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Assessment of the Relationship between Labour Force Ageing and the Labour Market in Lithuania in the Context of its Demographic Development

Laima Okunevičiūtė Neverauskienė
Lithuanian Centre for Social Sciences, Lithuania
E-mail: laima.okuneviciute@dsti.lt
https://orcid.org/0000-0002-7969-3254
https://ror.org/02e16g411

Arūnas Pocius
Lithuanian Centre for Social Sciences, Lithuania
E-mail: arunas.pocius@dsti.lt
https://orcid.org/0000-0002-4045-511X
https://ror.org/02e16g411

Emilija Webster
Lithuanian Centre for Social Sciences, Lithuania
Vilnius Gediminas Technical University, Lithuania
E-mail: emilija.webster@outlook.com
https://orcid.org/0009-0007-3068-0675
https://ror.org/02e16g411
https://ror.org/02x3e4q36

Abstract. This study seeks to assess the relationship between population ageing in Lithuania and developments in the labour market. In analysing labour-resource dynamics and ageing-related demographic trends, the article prioritises an evaluation of the absolute and relative changes in the number of individuals of working age and older persons. To characterise the issue in greater depth, the publication also employs additional indicators associated with population (labour-force) ageing, including the demographic old-age coefficient and the median age. The link between population ageing and labour-market outcomes is further reflected through specific statistical indicators used in the analysis, such as the average age of employed persons and the average age of those exiting employment, derived from the Labour Force Survey data. A further priority of the study is to assess differences in labour-market integration opportunities for more vulnerable target groups in Lithuania, namely, for older people and for young people. By using correlation-regression analysis, the publication also examines the relationship between economic development (GDP) and labour-market conditions across the EU countries, while focusing on two demographically contrasting age groups: youth and older persons. Accordingly, the analysis does not rely solely on national statistics but, additionally, incorporates Eurostat data and comparative data from other Baltic States.

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Keywords: unemployment, employment, labour force, resilience in the labour market, population ageing, demographic change.

JEL Classification: J11, J21, J26, E24, O47.

Darbo išteklių senėjimo ryšio su darbo rinka įvertinimas Lietuvoje jos demografinės raidos kontekste

Autorių atliktame tyrime siekiama įvertinti Lietuvos gyventojų senėjimo ryšį su darbo rinka.

Analizuojant darbo išteklų ir su gyventojų senėjimu susijusias tendencijas, prioritetas šiame straipsnyje teikiamas bendrųjų darbingo ir pagyvenusių (senų žmonių) skaičiaus absoliutinių ir santykinių gyventojų skaičiaus rodiklių raidai vertinti. Publikacijoje plačiau naudojami autorių nagrinėjamą problematiką detaliau apibūdinantys ir kiti su gyventojų (darbo išteklių) senėjimu susiję rodikliai: demografinės senatvės koeficientas ir medianinis amžiaus. Gyventojų senėjimo ryšį su darbo rinka rodo tokie statistiniam tyrimui naudoti specifiniai rodikliai, kaip antai vidutinis užimtųjų ir išėjusių iš užimtumo (darbo rinkos) asmenų amžius, kurie nustatomi remiantis darbo jėgos tyrimų duomenimis. Kitas svarbus tyrimo prioritetas – įvertinti labiau pažeidžiamų tikslinių grupių (pagyvenusių žmonių ir jaunimo) integracijos į darbo rinką galimybių skirtumus Lietuvoje. Naudojant koreliacinės ir regresinės analizės metodą, publikacijoje taip pat skiriama daug dėmesio ryšiui tarp ekonominės raidos (BVP) ir situacijos darbo rinkoje skirtumams nustatyti ES šalyse demografiniu požiūriu itin kontrastingose jaunimo bei pagyvenusių žmonių amžiaus grupėse. Todėl publikacijoje neapsiribojama nacionalinės statistikos duomenimis, o taikomi ir „Eurostat“ bei kitų Baltijos šalių duomenys.

Raktiniai žodžiai: nedarbas, užimtumas, darbo jėga, atsparumas darbo rinkoje, visuomenės senėjimas, demografiniai pokyčiai.

Introduction

Population ageing is a major demographic challenge across Europe, affecting labour markets and economic growth. In Lithuania, low fertility, coupled with a longer life expectancy, and migration are adding pressure on employment and productivity. This study aims to assess the ageing of the labour force in Lithuania in the context of the country's labour market development.

The aim of the study is to assess the relationship between labourforce ageing and the labour market in Lithuania, viewed in the context of its demographic development. The study's focus and its underlying problem are linked to the evolving integration opportunities of the population groups identified in the analysis, examined through labourmarket indicators. The research objectives involve (1) evaluation of changes in the Lithuanian labour market in the context of demographic developments; the research also undertakes to (2) review the evolution of integration opportunities for more vulnerable groups (older persons and young people), to (3) examine the relationship between population ageing in Lithuania and the labour market, and to (4) determine the link between the situation of demographic groups (youth and older people) in the labour market and economic development (measured by GDP indicators). This publication explores the relationship between population ageing in Lithuania and the labour market. The degree of research into this issue, which is closely connected with the labour market dynamics, remains highly limited in Lithuania, as there are virtually no academic studies that would examine in detail how population ageing is linked to labour market changes. In the literature,

labour market indicators at the macro level are more commonly analysed separately from the influence of population ageing and other demographic factors. The relevance of examining the impact of population ageing on the labour market is therefore determined by the significant lack of comparative analyses in which demographic trends are at least partially connected with observable labour market changes. This is particularly true of specific indicators describing the labour market and demographic developments (population ageing), which undoubtedly have a relationship with ongoing labour market transformations. Insufficient attention in academic publications is also devoted to assessing the integration trends of more vulnerable demographic groups in the labour market.

Research methodology: the study employs comparative analysis; paired correlation–regression analysis; graphical data presentation (including the application of dual-indicator evaluation scales); demographic coefficients; relative and absolute labour market indicators; the index method; and a special index measuring the rate of ageing of the labour force (employed persons). The article is based on the results of the "*Employment challenges and resilience in the labor market: Social and individual resources and directions for their strengthening*" project (under Agreement No. S-MIP-24-27 with the Research Council of Lithuania).

1. Literature Review

Over the past several decades, scholarly literature has increasingly emphasised the impact of demographic change on labour markets and the wider economy. It is argued that demographic developments in the twenty-first century across many countries will be characterised by two principal processes: population ageing and population decline (Lisenkova et al., 2010; Serban, 2012; Cockett, 2024). According to Kühn et al. (2018), there are three principal ways in which population ageing may affect the economy: 1) a reduction in the labour force and a consequent slowdown in economic growth; 2) altered patterns of saving and consumption; and 3) increased pressure on public finances and social expenditure. Various studies have indicated that future demographic developments in many countries will increasingly be associated with population ageing and a population decline (Bloom et al., 2018; Serban, 2012; Lisenkova et al., 2010b; McKinsey Global Institute, 2016a; Belfiori & Macera, 2025; World Economic Forum, 2025; Okunevičiūtė Neverauskienė et al., 2025). Three principal demographic factors influencing population ageing are mortality, fertility, and migration (European Commission, 2015; Hoff, 2008; Serban & Aceleanu, 2015; Okunevičiūtė Neverauskienė et al., 2021; Park et al., 2022; Dörflinger & Loichinger, 2024). Demographic projections indicate that over a thirty-five-year period, the working-age population (15–64 years) in Lithuania could decline by approximately 45 per cent by 2050, while the share of those aged 65 and above is expected to constitute around one-third of the total population (Bouman, 2015). However, immigration inflows to Lithuania since 2019–2025 have measurably lifted the working-age population counts and eased immediate hiring constraints, thus moderating – but not reversing – the ageing pressure on the labour market and the dependency ratio (Husey-

nova & Huseynova, 2024; Boer, 2025). Recent cohorts are disproportionately of the prime working age, which raises participation and employment in the short run; yet, the effect decays unless inflows are sustained and retention is high, because cohorts age and outflows persist. At the EU level, immigration has mitigated labour shortages unevenly across regions and sectors; the aggregate ageing trend remains unless net migration is sufficiently large and continuous relative to low fertility (European Commission, 2013; Eatock, 2019). In Lithuania, the impact is thus cyclical and compositional – short-term relief, medium-term plateau, long-term dependence on the policy, and persistent inflows.

