LABOUR MARKET TRANSFORMATIONS AND DUALITY IN CENTRAL AND SOUTHEASTERN EUROPE: A COMPARATIVE FACTOR ANALYSIS

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Abstract
This study offers a comparative analysis of labour market transformations in twelve Central and Southeastern European countries: Albania, Bosnia and Herzegovina, Serbia, North Macedonia, Bulgaria, Romania, Croatia, Slovenia, Slovakia, Poland, Hungary and the Czech Republic, covering the period 1993 to 2024. It examines the major structural shifts associated with the transition from centrally planned to market economies, marked by significant output declines, enterprise closures and substantial job losses that contributed to persistent and often long-term unemployment. Using the theoretical framework of labour market duality, the study explores segmentation between primary and secondary labour market segments, the prevalence of vulnerable and informal employment and the impact of institutional legacies such as rigid labour regulations, high employment protection and skill mismatches. Methodologically, the analysis combines descriptive indicators with factor analysis to reduce a wide set of seventy nine labour market variables into composite labour market dimensions obtained through dimensionality reduction., allowing for the identification of shared regional patterns and country specific disparities. Sectoral differences remain particularly evident in agriculture, which continues to employ a considerable share of the workforce in parts of Southeastern Europe despite low productivity and limited technological modernisation. The largest labour market gaps appear between Western Balkan economies and more advanced EU member states, most visibly in employment rates, labour force participation, youth unemployment and long-term unemployment. These persistent disparities reflect deep structural constraints and institutional weaknesses that continue to hinder labour market convergence across the region.
Keywords: Post-socialist economies, labour market duality, sectoral disparities, comparative analysis, Western Balkans, labour market convergence.
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1. INTRODUCTION

Labour markets in Central and Southeastern Europe underwent profound structural transformations during the transition from centrally planned to market economies. This shift was characterised by substantial declines in output, widespread closures of state-owned enterprises and significant job losses, particularly among mid-career workers who faced considerable barriers to re-employment. In this context, labour mobility—especially emigration—has been identified as a key mechanism of macroeconomic adjustment in developing and transition economies, often reflecting deeper structural constraints and policy trade-offs within monetary integration processes (Đogo et al., 2023). These developments generated persistent unemployment and underscored the need for comparative analyses that link institutional arrangements, sectoral adjustments and macroeconomic reforms to labour market performance. Against this background, the present study employs the theoretical framework of labour market duality to analyse primary and secondary labour market segments, the distribution of vulnerable forms of employment and the interactions between formal and informal labour markets.

The analysis covers twelve Central and Southeastern European countries: Albania, Bosnia and Herzegovina, Serbia, North Macedonia, Bulgaria, Romania, Croatia, Slovenia, Slovakia, Poland, Hungary and the Czech Republic, and examines long-term transition outcomes across key indicators such as employment, labour force participation, youth and long-term unemployment and sectoral labour distribution. Previous empirical evidence indicates that the largest performance gaps persist between Western Balkan economies and the more advanced EU member states in the region, particularly regarding employment outcomes, labour mobility and institutional adaptability. Methodologically, the paper combines descriptive analysis with econometric techniques, including factor analysis (principal component method), to group a large set of 79 labour market indicators into a smaller number of interpretable composite dimensions across seven thematic segments: labour force, non-active population, potential labour force, discouraged workers, employment, unemployment and youth unemployment. Standard diagnostic tests, such as the Kaiser-Meyer-Olkin measure and Bartlett's test of sphericity to ensure data adequacy and statistical validity, while Varimax rotation provides a clear and meaningful factor structure. This approach makes it possible to identify shared structural patterns as well as country-specific constraints and thereby offers an empirically grounded basis for policy formulation aimed at enhancing labour market efficiency, inclusiveness and convergence toward EU standards.

The paper is structured as follows. Section 2 provides a detailed overview of the historical, institutional and macroeconomic developments that shaped labour market trajectories in Central and Southeastern Europe during the transition period. Section 3 outlines the theoretical framework of labour market duality and its empirical relevance for the analysed countries. Section 4 presents the data, methodological approach and the application of factor analysis used to identify composite structural patterns of labour market performance. Section 5 provides a comparative assessment of labour market indicators across the twelve countries, followed by Section 6, which discusses the main findings and policy implications. The paper concludes with Section 7, which summarises the key contributions and highlights areas for further research.

2. THE THEORY OF DUAL LABOR MARKETS – EMPIRICAL RELEVANCE IN THE CASE OF CENTRAL AND SOUTHEASTERN EUROPEAN COUNTRIES

Labor markets in the countries of Southeastern Europe are facing structural disparities, that is, mismatches between the supply and demand of labor in specific activities, sectors, and professions, which lead to a deficit of certain worker profiles while simultaneously experiencing significant levels of unemployment. Labor markets in highly developed countries, but also in developing countries, are a reflection of numerous economic, political, social, cultural, historical, as well as traditional factors. Some of the key determinants influencing the characteristics and performance of the labor market in the countries of Central and Southeastern Europe are related to the efficiency and effectiveness of economic processes, demographic processes, the educational system, the structure of the economy, the healthcare system, the scope and type of the informal labor market, the institutions of the formal labor market, as well as a set of other factors. In summary, these factors contribute to the insufficient, suboptimal utilization of the labor market's potential in some of the countries of Central and Southeastern Europe, primarily in the Western Balkan countries, which results in the so-called "questionable sustainability," that is, the absence of opportunities and perspectives for convergence toward the highly developed European countries. These tendencies contribute to the perception of the Western Balkan countries as the European periphery (Bartlett & Prica, The deepening crisis in the European super-periphery, 2013).

The significant differences in the performance of labor markets between these countries, as well as between individual segments of the labor market within each country, contribute to their dual character. Hence, it is considered justified to emphasize that labor markets in the countries of Southeastern Europe are characterized by a certain degree of duality, without clearly delineating the market segments that are marked by a significant gap in economic performance. The problem of labor market duality implies the existence of long term and systemic challenges that limit the possibilities for worker mobility, particularly the possibility of transitioning from one to another (higher) segment of the labor market. Some economists explain the concept of labor market duality through the significant degree of segmentation (duality) of the overall economy, which is also reflected in the labor market (Lewis, 1954). The concept of dual labor markets was initially considered through the prism of urban and rural regions, where a rural labor market and an urban labor market existed. The rural labor market is primarily focused on increased engagement of workers in specific activities, with agriculture being particularly emphasized, while in the labor markets of urban areas, the focus is placed on non-agricultural activities. As an additional segment, or form of labor market duality, the formal labor market and the informal labor market also appear (Harris & Todaro, 1970).

In a general theoretical context, the duality of labor markets in developing countries can be analyzed through two segments: the primary and the secondary labor market. Within the context of the theory of dual labor markets, it is understood that labor markets are divided into markets with good jobs (primary markets) and labor markets with poor jobs (secondary labor markets) (Dickens & Lang, 1992). In summary, the classical formulation of the theory of labor market duality starts from the assumption that the labor market is segmented into a primary and a secondary labor market. Jobs in the primary labor market are characterized by high wages, good work environment and working conditions, stable employment, opportunities for career advancement, as well as compliance with labor legislation. Jobs categorized as belonging to the secondary labor market are characterized by low wages and insufficient contributions for health and pension insurance, poor working conditions, a significant degree of worker mobility, and insufficient opportunities for career advancement (Doeringer & Piore, 1971). Of course, in practice, certain jobs, according to their characteristics, may fall "in the middle," meaning that according to some criteria they may belong to the primary labor market, while according to other criteria they may be part of the secondary labor market (Osterman, 1975). Hence, in addition to the division between the primary and secondary labor markets, some authors supplement this theory with a primary labor market characterized by lower and upper levels of jobs (Osterman, 1975; Piore, 1975). Additionally, some economists, in defining jobs within the secondary labor market, differentiate between jobs characterized by low wages and jobs that fall within the informal economy and illegal activities (Bluestone, 1970). Furthermore, it is particularly important to emphasize that, in addition to the significant segmentation of labor markets, this theory assumes low and limited labor

mobility between different segments. Therefore, the problem of labor market duality should not be analyzed solely through the prism of the existence of jobs within the secondary labor market, but it is especially important to analyze the (im)possibility for workers to advance toward jobs within the primary labor market (Freedman, 1976).

The concept of duality, or segmentation, of the labor market can also be examined through the lens of different types and forms of employment. The primary labor market consists of sectors characterized by high, above-average wages, high labor productivity, workers employed full time on permanent contracts, and marked by pronounced job and income stability. Employment within the secondary labor market is concentrated in sectors that provide low, below average wages to employees, low labor productivity, a significant presence of self-employed individuals, part time workers, as well as employees on fixed-term contracts (Michael, et al., 1973; Hudson, 2007). Following the previously stated assumptions, it can be concluded that the difference in characteristics, working conditions, and the attractiveness of jobs within the two separate segments creates a significant gap in the supply and demand for workers in the labor markets. In the sectors that belong to the secondary segment, unemployment arises primarily as a result of a large labor supply which, in terms of workers' skills and qualifications, significantly exceeds the labor demand in these sectors. On the other hand, the situation in the sectors that fall within the primary labor market points to a deficit, for example a shortage of jobs requiring specific skills and qualifications.

