opportunities created by new technologies, as mentioned earlier.

Figure 2.4.1. Number of employed persons per 1,000 persons of working age

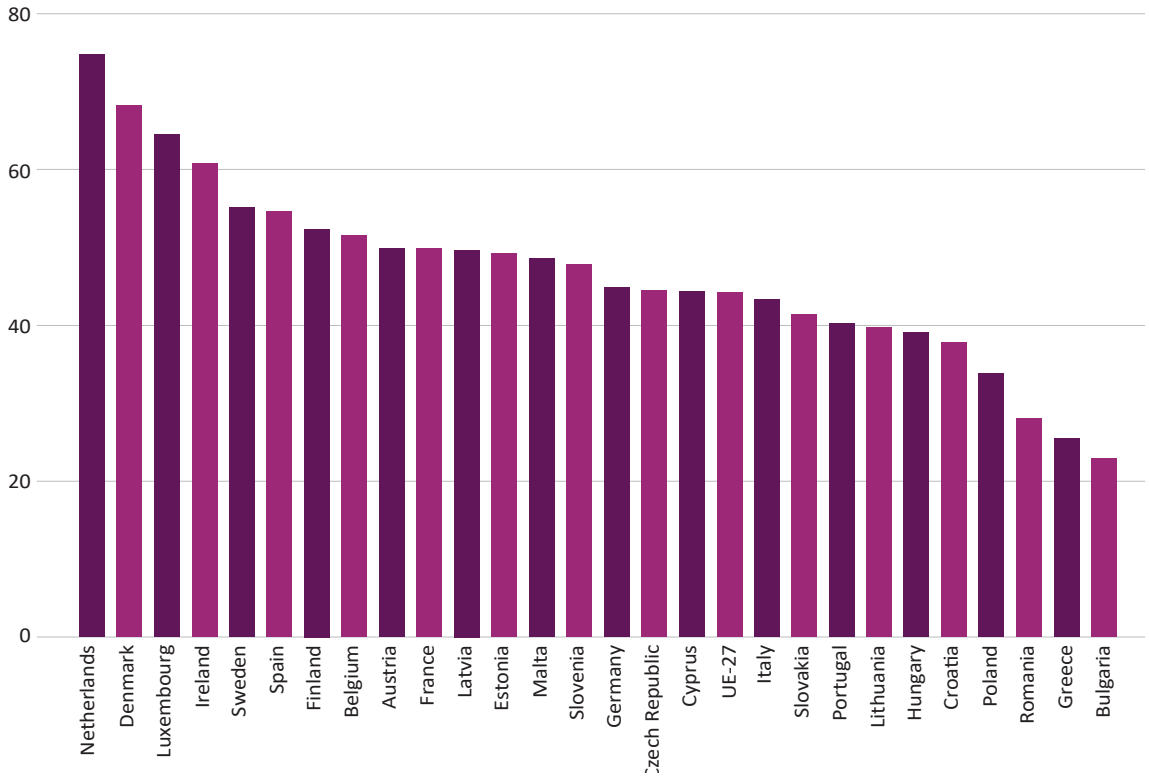


Source: own elaboration based on (GUS data, 2022).

The assessment of possibilities to support and activate people living in areas remote from urban areas should be preceded by an attempt to diagnose the current situation of the studied group in relation to the progressing digitisation processes. Focusing on the Rural Digital Index[1], which is a component of the Digital Economy and Digital Society Index – DESI (Figure 2.4.2), Poland ranks

1 The index is determined as the arithmetic average of indicators from three areas, i.e. *use of internet, human capital, and digital infrastructure (connectivity)*.

Figure 2.4.2. Rural digital development indicator in 2021



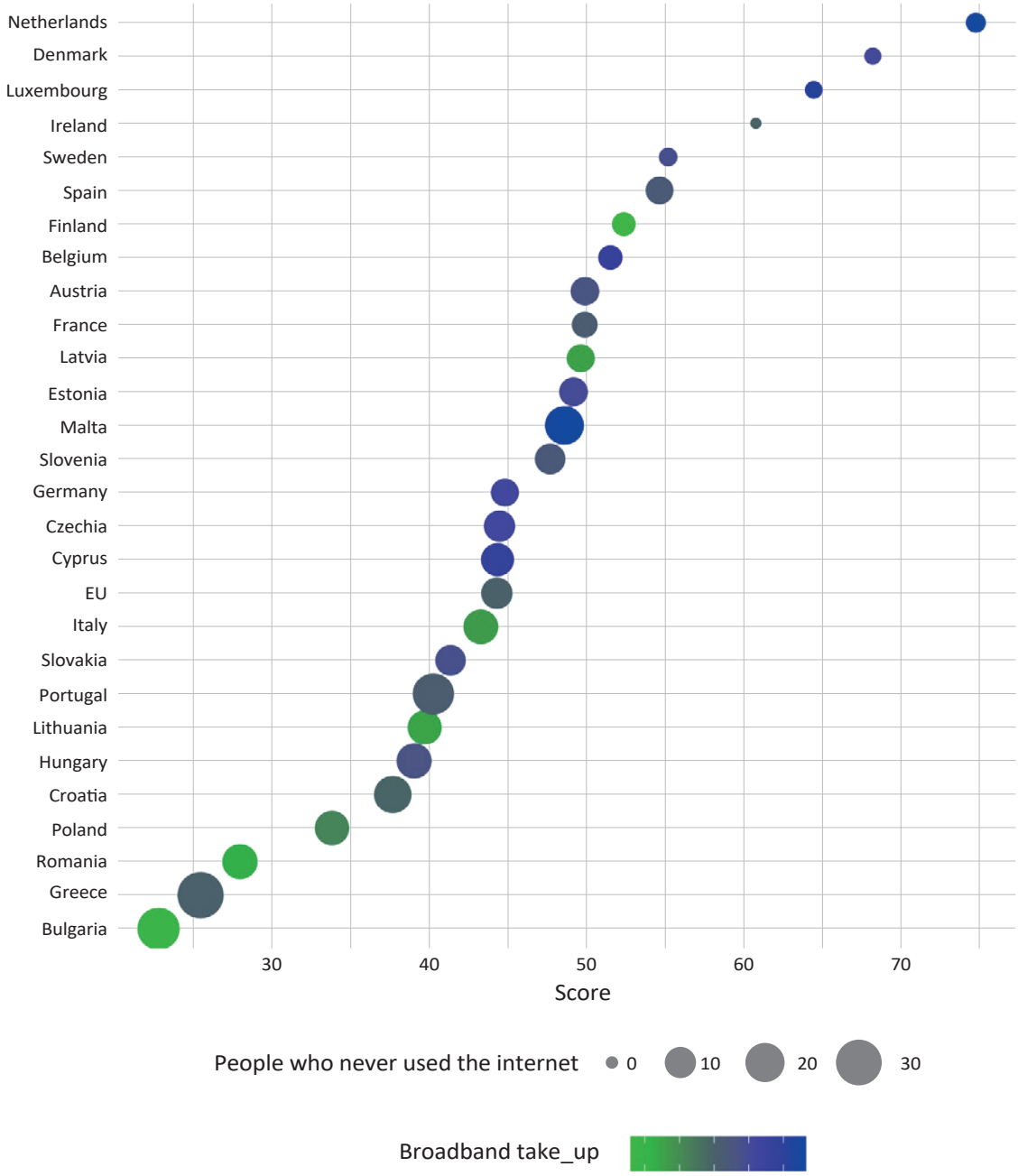
Source: own elaboration based on (DESI data, 2022).

24th among 27 EU Member States in the analysed area. The values of the synthetic index in the case of Poland are almost twice lower than in countries with the highest level of digital development of areas remote from cities, such as the Netherlands, Denmark, or Luxembourg.

> The rural digital index in Poland is nearly half of the index in countries with the highest level of rural digital development.

Assessing in more detail the values of the indicator in terms of the three examined areas (Figure 2.4.3), it must be emphasised that Poland performs poorly in all of them. The value of the indicator assessing the extent of internet use in rural areas (which assesses the regularity of internet use, percentage of people who have never used the internet, use of online services) was 42.3 for Poland (the EU-27 average was 52). A significantly lower value of 26.4 was observed for the second sub-indicator, i.e. the level of human capital in terms

Figure 2.4.3. Rural areas in a digital world



Note: Country ranking based on the Rural in digital index 2022 (scores ranging from 0 to 100). People never using the internet as a percentage of the population living in areas with a population density of less than 100 per km^2. Similarly, access to wired broadband as a percentage of households living in areas with a population density of less than 100 per km^2.