The impact of population ageing on the labour market should be examined through the lens of integration opportunities for the most contrasting demographic groups – young people and older adults. Scholarly literature asserts that the position of young people in the labour market is generally weaker than that of adults, as illustrated by employment indicators and, even more strikingly, by unemployment rates (Pastore, 2018a; Gruževskis & Pocius, 2022; Barry Fletcher, 2025; Okunevičiūtė Neverauskienė, Žalimienė, & Junevičienė, 2024a). The disadvantaged position of young people in the labour market is explained by their comparatively lower human capital relative to older cohorts, determined by factors such as professional competences, the duration of specific work experience, and the level of education (Pastore, 2018b; Okunevičiūtė Neverauskienė & Pocius, 2019; Okunevičiūtė Neverauskienė, Žalimienė, & Junevičienė, 2021; Brazienė & Vyšniauskienė, 2025). The principal challenges associated with the integration of older people into the labour market are identified as the health status, mismatches between professional competences and new working conditions, a slower work pace, reduced mobility opportunities, and related factors (Kalemli-Ozcan et al., 2012; Pollak & Sirven, 2012; Brusch & Büsch, 2013; Corsi & Lodovici, 2013; Bosch & ter Weel, 2013; Skučienė et al., 2025; Morgan et al., 2021; Malik, 2023) . As the workforce ages, national economies may face skills shortages, since older employees are generally less inclined to engage in training and thereby update their professional competences (OECD, 2025b; OECD, 2025a). The duration of unemployment among older individuals is considerably longer than that of younger people, as their integration into the labour market is more difficult. It is emphasised that a substantial proportion of older workers are unable to participate in employment due to their health-related problems (OECD, 2025b). Scholars argue that national statistics on the population decline and ageing conceal far more complex processes arising from significant regional differentiation across many countries (McCann, 2017; Nicolini & Roig, 2024). Research indicates that the average age of the population across different regions (cities) within a country can vary considerably, and this phenomenon may become particularly evident in nations with large populations (McKinsey Global Institute, 2016b). Even prior to the previous global crisis, Chawla et al. (2007) argued that demographic change could exert a direct influence on labour markets through the labour supply, productivity, and labour demand, particularly as a result of shifts in demand structures. Due to population ageing, the supply of older workers is increasing. Undoubtedly, demographic age structures exert a significant influence on the labour markets and productivity, as ageing reduces innovation and entrepreneurial activ-

ity, raises expenditure on the health care, pensions, and public investment essential for sustaining productivity, while simultaneously eroding tax revenues and constraining the fiscal capacity of states to support long-term economic growth.

2. Methodology

In analysing the labour market situation, this study makes extensive use of data from the Lithuanian State Data Agency (VDA). These data are compiled according to the methodology of labour force (employment) surveys, which is also applied for the comparison of different labour market indicators across the EU countries. The labour force survey methodology is based on the concept of the economically active population. According to this concept, the economically active population consists of the unemployed and the employed, while the labour force – which is used as the denominator for calculating the unemployment rate – is defined as the sum of these two components. The labourforce indicator is also used to determine the level of labourforce participation (hereafter, *participation*).

From a methodological perspective, the indicators applied in this publication with the objective to analyse labourforce ageing can be grouped into two main categories: labour-market indicators and demographic indicators. Let us first consider the labour market indicators. Upon summarising the characteristics of the data analysed in this group, it can be stated that, alongside the general labour market indicators defined by the labour force survey methodology, specific indicators were also employed. The general quantitative characteristics of the labour market in this case include activity, employment, and unemployment indicators. An example of the application of specific indicators is the average age of the employed and indicators of exit from the labour market (employment). The second group of indicators consists of demographic indicators. These include conventional measures of the population change, size, and structure, which are determined on the basis of the current population accounting data and refined by using census data. All such data in Lithuania are collected by the national State Data Agency. Unlike demographic indicators, the labour market indicators used in this publication are derived from the labour force survey data, by applying sociological survey methods. This method of statistical data collection differs fundamentally from the continuous statistical observation method used for demographic indicators. The labour market data are established on the basis of sample surveys, which cover only part of the population, although they are recalculated to represent the entire population of a given country (or a specific territory). By contrast, demographic data are collected to cover the entire population directly.

This publication adopts a non-standard approach to analysing the labour market situation, by attempting to compare the traditional demographic indicators with specific average-age indicators derived from labour force surveys. By introducing the assumption that the period between the average age of the employed and the average age of their exit from the labour market represents approximately half of the overall span of labour market participation for a given population – from the beginning to the end of

their working integration – it is possible to derive an indicator related to the approximate conditional duration of the labour market participation for a generation.

Depending on data availability, the specificity of the analysis, and the results obtained, the timeseries coverage varies across indicators. The naturalchange series for demographic indicators are somewhat shorter, illustrating the assessment of the observed trends primarily for the period following Lithuania's accession to the EU. However, changes in the population structure cover a longer timespan (2001–2024), particularly when linked to medianage indicators. Owing to pronounced fluctuations in the labourmarket indicators and the cyclical nature of their development, the longest period (1998–2024) is captured by Labour Force Survey data, which have been systematically published in Lithuania since 1998. It is worth noting that the demographic change in Lithuania proceeded more slowly prior to the EU accession, whereas unemployment and employment developments – shaped by socioeconomic factors and strong cyclical effects – were considerably more dynamic. Consequently, monitoring these indicators over a longer period expands the analytical field retrospectively, allowing for a fuller assessment of the impact of fluctuations during crisis episodes. However, the authors were not fully consistent, as the indicator on the average age of the employed by occupational group covers a considerably shorter period (2011–2024).

By applying the paired correlation–regression method to the EU country data, disaggregated by demographic groups (youth versus older people), certain regularities in the differences between the GDP volume and labour market indicators were revealed (Figures 14–15). The results can be linked to the influence of demographic factors (different target age groups) on the relationship between economic development and the labour market at the EU level. In assessing the differences between the labour market and economic development (GDP) indicators based on the EU distribution data, the results of correlation and regression analyses were visually combined. Regression analysis enables the elimination of a limitation inherent in the correlation method, which is restricted in determining the causal impact of the indicators under examination. On the other hand, correlation analysis makes it possible to identify the relationship between two related phenomena and its magnitude (strength), i.e., whether the relationship is strong, weak, or moderate. In this way, one method complements the other, thus allowing for a more objective picture of the interrelationship of the phenomena studied and even its dynamics over time. The calculations show that the annual relationship between the GDP and labour market indicators (employment and activity levels) is not random. From the dynamics of the values presented in this statistical study, it is evident that there are no sudden short-term random drastic fluctuations (outliers) that would significantly distort the nature of the observed changes (Figure 14).

3. Research Results

3.1. Fertility, Mortality, and Natural Change in Lithuania: Demographic Dynamics and Labour Market Implications

Fertility. Over the long term, with fertility declining, only occasional periods of stabilisation have been recorded. During the earlier period of economic growth, the number of births per 1,000 inhabitants temporarily rose, although only slightly (from 9.9 to 10.3 between 2010 and 2015). Between 2010 and 2014, on average, just over 30,000 children were born in the country each year, with the exception of 2009 – the peak of the global economic crisis – when the number of births fell below 30,000. However, the overall fertility rate declined sharply between 2016 and 2024, dropping from 10.3 to 6.5. Such a level of fertility is far from sufficient to ensure generational replacement that would be consistent with demographic equilibrium in Lithuania, as the relative indicator of natural increase remains negative in the long term.

Mortality and Natural Change. It should be emphasised that the relative overall mortality rate at the national level increased slightly between 2010 and 2013. In 2010, there were 13.6 deaths per 1,000 inhabitants, rising to 14 in 2013, before falling to 13.7 in 2014. The highest rate was recorded in 2015, at 14.4 deaths per 1,000 inhabitants. It should also be noted that, according to the *State Data Agency* (VDA) data, the absolute number of deaths in the country rose significantly up to 2007 (45.6 thousand) but subsequently declined quite markedly. As a result, the negative natural population increase decreased between 2007 and 2009, later stabilising at around minus 11 thousand. During the following decade (2009–2019), the total number of deaths fell considerably to 38.4 thousand. However, in 2020–2021, the figure rose again, reaching record levels in 2021 (47.7 thousand).

It can be stated that the relative mortality rate in Lithuania remained fairly stable during the past decade, although, between 2015 and 2019, it declined from 14.4 to 13.6 deaths per 1,000 inhabitants. The reduction in the overall mortality coefficient during this period was driven by an increase in life expectancy. However, this indicator does not fully reflect the true scale of changes in mortality, as its dynamics are significantly influenced by population ageing. In 2020, the crude mortality rate rose to 15.6 deaths per 1,000 inhabitants, whereas, in 2021, it reached 17. This sharp increase in 2020–2021 was primarily influenced by the COVID-19 pandemic, although the impact of population ageing on its dynamics cannot be excluded. The negative value of this indicator throughout the observed period, combined with unfavourable migration trends, points to a real long-term threat of depopulation in Lithuania. According to State Data Agency (VDA) data, the negative natural increase grew between 1994 and 2007, followed by a relatively long period of stabilisation (2008–2019). However, under the impact of the pandemic crisis, the negative natural increase coefficient rose very rapidly over a short period (2019–2021), reaching its highest level within the entire observation period. In 2021, its value stood at –24.4 thousand inhabitants, when the number of deaths exceeded

the number of births by the largest margin (Figure 1). Extremely low negative indicators of the natural population change suggest that this factor will reduce the size of the youth cohort in the future.

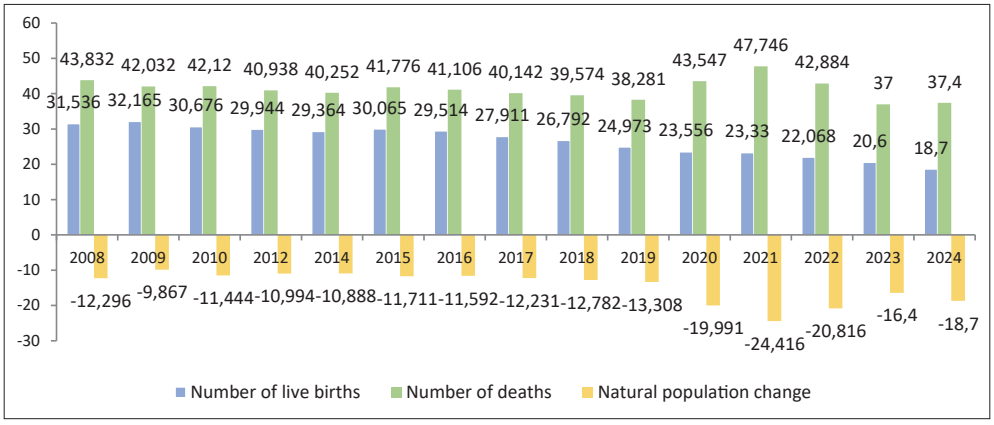


Figure 1. **Comparison of the Dynamics of Crude Birth, Mortality, and Natural Population Change Indicators in Lithuania, 2008–2024 (in thousands), according to State Data Agency data**

Summarised statistical data over a shorter period show that the absolute number of deaths in Lithuania grew very rapidly between 2019 and 2021, reaching the highest level across the entire observation period. At the same time, the natural increase indicator reached its lowest value in 2021, while the number of births was the lowest in 2022. The exceptionally low value of the natural increase coefficient in 2021 was driven by a sharp widening of the gap between crude birth and mortality rates. The negative value of Lithuania's natural increase coefficient in 2009 was almost twice as high as in 2021. However, due to declining mortality, the negative natural increase of the population, despite continuing decreases in fertility, fell during 2021–2024.

