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HUMAN CAPITAL FOR THE GREEN ECONOMY

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ABSTRACT: This study aims to assess the market availability of human capital for the needs of the green economy under the conditions of the changing labour market in Poland. It is a theoretical and analytical study based on desk research and critical analysis of available factual information. Based on an analysis of quantitative data describing the age structure and education of Poles from the perspective of three consecutive decades, a growing labour supply deficit was found. It also points to a possible shortage of competencies needed to green the economy. It was emphasised that, in view of the low effectiveness of the state's prevention policy aimed at preventing the growing demographic crisis, it would be necessary to supplement the shortage of workers from external resources, that is, labour migration. However, this may also be difficult because the labour markets in other European countries become increasingly competitive. Recommended solutions to foster labour market sustainability for the green economy may be to delay the exit of employees from the labour market, boost female economic activity, and make the education system more efficient.

KEYWORDS: labour market, green jobs, human capital, knowledge, sustainable development

Introduction

The last three decades have witnessed a considerable increase in the number of economic terms prefixed or mixed with “green”. Almost everywhere in social sciences, numerous papers have started to use terms such as green economy (Ryszawska, 2013; Sidorczuk-Pietraszko, 2020), greening (Adamowicz, 2021), green intellectual capital (Chang & Chen, 2012; Delgado-Verde et al., 2014; Yong et al., 2019), green labour market (Kulawczuk, 2014; Kassenberg & Śniegocki, 2014), and even green revolution (Sulich & Rutkowska, 2021; Huan et al., 2022; Caglar & Askin, 2023), although it no longer has anything to do with the 1960s UN and FAO programs aimed at eradicating famine through agricultural development around the globe.

Initially, “green” was used to describe the economy by referring to natural biological processes and primary plant production. However, over time, economists and politicians started using it to depict a farming and management method that relies as much as possible on biological processes in producing goods and services used in production processes and in addressing consumption needs (Adamowicz, 2021). Today, “green” is a reference to global transformation and, more precisely, to economic restructuring efforts that have been taken to attain economic, social, and environmental equilibrium. Indirectly, it also means the need to find a new balance between the market and the state, between an individual and the community, and between humans and the environment (Ryszawska, 2013). Well-informed, responsible human capital – actively involved in measures taken to make development a multidimensional sustainable process and to preserve the planet as a place where future generations can live and farm – is an intrinsic component of the restructuring.

Despite the importance of this issue, relatively little space has been devoted to it in literature. This observation was confirmed by bibliographic analysis carried out using the program VOSviewer (Visualizing Scientific Landscapes), version 1.6.1. Among other things, it was possible to conduct cluster analysis in accordance with the method developed by Zhu et al. (2009) (compare: Ejdyś, 2016; Siemieniako et al., 2018).