Source: own elaboration based on (DESI data, 2022).

of digital skills among the rural population. It is worth noting, however, that this area is characterised by significantly lower scores in all the analysed countries, and its average value for the 27 Member States was 35.9. Assessing the third area related to access to digital technologies, which seems to be particularly important from the point of view of professional activation of the examined group, it is worth noting that its low level (32.7) is largely due to the low capacity of available IT networks, as well as the low availability of 5G technology, which was available in Poland in only 13.5% of the analysed rural areas.

5G technology is only available in 13.5% of Poland's rural areas.

A challenge in activating people living in areas away from urban centres is also often the low level of education and lack of interest in digital skills. The problem is also exacerbated by a lack of access to IT education, as smaller towns lack schools or training centres offering courses in the use of modern technologies. These areas also lack specialised online services, which does not encourage people to learn new skills.

III. Openness of disadvantaged groups to technological change

III.1. Results of the survey

The objective of the survey was to understand the situation regarding the development of digital competence of people in one or more of the following disadvantaged groups: people aged 50+, women, people with disabilities, and people living in areas remote from urban centres. The survey consisted of groups of questions in the areas of knowledge, skills, and attitudes.
In particular, the questions related to the ability to use ICT in private and professional life, perception of the changes taking place in the context of personal and professional development, fears related to technological change, such as, among others, fear of losing one's job or fear of marginalisation due to lack of access to modern technologies. In addition, the survey attempted to identify barriers to the development of digital skills, including access to appropriate resources, training, and support from employers or public institutions. A group of questions also explored the motivations of the groups examined to improve their skills and their preferred forms of support. The results of the survey provide a better understanding of the challenges faced by disadvantaged people in the context of digitisation and provide information for institutions and public policies to develop effective strategies to support these groups.

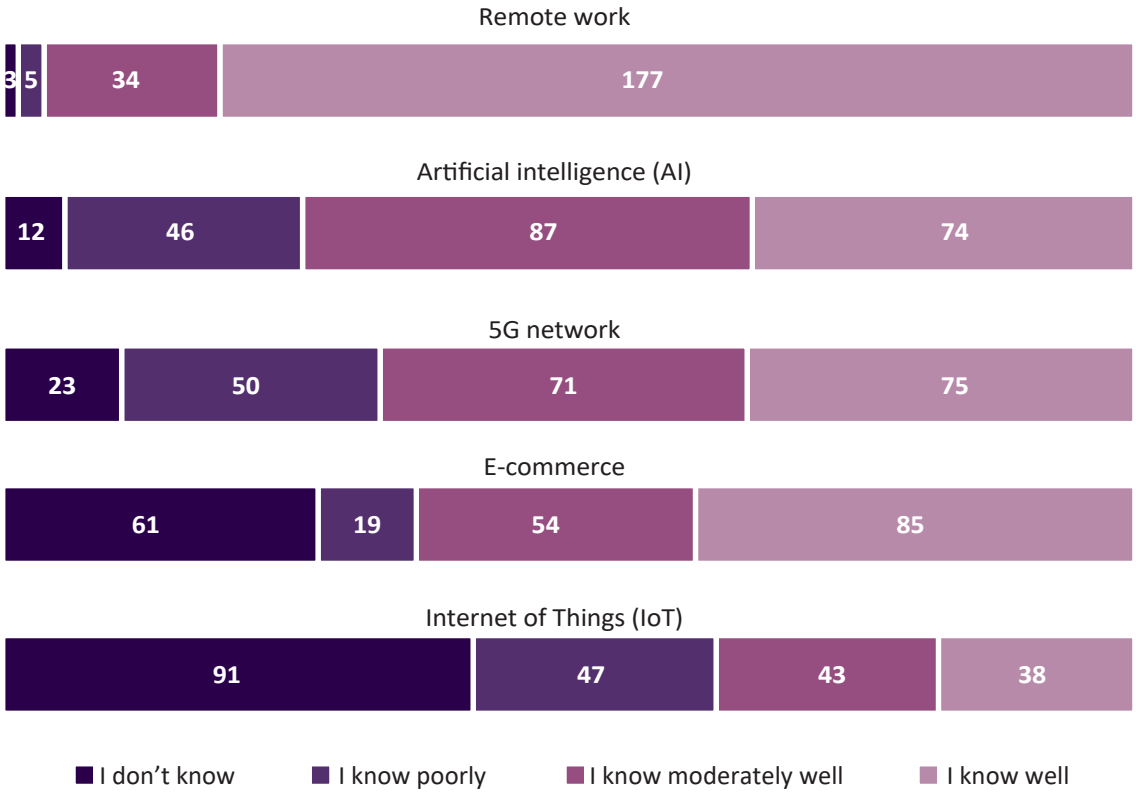
The sample analysed included 223 participants, the majority of whom were female (76.68%). Men accounted for 21.52% and 1.79% of participants did not want to state their sex. Respondents aged 35-49 were the largest group (56.05%), followed by those aged 50-54 (17.04%) and those aged 55-60 (8.52%). In terms of education, the vast majority of survey participants had a university degree (78.03%). Secondary and post-secondary education was declared by 18.83% of respondents, basic vocational or trade education was declared by 2.69%, and only one participant in the study had a lower secondary education (0.45%). As regards place of residence, the largest number of participants lived in the countryside (32.74%), followed by a city of more than 500,000 inhabitants (26.91%), a city of 20,000 to 99,000 inhabitants (17.49%), smaller cities of less than 20,000 inhabitants (9.87%), and cities of 100,000 to 199,000 inhabitants (7.17%). Among the participants in the survey sample, 92.83% did not have a disability certificate. However, 0.90% of the participants without a certificate

considered themselves to have a disability. 6.28% of the respondents had a disability certificate. Regarding the nature of the paid work performed, the predominant group was those performing work of a mental nature (86.55%). Work of a physical nature was performed by 7.62% of the participants and 5.83% of the respondents did not work.

The results showed that remote working was the most familiar concept among respondents with an average score of 3.76 on a four-point scale. Artificial intelligence ranked second with an average score of 3.02, e-commerce and 5G technology came next with average scores of 2.74 and 2.90 respectively, and the Internet of Things (IoT) came last with a score of 2.13. This indicates that while some digital concepts are very familiar to members of the groups examined, it is still worth building awareness and knowledge of emerging technologies.

As regards private life, the highest average score was 5.01 for using online banking, followed by 3.62 for buying goods or services online. Installing new

Figure 3.1 How familiar are you with the following concepts?

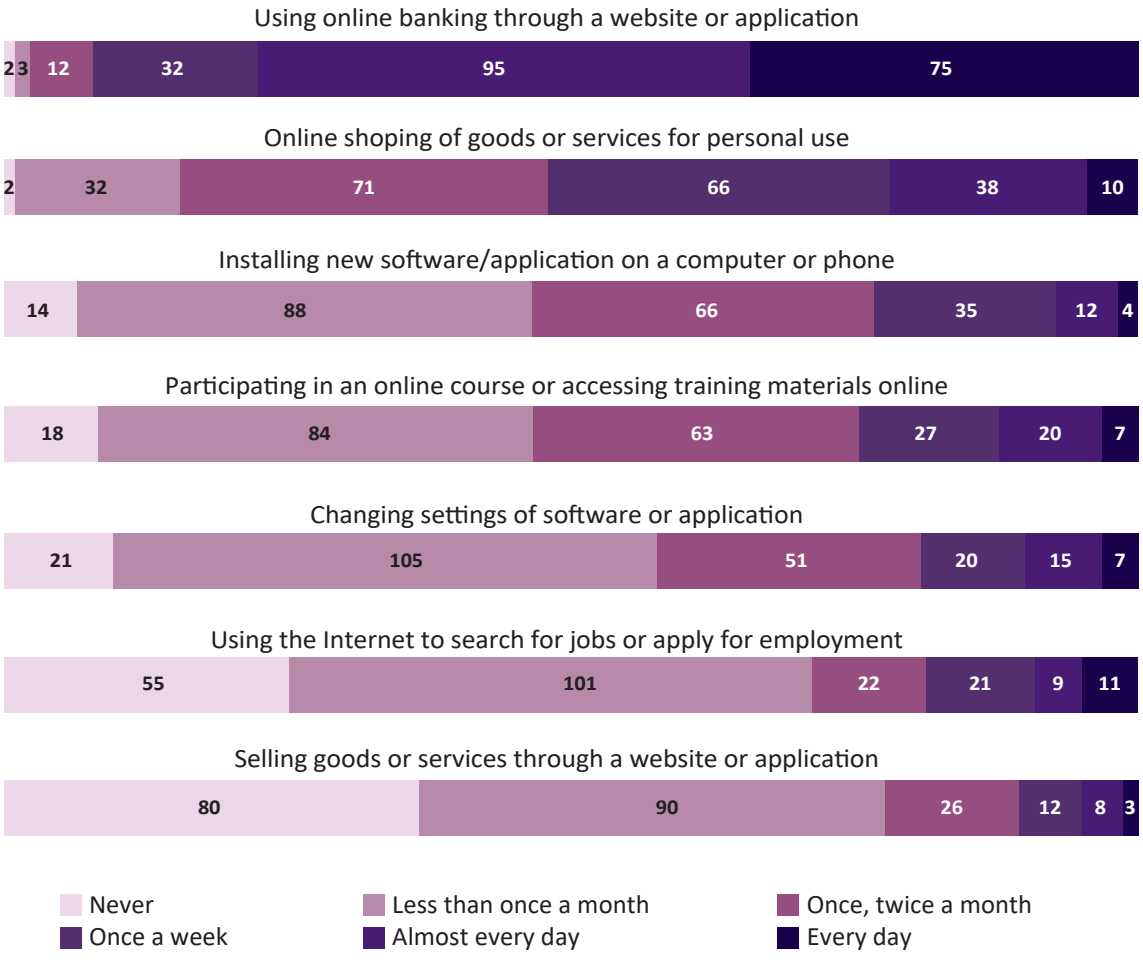


Source: own study.

software or applications and taking online courses had similar average scores of around 2.82 and 2.87, respectively. The lowest score was for using the Internet to search for a job or apply with an average of 2.35.