The long-term decline in fertility along with unfavourable migration trends have led to a rapid decrease in Lithuania's population. According to earlier Eurostat projections, under adverse demographic developments, the population would fall to around 2.5 million by 2033 (Figure 2), while updated forecasts place this outcome closer to 2040. On the other hand, demographic trends in the country could shift in a positive direction due to the growing impact of immigration. However, sustainable long-term positive population growth could only be ensured by a significant increase in fertility and a non-negative natural population change. If these conditions are not met, the only sources of improvement in Lithuania's demographic situation would be re-emigration and immigration.

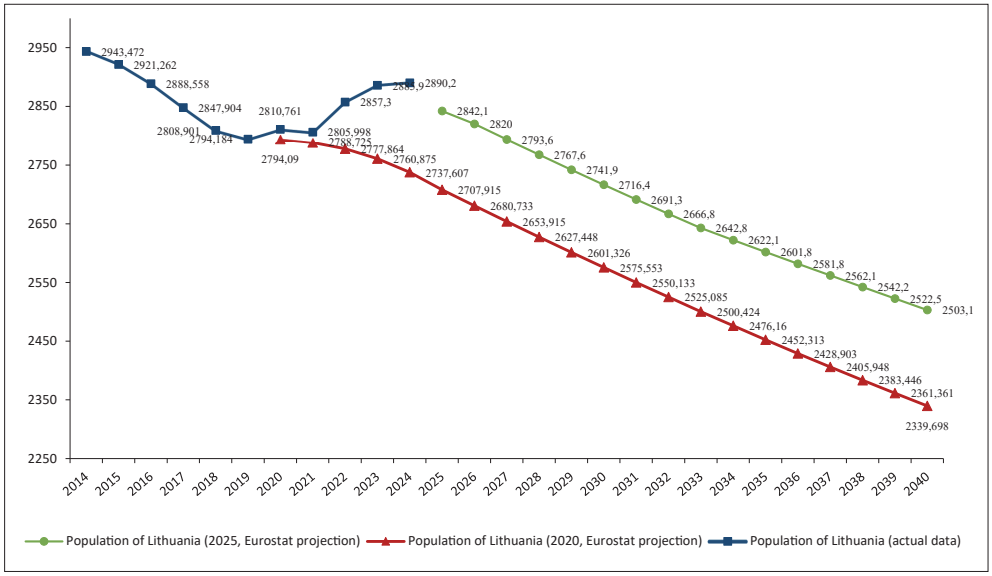


Figure 2. **Projections of Lithuania's Total Population up to 2040 (in thousands), based on Eurostat data**

Source of projections: Eurostat data (https://osp.stat.gov.lt/statistiniu-rodikliu-analize#; https://ec.europa.eu/eurostat/data/database).

Over the long term, Lithuania's population has declined due to two main factors: negative net migration and negative natural population change (Figure 3). A particularly strong negative impact of migration was observed in 2010, when around 90 per cent of the overall decrease was attributable to negative net migration. However, the relative effect of migration on population changes subsequently diminished. By 2014, migration accounted for almost 50 per cent of the decline, while the role of the natural increase grew significantly, making up slightly more than 50 per cent of the observed change. Although, in 2016, the relative impact of net migration on the population decline rose sharply (to about 70 per cent), in 2017–2018, the influence of migration on the overall population change decreased considerably. In 2018, 91 per cent of the reduction in population was due to negative natural change, and only 9 per cent to negative migration. In summary, statistical data confirm that Lithuania's population losses are driven both by negative natural change and migration. The balance between births and deaths has remained negative for a prolonged period, as has the migration balance (with significantly more people leaving than arriving). Nevertheless, in 2018, the pace of population decline slowed markedly due to the reduced impact of negative migration. In 2020, positive net migration even led to a slight increase in the population. It is clear that immigration has had a positive effect on the population dynamics during the last six years of the observation period (2019–2024), although its impact has diminished in the most recent years (from 2022 onwards).

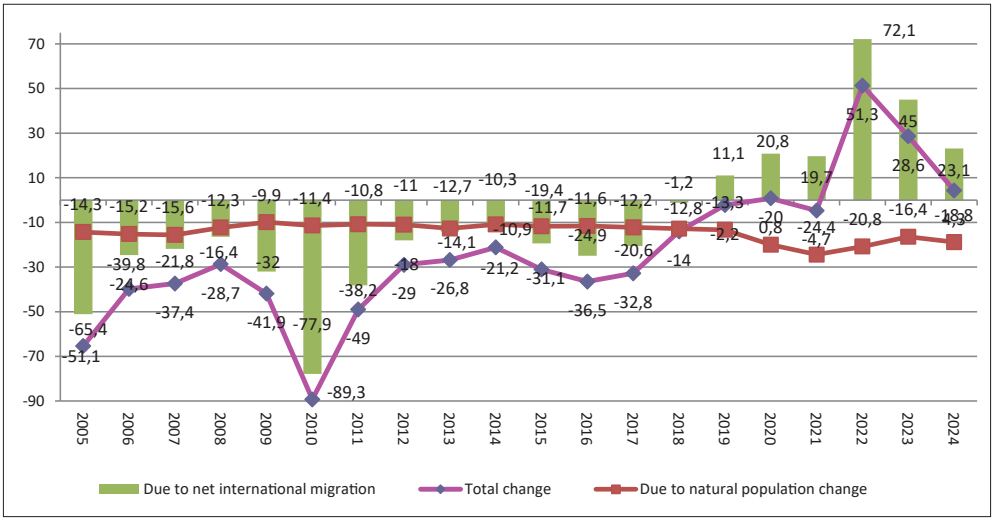


Figure 3. **Annual Decrease (Increase) in Lithuania's Population due to the Impact of Different Factors (in thousands), according to State Data Agency data**

3.2. Population Ageing in Lithuania and its Relationship with the Labour Market

In analysing population ageing, three indicators were employed to capture this phenomenon: the share of the population aged 65 and over (relative weight), the demographic old-age coefficient, and the median age of the population. Population ageing is most effectively measured by using relative indicators. As shown by the dynamics of the share of those aged 65 and over, the ageing process has proceeded intensively throughout the entire observation period. In the long term, rapid population ageing in Lithuania is associated with two opposing trends. Declining fertility has led to a sharp increase in the relative weight of younger cohorts, resulting in ageing 'from below'. At the same time, the rising life expectancy has driven accelerated ageing 'from above'. Population ageing is a complex demographic process, occurring unevenly, and it gained greater momentum even before Lithuania's accession to the EU and prior to the global economic crisis (up to 2008) (Figure 4). From a demographic perspective, at present, roughly one in five inhabitants belongs to the older generation, whereas, in 2001, the figure was approximately one in seven. For labour market development, the decline in the relative weight of younger cohorts is particularly significant, as it negatively affects the future dynamics of labour resources and manifests with a lag of 10–20 years.

Over the long term, Lithuania has experienced a decline in the absolute numbers of both children and older generations (Figure 5). Of particular importance to the labour market is the reduction in the working-age population (15–64 years). Between 2001 and 2024, the number of working-age inhabitants fell by 19 per cent (435 thousand). The decline in the child cohort (0–14 years) was even sharper during this period, amounting to 39 per cent (268 thousand). Balance calculations based on the observed changes

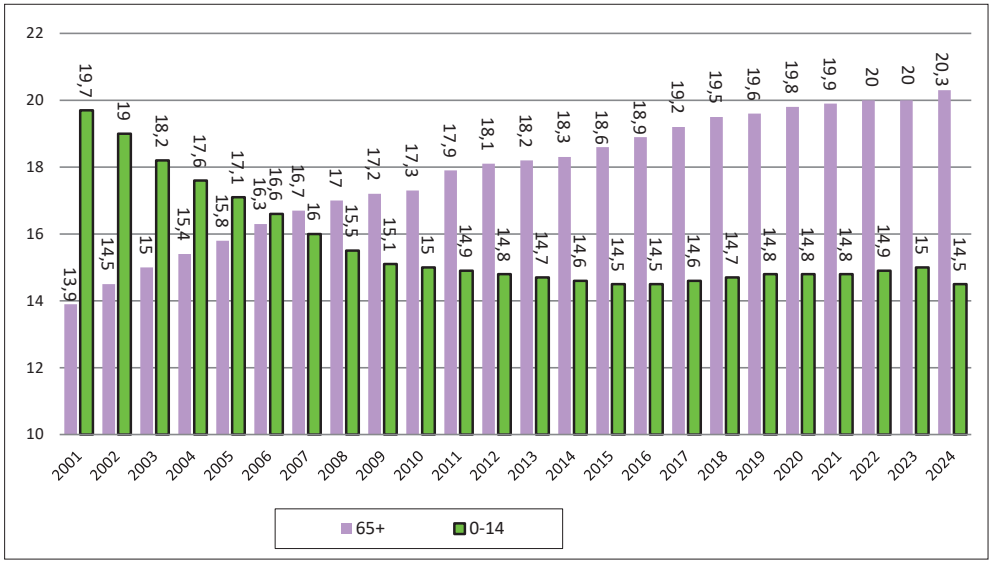


Figure 4. **Changes in the Relative Share of the Population Aged 65 and over and 0–14 in Lithuania (per cent), according to State Data Agency data**