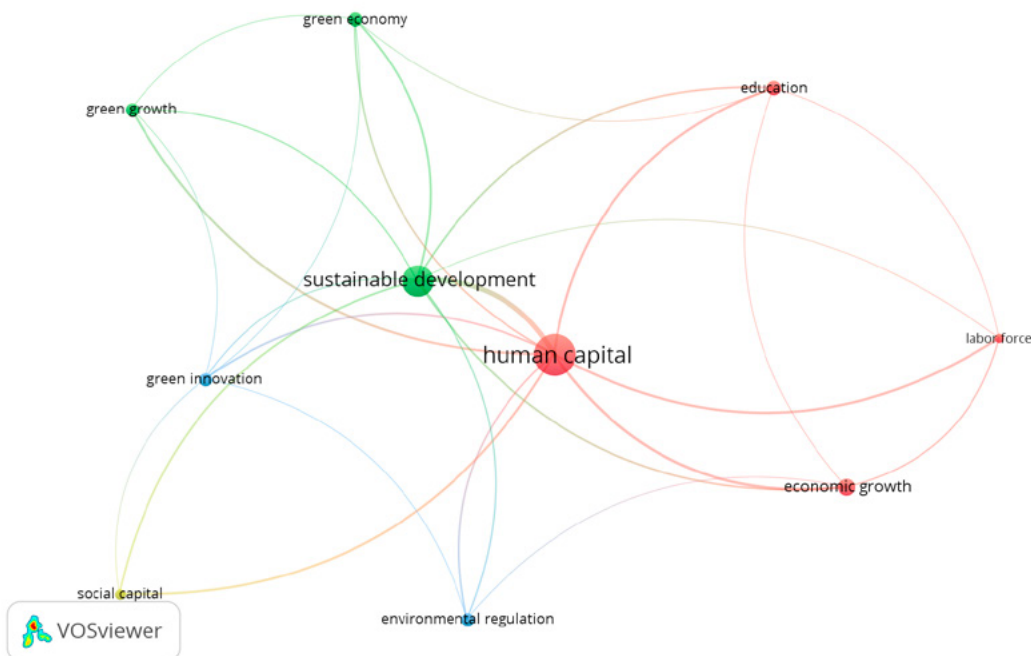


Figure 1. Map of co-occurrence of keywords characterising publications related to the area of human capital for the green economy

Source: author's work based on VOSviewer program.

The analysis was based on articles indexed in the Web of Science database over a 12-year period from 2012 to 2023. The database was searched using such phrases as “green economy”, “human capital”, “green jobs”, “labour market”, and “sustainable development”, among others, and related phrases included in the titles, abstracts and keywords of articles. The preliminary analysis indicated that the number of publications in the green economy field grew dynamically during the period under review, exceeding 30,900 in 2023. At the same time, in this area, only 312 studies were devoted to issues related to human capital (of which 32 were among the most cited and only 4 were included in the so-called “hot citation” list). Most studies have focused on issues of social, economic, and technical infrastructure as the basis for the development of a green economy, only indirectly referring to the role of human capital in its creation and development.

The analysis of the co-occurrence of words made it possible to identify four research clusters on the topic of human capital (for) in the green economy (Figure 1). The clusters were (1) economic growth, education, human capital, and labour force, (2) green economy, green growth, sustainable development, (3) environmental regulation, green innovation, and (4) social capital. Among the identified groups, the first and some aspects of the fourth group were the author’s main focus. A bibliometric analysis of foreign and domestic scientific output in the area of human capital in the green economy clearly indicates the existing cognitive gap in this area. The presented study aims, among other things, to reduce this gap.

Therefore, the considerations presented in this paper focus on assessing the availability of human capital in Poland in the context of the labour market’s development needs for a green economy.

This study sought to answer the following questions:

- Is the Polish labour market conducive to the development of the green economy today, and will it be in the next three decades?
- What opportunities and barriers to the Polish labour market determine the growth rate of the green economy?

The study consists of an introduction, a methodological part, and subsections describing successively the issues of the green economy, green jobs, human capital of the green economy, and the human capital of the green economy, as well as conclusions and research limitations.

Research methods

This is a theoretical and analytical study based on a literature review and factual materials related to the green labour market. It used a two-step analytical procedure: first, it presented the main concepts of the green economic model based on desk research; then, on the basis of the situation in the labour market in Poland, the availability of human capital for its development was analysed. In addition, attention was paid to the ability to activate and tap into the unused labour potential of the Polish population grouped by age.

The base material included scientific literature presenting the theoretical and model assumptions behind the green economy and studies and the elaborations recognised as sources of high credibility, including institutions such as the Polish Agency for Enterprise Development (PARP), the Central Statistical Office (GUS), the Research Institute on Democracy and Private Enterprise, and works of other institutional and individual researchers, as well as European Commission materials. The factual materials, together with the author’s experience, provided grounds for performing the inference procedure and formulating recommendations.