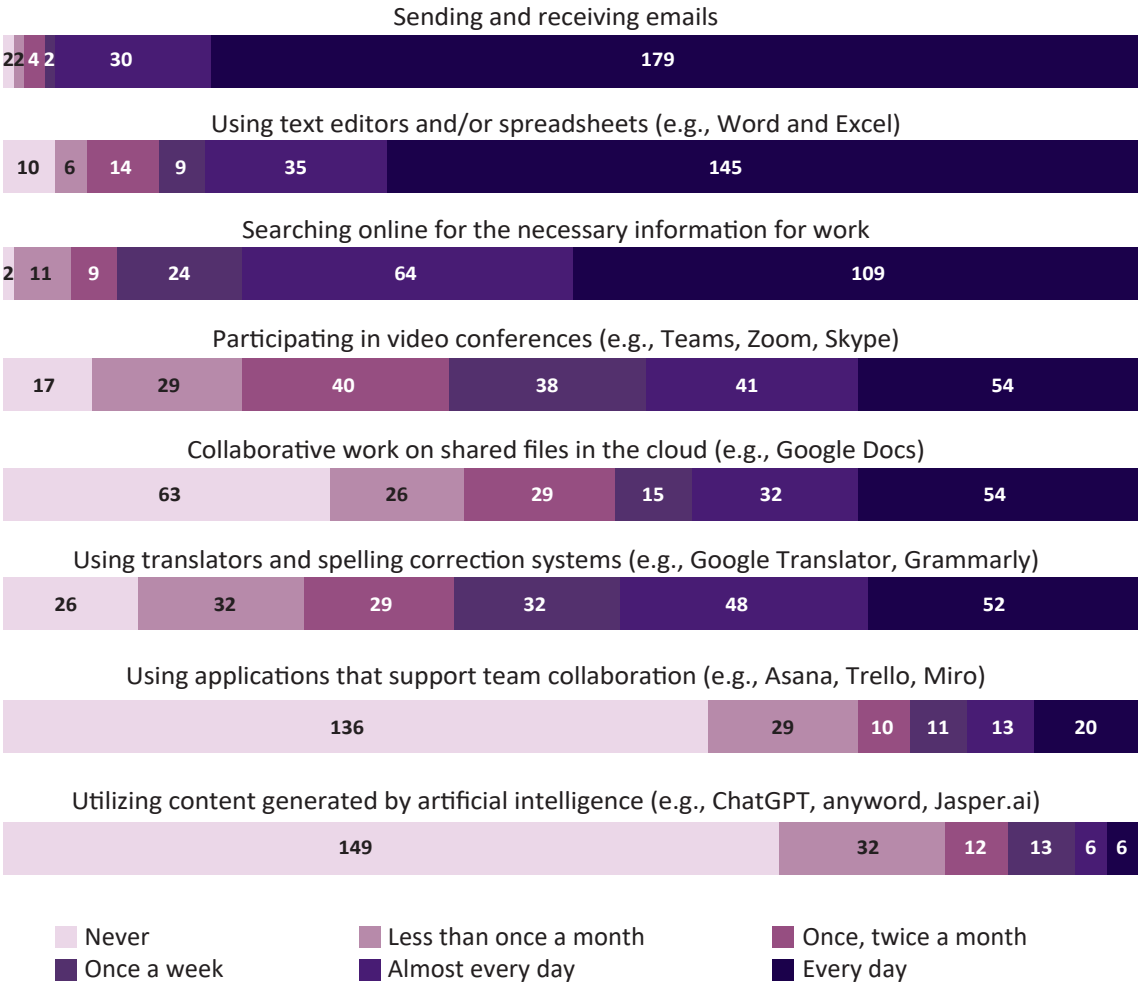
In terms of working life, using the internet for job searches or applications had the same average score as in private life (2.35). Respondents reported high involvement in searching for work-related information online (5.13), sending and receiving emails (5.71) and using word processors and spreadsheets (5.24). However, scores were lower for participation in video conferencing, use of cloud-based collaboration tools, and use of AI-generated content with mean scores of 4.00, 3.41 and 1.69, respectively. This suggests that while basic digital skills are widely used in working life, more advanced skills and tools are far less popular.

Figure 3.2 How often do you do the following activities in your private life?



Source: own study.

Figure 3.3 How often do you carry out the following activities in your working life?

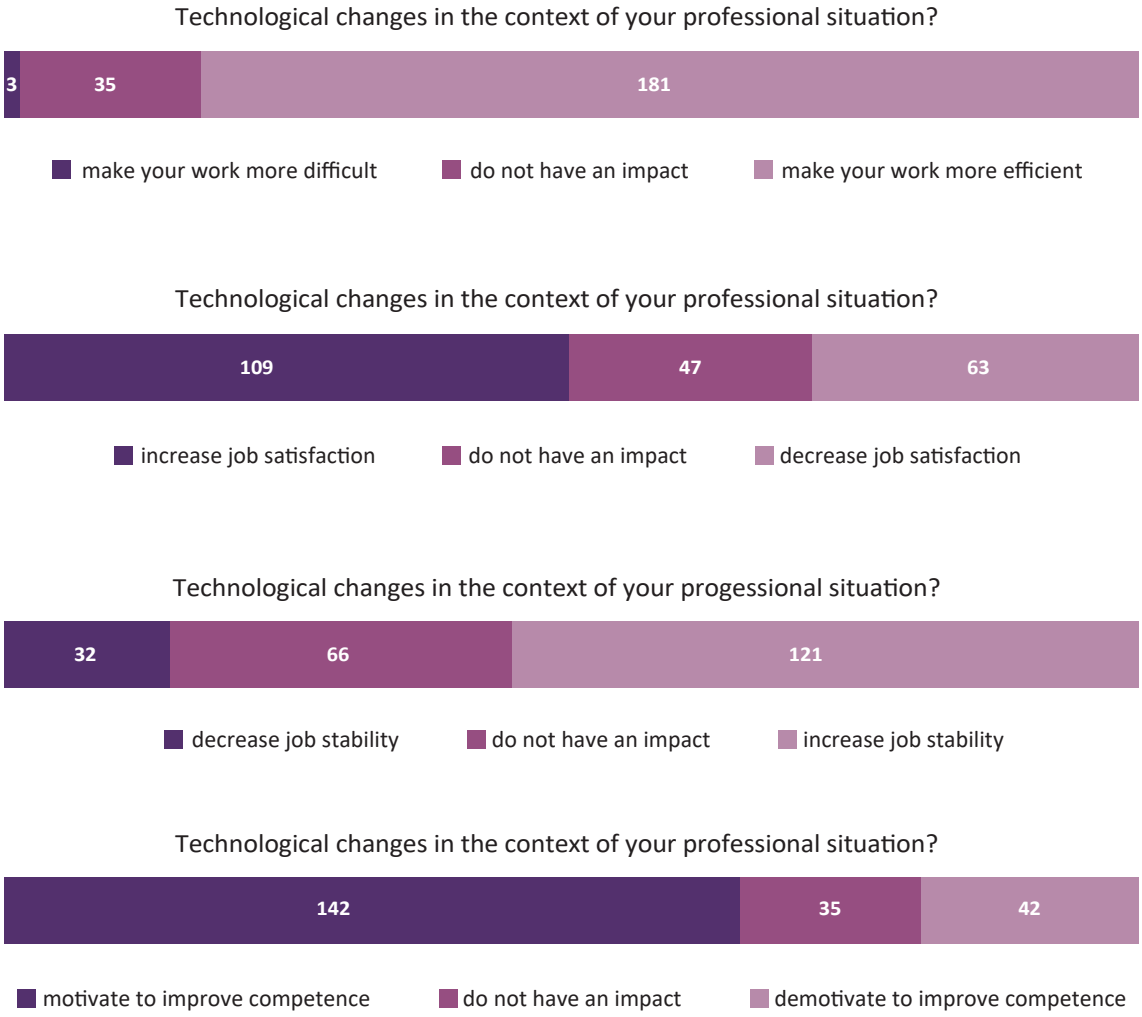


Source: own study.