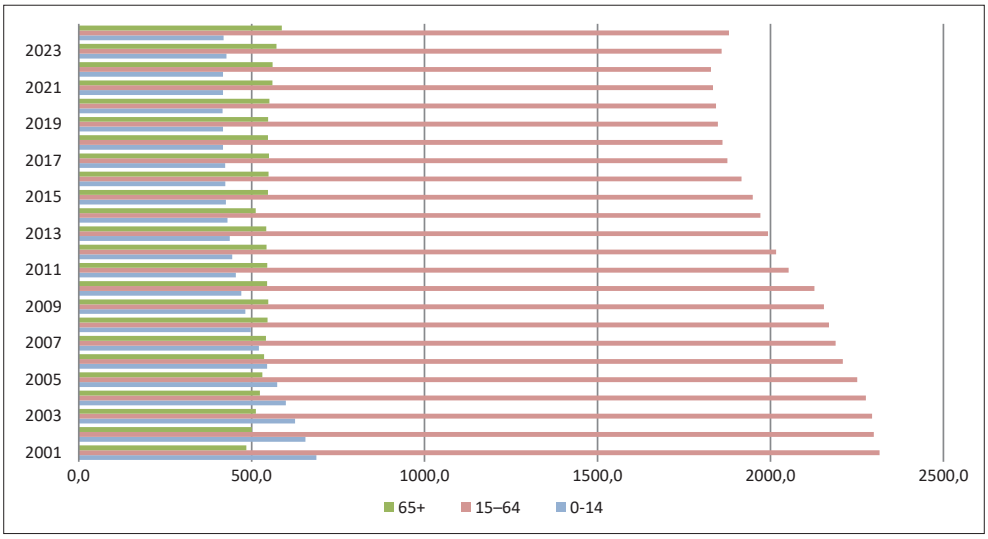


Figure 5. **Population by Age Group in Lithuania (in thousands), according to State Data Agency data**

in these age groups indicate that, between 2001 and 2024, as much as 62 per cent of the reduction in the working-age population was due to the significant decrease in the child cohort. The remaining 38 per cent of the change is attributable to migration and the negative balance of replenishment within the working-age group. This negative balance arises because the number of young people entering the working-age category is

considerably smaller than the number of older people leaving it. These calculations are approximate, as they do not take into account the detailed balance of population change across different age groups. While the numbers of children and working-age inhabitants declined rapidly, the number of older people in Lithuania increased by 21 per cent (specifically, by 102 thousand) over the same period.

Thus, the overall decline in Lithuania's population over the long term has been driven by the rapid reduction in the children and working-age cohorts, while being partly offset by the increase in the number of older people. In summary, between 2001 and 2024, the working-age population in Lithuania decreased by almost one-fifth, while the number of older people grew by slightly more than one-fifth. The children cohort declined particularly sharply, shrinking by as much as three-fifths. It is important to note that, despite these negative trends, the number of working-age inhabitants in Lithuania began to increase between 2022 and 2024 due to the impact of migration. However, this growth is not substantial enough to alter the long-term balance of the observed demographic change.

Another important indicator is the demographic old-age coefficient, which responds very sensitively to the deterioration of the demographic situation (Figure 6). The demographic old-age coefficient has increased rapidly nationwide. According to the State Data Agency data, between 2001 and 2024, this indicator in Lithuania almost doubled, specifically rising from 71 to 140 per cent (Figure 6).

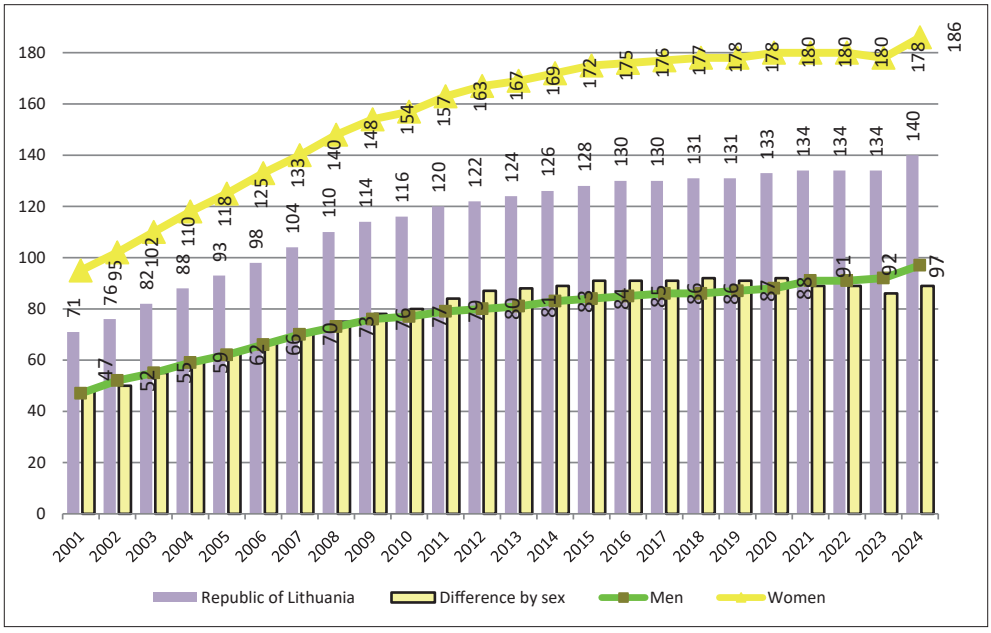


Figure 6. **Demographic Old-Age Coefficient of Lithuania's Population, 2001–2024 (per cent), according to State Data Agency data ***

*Demographic old-age coefficient – the number of older people (aged 65 and over) per one hundred children under the age of 15.

In recent years, the growth rate of the demographic old-age coefficient has accelerated. The problematic aspect lies not only in the overly rapid increase in this indicator, but also in its sharply rising differentiation by gender. A 'moderate' increase in the coefficient is linked to the direct consequences of ageing 'from above'. The positive side of this phenomenon is the greater opportunity for older people to remain in the labour market. By contrast, the risky surge in the coefficient due to ageing 'from below' is driven by the rapid decline in fertility. However, the pronounced gender differences in ageing are not caused by declining fertility, but by the traditionally higher life expectancy of women. Over the long term, the demographic old-age coefficient for women in Lithuania has grown faster than for men, as older male cohorts died out more quickly than their female counterparts. In 2024, the coefficient for women was almost twice that of men (186 per cent compared with 97 per cent). In 2001, the relative gender difference was also twofold, though the absolute values of the indicator were much lower than in 2024. Gender differences in ageing have significant negative consequences not only for Lithuania's socio-economic development but also for that of other countries. The labour market suffers as well, since favourable proportions of employed persons by gender cannot be ensured. An optimal value of the demographic old-age coefficient could be considered 100 per cent, which, under current conditions, would, over the longer term, ensure a sufficiently balanced generational replacement. A value close to this optimum was reached in Lithuania during the period of labour market improvement prior to the global crisis (2006–2007) but later diverged considerably. An interesting counterpart to the old-age coefficient is its inverse indicator, which shows the ratio at which the child cohort (aged 0–14) replaces the older generation (65+). In 2024, this replacement ratio in Lithuania was only 71.4 per cent.

Population ageing is also reflected in the rise of the median age. Unlike the demographic old-age coefficient, the median age indicator is less sensitive to short-term fluctuations. However, a one-year change in the median age is considerably more significant than a percentage change in the old-age coefficient. In 2001, Lithuania's median age was 36 years, which means that half of the population was older than 36 and the remaining half was younger (Figure 7). The median age has grown steadily: from 32 years in 1990 to 44 years in 2024. This indicator reflects long-term rather than short-term developments, and it remained unchanged for a relatively long period (2018–2024). One factor that slowed its growth was the increased mortality during the pandemic crisis. A very similar trend is observed in the average age of employed persons, which in Lithuania rose from 40.1 years in 2001 to 44.3 years in 2024. This demonstrates a strong direct correlation between the two indicators. The average age of the employed increased very evenly, resembling a straight line, with only a temporary decline due to the pandemic crisis. Another important indicator is the average age of the labour market exit. Between 2001 and 2024, this increased by almost five years, linked to the gradual extension of the statutory retirement age in Lithuania. In fact, the maximum level was reached well before the completion of the retirement age reform, with the average exit age standing at 66.1 years in 2017.