Green economy: development and structure

Although a green economy has become a reality in many countries, scientific efforts aimed at providing a unified description of it are still ongoing (Dokurno et al., 2016). The literature on the subject includes a number of different definitions, all of which share respect for nature and take into account the environmental costs of economic activity (Ryszawska, 2013). These terms can be found in the 2011 definition (“Green Economy Report”) provided by the United Nations Environmental Program (UNEP), which views a green economy as “one that results in improved human well-being

and social equity, while significantly reducing environmental risks and ecological scarcities”, and in the description published in 2012 by the European Environmental Agency (EEA), according to which it means one whose environmental, economic, and social policies and innovations support societies in making efficient use of resources and improving human well-being while emphasising social integration and the protection of natural systems that underpin all life on Earth (Sulich & Rutkowska, 2021). A broader review of how the green economy is defined was carried out by authors such as Burchard-Dziubińska (2014), Szyja (2015), Pichlak (2017), and Sulich and Rutkowska (2021). Note that society viewed both as the recipient of outcomes and as the trigger of the proposed transformation remains the framework for all these definitions.

The analysis of how the green economy and its related terms are described reveals one more pattern: its implementation requires the involvement of government bodies, businesses (which rely on natural raw materials and other resources in their activities), and individuals. From this perspective, the green economy is of key importance to considerations of related human aspects (employees and employers) and, indirectly, on society as a whole. This is consistent with the commitment to seek sustainable improvements in the quality of life for present and future generations by ensuring rational proportions between different kinds of (economic, human, and natural) capital (Czudec et al., 2018).

In practice, shifting to a green economy (also referred to as greening) involves individuals (which can be reflected in measures such as separate collection of waste or recovery of rainwater), businesses (implementing technologies that reduce adverse environmental impacts), and the state (formulating legal, administrative, and financial regulations). At the macro level, it also means a spectacular transformation of successive sectors of the economy that entails inevitable changes to the labour market, primarily including the emergence of what is referred to as green jobs. According to the broadest definition, they are the consequence of environmentally oriented changes made by economic operators to reduce their local environmental footprints (Kozar, 2019, 2022).

Green jobs

Initially, “green” jobs were directly related to the agricultural, mining and energy sectors. However, the term evolved over time to include intermediate sectors that are important to sustainable economic and social development and to create jobs that help protect ecosystems and biodiversity, reduce energy, materials, and water consumption through high-efficiency strategies, decarbonise the economy, and minimise or completely avoid the generation of any kind of waste and pollution (UNEP, 2008). According to the International Trade Union Confederation (ITUC), green jobs reduce the environmental impacts of enterprises and economic sectors while ensuring decent working and living conditions for all people involved in the production process and ensuring that employees’ rights are respected (2023). More synthetic wording is provided in the vocabulary of the International Labor Organization (ILO), which indicates that green jobs include direct employment that reduces environmental impacts to sustainable levels. Hence, all jobs contribute to reducing energy and resource consumption, decarbonising the economy, protecting and restoring ecosystems and biodiversity, and minimising the generation of waste and pollution. Accordingly, a “green” job is any new job in a given sector that reduces its environmental footprint to a below-average level and contributes even slightly to improvements in overall efficiency. A detailed review of green job definitions was performed by Sulich and Rutkowska (2021).

Despite a broad theoretical description, a quantitative analysis of green jobs is significantly impeded by the lack of public statistical data that can be used to describe them. Nevertheless, attempts have been made to identify such data, as illustrated by the Eurostat methodology for Environmental Goods and Services. While it does not define green jobs, it measures employment in the Environmental Goods and Services Sector (EGSS), a heterogeneous group of producers of technology, goods, and services that prevent and minimize pollution or reduce the consumption of natural resources (Kozar, 2022). In Poland, research related to estimating the number of green jobs at the local and regional levels usually relies on the Polish Classification of Economic Activity (PKD 2007), and makes a distinction between sections directly related to the green sector and those loosely coupled to the environment (Brodziński et al., 2017). In this approach, green jobs are identified in virtually every section

of PKD which has any kind of impact on the natural environment rather than—as assumed earlier—only in the ten key economic sectors, i.e. agriculture, construction, energy, fisheries, forestry, energy-efficient industries, tourism, transport, waste management and water management (Śledź, 2012).

The creation of green jobs is not only a technological challenge (each new product, service or technology may evolve into a more efficient equivalent in terms of emissions or material or energy consumption, etc.) (Grudziński & Sulich, 2018) but also a social one (staff training, raising social awareness, etc.). This implies the need to invest in both the production sectors of the green economy and human capital development. While technological development is largely determined by economic factors, it is much more difficult to identify and modify the determinants of human capital development (habits, customs, the way work is perceived, and the place it has in human life, for example, Generation Z, which is already present in the labor market).