The duality of the labor market should also be analyzed through the prism of employment status and the various forms of employment. According to employment status, individuals may occupy one of the following forms of employment: wage employees, self-employed, and unpaid family workers. Hence, individuals who are self-employed, as well as those engaged in unpaid family work, fall into the category of persons with vulnerable employment and are therefore classified as workers operating within the secondary labor market (Saunders, 2003). Theoretical and empirical studies show that wage employment, or employment under an employer, provides greater job security and higher earnings for workers (Neal and Rosen, 2000; Polhemus, 2001; McNabb and Whitfield, 2007; Bargain and Kwenda, 2011). Additionally, the so-called vulnerable employment includes the following categories of employment (Saunders, 2003):

- Workers who are self-employed and who fall outside the scope of labor legislation. However, it should be taken into account that not all workers or job positions that fall into the category of self-employed persons belong to the category of vulnerable employment, or fall within the secondary labor market. Some job positions, such as lawyers, consultants, and other self-employed professionals, are characterized by high earnings and stable employment. Furthermore, some individuals who are knowingly and voluntarily self-employed, for various reasons, intentionally register their employment with low earnings or low social security contributions in order to avoid taxation on part of their income and receive it in cash (off the books, outside official statistics).

Nonetheless, a significant share of self-employed workers fall into the category of workers with low and unstable incomes. This is a consequence of the fact that a large part of their total income depends on business collaboration with a few clients. Additional factors that contribute to the categorization of these workers as part of the secondary labor market include: the inability to fully exercise labor rights, such as the right to paid annual leave, overtime pay, statutory minimum wage, paid public holidays, etc.

- Workers who are covered by labor legislation but face difficulties in exercising and realizing their guaranteed labor rights. These outcomes are primarily due to low levels of knowledge and awareness about their labor rights, but also as a result of fear of losing their job if they attempt to claim or exercise part of these rights;
- Workers who are not able to qualify for, or do not meet the conditions for, programs such as unemployment insurance or do not have the ability to exercise the right to a pension;
- Workers characterized by low, long-term earnings, which are primarily the result of jobs with low added value, as well as a lack of stable employment.

The degree of segmentation, or the duality of labor markets, especially in developing countries, should also be analyzed through the prism of the existence of the informal labor market. Hence, the existence of a dual labor market is also a result of the high level of worker engagement within the informal labor market. The share of informal employment in total employment is particularly relevant in developing countries, whereby duality in these countries demonstrates empirical relevance also from the aspect of the engagement of informal employment within both the formal and informal labor markets. Regarding the prevalence of different types of informal employment in developing countries, it is most commonly present in the form of self-employment, while in terms of distribution across sectors, it most frequently occurs in agriculture, personal services, as well as in retail trade and construction.

In terms of sectoral patterns and the distribution of employment across activities, the theory of dual labour markets also demonstrates strong empirical relevance. The duality of labour markets by sector is particularly evident when contrasting agricultural employment with employment in non-agricultural sectors, a distinction repeatedly emphasized in the literature on labour market segmentation in Southeastern Europe. The share of

agriculture in total employment remains especially high in Albania, Romania, Serbia and North Macedonia, where agriculture continues to absorb a large portion of the labour force and plays a critical role in sustaining household livelihoods and rural economies (Bojadjieva et al., 2022; Bucevska & Kozheski, 2022). This sector exerts both direct and indirect effects on employment, particularly in developing economies where agriculture contributes significantly to gross value added and serves as a key input to manufacturing activities, especially the food processing industry (Trpeski et al., 2024; Trenovski et al., 2021).

In the Western Balkans—most notably Albania, Bosnia and Herzegovina, Serbia and North Macedonia—the structure of the economy points to a pronounced duality within the agricultural sector itself. Employment is dominated by numerous small-scale, low-productivity farms operating with fragmented land and limited technological capacity, a pattern consistent with broader findings on labour productivity constraints across the region (Trenovski et al., 2020; Borovic, Z., et al., 2020; Trenovski et al., 2023; Trpeski, Kozheski & Merdzan, 2024). These small agricultural holdings coexist with a very small number of large agricultural enterprises that account for a disproportionate share of total agricultural output. The persistence of such structural polarization aligns with empirical work showing deep productivity divides and uneven sectoral performance between primary and secondary segments of the labour market (Slaveski & Kozheski, 2024; Kozheski et al., 2024). Furthermore, ongoing migration from rural to urban areas, combined with a gradual shift of the labour force from agriculture to other sectors, contributes to a long-term decline in agricultural employment. This trend is consistent with broader evidence of structural transformation and labour reallocation dynamics documented in the SEE region (Trenovski & Kozheski, 2020; Trpeski et al., 2021). As a result, the dual structure of agriculture reinforces wider labour market disparities, limiting productivity growth, constraining formal employment creation and reinforcing the segmentation that is characteristic of labour markets in Central and Southeastern Europe.

The concept of duality in labor markets is also reflected through the prism of significant differences in labor productivity, especially when comparing labor productivity in agriculture with that in non-agricultural activities (Kołodziejczak, 2020). Higher productivity in the industry and service sectors implies that labor and capital in these sectors generate higher added value compared to the gross value added in agriculture. Hence, the reduction of employment in agriculture, that is, the migration of workers from agricultural activities in favor of non-agricultural activities, represents a basis for generating more intensive rates of economic growth. Table 1 presents the structure of jobs according to the theory of dual labor markets, showing the distribution of jobs between the primary and secondary labor market.

Table 1: Segmentation of the Labour Market

Segments of the Labor Market	**Workers**	**Job Characteristics**
Primary Labor Market – Upper Segment (Good Jobs)	Workers employed in the public sector on permanent contracts; Workers employed in the primary private sector (Information Technology, financial services, large corporations).	High job security and stability; Wage rigidity, or resistance to wage reductions.
Primary Labor Market – Lower Segment (Average Jobs)	Workers employed in the private sector on permanent contracts in sectors such as industry, traditional services, small and medium-sized enterprises; Owners of small firms and self-employed persons; Registered farmers.	Moderate job security; wage flexibility reflected in the likelihood of downward wage adjustments; the statutory minimum wage functioning as a lower employment threshold, with occasional delays in payment; and the presence of elements of undeclared or unregistered labor.
Secondary Labor Market (Poor Jobs)	Formally employed workers with flexible contracts: fixed-term, part-time, temporary employment, freelance contracts, etc.; Informally employed workers (individuals informally employed for wages by another employer, unpaid family workers).	Minimal or nonexistent job security; Flexibility of earnings/wages.

Source: Adjusted from (Arandarenko, 2018)

3. DATA AND METHODOLOGY

As emphasized earlier, the analysis of the fundamental characteristics and performance of labor markets in selected Central and Southeastern European countries, together with the mapping of key differences and the development gap across various labor market segments, represents the primary objective of this study. Hence, when analyzing the condition of the various segments of the labor market, it is essential to devote special attention to the structure of the respective national economies in these countries. The structure of the national economy, as well as the stage of economic development in which the national economies are situated, is in direct correlation with the structure and characteristics of the labor market. Additionally, various non-economic

factors, such as labor legislation, labor market institutions, respect for workers' individual rights and freedoms, and the active and passive labor market measures, have a significant impact on labor market performance and the characteristics of the workforce.

The analysis of labor markets through individual segments is the subject of research in both theoretical and empirical literature (Reich, et al., 1973; Pages & Stampini, 2009; Obadic & Viljevac, 2023; Baht, et al., 2023; Kottelenberg & Lehrer, 2019). The contribution of this analysis within the framework of the doctoral dissertation is focused on a detailed analysis of the condition and performance of labor markets in the countries of Central and Southeastern Europe through seven segments of the labor market. The empirical analysis covers 79 labor market indicators that are analyzed using the example of 12 countries from Central and Southeastern Europe: Albania, Bosnia and Herzegovina, Serbia, Macedonia, Bulgaria, Croatia, Slovenia, Romania, Slovakia, the Czech Republic, Poland, and Hungary. The analysis focuses on the period from 2005 to 2022, which implies a large dataset through which the individual segments of the labor market are analyzed. The specific labor market segments and the indicators within each individual segment of the labor market, which are the subject of this analysis, are presented in Table 2.