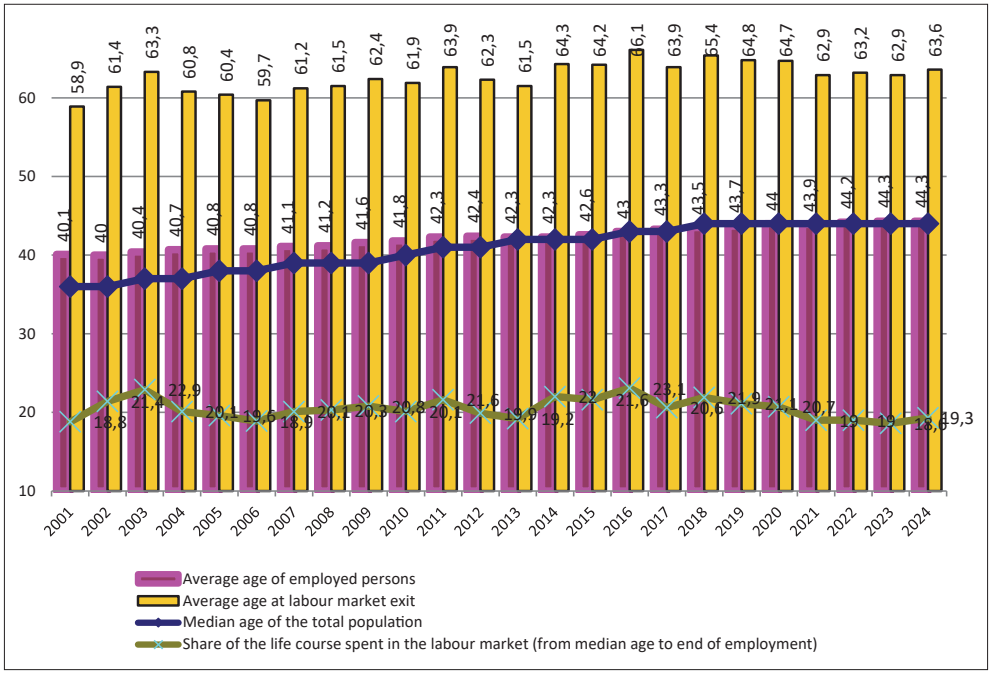


Figure 7. **Changes in the Average Age of the Employed and the Total Population in Lithuania (in years), according to State Data Agency data**

Although the statutory retirement age in Lithuania was extended until 2025 (to 65 years for both men and women), the indicator of labour market exit began to decline after 2017, reaching 63.6 years in 2024. The relatively marked fluctuations in this indicator may be explained by the difficulty of determining the precise end of labour market participation, since individuals who have reached retirement age may still take up temporary employment. Assuming that variations in the timing of youth entry into the labour market did not affect the overall duration of participation, it can be estimated that, between 2001 and 2024, the average length of the labour market participation in Lithuania increased by about five years. Over the course of a career, the average duration of participation should amount to around 44 years. These conditional estimates, of course, do not account for possible interruptions within the period, when individuals temporarily drop out of the labour market due to unemployment. Thus, the actual average employment duration (up to the end of a career) is likely to be shorter. It is worth noting that the variation in the average age of the employed across occupational groups in Lithuania is particularly high (16.5 years in 2024). On average, the youngest are members of the armed forces (35 years), while the oldest are agricultural workers (51.5 years) and unskilled workers (48.2 years) (Figure 8).

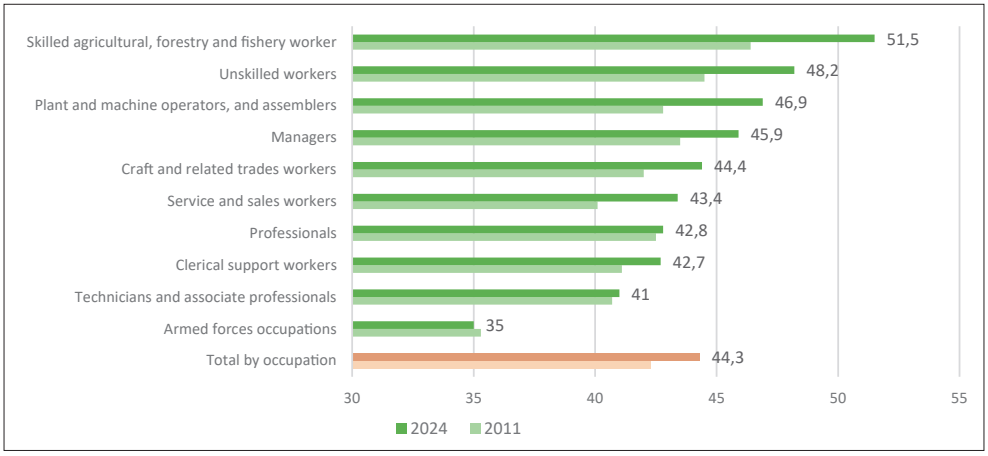


Figure 8. **Average Age of the Employed in Lithuania by Occupational Group, 2011 and 2024 (in years), according to State Data Agency data**

To evaluate differences in population ageing within the labour market across occupational groups, the labour force (employed persons) ageing intensity index is introduced (Figure 9). This index is expressed as the ratio of average age indicators of the employed and reflects the unevenness (dynamism) of the observed changes.

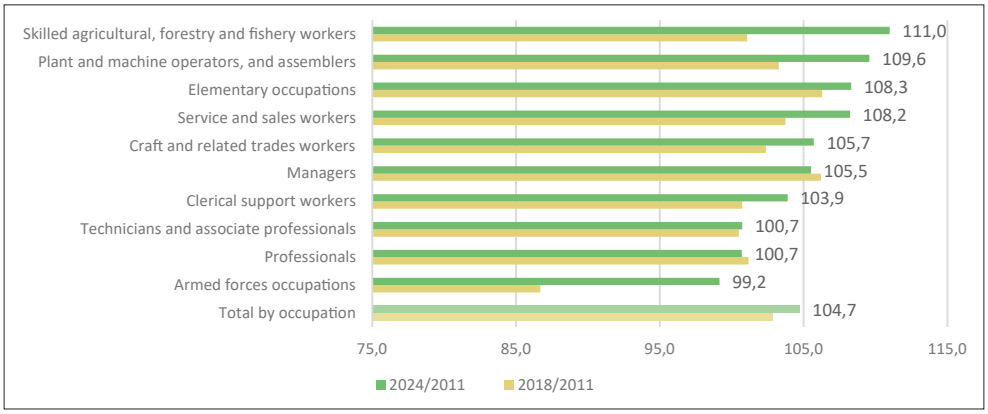


Figure 9. **Labour Force (Employed Persons) Ageing Intensity Index in Lithuania by Occupational Group, Comparison of the Periods 2011/2018 and 2011/2024 (per cent), according to State Data Agency data**

Between 2011 and 2024, the index values were generally higher than in 2011–2018, thus indicating the continuation of population ageing over a longer period. Based on the data for 2011–2024, it can be stated that the fastest ageing occurred in the agricultural and forestry labour force (11 per cent), followed by equipment operators and assemblers (9.6 per cent), unskilled workers (8.3 per cent), and service sector employees (8.2 per

cent). Only members of the armed forces experienced slight rejuvenation (by as little as 0.8 per cent). The ageing index for technicians and associate professionals changed very little, thus showing that the average age of workers in these occupational groups shifted only marginally. The pronounced unevenness of the labour force ageing across occupational groups in Lithuania is linked not only to differences in the employment structure, but also to mismatches between the labour supply and demand, as well as to labour shortages.

Summarising the results of this section, it may be assumed that the difference between the average age and the age of the labour market exit corresponds to the period from the beginning of a working career to the average age. In other words, the average age of the employed divides their participation in the labour market into two equal parts. The first part of this interval approximately reflects the start of youth employment and their subsequent integration until reaching the average age of the employed, while the second part covers the average career period of individuals from that age until their exit from the labour market. From this assumption, it follows that the average duration of labour market participation from the average age to exit, as presented earlier in Figure 7, becomes equal to the average conditional indicator of the youth entry into the labour market (Figure 7). Official statistics do not provide this indicator, as it is particularly difficult to measure. For part of the youth population, entry into the labour market may not be linked to genuine integration, since their employment may be only episodic or incidental. According to the authors' estimates, the average approximate age of youth integration into the labour market, associated with their employment, should have fluctuated between 18.8 and 22.9 years during the period of 2021–2024. It is likely that, over the long term, this indicator has changed only marginally.

3.3. General Characteristics of Labour Force Change Trends in the Baltic States

One of the most important relative indicators of labour resources is the comparative weight of the working-age population (15–64 years). Despite the deteriorating demographic situation, the share of the working-age population in the Baltic States continued to grow for quite some time. The earliest decline in this indicator occurred in Estonia (several years before the previous global economic crisis), followed later by Latvia (during the crisis itself). In Lithuania, however, the relative share of the working-age population only began to decrease in the post-crisis recovery period (from 2012 onwards). Throughout the last decade and the beginning of this one, the proportion of the working-age population in the Baltic States declined consistently, stabilising only in recent years due to the positive impact of migration. Despite the undeniable significance of this indicator, its amplitude of fluctuation has been relatively small. In Lithuania, the working-age share fell from 67% to 65.1% over the period 1998–2024; in Latvia, from 65.8% to 63.1%; and in Estonia, from 66% to 63.5%. The nominal differences between the Baltic States in 2024 were relatively minor (amounting to only a few percentage points). Nevertheless, according to this indicator, Lithuania retained the largest labour

resource potential over the past 15 years, while Latvia had the smallest (see Figure 10). The dynamics of the working-age population in the Baltic States fluctuated around the average level of this indicator in the EU. However, Lithuania's values (compared with the EU average) remained higher throughout almost the entire observation period. These fluctuation patterns provided Lithuania with potential opportunities to integrate more working-age individuals into the labour market than either the other Baltic States or a considerable number of other EU countries.