Human capital of the green economy

On the one hand, becoming part of the labour market is the expression of how human capital evolves; on the other, it is a checkpoint for workforce quality built upon knowledge, experience, or social and technical skills (Kozera, 2011; Kacprzak & Król, 2015; Dziwulski, 2018). Many of these characteristics are difficult to verify empirically based on public statistics, even at the macroeconomic level. Those that can be estimated and then used in building forecasts include age and education, although the statistics do not distinguish between acquired profession (resulting from one's education) and actual profession (practised because of having no other option upon completing an apprenticeship, etc.).

Demographic processes play a key role in determining the level and structure of human resources, and demographic processes play a key role. In Poland, the forecasted demographic change by age group (based on Eurostat data) gives rise to major doubts as to whether the future needs of the labour market can be met. The projection for 2050 clearly shows that the market will be affected by adverse demographic shifts. Although heavily distorted by errors resulting from a distant time perspective and rapidly changing geopolitical and socioeconomic factors, these forecasts do not engender optimism. In the next three decades, Poland will witness a negative balance of people entering and exiting the labour market (Chrostowski, 2023; Kałuża-Kopias, 2016). The intensity of this process varies over time and between regions. According to estimations, approximately one million employees will exit the labour market by the end of 2030. In the next decade (2030–39), it will be 700,000, and as much as 2.2 million in 2040–49 (European Commission, 2021; Chrostowski, 2023). Also, the Polish population will reduce by 4.4 million by 2050 (GUS, 2022). These processes will take place in a broader context of changes in the European labour market, especially with regard to population ageing. What should give rise to concern is that these phenomena are much more intense in Poland (a sharp reduction in fertility in the second half of the twentieth century and the perpetuation of that trend). Moreover, the latest European fertility data clearly show the strength of the impact of the geopolitical situation (especially the COVID-19 pandemic and the war resulting from the Russian invasion of Ukraine) on changes to forecasts (even when done on a short-term basis), and successive ESSPOP 2015 and UROPOP 2019 forecasts reported considerable changes in key indicators, that is, fertility, life expectancy, and net migration rates. Only one of them (life expectancy) increased, whereas the other two declined (European Commission, 2021).

If Poland continues to follow the forecasted demographic trends, it may expect a significant slowdown in economic growth, including greening the economy. The national authorities' attempts to impact the labour market with a fertility policy fail to deliver the expected outcomes, as illustrated by the example of the government's 500+ program, which shows that despite relatively high-cost levels, its actual effects are weaker than those of birth rate-boosting interventions in other countries (Brzęczek, 2019; Bartnicki & Alimowski, 2022). In this regard, it is essential to put in place a much broader, active, long-term demographic policy for the labour market to remain in equilibrium. Because of biological conditions, the market would experience the potential positive effects of such a policy in two or three decades when new employees born in 2020–2025 enter it (Chrostowski, 2023).

The shortage of employees in the Polish labour market has been noticeable since the early 2010s and can be exacerbated by the exclusion of women (making them less economically active, even if on

a temporary basis), the potential mothers of the future workforce. Generation replacement and family models are separate problems (Guja, 2016; Kotowska, 2019; Pelc, 2017). Generally, the fertility policy, however good or bad it may be, provides delayed effects and cannot be viewed as the sole instrument for preventing a shortage of staff in the Polish labour market, both today and in the future.

One of the quality aspects of the market's human capital resources is the age structure, in which the prime age (25–44) is believed to be the period of peak professional activity and the period in which people reap profits from their earlier investments in human capital (Saczuk, 2020). The analysis of changes in the structure of the working-age population between 2015 and 2050 suggests that while they accounted for nearly half (49%) of labour resources in the early 2010s, that share will decline over successive decades, reaching 43% in 2030, 40% in 2040, and 44% in 2050. In addition, the number of people aged over 45 years (referred to as the non-mobile age¹) will grow by 2040 (Figure 2).