Table 2: Distribution of the Labor Market by Individual Segments and Groups of Indicators

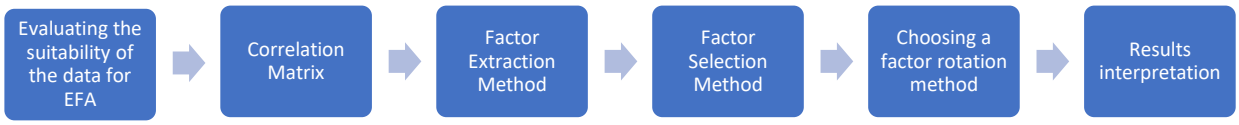
Segment	**Indicators – Number and Characteristics**
Total labor force in the labor market	10 indicators – by gender, age, and level of education
Persons outside the labor force	11 indicators – by gender, age, and level of education
Potential labor force	11 indicators – by gender, age, and level of education
Discouraged job seekers	11 indicators – by gender, age, and level of education
Employment	17 indicators – by gender, age, level of education, and type of employment (full-time or part-time)
Unemployment	13 indicators – by gender, age, level of education, duration of unemployment
Youth unemployment	6 indicators – by gender, duration of unemployment

Source: Author's own elaboration

The econometric analysis applied in this paper is based on factor analysis (FA), using the principal component method, which enables the analysis of a large dataset. This type of factor analysis is a widely used and accepted statistical and econometric technique for analyzing trends and causalities in the social sciences. From a theoretical standpoint, factor analysis is divided into two main categories: Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) (Williams, et al., 2010). Some researchers in their empirical studies have noted that during the period 2003–2004, around 1,700 empirical studies were conducted in which factor analysis was applied (Costello & Osborne, 2005). Factor analysis primarily enables the transformation of large sets of variables (indicators) into a smaller and, more importantly, understandable and easily analyzable set of factors. If researchers applying factor analysis do not have prior assumptions about the number, significance, and interrelationship of the individual indicators, the method of exploratory factor analysis is used. This type of analysis is directed toward creating a model based on a set of factors derived from a large number of variables and data. Conversely, confirmatory factor analysis is used when the selection of variables and factors in the model is guided by a form of structural modeling, meaning that the intention is to test or confirm a theoretical assumption within the empirical framework. In summary, unlike exploratory factor analysis, confirmatory factor analysis is most often used when starting from the a priori assumption of proving a theoretical relationship between the variables (Williams, et al., 2010; Taherdoost, et al., 2022).

For the purposes of this research, Exploratory Factor Analysis (EFA) is applied, which is considered a widely used instrument in the social sciences, especially among socio-economic disciplines, where the analysis is based on the assumption of a certain correlation between individual variables, as well as a theoretical connection regarding their mutual influence (Thompson, 2004; Williams, et al., 2010; Pitombo, et al., 2011). In this study, Exploratory Factor Analysis is primarily used as a data reduction technique rather than as a strict latent-variable modelling framework. The objective is to condense a large set of highly correlated labour market indicators into a smaller number of interpretable composite dimensions that summarize labour market performance across countries. Many of the indicators in the dataset represent demographic and structural disaggregations (by gender, age and education). Consequently, the extracted factors should be interpreted as empirical summaries of correlated labour market characteristics rather than latent theoretical constructs. As the analysis relies on exploratory factor extraction using the principal component method, the emphasis is placed on variance explained, eigenvalues and interpretability of factor structures rather than on global model fit indices typically used in confirmatory factor analysis. Chart 1 presents the individual steps necessary for the implementation of exploratory factor analysis.

Figure 1: Steps in the Implementation of Exploratory Factor Analysis (EFA)



3.1. Sample Size and Data Suitability

The suitability and degree of optimality in the application of factor analysis primarily depend on the dataset and the sample size. Quantitative economists hold a consensus regarding the need for a large dataset in order to ensure proper application and relevant results from factor analysis. Some economists start from the assumption that at least 300 observations are necessary for the appropriate use of factor analysis, while others argue that a sample with more than 100 observations can be considered a sufficiently large dataset (Tabachnick & Fidell, 2001). In this context, some economists make a classification of sample adequacy for the application of factor analysis. Accordingly, a dataset with up to 100 observations is considered poor and suboptimal for factor analysis; a sample of 200 observations is regarded as an adequate sample; 300 observations as a good sample; 500 observations as very good; and finally, a sample with more than 1000 observations is considered an excellent sample.

Additionally, some quantitative economists emphasize that the need and level of optimality for applying factor analysis are not determined solely by the number of observations, but also by the characteristics of the data. Namely, if the data in the analysis are characterized by a high degree of correlation between indicators, as well as significant repetition (recurrence) of indicators within the respective factors, this serves as an indication that the dataset is suitable for the application of factor analysis (Costello & Osborne, 2005).

3.2. Correlation Matrix

One of the necessary statistical techniques for determining the degree of correlation between individual variables (indicators) is the correlation matrix (Henson & Roberts, 2006). The construction of the correlation matrix is considered one of the preliminary steps, which should precede and establish the justification for the application of factor analysis. Accordingly, the degree of correlation between individual indicators is compared to the total variance of the individual factor, which is comprised of the variables within it. If the correlation coefficient shows a degree of correlation lower than 0.3, then the necessity and suitability of applying factor analysis is called into question. In summary, the coefficients from the correlation matrix serve as the basis for both the possibility and the necessity of factor analysis on the given dataset.

3.3. Kaiser–Meyer–Olkin (KMO) and Bartlett's Test for the Adequacy and Suitability of the Dataset for the Application of Factor Analysis

Before proceeding with the application of factor analysis, it is necessary to conduct the Kaiser–Meyer–Olkin (KMO) test and Bartlett's test in order to assess the adequacy of the sample and the suitability of the data for applying factor analysis. For this purpose, when grouping some of the indicators into individual factors that can be appropriately analyzed and interpreted, adequacy tests are used with the main goal of determining the degree of correlation among them (Laura, et al., 2011). The application of the Kaiser–Meyer–Olkin test is specifically aimed at determining the adequacy of the dataset for the application of factor analysis. The value of this test ranges from 0 to 1, whereby values above 0.5 indicate a model suitable for applying factor analysis. Some quantitative economists start from the assumption that if the coefficient value falls within the range of 0.6 to 0.7, then exploratory factor analysis is considered an optimal model for application (Netemeyer, et al., 2003). Additionally, Bartlett's test is also applied in the empirical analysis as a supplementary indicator of sample adequacy and data suitability. This test assumes the existence of statistically significant matrices that are appropriate for applying factor analysis (Tabachnick & Fidell, 2001). Therefore, if the p-value of this test is statistically significant, then it is possible to proceed with the creation of factor analysis.

3.4. Method for factor extraction (selection): Principal Component Method vs. Factor Analysis

The application of different methods for the extraction of the optimal number of factors is observed among empirical studies, as well as among the views of quantitative economists, who state that there is almost no significant difference between the application of the principal component method and factor analysis (Velicer & Jackson, 1990; Steiger, 1990). In the context of extracting the optimal number of factors, the following approaches are most commonly used: Principal Component Analysis (PCA), Principal Axis Factoring (PAF), Maximum Likelihood, Unweighted Least Squares, and Generalized Least Squares (Costello & Osborne, 2005). Among these, Principal Component Analysis (PCA) and Principal Axis Factoring (PAF) are highlighted as the most commonly applied methods in socio-economic research in the empirical literature (Henson & Roberts, 2006). It is important to note that no significant differences are observed between these two methods; the only reason why PCA is more frequently used in practice is that it is set as the first or default option in statistical software.

Methods for Selecting the Optimal Number of Factors (Factor Retention Methods)

After the phase of factor extraction, in which factors are selected based on the extent to which their indicator structure explains the largest share of variance, the next step involves determining the appropriate number of factors to be rotated in the model. If a suboptimal number of factors is chosen—either more or fewer than the optimal number—and they are subjected to rotation, this may negatively affect the final results. Selecting the optimal number of factors to which the rotation method will be applied helps reduce the likelihood of obtaining irrelevant results that could lead to incorrect interpretation and understanding of the effects of individual factors. Therefore, when selecting the number of factors, attention must be paid to both over-selection and under-selection of the number of factors in the model. The criteria used in the selection of factors include: the cumulative percentage of variance explained by the factors, and the Kaiser criterion (eigenvalue > 1). In some empirical studies, the aforementioned criteria are used in parallel.

Given the importance of these two criteria, it is considered justified to provide a brief explanation of their role in selecting the factors to which the rotation method will be applied. The cumulative percentage of variance refers to the conclusion that factors which cumulatively explain 95% of the total variance are selected. Regarding Kaiser's eigenvalue > 1, factors with an eigenvalue greater than 1 are selected. These values represent a set of scalar values associated with the set in matrix equations (Bentler & Kano, 1990; Velicer & Jackson, 1990). Some economists emphasize the need for caution when using this criterion to select the number of factors to be considered in the analysis, as it may lead to suboptimal selection of factors, it may result in an overestimation of the number of factors (Ledesma & Valero-Mora, 2007).

3.5. Method of Factor Rotation in the Model (Rotation Method)

The next phase in the application of factor analysis is the rotation method. The purpose of applying this method is to simplify and clarify the structure of the variables within the individual factors. The rotation method does not affect the fundamental aspects of the analysis; in other words, it does not influence the degree of variation between or within the individual variables (indicators) within the factor. In the application of the rotation method, different approaches exist, of which only the Varimax rotation will be highlighted here, as it is the most widely used method in practice. In addition to Varimax, econometric software typically also offers the quartimax and equamax orthogonal rotation methods. For the purposes of this analysis, the Varimax rotation method was used.

It should be noted that the purpose of applying factor analysis in this study is primarily analytical and descriptive, aiming to summarise highly correlated labour market indicators into a smaller set of composite empirical dimensions. Given that many indicators represent structural disaggregations of labour market variables (e.g. by gender, age and education), the extracted factors should be interpreted as empirical patterns of labour market characteristics rather than strictly latent theoretical constructs.