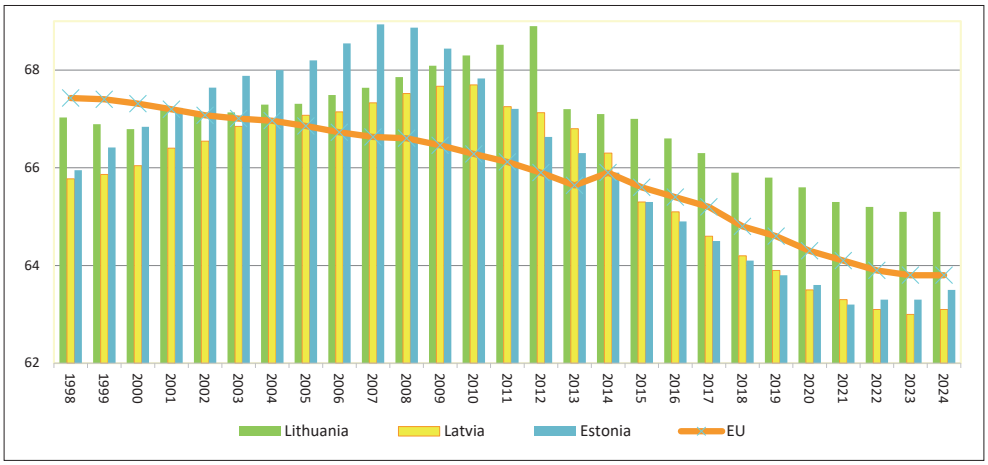


Figure 10. **Assessment of the Dynamics of the Working-Age Population (15–64 years) in the Baltic States, based on Eurostat and Statistics Lithuania data, 1998–2024 (percentage)**

By applying the index method, we can compare differences in the labour force change indicators across the Baltic States. On the one hand, the index method eliminates the influence of territorial disparities on the labour force changes; whereas, on the other hand, it enables the assessment of differences in the dynamics of this labour resource indicator among the Baltic States. According to the labour force index dynamics, the most favourable situation was observed in Estonia. Between 1998 and 2024, the labour force there increased by as much as 13.1% (with a dynamics index of 113.1%). By contrast, the long-term decline in the overall labour resource in Latvia and Lithuania is evidenced by a labour force index below 100%. Over the same period, the labour force decreased most significantly in Latvia (by 17.7%), and, to a lesser extent, in Lithuania (by 8.2%). The dynamics index for these countries during this period was 82.3% and 91.8%, respectively (see Figure 11).

Thus, in the long term, labour resource shortages in the Baltic States were most pronounced in Latvia and less so in Lithuania. While the base labour force index values in Lithuania increased during the period of 2017–2024, in Latvia they declined. The size of the labour force is a particularly interesting indicator, as it is influenced by both demographic and economic factors, whose effects on the labour market are closely intertwi-

ned. As shown in the most recent diagrams, despite the decline in the relative share of the working-age population in Estonia, the size of the labour force there increased over the long term. It may be argued that, in Estonia's case, the significant rise in the population activity levels along with relatively more favourable trends in absolute indicators (compared with the other Baltic States) offset the negative impact of the declining relative share of the working-age population on the labour market. According to the Eurostat data, the number of working-age inhabitants in Estonia decreased by only 5% between 1998 and 2024.

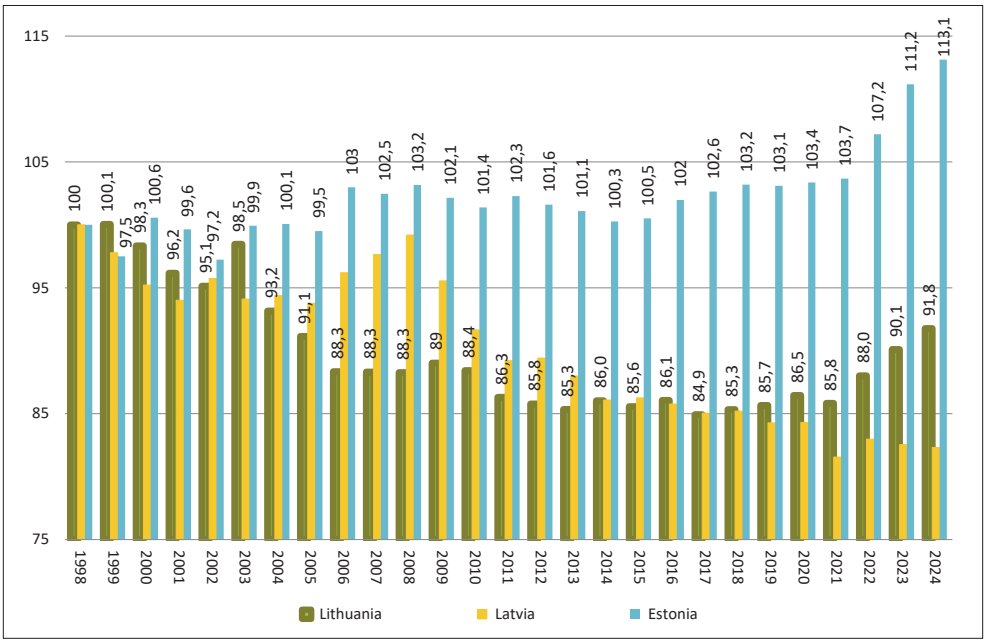


Figure 11. **Dynamics of Labour Force Base Indices in the Baltic States, 1998–2024, according to Eurostat data (1998 value = 100%)***

* The diagram presents the numerical base index values for Estonia and Lithuania (compared with 1998). When calculating the indices, the value of the labourforce indicator for a given year is compared with its value in 1998.

3.4. Differences in Labour Market Integration Opportunities for Target Demographic Groups (Youth and Older People)

A more detailed examination of changes in employment and activity among the more vulnerable groups in the Lithuanian labour market – notably, the youth and older people – reveals striking demographic contrasts. Analysis of both absolute and relative employment indicators highlights a widening disparity between these groups, which became even more pronounced during periods of economic crisis. An even greater challenge has been the insufficient renewal of youth labour resources, which is a problem that

became particularly evident during the previous economic upswing. Although youth employment grew relatively rapidly in the last decade, the number of employed individuals within this target group declined during certain years of the earlier economic expansion (2014–2019). As a result, the country experienced a significant shortage of young labour resources, while the gap between the number of employed persons and the employment-level indicators widened sharply (see Figure 12).

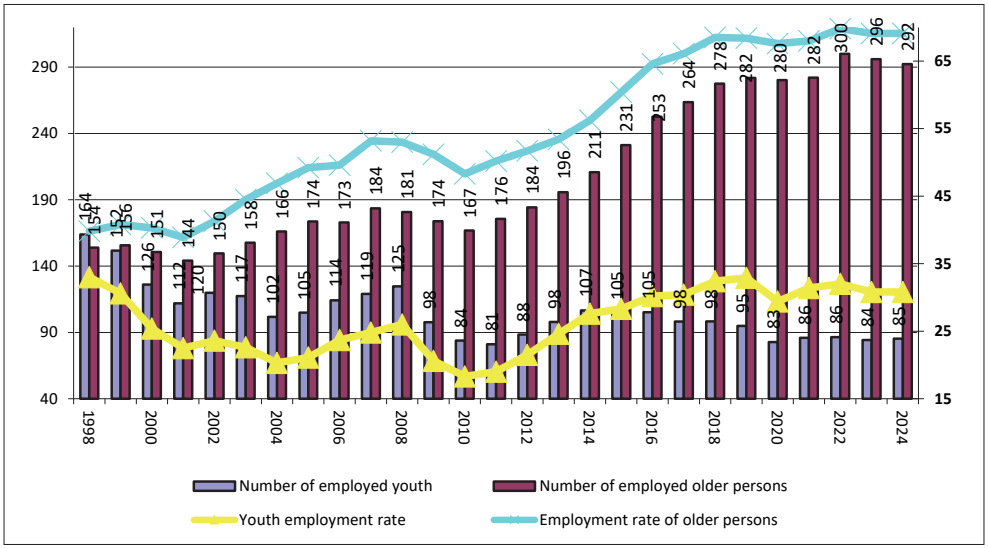


Figure 12. **Number of Employed Youth and Older Persons (thousands) and Employment Rate in Lithuania, 1998–2024, according to Statistics Lithuania (percentage) ***

*On the left axis, the number of employed persons is presented in thousands, while, on the right axis, the employment rate is expressed as a percentage. The indicators examined here, and in subsequent sections, pertain to the target demographic groups of youth (aged 15–24) and older individuals (aged 55–64). The number of employed older persons in 2024 has been calculated on the basis of quarterly averages. The diagram depicts the numerical values of employment in a column format, expressed in thousands.

In contrast, the employment characteristics of older individuals responded differently to the previous economic upswing, as the growth in their employment rate was accompanied over a long period by an increase in the number of employed persons within this age group. A more favourable situation for youth was observed only in 2021–2022, when the rising employment levels were matched by an increase in the number of employed individuals in this age category. Temporary growth in the number of employed youth aged 15–24 was also recorded in 2024. In summary, the number of employed youth aged 15–24 remained almost stable during the period of 2020–2024. However, over a longer horizon, the increase in the number of older workers (aged 55–64) coincided with a decline in the number of employed youths. Consequently, the rise in youth employment

within the examined group was largely temporary in nature, shaped by uneven patterns in the country's demographic development.