The answer to the question on the benefits and drawbacks of remote working in utilitarian terms is very interesting. In the case of these categories, remote working was assessed unequivocally positively (improved work efficiency), but we observe a high degree of polarisation in terms of the impact on participants' circumstances, including motivation and satisfaction. This highlights the importance of addressing the potential negative consequences of technological change and providing appropriate support to help individuals adapt.

Concerning concerns about technological change, the highest average scores were for concerns about security (4.33), health (4.19), and privacy (4.13). Respondents were also concerned about an increase in unemployment (3.34), social inequality (3.74) and a decrease in the value of their skills (2.57).

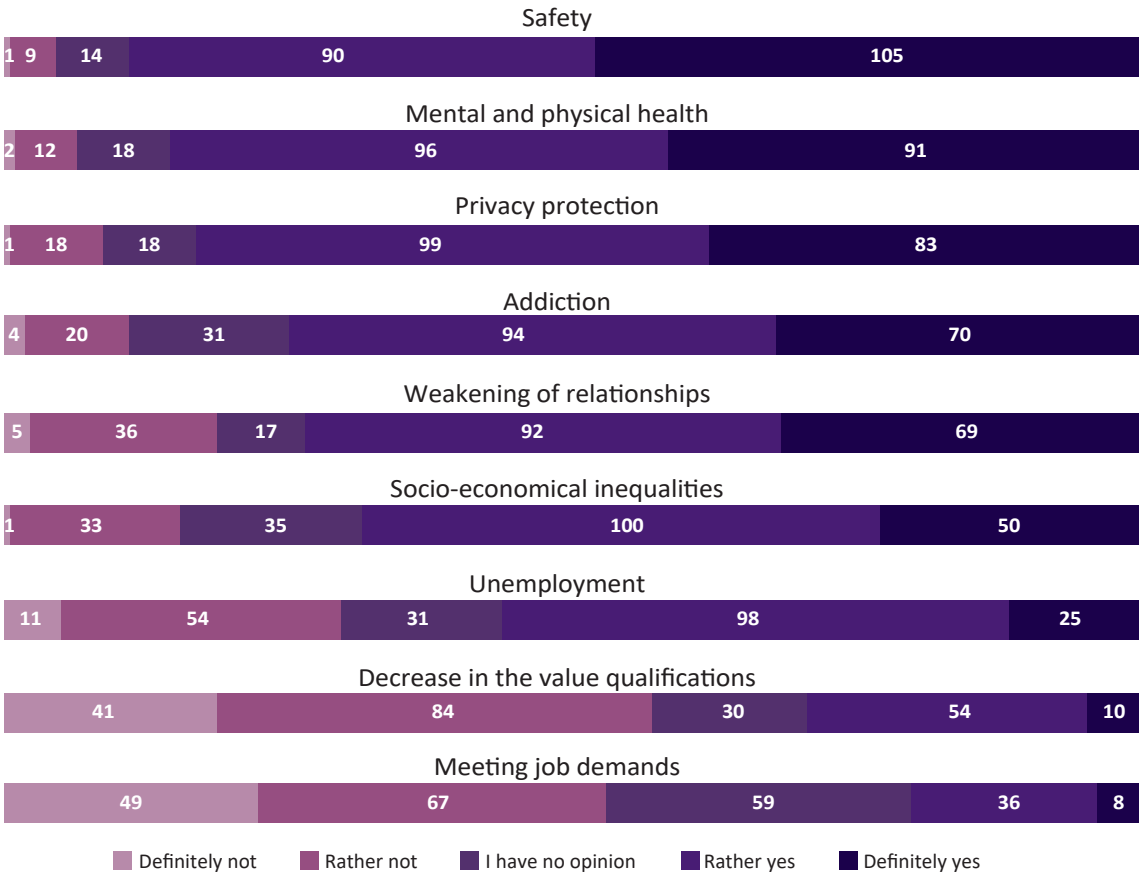
Figure 3.4 Perception of technological change



Source: own study.

When asked about obstacles to improving their digital skills, respondents most frequently reported a lack of time due to personal (45.29%) and professional obligations (43.95%), a lack of motivation or desire to learn new skills related to age or experience (17.94%), and a lack of knowledge of appropriate training or resources (26.01%). In addition, financial barriers (36.77%) and lack of equipment (4.48%) were also cited as obstacles. Lack of sufficient resources or knowledge is a group of factors that can be objectively addressed, while lack of motivation and a sense of lack of time require a presentation of the benefits associated with developing these skills. It is worth noting that fear or lack of equipment was marginally indicated as reasons for lack of motivation to improve digital skills.

Figure 3.5 Do you share any of the following concerns about the development and use of new technologies?

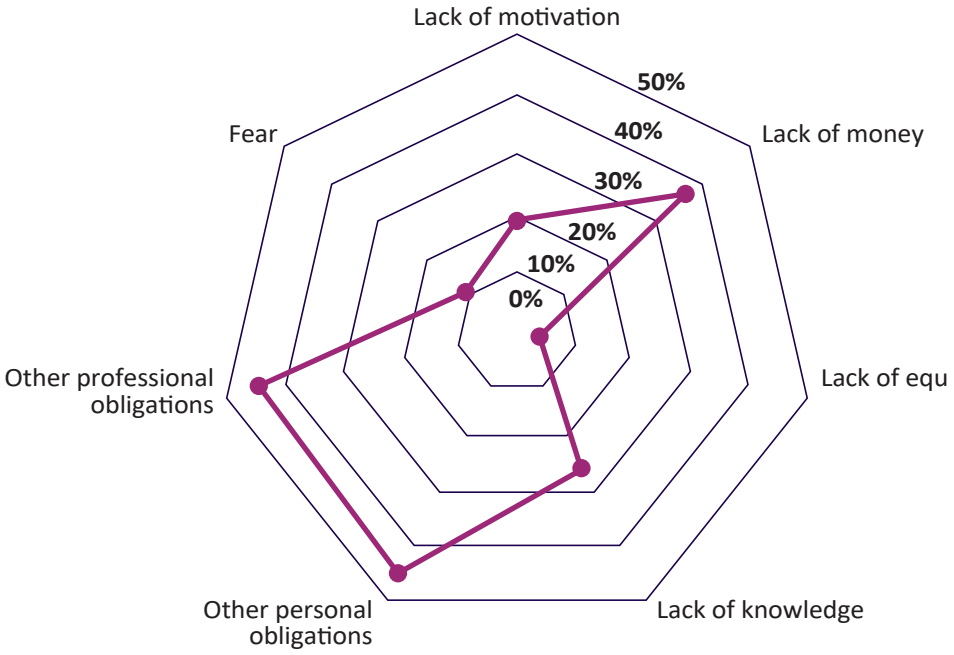


Source: own study.

Furthermore, the results of the survey show that the majority (58%) of participants declared readiness to improve their competencies. This indicates a positive trend, but it is worth noting that not all participants are motivated to develop further in this area.

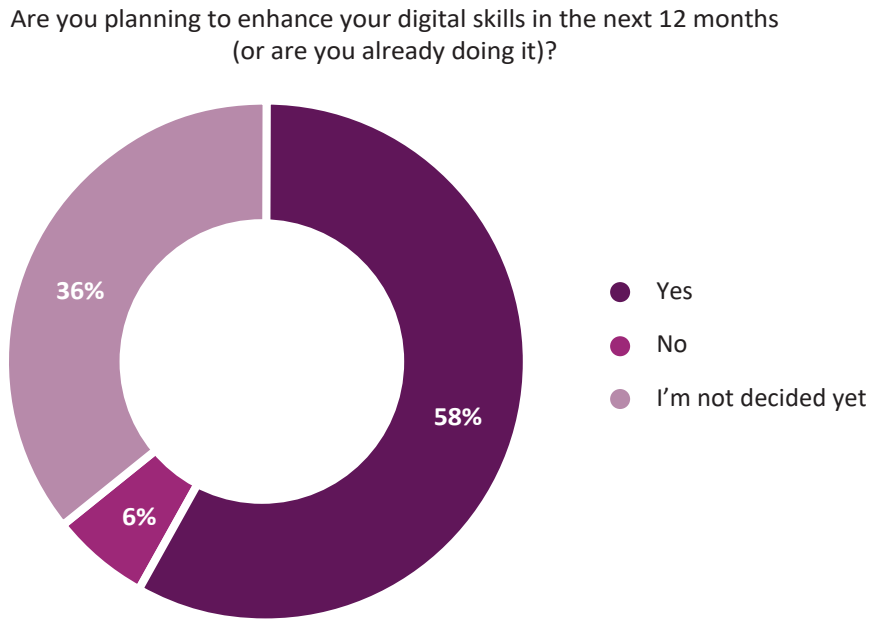
Disadvantaged groups face unique challenges in developing digital competence. In terms of motivation for improving digital skills, respondents were most interested in increasing their competences for personal (74.11%) and professional development (72.29%). Other motivations included the desire to keep up to date with technological changes (65.53%), to increase job security (61.39%), and to find a new job (55.29%). These motivations indicate that disadvantaged groups are aware of the benefits of improving their digital skills but may need additional support and resources to pursue their goals. In terms of

Figure 3.6. What is preventing you from improving your digital skills and adapting to the technological changes taking place?