4. DISCUSSION OF FACTOR ANALYSIS RESULTS

4.1. Factor Analysis Results for Segment 1: Employment

The results of the applied factor analysis presented in Table 3 show that, using the principal component method, four factors were retained. This method allows for the identification of the factors that explain the maximum variance in the data with the smallest number of factors. The results for Factor 1 show that it has the highest eigenvalue of 7.2 and explains approximately 42% of the variance. The difference between its eigenvalue and that of the next factor is 4.06, which emphasizes the strong distinction and significance between Factor 1 and Factor 2 in explaining the variance in the model. Regarding the results of Factor 2, it has an eigenvalue of 3.2 and explains an additional 18.5% of the variance, making these two factors together account for about 61% of the total variance. Furthermore, Factor 1 includes demographic and educational indicators and characteristics of the labor market (see Table 4). These indicators show high loadings in employment among women (0.9146), men (0.8938), and individuals with secondary education (0.9120), indicating their key role in shaping the structure and performance of the labor market. Factor 2, with an eigenvalue of 3.2, explains an additional 18.5% of the variance and is strongly associated with part-time employment, highlighting the distinction between this form of employment and full-time employment.

Regarding the next factor, the eigenvalue of Factor 3 and the degree of variance it explains suggest that this factor has a smaller, yet still significant, contribution to explaining the variations in the model. Factor 3 addresses the challenge of the educational level of workers relative to that required in available jobs. Specifically, the results indicate high loadings for individuals with a lower level of education compared to what is required in relevant jobs (0.9749), for workers with a higher level of education than required (0.9612), as well as those with only primary education (0.9042). These results underscore a structural issue in the labor market that calls for investment in lifelong learning programs and improved alignment between educational qualifications and labor market needs. Factor 4, with an eigenvalue of 1.77, reflects the role of older workers (0.892) and employment in the industrial sector (0.8244), highlighting the continued strong dependence on traditional sectors

and the limited transition toward the tertiary sector (see Table 4).

In summary, the results from the conducted factor analysis indicate the successful identification of four distinct factors that explain about 85% of the total variation in the model. The results emphasize the complex demographic, educational, and sectoral characteristics of the labor market. These factors reflect the need to improve the participation of women and various age categories of workers in the labor market, as well as to introduce structural changes that promote diversification and productivity growth, particularly through the development of the tertiary sector and educational programs. The identified factors provide a basis for the development of measures and policies aimed at increasing the efficiency and inclusiveness of the labor market.

Table 3: Factor Analysis Using the Principal Component Method, Retained Factors: 4

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	7.21965	4.06829	0.4247	0.4247
Factor 2	3.15136	0.86133	0.1854	0.6101
Factor 3	2.29003	0.51661	0.1347	0.7448
Factor 4	1.77342	0.98373	0.1043	0.8491

Source: Author's Own Calculations

Table 4: Factor Analysis Using the Principal Component Method with Factor Rotation

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Uniqueness
Female Employment Population Ratio	**0.9146**	0.3012	0.1593	0.0276	0.0466
Employment Population Ratio by Intermediate Education Level	**0.912**	0.0704	0.2353	-0.0944	0.099
Employment Population Ratio (Age 25-54)	**0.9032**	0.2675	0.2171	-0.1143	0.0524
Male Employment Population Ratio	**0.8938**	0.2749	0.253	0.0773	0.0556
Employment Population Ratio (Age 25-54)	0.7462	0.443	0.1442	-0.0525	0.2234
Employment Population Ratio (Age 55-64)	0.7288	0.0786	-0.0781	0.2811	0.3775
Employment Population Ratio (Advanced Education)	0.5481	-0.0263	0.4765	-0.3017	0.3809
Part time Employment (Female)	0.2472	**0.9557**	0.0035	0.0704	0.0207
Part Time Employment (Male)	0.2407	**0.9549**	0.0742	0.0222	0.0243
Employment by Educational Mismatch (Matched)	0.1907	**0.9412**	-0.0677	0.0488	0.0708
Employment by Educational Mismatch (Undereducated)	0.1333	0.021	**0.9749**	-0.0697	0.0265
Employment by Educational Mismatch (Overeducated)	0.1696	-0.0295	**0.9612**	-0.051	0.0439
Employment Population Ratio (Basic Education)	0.2854	0.0789	**0.9042**	0.0166	0.0944
Employment Population Ratio (Age 65+)	0.0277	0.1208	-0.1749	**0.892**	0.1585
Manufacturing Employment	0.1939	0.0688	0.155	**0.8244**	0.2539
Employment Population Ratio (Less than Basic Education)	0.4394	-0.0028	0.0728	-0.7195	0.2839

Source: Author's Own Calculations

4.2. Results from Factor Analysis – Segment 2: Labor Force

The labor force represents one of the fundamental segments of the labor market. By encompassing the total working-age population, which constitutes the overall labor supply in the economy, it provides information about the capacity and relevant characteristics of the supply side of labor in individual national economies. In analyzing the performance and dynamics of the labor market, factor analysis is applied to identify the key characteristics and differences among the various groups of workers that comprise the total labor force. In the countries of Central and Southeastern Europe, where labor markets have been significantly shaped by transition processes—particularly the shift from a planned to a market economy—these transitions have also substantially influenced labor market structures (Hornstein Tomic, 2019). The results of the factor analysis contribute to the segmentation of the labor force by age, gender, and level of education in the selected Central and

Southeastern European countries. Hence, the factor analysis helps to better understand the significance and role of these variables in labor market performance, as well as the extent to which education and demographic characteristics contribute to labor force segmentation and to the possibility of worker integration into the labor market.

The labor force, as one of the most comprehensive labor market indicators—representing the total working-age population—is included in the factor analysis as Segment 2 of the labor market. The results from the conducted factor analysis for the selected countries of Central and Southeastern Europe (Albania, Bosnia and Herzegovina, Serbia, Macedonia, Slovenia, Croatia, Bulgaria, Romania, Slovakia, Czech Republic, Poland, and Hungary) for the period 2005–2022 are presented in Table 2.7 and Table 2.8. The results show that Factor 1 has the highest eigenvalue of 3.26, meaning it contributes the most to explaining the variance among factors, accounting for approximately 33% of the total variance. Factor 1 is significantly influenced by the total labor force, as well as variables that segment the labor force by age categories and gender distribution.

One of the variables representing a significant source of variation in the labor market is the female labor force aged 25–54, with a factor loading of 0.95. Another variable with a strong influence on the model's variations is the labor force aged 25–54, with a loading of 0.91. The substantial difference between Factor 1 and Factor 2 demonstrates that the individual variables in Factor 1 contribute significantly to the total variance in the model. The cumulative proportion of variance explained by the four factors is 80.61%, suggesting that these four factors account for the majority of variability in labor force-related variables in these countries.

Furthermore, Factor 2 includes indicators related to the educational level of the labor force. In the countries of Central and Southeastern Europe, the level of education—as well as labor market performance—is highly correlated with the characteristics and dynamics of the labor force. The results of the factor analysis suggest that the educational level of the labor force is a determinant explaining a significant portion of the variation within Factor 2. In the context of labor market segmentation, and with respect to the relevance of dual labor market theory, workers with higher education tend to form a distinct market segment, as confirmed by the high factor loadings in Factor 2. This indicates that higher education is correlated with labor force participation.

Additionally, these results reflect a tendency toward the employment of highly educated workers, as well as an increased demand for highly qualified workers in the labor market. Conversely, individuals with low levels of education—based on their characteristics, performance, and qualifications, form a distinct labor market contingent likely to face challenges in labor market integration.

Moreover, Factor 3 (16.6% of the variance) emphasizes the role of the labor force with secondary and higher education, with special emphasis on those with secondary education (0.7573). This indicates that this group remains a significant component of the labor market, although it is less competitive compared to highly educated workers. On the other hand, Factor 4 (12.42% of the variance) is associated with young workers (aged 15–24), with a loading of 0.9027, highlighting the vulnerability of this group, particularly in the face of economic shocks and insufficient integration.

The cumulative variance of 80.61%, explained through the four factors, suggests that the factor analysis successfully captures the main aspects of the labor force in the selected countries. The results show that demographic characteristics, education, and age structure play a key role in shaping the labor force in the countries of Central and Southeastern Europe. This implies that effective policies to improve employability and worker mobility should be aimed at supporting vulnerable groups, increasing educational attainment, and enhancing skills—particularly for young and low-educated workers.