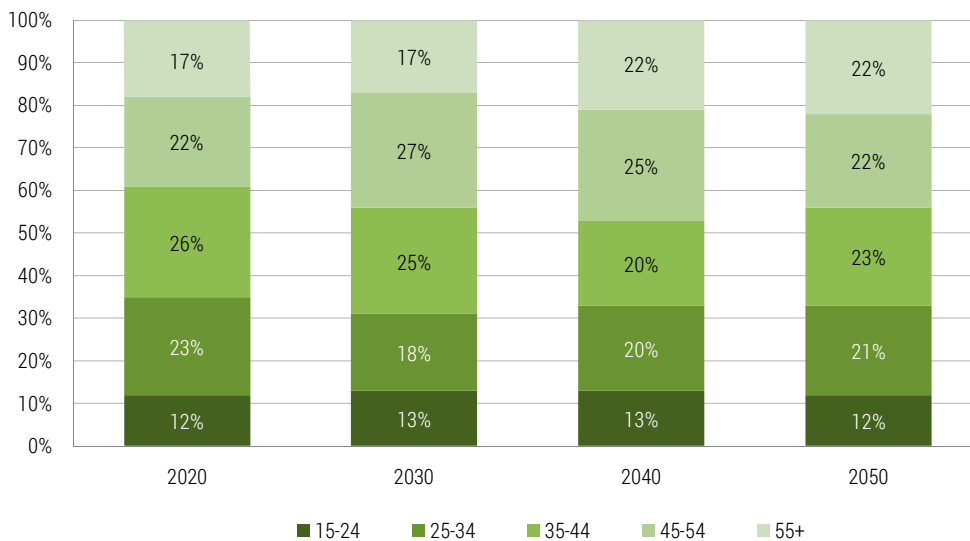


Figure 2. Working-age population structure

Source: author's work based on Chrostowski (2023).

Demographic forecasts give little cause for optimism and are a good reason to search for alternative solutions to ensure an adequate supply of labour. In Poland, these include the policy for extending the period of economic activity of the working-age and post-working-age population; however, little use has been made of it. It is about regulating the labour market in a way that makes employment more attractive to people outside the prime-age group, especially women (who discontinue their economic activity to carry the burden of insufficient institutional care), youth (who struggle to maintain the balance between learning and working), and the disabled (who face a chronic shortage of adapted jobs) (Sobczak, 2023). Pre-retirement employees are another group whose potential is yet to be tapped into; having no additional incentive to continue working, they leave their jobs and often turn to pre-retirement aid programs (this is especially in a turbulent economic and political environment where they fear they might lose their jobs in general). The extended employment of this group is associated with numerous stereotypes that are less productive (Mockało, 2015; Białożył, 2014), slower learners (including new technologies in their working environment), or committed to caring for and raising their grandchildren (Kołążyk, 2020).

This means that the potential resources of the Polish labour market are not fully used. This becomes particularly evident when looking at the summary of changes in the foreseen age structure over successive decades between 2020 and 2050 (Figure 3).

¹ Working-age population who are no longer willing to change their employer, extend their skills or change their career path to access new jobs. The non-mobile age interval is usually defined as 45–59 for women and 45–64 for men. Cf. Central Statistical Office.