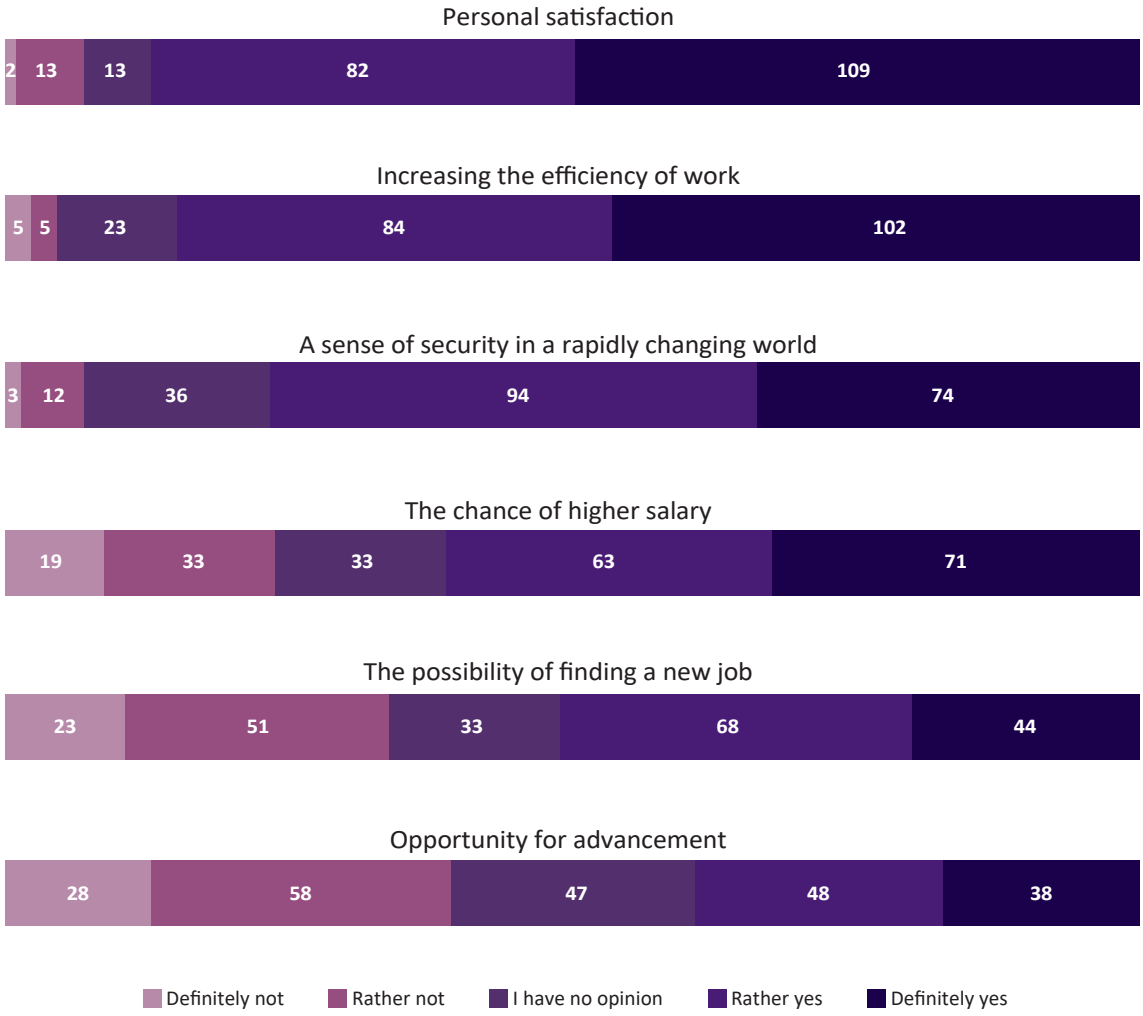
Source: own study.

Figure 3.7 Improving digital competences



Source: own study.

Figure 3.8 What motivates you to improve your digital skills?



Source: own study.

preferred forms of support, respondents favoured free online courses (69.53%), workshops or a seminar (52.11%), support from peers or colleagues (43.84%), and financial support to purchase digital devices (33.67%). This indicates that a combination of online and onsite training, as well as financial support, can be effective in helping disadvantaged groups to develop their digital competencies.

Figure 3.9. Would you use any of the following forms of digital skills development?

Source: own study.

III.2. Baseline conditions for solutions supporting the development of digital competences

In addition, the survey included open questions that allowed us to obtain directly the opinion of those in the disadvantaged groups about the key factors determining the effectiveness of measures increasing the level and motivation to acquire new digital skills. Based on the respondent's answers, the following baseline conditions for solutions supporting the development of digital competence for disadvantaged groups can be distinguished:

1. Availability of technology

To effectively support the development of digital competence of employees from disadvantaged groups, attention should be paid to the accessibility of the solutions offered, including in particular:

- **Access to technology and high-speed internet:** one of the basic conditions for the development of digital competence is access to appropriate equipment (computers, laptops, smartphones) and a fast and stable internet connection. Supporting access to equipment and infrastructure can include, for example, making equipment available for training or working with local governments and NGOs to provide appropriate infrastructure.
- **Equal opportunities and support for everybody:** while designing solutions, it is important to ensure that participants have equal opportunities and access to support, regardless of their background, age, sex, or level of education. Programmes and training should be accessible to different social groups, promoting integration and cooperation between participants.
- **Funding of training and courses by employers and EU funding:** the cost of participating in training programmes can be a barrier for people from disadvantaged groups. It is therefore worth pursuing the provision of funding for training, for example through employer support or the use of EU funding. In this way, the cost of participation for participants can be minimised, while encouraging them to improve their digital competence.

2. Personalisation and flexibility

An important element in designing effective solutions to support the development of digital competence of employees from disadvantaged groups is to take into account the individual needs, abilities, and limitations of the participants. To this end, attention should be paid to:

- **Adapt programmes and materials to the diverse needs of participants:** When designing training programmes, it is useful to adapt the content, teaching methods and learning materials to the needs and abilities of participants. This can be achieved by analysing the needs of participants, taking into account their level of sophistication and individual predispositions (eg neurobiological diversity, different learning styles).
- **Flexibility in the organisation of training**: To allow participants to participate freely in training, it is useful to provide flexibility in terms of dates, times and form of delivery (for example, classroom, online, hybrid). In this way,

participants will be able to adapt the learning to their needs, as well as reconcile it more easily with other professional and private obligations.

- **Support for people with disabilities:** When designing training programmes, the needs of people with disabilities should also be taken into account. This may include adapting materials to meet accessibility requirements (eg WCAG 2.1 compliance), making appropriate software available and providing technical and content support for participants.
- **Individualised approach to learning:** Supporting the development of digital competence should be based on an individual approach to each participant. It is important to allow asking questions, implement practical exercises, and adapt the pace of learning to the participants' abilities. Small training groups and qualified trainers can contribute to better learning outcomes and higher participant engagement.

3. Social and motivational support

To increase the effectiveness of solutions supporting the development of digital competence of employees from disadvantaged groups, social and motivational aspects should be taken into account, including in particular:

- **Building a sense of community:** creating an environment where participants can support, motivate and learn from each other is key to maintaining engagement and increasing the success of training sessions. Shared goals, discussions, and sharing of experiences can help participants break down barriers and relate to others with similar problems or aspirations.
- **Support from mentors or coaches:** access to the support of mentors or coaches who have experience working with disadvantaged groups and know their needs can contribute significantly to the success of the programme. Mentors can help participants to achieve their goals, overcome obstacles and motivate them to develop further.
- **Long-term support and development path:** it is important that participants in training programmes feel that participation in the programme is only the beginning of their development path. Providing long-term support, for example in the form of additional training, workshops, meetings with mentors, or opportunities to connect with potential employers can motivate participants to continue learning and developing their digital competences.
- **Taking cultural and social diversity into account:** When designing training programmes, it is worth taking into account aspects related to the cultural and social diversity of the participants. Working with organisations that are familiar with the specific characteristics of local communities can help tailor

the content and teaching methods to the needs of the participants and increase commitment and ownership of the project.