Table 5: Factor Analysis Using the Principal Component Method, Retained Factors: 4

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	3.26205	1.36562	0.3262	0.3262
Factor 2	1.89643	0.23595	0.1896	0.5158
Factor 3	1.66049	0.41855	0.1660	0.6819
Factor 4	1.24194	0.47052	0.1242	0.8061

Source: Author's Own Calculations

Table 6: Factor Analysis Using the Principal Component Method with Factor Rotation

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Uniqueness
Female Labor Force	**0.9526**	-0.0173	0.0257	0.0634	0.0876
Labor Force (Age 25-54)	**0.9124**	-0.2080	-0.0724	0.0597	0.1154
Male Labor Force	**0.7871**	0.0789	0.4791	0.0492	0.1422
Labor (Age 55-64)	**0.6507**	0.1230	0.0295	-0.6278	0.1664
Labor Force (bachelor's degree Holders)	-0.1436	**0.8943**	0.1266	0.0356	0.1623
Labor Force (Age 65 and Over)	0.1506	**0.7658**	-0.2702	0.0940	0.3091
Labor Force (Less than Basic Education)	-0.3632	0.5283	0.4210	-0.4908	0.1708
Labor Force (Intermediate Education)	0.4054	0.1090	**0.7573**	0.0844	0.2432
Labor Force (Advanced Education)	-0.1799	-0.1893	**0.6729**	0.2426	0.4202
Labor Force (Age 15-24)	0.1283	0.1265	0.1756	**0.9027**	0.1218

Source: Author's Own Calculations

4.3. Factor Analysis Results – Segment 3: Unemployment

The results of the factor analysis for the unemployment segment offer a broad coverage of the various characteristics and categories of unemployed individuals across different educational and demographic groups of workers. Using the principal component method, three factors were retained, which account for 96.16% of the cumulative variance and explain approximately 96% of the total variability (see Table 7 and Table 8). The first factor, with an eigenvalue of 8.6, represents the largest portion of the variance, at 70.41%, which indicates its dominant role in explaining unemployment patterns. The second and third factors, with eigenvalues of 2.0 and 1.14 respectively, represent smaller proportions of variance (16.4% and 9.3%), but together with the first factor contribute to the overall explanatory power of the model.

The first factor shows high similarities between the various variables that make up this indicator. Within this indicator, significant positive loadings are observed for unemployment by gender, according to the level of education, as well as according to whether individuals are located in rural or urban areas. These results indicate that these variables share a significant underlying factor that drives unemployment in the selected countries. Thus, the first factor represents the structural characteristics of unemployment that have a significant impact on overall labor market performance. Regarding youth unemployment (ages 15–25), it represents a significant indicator that contributes to the overall variability of unemployment.

With regard to Factor 2, the results indicate that it captures unemployment from the perspective of duration, specifically the length of time individuals remain actively engaged in job search. The highest positive loadings within this factor are observed for unemployment duration from 6 to 12 months (0.95), and for less than 6 months (0.86), which indicates that in the overall variance of unemployment, short-term and medium-term unemployment have the greatest impact. Therefore, it can be stated that a significant share of workers experience short-term, or frictional, unemployment, which reflects situations where individuals remain unemployed only briefly while transitioning between jobs, as well as cases where recent graduates enter the labor market within a relatively short period. Thus, it can be concluded that frictional unemployment represents an immanent characteristic of modern labor markets. However, the fact that in this factor the level of education of the unemployed is also emphasized, as an indicator that contributes to the total variability, requires special caution when analyzing such relations. Namely, within this factor, a relatively high loading is observed for unemployed individuals with incomplete primary education, indicating that some of these workers may face additional challenges in integrating into the labor market and may therefore remain outside employment for a longer period.

Within the third factor, high loadings are also observed for unemployment, especially among individuals with incomplete secondary education (0.85), as well as among unemployed individuals with primary education (0.51). This suggests that Factor 3 captures the educational aspect of unemployment, particularly for those with lower levels of education. The strong positive loading on this factor implies that individuals with lower educational levels and qualifications face significant challenges in integrating into the labor market and exhibit lower employability compared to workers with higher levels of education. Additionally, long-term unemployment (12 months or more) moderately loads on this

factor, which shows that individuals with lower educational qualifications are more likely to experience long-term unemployment. Furthermore, the uniqueness values provide additional insights, with most variables showing low uniqueness, which suggests that the retained factors explain a significant portion of the variance in the data set. However, higher uniqueness values for long-term unemployment (0.1461) and unemployment among individuals with less than primary education (0.2274) suggest that these variables may have unique characteristics that are not fully captured by the three factors.

In conclusion, the factor analysis identifies three essential dimensions of unemployment within the labor market. First, unemployment emerges as a structural determinant that shapes overall labour market performance. Second, the duration of unemployment represents a distinct temporal dimension that influences both the characteristics and the intensity of unemployment. Third, the educational profile of unemployed individuals constitutes an additional dimension that affects the aggregate unemployment rate and the likelihood of successful labour market integration for certain groups. Therefore, these results suggest that addressing unemployment requires a multi-layered approach aimed at structural factors and specific challenges faced by workers with lower levels of education, as well as long-term unemployed individuals. Such results can serve in the creation of additional measures and policies aimed at reducing unemployment in different segments of the labor market, with particular attention to individuals with insufficient skills and qualifications, as well as workers facing long-term unemployment.

Table 7: Factor Analysis Using the Principal Component Method, Retained Factors: 3

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	8.62226	6.61154	0.7041	0.7041
Factor 2	2.01072	0.86888	0.1642	0.8683
Factor 3	1.14184	0.80133	0.0932	0.9616

Source: Author's Own Calculations

Table 8: Factor Analysis Using the Principal Component Method with Factor Rotation

Variable	Factor 1	Factor 2	Factor 3	Uniqueness
Unemployment (Age 15 and Above)	**0.9902**	-0.1068	-0.0265	-0.0004
Unemployment (Male)	**0.9895**	-0.0789	0.0202	-0.0004
Unemployment (Intermediate Education)	**0.9869**	-0.0869	-0.0878	0.0016
Unemployment (Age 15-25)	**0.9814**	-0.0307	-0.0997	0.0131
Unemployment (Female)	**0.9794**	-0.1405	-0.0709	-0.0012
Unemployment (Urban Areas)	**0.9642**	-0.0959	-0.1692	0.0052
Unemployment (Rural Areas)	**0.9350**	-0.1417	0.1926	0.0293
Unemployment (Advanced Education)	**0.8813**	-0.1323	-0.2228	0.0485
Unemployment (Basic Education)	0.7620	-0.1574	0.5147	0.0378
Long-Term Unemployment (12 months or more)	0.6286	0.5001	-0.1158	0.1461
Unemployment (Duration 6-12 months)	-0.0366	**0.9493**	0.0412	0.0846
Unemployment (Duration Less than 6 months)	-0.4037	**0.8604**	-0.0282	0.0734
Unemployment (Less than Basic Education)	-0.2135	0.0418	**0.8496**	0.2274

Source: Author's Own Calculations

4.4. Factor Analysis Results – Segment 4: Discouraged Workers Seeking Employment

The results of the conducted factor analysis related to the category of discouraged job seekers emphasize that two factors have been identified as relevant (see Table 9 and Table 10). Factor 1 contains a dominant portion of the variations in the model, with an eigenvalue of 6.53435 it accounts for around 72.6% of the total variance. This proportion points to the high significance of the individual variables that are part of Factor 1 and that have a considerable impact in determining the share of the labor force that is discouraged from seeking employment. The results from Factor 1 show that particularly significant categories of workers who are discouraged from job searching are individuals aged 25–54, as well as those who have only completed primary education. Regarding Factor 2, although it has a smaller contribution to explaining the total variance in the model, with an eigenvalue of 1.26273 it explains about 14% of the total variance in the model. This factor highlights the

importance of discouraged workers aged over 65, as well as individuals with higher education in determining the total variance in the model. Hence, the cumulative variance explained by Factor 1 and Factor 2 reaches 86.6%, which emphasizes the high level of coverage of the individual variables in the model.

The results from the loadings within the factors show that variables such as gender, age structure, and educational level are key determinants in determining discouragement in the labor market. For example, discouraged women and men show high positive loadings within Factor 1, with values of 0.9250 and 0.8918, respectively, which suggests that discouragement is a widespread phenomenon in terms of the gender distribution of the labor force. Furthermore, the high loadings for discouraged workers with primary education (0.9369) indicate significant challenges faced by this group, especially due to the mismatch of their skills and qualifications with the needs of the labor market. Factor 2, on the other hand, highlights the importance of specific groups, such as workers aged over 65 (loading of 0.8703) and those with higher education (loading of 0.7106). These results indicate the existence of different mechanisms and barriers that influence discouragement, which require detailed analysis for a better understanding of their nature. In this regard, it is worth noting that some empirical studies that also emphasize the demographic and educational structure as part of the determinants of the labor market particularly highlight the educational level of the labor force, as well as its alignment with the needs of the labor market (Yunisvita, et al., 2021). The results of the factor analysis in this segment lead to the conclusion that among discouraged workers seeking employment, the main indicators are considered to be the level of education and the age of the workers.

