Annals of "Dunarea de Jos" University of Galati
Fascicle I. Economics and Applied Informatics
Years XXXII – nº1/2026
ISSN-L 1584-0409 ISSN-Online 2344-441X
www.eia.feaa.ugal.ro

DOI https://doi.org/10.35219/eai15840409581

Professional Training and Employment in Romania: An Analysis Based on Eurostat Data (2015–2023)

Bianca Elena Miron★, Angela-Eliza Micu★★, Ana-Maria Săcuiu★★★, Isabelle-Ana-Maria Vîlsan★★★★

ARTICLE INFO

Article history:
Received March 25, 2026
Accepted April 20, 2026
Available online April 30, 2026

JEL Classification
J24, J21, I26, J08

Keywords:
professional training; lifelong learning; employment outcomes; labor market; human capital; Romania

ABSTRACT

This article analyzes the relationship between participation in professional training and employment outcomes in Romania, based on Eurostat data from 2015–2023. The research adopts a quantitative design, using seven indicators: adult participation in education and training, perceived need for training, participation in online courses, NEET rate, overqualification, employment rate, and unemployment. The methodology includes descriptive statistics, Pearson correlations, and principal component analysis (PCA). The results highlight an increase in participation in training from 6.6% (2015) to 12.3% (2023) and an improvement in the employment rate from 59.2% to 68.7%. The correlation analysis confirms the strong positive association between participation in training and employment ($r = 0.809$, $p < 0.01$) and the negative correlation with overqualification ($r = -0.707$, $p < 0.05$). PCA identifies two dimensions: occupational integration and persistent vulnerabilities. The study provides an updated empirical analysis and benchmarks for public policies targeting the adaptability of the workforce in Romania.

1. Introduction

Romania has one of the lowest rates of adult participation in education and training in the European Union only 6.6% in 2015, compared to the EU aggregate level of approximately 16.2% (Eurostat, 2022). This gap persists in a context marked by technological change and economic restructuring, which require continuous adaptation of skills, while labor market efficiency increasingly depends on the ability to translate acquired skills into concrete occupational outcomes.

The specific challenges for Romania include a high rate of NEET (8.2% in 2015 for the 15–29 age group), persistent levels of overqualification (18.7%), and a structural imbalance between the skills acquired through education and the occupational requirements of the labor market (Eurostat, 2022; Eurofound, 2012; Diaconu, L. 2014). These developments raise questions about the effective contribution of professional training programs to improving labor market outcomes.

Although the literature highlights a positive relationship between participation in professional training and occupational outcomes such as increased employment opportunities and reduced unemployment (Card, Kluve, & Weber, 2018, Kluve et al., 2019), empirical research shows that the magnitude of these effects is variable. Meta-analyses suggest that the impact of training varies significantly depending on the type of program, the target group, and the institutional context (Card, Kluve, & Weber, 2018).

In this context, the favorable evolution of employment in Romania, from 59.2% in 2015 to 68.7% in 2023, raises additional questions about the role of professional training in supporting this dynamic. This study contributes to the literature by providing an empirical analysis of the relationship between participation in professional training and employment outcomes at the national level, using official Eurostat data for the period 2015–2023.

Specifically, the research seeks to answer the following questions:

- How have professional training and employment indicators evolved in Romania over the last decade?
- Are there significant correlations between participation in training and occupational outcomes?
- What are the latent dimensions that structure the relationship between professional training and the labor market at the national level?

★, ★★, ★★★, ★★★★Ovidius University of Constanța, Romania. E-mail addresses: bianca.miron@365.univ-ovidius.ro (Corresponding author - B. E. Miron) - angela-eliza.micu@365.univ-ovidius.ro (A. E. Micu), sacuiu.ana-maria@365.univ-ovidius.ro (A. M Săcuiu), isabelle.vilsan@365.univ-ovidius.ro (I. A. M. Vîlsan).