- **Rewarding progress and achievements: to** keep participants motivated, it is useful to use a system of rewards and recognitions for progress and achievements in the learning process. This can include certificates, diplomas, or small gifts. This kind of motivational support can encourage participants to develop further and stay engaged.

4. Individual approach to needs and capabilities of the participants

To effectively support the development of digital competences of employees from disadvantaged groups, training programmes must be tailored to the individual needs and capabilities of the participants, including in particular:

- **Diagnosis of needs and skill level:** Before starting the training, it is useful to carry out a diagnosis of the participants' needs and their current skill level. This will allow the content and form of the training to be tailored to the individual expectations and abilities of the participants, increasing its effectiveness.
- **The flexibility of the training format:** the flexibility of the training format, ie the possibility to choose between on-site, remote, or hybrid classes, can allow participants to adapt the learning process to their needs and constraints, for example in the case of people with disabilities or from areas remote from urban centres.
- **Personalisation of content:** customising the training content to the specific characteristics of a particular participant or group of participants can increase learning engagement. Examples of this approach can include using real-life situations from the participants' working lives, tailoring the training to their career goals, or adapting the pace and methods of learning to individual aptitudes.
- **Support for different learning styles:** it is important that training courses accommodate different learning styles so that each participant can find a way of learning that suits his or her preferences. This includes, for example, using a variety of forms of material presentation, such as texts, presentations, videos, or interactive games, as well as giving participants the opportunity to choose their learning path.
- **Monitoring progress and adapting the curriculum:** regular monitoring of participants' progress allows the curriculum to be adapted to their current needs and skills. Based on the information obtained, changes can be made to the training content, teaching methods and form of training, increasing the effectiveness and satisfaction of participants with the curriculum.

5. Practicality and application in everyday life

In designing solutions to support the development of digital competence for disadvantaged groups, it is important to focus on the practicality and application of the skills acquired in everyday life. The effectiveness of such programmes can be increased by focusing on three subgroups.

- **Focus on skills that are useful for everyday work and life:** training and courses should target specific skills that participants can use in their professional and private lives. Examples include learning how to use Office, how to handle email or how to use personal finance management applications.
- **Demonstrating specific uses of technology:** instructors should present participants with real-life use cases of digital technologies to show how these tools can make everyday life easier. This can be done by showing how these technologies can help with work, communication with family and friends, time management, or travel planning.
- **Opportunities to practice the material themselves:** participants should be able to practically apply the skills they have learnt during the training. This can be achieved by providing access to relevant tools, software, or learning platforms. Practice is crucial to consolidate new skills and increase participants' confidence in using digital technologies.

6. Relationships and interactions

Another issue is the focus on the role of technology in facilitating and supporting interpersonal relationships and interactions in the educational process. Including these aspects in the design of solutions can lead to more effective learning and greater participant satisfaction.

- **Technology as a support for, rather than a replacement of relationships and interpersonal communication:** when designing online training and courses, technology must serve as a tool that facilitates communication, rather than a replacement of interpersonal relationships. This can be achieved by using video conferencing tools, discussion forums, or chat rooms that allow participants to exchange opinions and collaborate.
- **A small group works with opportunities to ask questions and participate:** organising classes in small groups allows for greater involvement of participants, as well as better tailoring to individual needs. In such groups, individuals have more opportunities to ask questions, and the instructor can respond more effectively and adapt his or her teaching methods.

- **Support for relationship building between participants:** it is important to create an environment that encourages relationships between participants. This can be achieved by introducing group exercises, joint projects, or discussions to help participants get to know each other and learn to work together. This allows participants to motivate and support each other, which can lead to better learning outcomes.

7. Elimination of barriers and fears

The designed solutions should also support the removal of barriers and fears that may hinder the development of digital competence among disadvantaged groups. To achieve this effectively, it is important to take a holistic approach and understand the different aspects of the issue.

- **Familiarising with technology and the internet:** For those who have not used digital technologies before, it is important to create a friendly and accessible learning environment. This can be achieved by organising workshops, meetings, or training sessions oriented towards the practical use of digital tools, and a gradual introduction to this world so that participants do not feel overwhelmed.
- **Build confidence in the usefulness and safety of technology**: to increase participants' engagement in learning, it is important to show them the benefits of digital competence. It is important to emphasise how technologies can make everyday life and work easier while ensuring education on privacy and data security.
- **Supporting people with a fear of technology**: some participants may have emotional barriers due to a fear of technology. In such cases, it is important to create emotional support, for example by providing specialist counsellors or coaches to help overcome fears and build confidence when learning to use digital tools.

Based on free comments obtained from the participants, the following main areas can be distinguished:

1. **Customising to the individual needs and skills of participants:** The survey shows that relevant training and courses should be adapted to different levels of proficiency, learning styles, and the specific characteristics of the target group (women, people 50+, people from areas remote from urban centres and people with disabilities).

2. **Easy access to information and resources:** responses from survey participants' emphasised that the availability and accessibility of information on websites and the ability to use learning platforms should be key elements of solution design.
3. **The flexibility of time and place of training: the** need to provide opportunities for remote learning, to subsidise courses, adapt course times to the needs of participants, and deliver training away from the workplace in one's spare time was mentioned.
4. **Technical and content support:** participants in the survey highlighted the need for technical support (helpdesk, email) and access to coaches and mentors to assist in the acquisition of knowledge and skills.
5. **Data protection and security:** in the context of the increasing number of cybercrimes, participants stressed the importance of education on data protection and ensuring the safe use of online tools and services.
6. **Taking into account neurobiological diversity and disability adaptation:** for people with disabilities, survey participants indicated the need for appropriate software, equipment adaptation, and tailored training.
7. **Promoting the benefits of developing digital competence: the** study noted that it is important to demonstrate the benefits of digital competence and the use of technology in everyday life.

In summary, the results of the quantitative research show that while some digital concepts and skills are well-known and used by members of disadvantaged groups, there is still significant room for developing awareness, access to resources, and support. Reducing concerns about technological change, overcoming barriers to improving skills, and designing targeted support in the form of online courses, workshops, and financial assistance can help to reduce the digital exclusion of members of disadvantaged groups.

IV

IV. Proposed mechanisms to support equalisation of opportunities for disadvantaged groups in the labour market

IV.1. Identification of opportunities to support equal opportunities

The research carried out leads to the following general conclusions:

- The pandemic has accelerated digitisation processes, but the magnitude of the significance of these changes varies significantly within the different disadvantaged groups. **Those who benefited were those who were in the process of acquiring digital competence in recent years or who had knowledge and skills at least at the so-called baseline level.**
- **The differences in the use of digital technologies are partly due to the lack of, or limited access to, selected equipment or infrastructure** (computer hardware is often outdated, which determines the type of software running on it), as well as insufficient access to the internet, particularly in rural areas.
- **The unequal allocation of funding for the purchase of IT equipment is also pointed out:** during the covid pandemic, schools and children became the main beneficiaries of state aid. Excluded people, due to their limited earning capacity, fall into the loop of not being able to finance their professional development, and NGOs have limited opportunities to obtain funding for equipment. The inability to purchase computers for living reasons (medical expenses, living expenses, etc.) combined with low wages mean that excluded people are unable to improve their skills.
- On the one hand, the war and the covid pandemic drew the attention of state institutions away from disadvantaged groups and towards supporting their activation in the labour market. On the other hand, the covid pandemic has forced remote working and it has become apparent that, for example, people with disabilities are full-fledged employees (with this being mainly true for those already active in the labour market before the pandemic). **Those absent from the labour market with the onset of the pandemic found themselves in an even worse situation.**

- The source of problems for excluded groups is often a **lack of time to develop competencies, physical fatigue due to heavy workloads, and psychological problems** (lack of faith, fear of the reaction of the environment, habitual use of assistance, etc).
- Disadvantaged groups have **limited confidence in the technology.** In rural areas, children's access to computers is deliberately restricted. Other groups fear the theft of personal data, responding to suspicious emails, and opening unknown attachments. Disadvantaged groups also fear addiction to technology, such as smartphones.
- **Those who are economically active have often seized the opportunities of the pandemic and changes in working styles.** Others remain passive and fear changes to their current status quo. NGOs are safe zones for them. These people are willing to develop skills, but only to the extent that their current needs are met. They do not want to go beyond what they experience; what they need to lead the normal life they know.
- Motivation to develop skills depends very much on individual characteristics and the character of the person. Among disadvantaged groups, **a sizable group of people** (some claim a majority, around 70 to 90%) **do not want to go beyond their comfort zone** and the associated benefits they derive from the existing system of assistance and support.
- **Support groups on Facebook or other social media** remain an important **source of information**.
- **Accelerated digitisation during the** covid pandemic period **has influenced the development of knowledge and skills in the use and operation of mobile devices (smartphones)** and less computers/laptops. This is due to the 'forced' use of solutions such as, for example, e-prescriptions, and bank transactions related to bill payment, and farmers also have to use smartphones for accounting and reporting to ARMA.