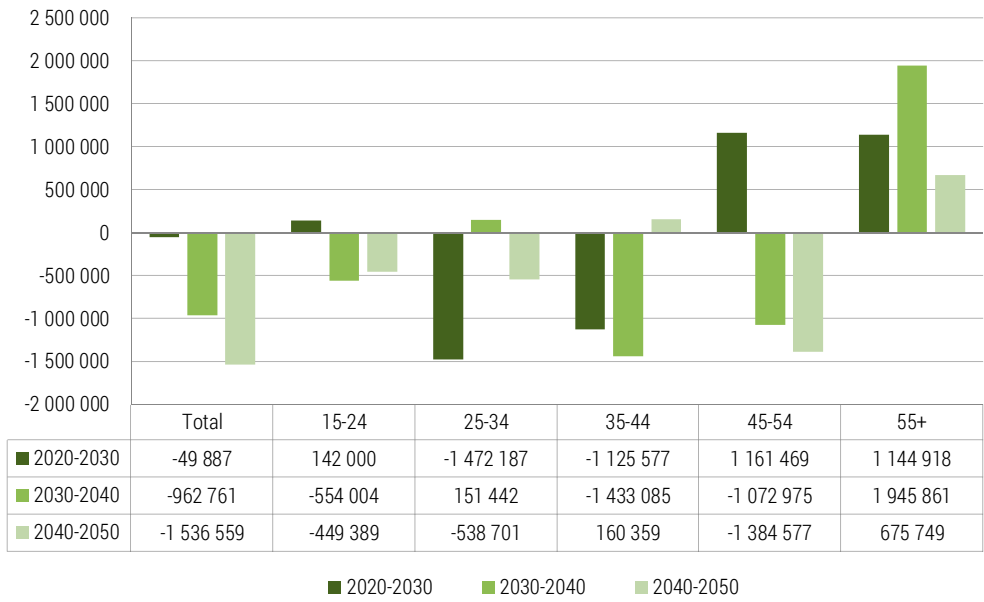


Figure 3. Foreseen changes in the Polish population between 2020 and 2050, grouped by age

Source: author’s work based on Chrostowski (2023).

Another factor that impacts the supply side in the labour market is migration, both from and to Poland (employees moving from other countries, including Ukraine). The Central Statistical Office estimates that, in 2020, ca. 2.2 million permanent Polish residents lived abroad on a temporary basis (GUS, 2021), and a significant portion of them entered international labour markets. In the last two years, the shortage has been partly offset by the inflow of Ukrainian workers forced by the war to seek employment abroad.

Experts of the QUANT TANK Institute of Expert Debate and Analysis and of the Friendly State Foundation believe that in the next decade (i.e., by 2030), the net employment of migrants should be between 120,000 and 150,000 (Supernak, 2022) and is expected to increase to 200,000 later on. This results from several aspects, including macroeconomic conditions. In most European countries, the deficit of the workforce will become increasingly pronounced as a consequence of the European population ageing process. For the same reason, there is increased competition for economic migrants. The situation will probably become even more complicated because of the temporary nature of migration from Ukraine (the main migration stream desired in Europe). Indeed, after the war ends, many Ukrainians employed in Europe will return to their home country. Although this shortage could probably be offset by Asian and African migrants, they would face important barriers posed by integration aspects, the lack of a comprehensive employment policy, and growing nationalist sentiments – not only in Poland but also in many European countries.

Another issue is how to align the level of knowledge and skills (of both domestic and migrant employees) with the ever-increasing complexity of management processes. This situation has given rise to new challenges faced by the adult education system and requires employees to embrace a life-long learning approach. Otherwise, misalignment between competencies and market needs may worsen the deficit.

Automation is one way to bridge the supply gap in the market. Indeed, it has strong potential, especially with regard to replacing simple, repeatable human work. However, more complex work that requires knowledge, intuition, and creativity continues to be problematic. Even with the relatively rapid progress in automation and robotisation, there is a limited capacity to replace humans in that area. Additionally, humans and their knowledge are required to create and handle machinery and robots.

The changes in the population’s age structure translate into their education levels and propensity to embark on formal and informal educational paths. By 2050, the enrolment rate for tertiary education is expected to increase from 23% to 40% in the group aged over 25 years. Meanwhile, the share

of people with a basic vocational (or lower) education will decline, whereas that of people with a secondary education (whether general or vocational) will remain unchanged (Lis & Baran, 2013). Competencies derived from formal education will also change. Fewer people will have technical and agricultural skills (a decline from 35% in 2012 to 27% in 2050 in the 25+ age group). This will not always be consistent with the actual demand from the labour market, even though the education structure evolves under pressure from economic restructuring, including greening. This is reflected in the growing share of people enrolled in service-related IT and social science (including economics and finance) programs. Some examples of changes in the demand for employees with specific skills are presented in “Forecasted changes in the labour market triggered by the energy transformation”, a paper by Lewiatan Confederation (2021). This suggests that the decline in demand for certain employees will result in many exiting the labour market. This, in turn, aggravates the deficit not only in its qualitative dimension but also in quantitative terms.