2. Literature review

From a theoretical perspective, human capital theory provides the central conceptual framework for understanding the relationship between education, training, and employment (Becker, G. S. 1993). Investments in skills contribute to increased productivity and labor market integration. However, from a human resource management perspective, the effectiveness of training does not depend entirely on investment, but also on the ability of systems to align the skills acquired with occupational requirements (skills matching). International literature emphasizes that the effectiveness of training investments depends both on the relevance of the skills developed and on the labor market's ability to absorb and capitalize on these skills (Vandenberg, Laranjo, & Aguilar, 2020; Carruthers & Jepsen, 2021).

In the field of human resource management, continuous training is considered an essential tool for supporting employee performance and adaptability. Studies show that training programs contribute to the development of skills relevant to organizations and reduce the risk of mismatches between qualifications and occupational requirements (Giday & Perumal, 2022, Maheswari & Nalini, 2025). These issues are particularly relevant in the Romanian context, which is characterized by sectoral differences and unequal use of skills in the labor market.

Participation in training is determined by structural factors such as geographical and temporal access to programs, associated costs, and local labor market characteristics (Boeren, E. 2016). Studies show that the effectiveness of training is significantly influenced by the relevance of program content to the specific needs of employers and by institutional mechanisms that facilitate the transition from training to employment (Vandenberg, Laranjo, & Aguilar, 2020). The literature on human resource management highlights that training effectiveness increases when individuals perceive the relevance of skills for personal and occupational professional development (Deci & Ryan, 2000). Complementarily, goal-setting theory shows that formulating clear and relevant goals can increase the effectiveness of the learning process and influence the results obtained from participating in training (Locke, E. A., & Latham, G. P. (2002).

From an empirical perspective, european studies show that training has positive effects on employment, but these effects are varied and dependent on the institutional context and the characteristics of the participants (Card, Kluve, & Weber, 2018, Kluve et al., 2019). Analyses of skills mismatches show that overqualification and inefficient use of skills can limit the impact of training on labor market performance (Quintini, 2011; McGuinness et al., 2018). Romania illustrates this issue: low participation in training (6.6% in 2015) coexists with persistent overqualification (18.7%), suggesting difficulties in aligning training provision with market requirements (Andrei et al., 2012).

European reports emphasize the importance of aligning training programs with the real needs of the labor market and supporting professional transitions (CEDEFOP, 2022; European Commission Joint Research Centre, 2025). In this context, the literature supports the need for empirical analyses focused on Romania, which assess how participation in professional training is reflected in employment outcomes.

3. Methodology

The study adopts a quantitative research design, focusing on examining the relationship between participation in professional training and employment outcomes in Romania, based on data provided by Eurostat, which ensures the methodological consistency of indicators and their comparability over time.

The period analyzed covers 2015–2023, allowing for the investigation of medium-term labor market developments and the identification of structural changes, including the effects generated by exceptional economic contexts (the COVID-19 pandemic, 2020–2021). The population analyzed includes people aged 15 to 64, depending on the specifics of each indicator used.

In order to capture both the extent of participation in training and its results on the labor market, seven indicators relevant to the national context were selected. These reflect different dimensions of professional development, skills utilization, and labor market integration in Romania. The indicators analyzed includes:

1. *Participation of the population in education and training in the last four weeks (25–64 years old);*
2. *Perceived need for training (25–64 years old);*
3. *Participation in online courses (25–64 years old);*
4. *NEET rate (15–29 years old);*
5. *Overqualification rate (25–64 years old);*
6. *Employment rate (15–64 years old);*
7. *Unemployment rate (15–64 years old).*

The statistical analysis was performed using SPSS Statistics software. In a first stage, descriptive statistics were applied to analyze the evolution of indicators over time, as well as their distribution and variation. Afterwards, Pearson correlations were calculated to investigate the relationships between participation in professional training and variables associated with employment outcomes, in order to identify statistically relevant associations.

To complement these analyses, principal component analysis (PCA) was used for exploratory purposes, to reduce dimensionality and identify latent structures that synthesize the relationships between the indicators analyzed. The application of PCA allows the main dimensions characterizing the interaction between

professional training and the labor market in Romania to be highlighted, without replacing descriptive or correlational analysis, but rather complementing it.

The approach adopted focuses exclusively on Romania and seeks to identify longitudinal trends and relationships between professional training and employment performance at the national level, using nationally aggregated data from official Eurostat sources. This perspective provides a solid empirical basis for interpreting the results and formulating relevant conclusions in the context of the Romanian labor market.