In specific terms, the situation of the studied disadvantaged groups can be summarised as follows:

People 50+

People aged 50 and over face challenges in the labour market due to factors such as age discrimination, ageing skills, lack of familiarity with digital tools and platforms, and exposure to restructuring changes, downsizing, or automation of work tasks. The level of motivation plays a key role in the activation of older people. The mentality of society is that work is an unpleasant obligation and retirement is an exemption from this obligation. The image of a working pensioner

is that of a very poor person who is exploited by the system despite physical limitations. In addition, the public perception of the elderly still includes the image of a less educated, slow learner, unable to communicate interpersonally with younger workers. Such an image has a negative impact on their greater involvement in the labour market. Such **stereotypes are** also **sustained by the media portraying older people as infirm, in need of care and assistance.** Therefore, building the motivation to change the situation in the labour market requires a change in mentality and, further, support from the immediate family environment, an appropriate number of jobs offer for older people, limiting the possibility of using other social benefits and minimising physical limitations, but also changing stereotypes about older people. An obstacle to the economic activation of older people may also be the behaviour of employers themselves, who, regardless of the competencies of mature employees, prefer to employ younger people with much lower salary expectations. Therefore, in the group of people aged 50+ it is worth building a belief that raising digital competence will be associated with benefits in the labour market in the form of employment. It is also worth distinguishing between the situation of seniors in large cities and in smaller centres. In small towns and villages seniors have the support of the social group of their closest neighbours and therefore their need to use electronic media is lower, and vice versa - in large centres electronic media enable communication with other people, as they are often a substitute for social capital, which is decreasing in Poland. Contact with state institutions, offices, or other organisations providing services to senior citizens is therefore possible here with the help of electronic media. The **lack of digital competence significantly worsens the quality of life of seniors in large cities, but probably has less of an impact on seniors in rural areas and small towns.** It should also be noted that **the topic of economic activation of senior citizens is not a priority either for NGOs or for the target group itself**. In addition, the current legal system is not conducive to older people taking up employment in the labour market, as they are afraid of losing the social benefits they receive.

Women

Although progress has been made in terms of sex equality in recent years, women in Poland still face various challenges in the labour market. This is due to a combination of factors, such as sex stereotypes, occupational segregation, pay disparities and the dilemma of maintaining a work-life balance. For women, the most important demand is **the need for flexible working conditions** that allow a combination of family and work life. Flexible working hours and the possibility to work remotely can provide an attractive incentive to improve digital skills.

Women do not become active in the labour market primarily due to the need for caring and family responsibilities and the lack of institutional support. **Local labour markets generally lack places that offer flexible conditions** or part-time work. The available level of wages, especially for part-time work, also does not encourage women to take it up.

Persons with disabilities

People with disabilities who can work face numerous barriers to full participation in the labour market due to a number of factors, such as limited availability of jobs, inadequate equipment and adaptation of workplaces to their needs, misconceptions about job opportunities and discrimination. For people with intellectual disabilities, social activation and independence is often the primary goal, and the possibility of vocational activation is very limited. The situation is different for people on the autism spectrum. Digital transformation is an opportunity for people with this type of disability. Children with autism can function in home-based education using a variety of digital programmes and tools, including those that allow for remote education. The problem, however, is even the small charge for such programmes or training. In the case of each group, however, **the individual dimension of the proposed solutions** is important, as well as systemic support solutions, which are lacking in Poland. It is also worth remembering that older people with adult children with disabilities are less open to motivating their children to develop digital competences and enter the labour market. This type of thinking is less common among young parents already growing up in the digital age. These people see more opportunities not only for themselves, for example to work remotely, but they are also strongly committed to the development of their growing children's digital competences due to the belief that this is a way for them to become fully or partially independent and lead a normal life. It is therefore worth ensuring **systemic changes in the support of people with disabilities** (for example, through access to free training), as well as **building a positive image of a person with disabilities among employers**. Digitisation may provide some opportunities for, for example, repetitive activities or work for people with communication and social relationship difficulties. However, people with disabilities must be provided with the right conditions and tools in the workplace and with acceptance and understanding of their specific needs.

People living in areas away from large urban centres

People living in areas remote from large urban centres face unique challenges in accessing and participating in the labour market, which can be attributed to

factors such as limited access to infrastructure and services, fewer employment opportunities, a skills mismatch with the needs of the modern labour market and digital exclusion due to a lack of skills and access to digital infrastructure. **In urban areas, digital transformation was taking place much earlier than in rural areas** and opportunities to increase skills were emerging. For example, internet cafes were practically non-existent in rural areas. In urban centres, it was also much easier to take part in training courses even on a commercial basis. In general terms, the basic challenge for rural areas is still the construction of adequate infrastructure. In rural areas, it is not only access to "traditional" broadband that is **a major problem**, but also the quality of the **GSM signal and the lack of LTE coverage**. The technical infrastructure is not keeping up with the growing demand from modern smartphones. Investment in upgrading networks in rural areas is not profitable for large operators. There is also the problem of **unfinished** investments, for example non-functioning optical fibre, and the **lack of systemic solutions in** this area (ineffective 'broadband network' programmes, problems with the new 'Digital Poland' programme). There is often the problem of reluctance of operators to connect to the backbone network and therefore lack of access to the network by end users. The internet is eventually provided, but of poor quality, there is a problem of dropped connections, which, for example, makes it difficult to work with electronic document circulation and remote working in general. The need to develop local labour markets offering diverse jobs should also not be overlooked. Regional development requires a long-term strategy for structural change, also driven by new technologies. The regional development narrative to date indicates that, on the one hand, there are 'creation regions' that experience a virtuous cycle of employment growth and migration of highly skilled, highly paid creative workers who create and develop new technologies, and, on the other hand, there are regions merely 'applying new technologies' that fall into a vicious circle of declining competitiveness, rising unemployment of low-skilled workers and migration. Developing coherent regional development strategies that offer diverse jobs is the starting point for activating people in the labour market.

The levels and sources of demotivation/motivation in the development of digital competence vary. There is no clear pattern across groups. Change or reluctance to change attitudes and behaviours can be linked to:

- initial low self-esteem (due to, for example, age, disability, sex, etc). Opening up to novelty requires spreading the whole process over time. It is important to feel the small benefits of developing digital competence,

for example saving time at the office, a digital bank transfer, an MMS sent to friends, etc: "*There must be a need – a benefit – a curiosity – a willingness to learn – a self-interest, for example applying for a carbon allowance*",

- boredom "*...We have communication exclusion. A trip to a community town is a whole trip. There is nothing to do. One restaurant. What's left is a book or knitting, or... the internet and cultural offerings, entertainment, etc.*"
- the level of socio-economic development, including the type of industry/ services developed in the region; "*...We have two large wood industry plants. There are two people with higher education in our foundation. They have no problem writing a text, or a commentary, but the others in the area have secondary technical or vocational education. They have not used a computer in their work and still do not. They are even afraid of computers; they do not use smartphones. They have problems sending a text messages. They have never typed. According to them, physical work with a machine, a machine tool, a saw does not require them to improve their competencies, and digital ones in general.*"
- lack of positive signals from the immediate environment and/or lack of gestures of support/acceptance:
  "*…We proposed to the people at the welfare centre that we would do something for you, but on the condition that they would pay for our work... OPS without enthusiasm, because they would have to pay a token fee...*"
  although there are also positive but non-financial signals: "*...the Mayor praised the activity in ...*"
  "*...Our school is open to animation, and collaboration with older people. It provides a room, which makes it possible to create a coworking platform to exchange experiences. We help, we teach each other...*"
- socio-demographic structure, especially in non-urban areas where older people predominate:
  "*We have a lot of elderly people among whom there is a very high stratification in terms of skills. They seem to have smartphones with the Internet, but their children and grandchildren have set them up. Out of 130 people, about 30 are digitally active; the rest don't even have email because they don't think they need it. If anyone in our age group uses FB, they mainly give likes under posts, but no comments. During covid, a lot of young teachers were forced to work remotely. Older people had a 'block' on news. Zoom was in English, and besides, they didn't dare, because it's one thing to meet in person and another to meet on camera...*"

IV.2. Solutions for effectively improving the situation of people excluded from the labour market

Investment in equipment and access to technology

- **Legislative solutions for the expansion and management of digital infrastructure are called for, including legislative changes to address the problem of coordinating the construction and management of the broadband network.** "*Fibre optics should be taken over by local governments, such as powiats*": currently, the lack of coordination of construction and over-centralised network management processes is a significant problem.
- **The use of computer-based school laboratories** for training disadvantaged groups is also advocated.
- In applying for EU funding for local activation projects and **the** purchase of equipment, there is a call for **simplification of the procedures and the form of applications**. The intermediation of specialist companies in the preparation of applications is costly and often reduces the motivation of local initiatives to apply for EU funding. A solution could also be to distribute funds regionally in a targeted manner rather than through central institutions.