Table 9: Factor Analysis Using the Principal Component Method, Retained Factors: 2

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	6.53435	5.27162	0.7260	0.7260
Factor 2	1.26273	0.60568	0.1403	0.8663

Source: Author's Own Calculations

Table 10: Factor Analysis Using the Principal Component Method with Factor Rotation

Variable	Factor 1	Factor 2	Uniqueness
Discouraged Job Seekers (Age 25-54)	0.9462	0.2707	0.0315
Discouraged Job Seekers (Basic Education)	0.9369	0.0260	0.1215
Discouraged Job Seekers (Female)	0.9250	0.3179	0.0433
Discouraged Job Seekers (Male)	0.8918	0.3628	0.0732
Discouraged Job Seekers (Age 15-24)	0.8858	-0.0331	0.2142
Discouraged Job Seekers (Intermediate Education)	0.7492	0.5218	0.1665
Discouraged Job Seekers (Age 55-64)	0.6567	0.6230	0.1806
Discouraged Job Seekers (Age 65 and above)	-0.0635	0.8703	0.2386
Discouraged Job Seekers (Advanced Education)	0.6014	0.7106	0.1335

Source: Author's Own Calculations

4.5. Factor Analysis Results – Segment 5: Youth Unemployment

Youth unemployment and its far-reaching implications for labor markets in Central and Southeast European countries is a subject of analysis among academic economists (O'Reilly, et al., 2015; Tomic, 2018; Cefalo & Scandurra, 2023). High rates of youth unemployment not only represent an indicator of the level of underutilization of human potential, but also contribute to an increased risk of social exclusion, poverty, and reduced employment prospects for this category of workers. The labor markets in Southeast European countries, especially among the Western Balkan countries, are characterized by significant structural distortions, increased levels of mismatch between the educational profile of workers and the required qualifications for available jobs, which lead to a permanent reduction in the potential for generating new added value from young workers. Reducing youth unemployment is a key factor in creating and maintaining long-term economic growth rates, improving and strengthening social cohesion, and ensuring the successful integration of young people into the labor market, either as wage employees or entrepreneurs who establish their own businesses.

The results from the conducted factor analysis of this labor market segment, youth unemployment, based on the structure of the indicators, identify only one relevant factor (Table 11). Factor 1, with an eigenvalue of 3.78, explains about 94.4% of the total variance among the individual variables that contain data on youth unemployment. These results point to the high significance of the variables related to demographic characteristics and the variables that indicate the duration of youth unemployment. Particularly high factor loadings, ranging from 0.9625 to 0.9772, signal a strong correlation within the variables of Factor 1. This structure of

variables, complemented by the high level of loading within the factor, is an indicator of its importance in determining youth unemployment in Central and Southeast European countries. Additionally, one of the variables that has a significant impact on youth unemployment is long-term youth unemployment, that is, young workers who have been unemployed for more than 12 months (see Table 12). Long-term youth unemployment is particularly prominent among the female labor force, indicating gender disparities in the success rate of youth integration into the labor market. Furthermore, significant loadings within Factor 1 are also observed among men and women aged 15–29, which shows that, although with different intensity between men and women, they face a range of challenges in the process of finding sustainable employment in the countries of Central and Southeast Europe. In summary, the factor analysis applied to youth unemployment – as one of the segments of the labor market – points to the significance of long-term youth unemployment as one of the factors that negatively affects the potential for increasing medium- and long-term labor productivity in the countries of Central and Southeast Europe.

Table 11: Factor Analysis Using the Principal Component Method, Retained Factors: 1

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	3.77666	3.59216	0.9442	0.9442

Source: Author's Own Calculations

Table 12: Factor Analysis Using the Principal Component Method with Factor Rotation

Variable	Factor 1	Uniqueness
Youth Unemployment (Duration More than 12 months, Female)	0.9772	0.0451
Youth Unemployment (Age 15-29, Male)	0.9756	0.0483
Youth Unemployment (Age 15-29, Female)	0.9714	0.0565
Youth Unemployment (Duration More than 12 months, Male)	0.9625	0.0736

Source: Author's Own Calculations

4.6. Factor Analysis Results – Segment 6: Persons Outside the Labour Force

Persons who are outside the labor force represent a significant segment of the labor market, especially in developing countries that are facing an intensive outflow of the working-age population. Therefore, within the individual segments of the labor market, factor analysis is also applied to persons who are outside the labor force. The analysis of this category of workers enables a detailed examination of the determinants that influence their exclusion from the labor market, as well as the opportunities and potentials for their activation. In this regard, the conducted factor analysis explores the basic characteristics of persons who are outside the labor force.

The results of the factor analysis identify one dominant factor, with an eigenvalue of 8.66, which explains 86.6% of the total variance in the model (see Table 13). This indicates that Factor 1 successfully consolidates the most important variables related to persons outside the labor force, including gender, age groups, and level of education. The high factor loadings, ranging from 0.3185 to 0.9993, indicate a strong correlation among these indicators within Factor 1. It is important to note that these high loadings are observed equally for both men and women, which indicates a pronounced participation of both genders in the overall variability within this segment of the labor market. These results point to the pronounced contribution to the total variation of both men and women who are outside the labor force (Table 14).

In terms of age categories, the high factor loadings for young people (15–24 years) and persons aged over 55 indicate that these groups are particularly represented among persons who are outside the labor force. For example, for persons aged over 65, the factor loading is 0.9738. These results show that, despite different reasons (e.g., educational obligations, retirement, or health limitations), these age groups are highly represented among the inactive population. In the context of educational level, persons with primary and secondary education dominate in this segment, with factor loadings of 0.9616 and 0.9828, respectively. Additionally, the results show that persons with higher education (loading of 0.9080) are also significantly represented, indicating the existence of challenges for their activation in the labor market. However, the lowest loading is recorded among persons with less than primary education (0.3185), which suggests their marginalization and potential exclusion.

The results of the analysis serve as a basis for the creation of additional measures and policies aimed at activating and integrating persons outside the labor force, with a focus on youth and older working-age groups, as well as those with lower education. Policies should include educational and training programs to improve the qualifications and skills of young people, inclusive measures for older workers such as flexible work arrangements and improved working conditions, and initiatives for reintegrating marginalized groups through training, as well as opportunities for upskilling and reskilling these individuals. These findings confirm the

claims of empirical research on the importance of demographic and educational characteristics as key determinants of labor market activity, providing a foundation for identifying specific groups that should be targeted to increase economic activity or reduce inactivity.

Table 13: Factor Analysis Using the Principal Component Method, Retained Factors: 1

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	8.66049	7.71562	0.8660	0.8660

Source: Author's Own Calculations

Table 14: Factor Analysis Using the Principal Component Method with Factor Rotation

Variable	Factor 1	Uniqueness
Persons outside the labor force (Male)	0.9993	0.0015
Persons outside the labor force (Female)	0.9989	0.0022
Persons Outside the Labor Force (Age 15-24)	0.9816	0.0365
Persons Outside the Labor Force (Age 55-64)	0.9854	0.0289
Persons Outside the Labor Force (Age 65 and above)	0.9738	0.0517
Persons Outside the Labor Force (Advanced Education)	0.9080	0.1756
Persons Outside the Labor Force (Intermediate Education)	0.9828	0.0340
Persons Outside the Labor Force (Basic Education)	0.9616	0.0754
Persons Outside the Labor Force (Less than Basic Education)	0.3185	0.8986

Source: Author's Own Calculations

4.7. Factor Analysis Results – Segment 7: Potential Labour Force

The results from the factor analysis in the case of the potential labor force, as one of the segments of the labor market, using the principal component method, indicate the retention of two factors which significantly explain the variations affecting the potential labor force in the labor market in the countries of Central and Southeastern Europe (see Table 15). Namely, the values of Factor 1 show that it has an eigenvalue of 7.58704, which accounts for approximately 76 percent of the total variance, while Factor 2, with an eigenvalue of 1.58636, explains an additional 16 percent of the total variance in the model. Cumulatively, these two factors explain 92% of the total variance in the model. This high cumulative proportion indicates the fact that the structure of the variables (indicators) in these two factors explains the largest part of the variance within the potential labor force.

The application of the rotation method enables analysis of the structure and loadings with the individual determinants that make up the potential labor force within the two factors. Factor 1 is strongly associated with variables representing the age structure, gender structure, and level of education of the potential labor force (see Table 16). Thus, with the exception of persons who have not completed primary education, persons with completed primary, secondary, or higher levels of education show positive loadings within factor 1. The significant positive degree of loading for both men and women leads to the conclusion that this factor does not make a significant distinction between male and female potential participants in the labor force. Furthermore, within factor 2, a different dimension of the potential labor force is represented, focusing on the positive loading of persons who have not acquired primary education, which indicates that within this factor, workers who have no formal education are included and may be influenced by factors that will affect their inclusion in certain segments of the informal labor market as a result of educational barriers and insufficient qualifications for integration into formal employment (see Table 16).

The negative loading values for workers with higher education within this factor suggest that these individuals are less likely to participate in the informal labor market and are more likely to be integrated into the formal economy. Regarding the results for uniqueness in the model, they represent the variance within each variable that is not explained by the retained factors, and they are relatively low for most variables, which shows that the two factors have a significant scope in the total variance in the model. However, the relatively high uniqueness value for individuals with incomplete primary education indicates that certain characteristics within this group of the potential labor force require further examination, as they are not fully captured within the scope of this analysis.

Summarized, the factor analysis reveals a clear dichotomy within the potential labor force, based on the traditional determinants of employability such as educational attainment and age (Factor 1), as well as the likelihood of integration into the informal labor market, particularly among individuals who have not completed primary education (Factor 2). These findings underscore the presence of segmentation and duality within the labor markets of Central and Southeastern European countries, reflecting a dual structure even within the

pool of potential workers. This, in turn, highlights the need for differentiated and well-targeted policy measures aimed at ensuring the effective and sustainable integration of these groups into the labor market.