Conclusion and recommendations

From the point of view of both the economy as a whole and dynamic greening at the desired rate, the situation in the domestic labour market in successive decades from the 2050 perspective, as depicted in this study, does not engender optimism. The shortage of labour will affect all sectors, which are traditionally part of the economy, that is, renewable energies, environmental protection, and sustainable development, as well as agriculture and construction. This will be compounded by changes in demand for specific competencies, which, in the context of shortages, makes it significantly more complicated to access staff with the desired qualifications.

Hence, when considering the development of the green economy, its highly specific social conditions must be considered, defined not only as acceptance of changes but also as the capacity to ensure the supply of labour for the green economy.

This paper attempted to demonstrate that the development of the green economy is largely determined by the demographic situation, especially including the age structure and its related education aspects. In view of the symptoms of a demographic crisis, the following are the recommended measures that should be taken to drive the continued development of the green economy:

- creating conditions that delay retirement-aged people’s exit from the labour market,
- supporting female economic activity, including by taking over their care responsibilities (over children, the elderly or disabled, etc.),
- introducing flexible working systems as part of the labour market policy that promotes fertility,
- establishing formal and legal mechanisms that make it easier to have a “second job” for those who want to have it (students, pensioners),
- increasing the mobility of the education system with a view to aligning the qualifications with what the green labour market needs.
- The analysis of the materials collected also allows to outline of some conclusions regarding the opportunities for and basic barriers to the development of the green economy in the context of the present and future situation of the Polish labour market, i.e.:
- qualitative and quantitative deficiencies resulting from population ageing (due to adverse demographic processes) will certainly pose a barrier to development,
- the following will provide development opportunities for the green economy: tapping into unused domestic labor resources; accessing external workforce; designing a consistent and efficient system to onboard foreign employees; improving the efficiency of the education system for children, youth and adults.

It should be noted that the bibliometric research carried out is of a preliminary, exploratory nature. Full identification of research areas within which the role of human capital in the development of the green economy is analysed requires further analyses taking into account other databases of scientific publications, such as: SCOPUS, Science, Elsevier, Emerald and EBSCO (currently, this is a limiting factor). Nevertheless, the results obtained allow us to conclude that there is a significant research gap in the area studied, which this study aims to reduce.

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KAPITAŁ LUDZKI DLA ZIELONEJ GOSPODARKI

STRESZCZENIE: Celem artykułu jest ocena rynkowej dostępności kapitału ludzkiego na potrzeb zielonej gospodarki w warunkach zmieniającego się rynku pracy w Polsce. Opracowanie ma charakter teoretyczno-analityczny. Zostało przygotowane z wykorzystaniem metody deskresearch oraz analizy krytycznej dostępnych informacji o charakterze faktualnym. Na podstawie danych ilościowych opisujących strukturę wieku oraz wykształcenie Polaków w perspektywie trzech kolejnych dekad stwierdzono rosnący deficyt podaży pracy. Wskazano także na możliwy niedobór kompetencji niezbędnych dla zazielenienia gospodarki. Pokreślono, że wobec niskiej skuteczności polityki państwa w zakresie zapobiegania narastającemu kryzysowi demograficznemu koniecznym będzie uzupełnienie niedoboru pracowników z zasobów zewnętrznych tj. migracją zarobkową. Może to jednak być również utrudnione w związku z rosnącą konkurencyjnością rynków pracy innych państw Europy. Rekomendowanymi rozwiązaniami sprzyjającymi zrównoważeniu rynku pracy dla zielonej gospodarki może być opóźnienie wyjścia pracowników z rynku pracy, zwiększenia aktywności zawodowej kobiet oraz poprawa skuteczności systemu edukacyjnego.

SŁOWA KLUCZOWE: rynek pracy, zielone miejsca pracy, kapitał ludzki, wiedza, rozwój zrównoważony