More refined changes in labour resources, those largely independent of the influence of economic cycles, are illustrated by the activity-level indicators of the country's target demographic groups. At certain points in time, shifts in employment differed from changes in activity. Therefore, alongside employment characteristics, it is important to examine activity indicators, whose significance has grown considerably in the context of increasing labour resource shortages. During the period under review, the labour market activity of older people rose almost continuously. By contrast, a sharp decline in activity among the youth age group occurred between 1998 and 2005, with some stabilisation only after Lithuania's accession to the EU. When assessing the labour market situation, it can be argued that the rise in inactivity among young people was offset by the increased labour market activity of older individuals.

In 1998, the activity rate of both youth and older individuals was identical, amounting to 43% when rounded to whole units. By 2012, however, the activity of older persons had risen markedly to 59%, while that of youth had declined to 29%. During the peak of the earlier economic upswing in 2005, youth activity had fallen even further, reaching 25%. Subsequent trends in activity diverged significantly between demographic groups. The activity of older individuals increased even more rapidly between 2013 and 2016, rising from 60% to 70%, though this growth slowed considerably thereafter. By contrast, youth activity indicators became increasingly unfavourable in the latter half of the past decade, particularly in relation to labour force numbers (see Figure 13).

An increase in activity reflects a larger proportion of individuals entering the labour market, while a decline indicates withdrawal from it. Under conditions of demographic decline, fewer young people are entering the labour market. However, over the past two decades, this loss has been partially mitigated by periods of rising youth activity. The analysis shows that, in 2021, the labour resource situation of the target groups deteriorated, despite certain employment growth spurts in the labour market following the pandemic crisis. The size of the labour force within the youth age group continued to decline between 2021 and 2023, with no corresponding increase in youth activity. Moreover, between 2021 and 2024, the labour force also began to decrease among older individuals aged 55–64, despite the earlier long-term growth in these indicators. If participation (activity) rates among older people continue to decline, the country may face the risk of being unable to compensate for labour resource losses among the youth. Particular attention should be paid to the fact that when lower activity levels result in more individuals 'dropping out' of the labour market, the problem of labour shortages becomes even more acute. Thus, higher or rising levels of the population activity (employment) have, to a large extent, offset the labour resource losses in Lithuania.

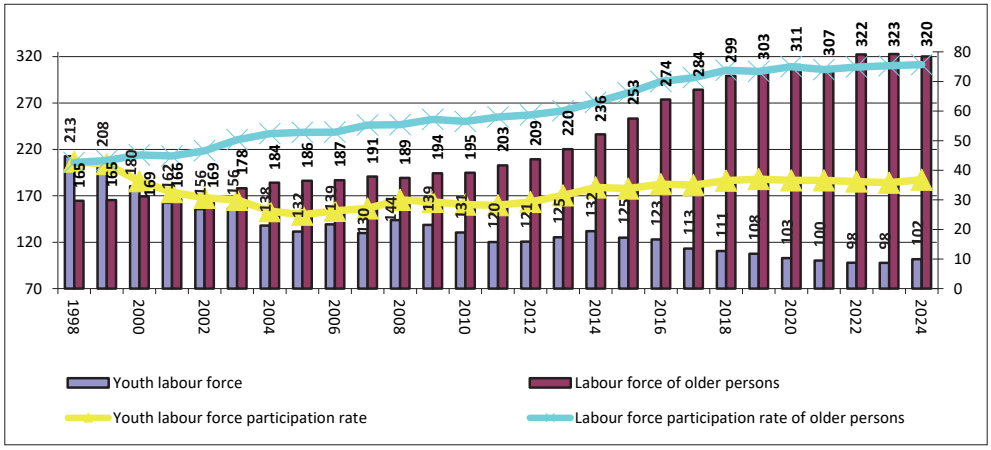


Figure 13. **Labour Force of Youth and Older Persons in Lithuania (thousands) and Activity Rate, 1998–2024, according to Statistics Lithuania (percentage)***

*On the left axis, the labour force is shown in thousands, while, on the right axis, the activity rate is expressed as a percentage. The labour force and activity rate of older individuals, together with the activity rate of the youth, for 2024 have been calculated on the basis of quarterly averages. The diagram presents the labour force values in a column format, expressed in thousands.

By applying the paired correlation–regression method to data from the EU countries, certain regularities in the interrelationship between the GDP volume and changes in activity-level indicators were revealed, particularly with respect to the more vulnerable groups in the labour market: the youth and older individuals. This assessment may be regarded as an example of conventional territorial analysis, in which, individual EU countries are treated as regions. It should be noted that, although the activity (employment) level of older persons is considerably higher than that of youth, in all dynamic series, when assessed year-by-year, the level of economic development – if measured by the real GDP per capita – has a significantly greater impact on the labour market position of the young people compared with older individuals. For this statistical investigation, the activity indicator was selected, given its close association with both employment and unemployment levels.

The results of the analysis indicate that higher GDP levels (and their growth) in the EU countries tend to encourage young people to seek employment. This is evidenced by the higher positive values of the correlation and regression coefficients. Moreover, the relationship between the GDP levels and youth labour market activity has strengthened over the long term (see Figure 14). In the case of youth, a relatively strong positive average correlation exists between the indicators under examination, whereas, for older individuals, the relationship was weak and, by the end of the period, even negative. In this sense, it may be argued that economic prosperity at the level of EU countries – represented in our study by the GDP indicator – does not, in itself, formally guarantee an increase in the labourmarket participation among older people. Following the pandemic

crisis, an inverse (negative) relationship between the indicators was observed. This leads to the conclusion that, in wealthier EU member states, the labour market activity of older individuals was somewhat lower than in countries with lower living standards and a more limited economic potential. These findings, however, call for deeper investigation in the future. The correlation analysis of the territorial distribution of the examined indicators indirectly points to the regional nature of the issue across the EU countries, as significant differences in social and economic development persist among the member states. Furthermore, the variation in correlation and regression results reflects only average tendencies, behind which, substantial exceptions may be concealed in the case of individual EU countries.

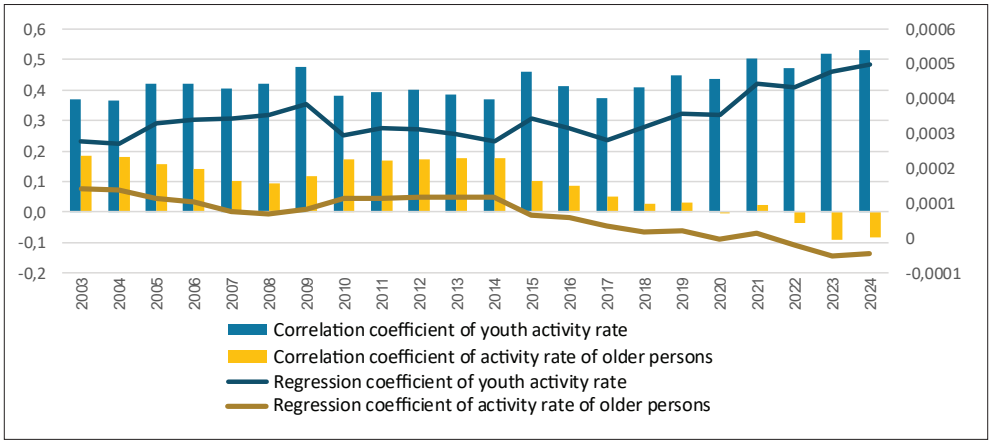


Figure 14. **Impact of Real GDP per Capita (EUR) on the Activity Rate of Youth (15–24) and Older Persons (55–64) by EU Country Distributions (Regression Coefficient (Slope) and Correlation)***

Calculations are based on Eurostat data.
* The left axis presents the values of correlation coefficients, while the right axis shows regression coefficients.

In summary, the results suggest that, over the long term, economic growth at the EU level has stimulated youth activity (employment), whereas, the overall rise in economic prosperity (GDP) has not significantly encouraged a greater labour market activity among older individuals (see Figure 14). A somewhat stronger relationship for older persons was observed only during the periods of 2010–2014 and 2003–2006. This does not imply that economic growth in the EU has no influence at all on the activity (employment) of older people; rather, the correlation between the indicators is extremely weak, as their participation is likely shaped by other factors beyond the scope of this analysis. It is important to note that the correlation and regression characteristics of the relationship between older people's activity and economic growth declined consistently throughout the period. This provides a well-founded assumption that long-term eco-

nomic growth and rising prosperity among older individuals at the EU level did not, in themselves, stimulate higher activity (employment) rates. Nevertheless, despite the weak dependency observed at the EU scale, Lithuania has experienced a sharp increase in older people's activity over the long term: between 1998 and 2024, it rose from 42.6% to 75.6%. Similarly, the employment rate of older individuals in Lithuania increased, albeit over a slightly shorter period (from 39.8% in 1998 to 69.8% in 2022). Such a significant rise in these indicators may be explained by the relatively high levels of poverty among older people, which incentivise them to remain in the labour market for as long as possible. However, this assumption requires a much deeper examination of the issue of poverty among older people.