Table 15: Factor Analysis Using the Principal Component Method, Retained Factors: 2

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	7.58704	6.00068	0.7587	0.7587
Factor 2	1.58636	1.13702	0.1586	0.9173

Source: Author's Own Calculations

Table 16: Factor Analysis Using the Principal Component Method with Factor Rotation

Variable	Factor 1	Factor 2	Uniqueness
Potential Labor Force (Education Intermediate)	0.9731	0.0972	0.0435
Potential Labor Force (Age 55-64)	0.9694	-0.0526	0.0574
Potential Labor Force (Advanced Education)	0.9531	-0.1589	0.0664
Potential Labor Force (Female)	0.9483	0.2673	0.0293
Potential Labor Force (Male)	0.9461	0.2715	0.0311
Potential Labor Force (Age 25-54)	0.9263	0.3605	0.0120
Potential Labor Force (Age 65 and above)	0.9039	-0.2739	0.1079
Potential Labor Force (Age 15-24)	0.8324	0.4473	0.1071
Potential Labor Force (Less than Basic Education)	-0.1619	0.8682	0.2200
Potential Labor Force (Basic Education)	0.6144	0.6861	0.1517

Source: Author's Own Calculations

5. DISCUSSION OF THE RESULTS OF THE CONDUCTED FACTOR ANALYSIS ON LABOUR MARKET PERFORMANCE AND CHARACTERISTICS

5.1 Structural Determinants of Labour Market Performance

The results of the conducted factor analysis provide a comprehensive and comparative overview of the performance and specific characteristics of labour markets in the countries of Central and Southeastern Europe. The analysis highlights the importance of demographic, educational and structural factors in shaping labour market outcomes across the analysed economies.

The findings indicate that the labour force aged 25–54 represents a key segment of economic activity, with high factor loadings reflecting its central role in sustaining labour productivity. The availability of a qualified labour force as a determinant of labour market performance has also been emphasised in previous empirical studies (Gebel, 2022). At the same time, unemployment emerges as a multidimensional challenge reflecting the structural characteristics of individual economies. These challenges are closely related to the limited absorption capacity of labour markets and the mismatch between the qualifications and skills of workers and those required by employers.

In several Western Balkan countries, Albania, Serbia, North Macedonia and Bosnia and Herzegovina, unemployment rates have remained in double digits for extended periods, particularly with regard to youth and long-term unemployment. The persistent presence of long-term unemployment, especially in North Macedonia, further illustrates the structural constraints affecting labour markets in this part of the region. Long-term unemployment reflects deep and persistent imbalances associated with the transition from centrally planned to market economies. The transition process exposed structural weaknesses within national economies and highlighted the limited ability of labour markets to absorb labour supply. In this sense, long-term unemployment can be interpreted both as a consequence and as a symptom of broader structural challenges, including shifts in industrial structures, weaknesses in education systems and limited opportunities for employment in dynamic and high value-added sectors. Consequently, long-term unemployment should not be viewed solely as a result of short-term macroeconomic fluctuations but rather as a structural phenomenon associated with insufficient economic adaptation and limited labour market flexibility.

Empirical studies frequently identify long-term unemployment as one of the most severe forms of unemployment and a significant challenge for developing and transition economies. Prolonged exclusion from the labour market often leads to economic inefficiency and increased financial dependency among affected individuals. Structural weaknesses and incomplete economic transformation reduce the capacity of labour markets to absorb additional labour supply, particularly within industrial sectors undergoing restructuring. When technological progress is not accompanied by sufficient job creation, a segment of the labour force remains persistently excluded from employment, contributing to the persistence of long-term unemployment. Individuals affected by long-term unemployment often include workers with lower levels of education, inadequate skills and qualifications, as well as older workers who have been outside the labour market for extended periods.

Although this labour force could potentially contribute to economic productivity, prolonged absence from employment increases the risks of marginalisation and socio-economic exclusion. In addition, long-term unemployment may increase dependence on social transfers, which can also affect the fiscal capacity of national economies.

The importance of long-term unemployment within the principal component analysis further highlights the structural characteristics of labour markets in the analysed region. Workers experiencing prolonged unemployment frequently face significant barriers to re-employment, including skill obsolescence, limited opportunities for retraining and social or psychological factors that reduce job-search intensity. Empirical research suggests that when effective retraining and reintegration policies are absent, long-term unemployed individuals face continued economic exclusion and declining labour market participation (Carter, 2015). High levels of long-term unemployment may also affect the broader economic potential of a country. Some authors associate persistent long-term unemployment with low growth in labour productivity, which may lead labour markets into a so-called "low equilibrium trap", a state characterised by a high share of long-term unemployment, weak productivity growth and low labour force participation.

In many countries of Central and Southeastern Europe, persistently high levels of long-term unemployment indicate limited capacity to create sustainable employment opportunities that correspond to the evolving structure of the economy and technological change (Landmann, 2004; Berger et al., 2019). Consequently, long-term unemployment represents not merely a statistical indicator but an important socio-economic signal of deeper structural challenges. Addressing this issue requires targeted policy measures, including retraining and upskilling programmes that enable the reintegration of long-term unemployed individuals into the labour market and support productivity growth and sustainable economic development.

5.2 Labour Market Segmentation and Vulnerable Groups

The results of the principal component analysis applied to different labour market segments indicate a significant presence of discouraged workers, particularly among individuals aged 25–54 with basic levels of education. Although these individuals belong to the economically active population, their withdrawal from active job search reflects broader structural inefficiencies within labour markets. Discouraged workers often emerge as a consequence of prolonged unemployment, persistent skill mismatches and insufficient labour market integration measures. Empirical literature on transition economies highlights the role of structural segmentation in shaping labour market outcomes (El-hadj & Brada, 2014). The presence of discouraged workers therefore reflects not only individual characteristics such as education and skills but also broader structural limitations, including the lack of available employment opportunities and the limited effectiveness of labour market institutions.

The analysis further indicates that workers with lower levels of education frequently experience marginalisation within labour markets. This marginalisation often results in exclusion from the formal sector and limited access to stable and secure employment. Such patterns contribute to the emergence of labour market "vicious circles", where individuals remain outside the labour market, engage in informal employment or become trapped in low-paid positions. The results also support the concept of labour market duality. Workers with secondary and higher education are more likely to be integrated into the formal sector and to participate in employment aligned with modern labour market demands. Conversely, individuals with incomplete or only primary education face higher risks of long-term unemployment and lower participation in formal employment. As a result, these workers often experience increased dependence on social transfers and passive labour market measures.

5.3 Cross-Country Differences in Labour Market Performance

The factor analysis results reveal significant differences in labour market performance among the countries of Central and Southeastern Europe. These differences reflect varying models of economic transition, the effectiveness of institutional reforms and the capacity of labour markets to integrate diverse groups of workers. It is important to note that labour market outcomes are influenced not only by economic policies but also by broader historical, social and cultural factors.

Countries such as Slovenia, Czechia, Slovakia and Poland demonstrate comparatively stronger labour market performance. In these economies, labour market institutions appear more effective in facilitating the integration of women and individuals with lower levels of education. The successful integration of these groups reflects both effective transition processes and the diversified industrial structures of these economies. For example, Slovenia exhibits relatively high female labour force participation, supported by active labour market policies and social measures encouraging labour market integration. Similarly, Czechia shows a high participation rate of workers with tertiary education, reflecting policies aimed at retraining and skill upgrading in response to technological and structural economic changes. In contrast, Western Balkan countries, including Albania, North Macedonia and Bosnia and Herzegovina, continue to face significant structural challenges. High levels of youth and long-term unemployment indicate limited labour market capacity to generate sufficient employment opportunities. Workers with lower education levels, women and older individuals often experience reduced prospects for labour market integration. Some studies attribute these outcomes to insufficient labour market reforms and limited effectiveness of policy

measures implemented in these economies (Pizzinelli et al., 2023).

Another important challenge concerns the mismatch between education systems and labour market demands. In several Western Balkan countries, individuals with tertiary education are often employed in positions requiring lower levels of qualification, while workers with limited education encounter serious barriers to stable employment. Such mismatches contribute to persistent labour market segmentation and high levels of youth and long-term unemployment. Romania, Bulgaria, Croatia and Hungary have achieved partial improvements in labour market outcomes, particularly in terms of declining unemployment rates. Nevertheless, these countries continue to face structural challenges related to the integration of low-educated workers, youth employment and labour productivity growth. Empirical studies also emphasise the regional dimension of labour market disparities, particularly in rural areas where employment opportunities remain limited (Bacher et al., 2017; Cefalo & Scandurra, 2023).