Combating stereotypes

- It is necessary to fight stereotypes, i.e. to **build general public awareness of the benefits of employing people from disadvantaged groups** together with showing the incorrect perception of these groups of workers, for example:
  - clarifying that the subsidies from PFRON are in some cases compensation for shorter working hours and not an extra allowance for companies,
  - referring to positive experiences of employers in employing disadvantaged groups,
  - supporting them not only financially or through training, but also in the area of creating a positive climate around these groups,
  - combating the stereotype that older people from remote areas or people with disabilities are inferior in the labour market and unable to master certain digital skills,
  - It is also particularly important to raise awareness among the immediate environment of people from disadvantaged groups (involvement of grandchildren, husbands, parents of people with disabilities, etc) that their loved ones have developmental potential and can be/are valued employees.

- **A change of mentality is required** not only among people from excluded groups and their immediate environment but also among **employers and government and local government employees**, even at the village level. Officials should be willing to help and support, and employers should recognise the additional benefits of improving digital competence and employing excluded people.
- **It is necessary to build trust in technology** through advertising campaigns targeting disadvantaged groups and building a positive image of technology.
- Building a positive image of technology can start with small initiatives, such as the opportunity to participate in a local referendum, which is publicised on social media and activates older people to take action that makes a real difference to the quality of life in the community.

Professional activation

- **The creation of a mechanism for systemic solutions to support the employment of older people** is postulated. Poland lacks such solutions as, for example, in Norway, where special start-ups for seniors are created, facilitating the continuation of professional activity of older people with higher education. This makes use of the competencies of older people, offering them the chance of a 'second career', for example an accountant whose hobby was gardening starts working as a gardener. The knowledge and experience of well-educated seniors are also being utilised by creating elite clubs of retired experts. As the problem of an ageing society deepens, these types of solutions should also be implemented in Poland.
- Poland **lacks a system for crowdsourcing IT services** that could be performed by people from disadvantaged groups. Employers should develop tools and typologies of tasks (usually very simple) that can be performed remotely and that can create added value for larger IT projects.
- As part of the activation, it is also worth creating special **applications for self-realisation and developing hobbies** (for example, in Leszno, during handicraft workshops, senior citizens use the internet to seek inspiration for designs of objects they create). The possibilities of technology should be shown to disadvantaged groups to convince them of the digital world.
- Due to the concerns of many disadvantaged groups about their ability to cope with work duties (for example due to health reasons), it could also be interesting to **organise short-term internships or open days** by potential employers to 'break down barriers' or 'get to know' the workplace. This would allow the needs of both groups, ie employers and potential employees, to be recognised.

- It is worth thinking about **creating a gradation of digital competences for people with disabilities** in cooperation with experts, **as is the** case with typologies of digital competences in general. Employers could create **certificates for the competences of people with disabilities based on** specifically defined evaluations. These certificates would give employers the opportunity to assign possible *crowdsourcing* tasks more quickly and to activate people with disabilities in digital projects adapted to the physical and intellectual capabilities of people with disabilities.
- Women, older people, and people with disabilities also expect above all **flexible working hours** adapted to their state of health, cognitive abilities, and family situation. Remote work offered should be based on task-based rather than hourly billing for the work commissioned .

Organisation of training

- **The nature of the training** offered (online vs. face-to-face) **should consider the level of development of the region**. Stationary training is proposed where old computers and poor connections are still available.
- The way in which training is delivered and the methods used should **consider the diverse needs of participants** and should not be based on academic/school-based delivery of content. For example, there is a need for professional broad-based didactics for senior citizens or people living in rural areas in Poland.
- The most effective training is provided **in small groups of 6-8 people** on equipment with up-to-date software with parameters adapted to the needs of older people or people with disabilities.
- It is suggested to implement **training based on fun, competition, satisfying people's natural curiosity, socialising/integrating local communities.**
- In disadvantaged groups, training should be **stretched over a long period of time because of the** capacity of inactive people to absorb knowledge. People from disadvantaged groups need small steps, the support of the environment and close friends to motivate them to go further.
- The older / or burdened by low self-esteem / bad experiences from the past, the **more patience is required to develop new** digital **competence**.
- For some people, training can be a form of therapy, a boost of confidence in their own suitability for the labour market. Psychological problems of people from disadvantaged groups require, in the framework of improving their digital competence, simultaneous **work in motivation and raising self-esteem**.
- In the case of seniors, **motivation through milestones** (badges), for example, "being able to send an email yourself", "doing an online transfer", etc., is a

good solution. Digital competence should be "measured" by grouping them into competence bundles or specific levels.

- More attention should be paid to **using seniors with high IT skills to train other seniors**. At present, such training courses are dominated by young people who, in the general opinion of seniors, "lack patience" and do not understand that some activities need to be repeated many times before a senior can master a skill. Younger trainers treat training for seniors as a set of modules: after presenting one module, they move on to the next one, instead of starting new material with a reminder of the previous topic. As the population ages, IT professionals will increasingly start to appear among retirees, who are the ideal material for senior trainers. Employing retired IT professionals as coaches could significantly increase the effectiveness of training for seniors.
- Effective assistance in developing the digital competence of people from excluded groups and improving their situation in the labour market requires at the same time the **development of the competencies and skills of NGO staff** (in therapy management, psychology, etc).
- Employees who are retraining and thus changing jobs should be offered **the same support as new employees:** including onboarding, and regular meetings with line managers. This is particularly important when working remotely.
- The perception of NGOs as safe zones translates not only into the suggestion of slow, evolutionary change but also the **expectation of individually tailored solutions. There is a** call for development support or the appointment of assistants/mentors who, after the end of the training cycle/support period resulting from the duration of some project, remain available to the people they are helping to activate.
- There is also a call for **greater involvement of people from the environment of a** specific devalued group, such as grandchildren in the case of people in the 50+ group or people who work with people with disabilities, to provide organisational support for training in support centres.
- **School-student volunteering** could also be effective in helping people with disabilities or the elderly to become familiar with new technologies.
- **Social media** also readily used by disadvantaged groups (for example, Facebook, Instagram) should be used to disseminate information about different training and support methods. MOPS and other public institutions supporting disadvantaged groups can also distribute information about the need for skills transformation, but also about the advantages of working with new technologies.

Concluding remarks

The disadvantaged groups are internally differentiated, although certain characteristics may overlap here. On the one hand, it is difficult to speak of similar conditions for young women compared to older women or women with different legal or biological disabilities. On the other hand, a given person may be excluded from the labour market due to qualifying into several disadvantaged groups (for example, a woman aged 50+ with a specific level of disability living in areas distant from large urban centres). Therefore, in supporting equalisation of opportunities and building an inclusive labour market, policy-makers, employers and civil society organisations must work together to create specific, targeted - depending on the individual situation of the recipient - interventions and impact mechanisms, but while ensuring that:

- A prerequisite for technological change in Poland is the development of an efficient ICT infrastructure for all areas, including the expansion and coordinated management of the existing infrastructure, also in centres distant from large cities.
- To build trust in technology among disadvantaged groups, it is necessary to create a consistent media message about the benefits of using digital technologies. It is also important to build trust in technology, especially among disadvantaged groups. The information media and local public administration institutions should play a key role in this process.
- The literature on the subject, as well as the research carried out (as part of this report), indicates that building human capital requires continuous education and training of the public. However, education should not only be about digital skills. As artificial intelligence, for example, performs more and more tasks, cognitive skills - social-emotional - and human qualities such as empathy, intuition, and creativity will continue to be important. Many studies indicate that creativity takes time. Artificial intelligence creates and delivers content at an express pace, but it also limits creativity. Therefore, critical thinking skills are particularly important in collaboration with machines. Social-emotional skills need to be developed and strengthened, social capital based on trust needs to be built and society needs to be trained in critical thinking.
- The construction of a modern digital society should be based on an increasing share of remote working in total employment. However, the spread of remote working based on trust and task-based accountability requires a change in employers' approach to managerial roles. It should be borne in mind that flexible working hours and self-organisation of work are crucial for people from disadvantaged groups.

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