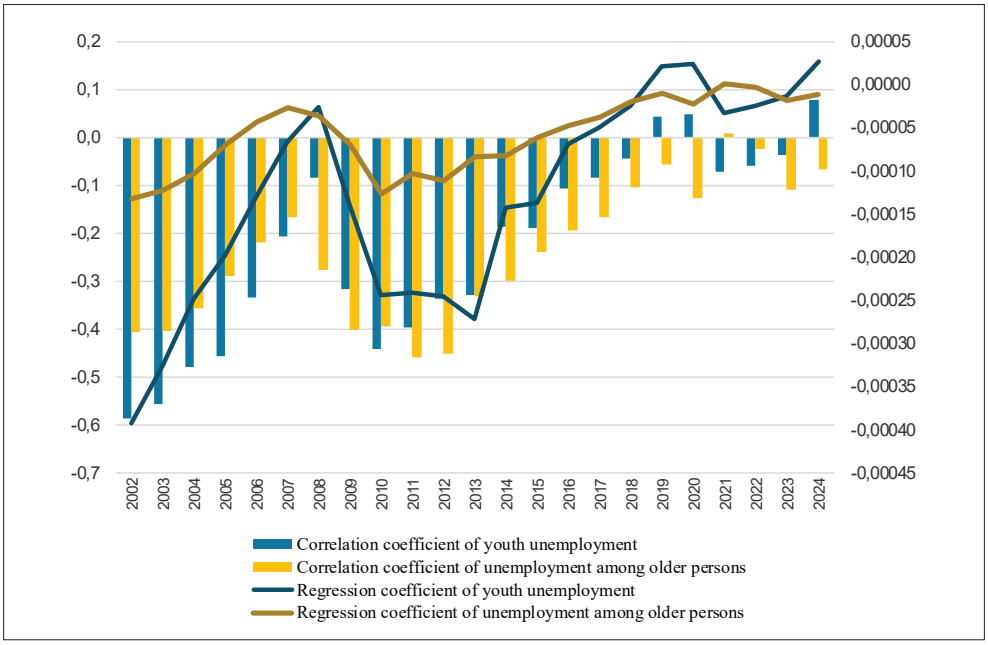


Figure 15. **Impact of Real GDP per Capita (EUR) on the Unemployment Rate of Youth (15–24) and Older Persons (55–64) by EU Country Distributions (Regression Coefficient (Slope) and Correlation)***

Source: Eurostat.

Similar patterns are observed when examining the relationship between unemployment and economic development (see Figure 15). In this case, however, the cyclical nature of the trends is more pronounced. The conclusion may be drawn that, overall, long-term economic growth plays only a limited role in reducing unemployment among the target demographic groups. Nevertheless, during certain periods, this relationship was relatively significant, notably, in 2002–2006 and 2009–2014. No major differences were identified between the youth and older individuals in terms of the relationship

between unemployment and the GDP levels. From the perspective of classical economic theory, one might expect that economic growth in the EU countries would lead to a more substantial reduction in unemployment. Yet, this rule did not apply when the overall unemployment levels in many EU countries were already relatively low and had approached the threshold of the natural rate of unemployment. In contrast, during more severe economic crises, when unemployment rose sharply, the relationship between the indicators under review became closer once again. Thus, this finding does not negate the potential positive impact of economic growth when labour market tensions intensify. This is confirmed by the higher absolute values of regression and correlation coefficients observed during earlier, less favourable periods of the labour market development. However, during the pandemic crisis, no such strengthening of the relationship was detected, owing to the relatively low unemployment levels recorded in the EU countries.

Despite the observations outlined above, a further discussion point emerges: does the absence of a stronger relationship between the countries' economic performance and the indicators examined in this decade suggest that the scope for reducing unemployment among the target groups – even under relatively stable economic conditions – had already been largely exhausted in many EU countries? Low correlation coefficients indicate not so much the absence of a relationship between the GDP and unemployment across the EU countries, but rather the absence of change in that relationship (a relative stability of the observed situation). The same principle applies to the weak association between economic performance and changes in the labour-market participation (employment) levels.

However, the causal relationship between economic growth (its level) and labour-market indicators is considerably more complex and cannot be fully captured by the magnitude of their statistical association. One could argue that if economic activity were to halt and the GDP were no longer generated, labour-force participation (employment) would not exist at all, as the logical connection between these indicators is more than evident. A similar interpretation applies to unemployment, where the interdependence of the indicators under examination is likewise clear (Okunevičiūtė Neverauskienė et al., 2024b).

Discussion and Conclusions

The dynamics of the relative share of the population aged 65 and over demonstrate that the ageing process in Lithuania has proceeded intensively throughout the entire observation period. At present, approximately one in five inhabitants belongs to the older generation, whereas, in 2001, the proportion was closer to one in seven. Population ageing is further reflected in the rise of the median age. Particularly striking, however, is the rapid increase in the demographic old-age dependency ratio. According to Statistics Lithuania, between 2001 and 2024, this indicator in Lithuania almost doubled, rising from 71% to 140%. The problematic aspect lies not only in the excessively rapid growth of this indicator but also in its pronounced differentiation by gender. The demographic old-age ratio for women was nearly twice that of men (186% compared with 97%). Gender-ba-

sed differences in ageing have significant negative consequences for the socio-economic development of Lithuania as well as other countries. The labour market is also adversely affected, as it becomes increasingly difficult to ensure balanced proportions of employed persons by gender.

Similarly to the overall median age indicator, the average age of the employed population in Lithuania has also increased. Between 2001 and 2024, the average age of employed persons rose from 40.1 to 44.3 years, while the median age increased from 36 to 44 years. Judging by the change in the median age, population ageing in the country as a whole proceeded considerably faster than the ageing of the labour force. This can be explained by the rapid growth in the relative share of older individuals within the retirement-age population.

It should also be noted that, despite the favourable employment trends among older individuals, the employment rate of the 40–44 age group in Lithuania was considerably higher than that of the 60–64 age group, according to the Statistics Lithuania data. In 2024, the respective figures stood at 85.5% and 61.9%. This indicates that middle-aged individuals had better opportunities to remain in the labour market with stable employment compared to the older cohorts. Furthermore, the authors' analysis reveals a close correlation between the average age of the employed population and the overall median age indicator. It was estimated that the average duration of the labour market participation in Lithuania increased by approximately five years between 2001 and 2024. Over the course of a full working career up to the retirement age, the average period of labour market participation is expected to reach around 44 years.

Youth and older individuals represent highly contrasting demographic groups. A major challenge is the insufficient renewal of youth labour resources, which became particularly evident during the previous decade's economic upswing. As a result, the country experienced a pronounced shortage of young labour resources, while the gap between the dynamics of the number of employed persons and the employment rate widened rapidly. In contrast, the employment characteristics of older individuals responded differently to the earlier economic expansion. For this group, the rise in employment rates was accompanied over a long period by an increase in the absolute number of employed persons. A more favourable situation for the youth was observed only in certain years of the current decade.

Under conditions of a demographic decline, fewer young people in Lithuania are entering the labour market. Over the past 20 years, however, this loss was partly offset by an increase in the youth activity rates. The results of the analysis show that, in 2021, the labour resource situation of the target groups deteriorated, despite certain employment growth spurts in the labour market following the pandemic crisis. The size of the labour force in the youth age group continued to decline between 2021 and 2023, while the youth activity did not increase. Moreover, between 2021 and 2024, the labour force also began to decrease among the older individuals, although these indicators had previously risen steadily during the period of 1998–2021.

Although the activity (employment) level of older individuals is considerably higher than that of the youth, the level of economic development, measured by the real GDP per capita, has a much stronger impact on the labour market position of the young people compared with the older cohorts in the EU countries. Summarising the results of the correlation analysis, it may be concluded that, over the long term, economic growth at the EU level has stimulated youth activity (employment), whereas, the overall rise in the economic prosperity (GDP) has not significantly encouraged a greater labour market activity among older individuals.

Even without the support of a dedicated sociological study, it can be asserted that population ageing inevitably leads to the ageing of the labour resources, both in Lithuania and in other countries. This is not a matter of debate, although it remains highly relevant. The key question, however, is whether population ageing (i.e., a demographic decline) affects the overall employment trends and the labour market position of the target groups – specifically, youth and older individuals. This is a serious issue, since, although the number of young people in Lithuania's labour market has declined over the long term, while the number of older individuals has increased, the absolute indicators alone cannot serve as precise criteria for assessing improvements or deteriorations in the labour market conditions. From a demographic perspective, the importance of absolute indicators is undeniable; nevertheless, it would be appropriate in future research to examine in greater detail the impact of a long-term population decline and ageing on the relative labour market indicators for the target groups (such as the employment and activity rates, as well as other quantitative characteristics), which would more accurately reflect the intensity of the phenomenon under study. Equally important is the need to assess whether population ageing influences the overall trajectory of the employment levels in the country. Given the rapid pace of demographic deterioration, the interaction between the demographic change and the labour market dynamics has not yet been examined in sufficient depth in Lithuania.

The main conclusion of the study is that, in Lithuania, not only the society is ageing, but the labour market is ageing as well. This conclusion is neither surprising nor new; what this study provides is a detailed analytical basis that allows the discussion to move beyond generalised or speculative statements. The pace at which population ageing and labourmarket ageing are unfolding already requires the search for possible complex solutions that would encompass both economic and social dimensions. Possible answers to the question "*What should be done?*" do not constitute the aim of this study; rather, they mark the boundary at which the presented results arrive. These answers can be viewed as scenario pathways: immigration, accompanied by the persistent challenges of economic development and social protection; or investment in economic transformation through robotisation, automation, artificial intelligence, and universal basic income. The latter scenario is being increasingly discussed globally not as science fiction, but as a form of utopia that may become reality.

Author contributions

Laima Okunevičiūtė Neverauskienė: conceptualization, methodology, data curation, investigation, writing – original draft, writing – review and editing, visualization.

Arūnas Pocius: conceptualization, methodology, formal analysis, writing – review and editing.

Emilija Webster: writing – review and editing, visualization.

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