Overall, the analysis indicates that labour market performance across Central and Southeastern Europe is shaped by a complex interaction of demographic, educational and structural factors. Economies with higher levels of economic development, such as Slovenia, Czechia and Slovakia, demonstrate stronger capacity to integrate vulnerable groups into the labour market. These outcomes suggest more effective labour market institutions and more successful implementation of economic reforms. At the same time, education level, gender and age emerge as key determinants of labour market outcomes. In more developed labour markets these factors contribute to higher productivity, stronger inclusiveness and lower structural unemployment. In contrast, Western Balkan economies continue to face persistent structural challenges, including lower productivity levels, gender disparities in employment, skill mismatches and the continued presence of informal labour markets.

6. CONCLUSION

This study examined the long-term structural transformations of labour markets in twelve Central and Southeastern European countries during the period 1993–2024, drawing on a multidimensional analytical framework that combines descriptive statistics, labour market theory and factor analysis. The findings reveal that despite more than three decades of transition, labour markets in the region continue to exhibit profound differences in performance, institutional capacity and structural resilience. These differences stem not only from initial transition conditions, but also from the varying depth, pace and sequencing of economic reforms across countries.

The results demonstrate that labour market duality remains a defining structural feature of the region. Advanced EU member states such as Slovenia, Slovakia, the Czech Republic and Poland have gradually consolidated primary labour market characteristics higher-quality jobs, more stable employment relations, and stronger social protection systems. In contrast, Western Balkan economies continue to face persistent vulnerabilities, including high informality, low employment rates, limited mobility and pronounced skill mismatches. These factors contribute to the sustained presence of a large secondary labour market segment characterised by precarious work, vulnerable self-employment and weak institutional protections. The application of factor analysis enabled the identification of latent structural patterns that underpin labour market outcomes. The extracted factors—relating to inactivity, discouraged workers, the structure of employment, unemployment dynamics and youth labour market performance—collectively illustrate the multidimensional nature of labour market disparities. The separation between Western Balkan countries and more advanced EU members is structurally embedded across several factor dimensions, suggesting that convergence cannot be achieved solely through economic growth, but requires deeper institutional reforms and targeted labour market interventions.

Sectoral disparities, particularly the enduring reliance on agriculture as a major source of employment in parts of Southeastern Europe, further amplify the structural divide. Low productivity, technological stagnation and fragmented agricultural structures continue to limit the capacity of these economies to generate quality non-agricultural employment and to transition workers toward higher productivity sectors. These constraints are exacerbated by demographic pressures, including migration, population aging and shrinking labour force participation. Institutional factors also remain central in shaping labour market performance. Rigid labour regulations, insufficient enforcement, low awareness of worker rights and weak social protection frameworks continue to constrain market efficiency and adaptability. The 2008 financial crisis and the COVID-19 pandemic exposed these vulnerabilities, revealing limited capacity to respond to external shocks and highlighting the need for more resilient labour market institutions.

Taken together, the findings underscore the importance of a multidimensional reform agenda aimed at strengthening labour market resilience, enhancing inclusiveness and supporting convergence with EU standards. Priority areas include: improving the alignment of education and training systems with labour market needs; accelerating structural transformation toward higher-productivity sectors; strengthening activation policies; modernising labour regulations to balance flexibility and security; and addressing informality through incentives, enforcement and improved social protection coverage.

Ultimately, this comparative assessment demonstrates that labour market transformation in Central and Southeastern Europe is an ongoing and uneven process. While significant progress has been made in several countries, persistent structural gaps—especially between the Western Balkans and the more advanced EU members—highlight the need for sustained policy commitment and long-term institutional strengthening. Only through coordinated reforms can the region achieve durable labour market convergence, enhance economic competitiveness and improve social and employment outcomes for its populations.

REFERENCES

1. Bartlett, W., & Prica, I. (2013). The deepening crisis in the Western Balkans: A socioeconomic perspective. LSE Research on Southeastern Europe.
2. Bluestone, B. (1970). The tripartite economy: Labor markets and the working poor. American Economic Review, 60(2), 406–413.
3. Boeri, T. (1999). Transition with labour supply. OECD Publishing.
4. Bojadjieva, D., Mamucevska, M., Cvetanoska, M., Kozheski, K., Mujčinović, A., & Gašparović, S. (2022). The impact of education on youth employability: The case of selected Southeastern European countries. Youth & Society, 54(2_suppl), 29S–51S.
5. Borović, Z., Rebić, M., & Tomaš, D. (2020). Total factor productivity drivers in the selected EU countries: Cointegration approach. Zbornik radova Ekonomskog fakulteta u Rijeci, 38(1), 295–315.
6. Bucevska, V., & Kozheski, K. (2022). Determinants of youth unemployment in SEE countries. Management Research & Practice, 14(4).
7. Dickens, W. T., & Lang, K. (1992). Labor market segmentation theory: Reconsidering the evidence. Explorations in Economic History, 29(1), 1–22.
8. Doeringer, P. B., & Piore, M. J. (1971). Internal labor markets and manpower analysis. D.C. Heath.
9. Đogo, M., Gligorić, D., Grujić, M., & Mekinjić, B. (2023). The impossible trinity of developing countries–the Greek example. Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu, 41(1), 271-297.
10. European Commission. (2009). Employment in Europe report 2009. Directorate-General for Employment, Social Affairs and Equal Opportunities.
11. Ferragina, A. M., & Pastore, F. (2008). Mind the gap: Unemployment in the new EU regions. Journal of Economic Surveys, 22(1), 73–113.
12. Harris, J. R., & Todaro, M. P. (1970). Migration, unemployment and development: A two-sector analysis. American Economic Review, 60(1), 126–142.
13. Hudson, J. (2007). Vulnerable workers in the European Union. European Journal of Industrial Relations, 13(3), 287–304.
14. Kołodko, G. W. (2004). Transition to a market economy: The road ahead. Palgrave Macmillan.
15. Kovtun, D., Cirkel, M., Murgasova, Z., Smith, D., & Tambunlertchai, M. (2014). Boosting job growth in the Western Balkans (IMF Working Paper).
16. Kuddo, A. (2009). Employment services and active labour market programs in Eastern Europe and Central Asia. World Bank.
17. Kozheski, K., Slaveski, T., Trpeski, P., & Trenovski, B. (2024). Labour productivity, wages, and inflation: Evidence from selected Central and South-East European countries. Journal of Euroasian Economies.
18. Kozheski, K., Slaveski, T., Trpeski, P., & Trenovski, B. (2024). Macroeconomic determinants of labour productivity: An empirical analysis of the Republic of North Macedonia. In Proceedings of the 5th International Conference "Economic and Business Trends Shaping the Future" (pp. 174–190). Faculty of Economics–Skopje.
19. Lehmann, H. (2010). Labour markets in Eastern Europe and Central Asia: The crisis and beyond. IZA Policy Paper, 21.
20. Lehmann, H., & Muravyev, A. (2010). Labour market institutions and informality in transition and developing countries. In Handbook of the economics of the informal sector.
21. Lewis, W. A. (1954). Economic development with unlimited supplies of labour. The Manchester School, 22(2), 139–191.
22. McNabb, R., & Whitfield, K. (2007). The impact of self-employment on earnings inequality. Economica, 74(296), 397–418.
23. Michael, J., et al. (1973). Labour market segmentation: A review. Economic Inquiry, 11, 97–109. (Napomena: "et al." nije standardno u referencama—ako imaš kompletne autore, treba ih navesti.)
24. Neal, D., & Rosen, S. (2000). The theory of labour markets. In Handbook of economics (pp. 315–356).
25. Osterman, P. (1975). An empirical study of labor market segmentation. Industrial and Labor Relations Review, 28(4), 508–523.
26. Piore, M. J. (1975). Notes for a theory of labor market stratification. In Labour market segmentation. Lexington Books.
27. Polhemus, J. (2001). Labour market flexibility and worker security in transition economies. ILO.
28. Rutkowski, J. (2006). Labour market developments during economic recovery. World Bank.
29. Saunders, P. (2003). Vulnerable workers and precarious jobs. Social Policy Research Centre.
30. Slaveski, T., & Kozheski, K. (2024). Labour productivity, wages, and inflation: Evidence from selected Central and South-East European countries. Journal of Euroasian Economies.
31. Trenovski, B., Gligorić, D., Kozheski, K., & Merdzan, G. (2023). Do wages reflect growth productivity? Comparing the European East and West. Journal of Balkan and Near Eastern Studies, 25(4), 683–699.
32. Trenovski, B., Trpkova-Nestorovska, M., Merdzan, G., & Kozheski, K. (2020). Labour productivity in terms of the fourth industrial revolution. Southeast European Review of Business and Economics, 1(2), 38–51.
33. Trenovski, B., Kozheski, K., Tashevska, B., & Peovski, F. (2021). The minimum wage impact on labour productivity: The case of selected SEE countries. Management Research and Practice, 13(3), 32–42.

34. Trenovski, B., & Kozheski, K. (2020). Theoretical foundation of the great decoupling between productivity and labor compensation. Knowledge: International Journal, 43(1).
35. Trpeski, P., Kozheski, K., & Merdzan, G. (2024). Labour productivity in the selected SEE countries: Trends and determinants. Economic Horizons, 26(1).
36. Trpeski, P., Trenovski, B., Merdzan, G., & Kozheski, K. (2021). The impact of ICT on labour productivity: Europe vs US. SHS Web of Conferences, 129, 08021.