4. Results

4.1. Evolution of professional training and employment indicators in Romania (2015–2023)

To highlight the dynamics of the relationship between professional training and employment outcomes in Romania, the analysis begins with a presentation of the evolution of the main indicators for the period 2015–2023 (Table no. 1). This approach allows for the identification of general trends and structural changes that have occurred in the labor market over the last decade.

Table no. 1 Evolution of professional training and employment indicators in Romania (2015–2023)

Indicators	EducTrain	NeedTrain	NrPartic	NEET	QualRate	EmplRate	UnemplRate
ROMANIA 2015	6.6	4.9	42.54	8.2	18.7	59.2	8.4
ROMANIA 2016	7	5.8	41.81	7.1	17.2	60.3	7.2
ROMANIA 2017	6.8	5.3	45.22	5.6	17.7	62.7	6.1
ROMANIA 2018	6.8	5.9	41.88	6.2	18	63.9	5.3
ROMANIA 2019	7	4.6	43.12	5.9	16.2	65.1	4.9
ROMANIA 2020	6.7	4.2	39.86	6.1	17.2	65.2	6.1
ROMANIA 2021	10.3	3.9	42.41	7.7	16.2	67.1	5.6
ROMANIA 2022	11.2	3.9	42.52	7	16.5	68.5	5.6
ROMANIA 2023	12.3	4.2	44.23	6.3	16	68.7	5.6

Source: Own processing based on Eurostat data, https://ec.europa.eu/eurostat/databrowser/

The data indicate a significant increase in adult participation in education and training, particularly since 2021. After a period of relative stability between 2015 and 2020, the EducTrain indicator shows accelerated growth, reaching 12.3% in 2023, suggesting an intensification of engagement in lifelong learning activities.

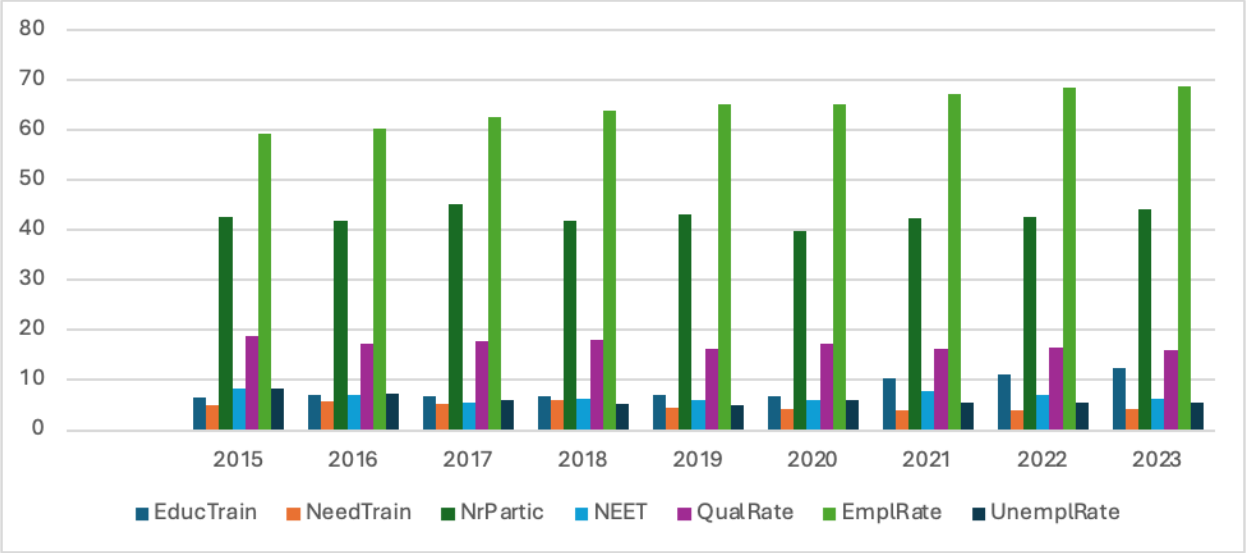
In contrast, the perceived need for training (NeedTrain) shows a downward trend over the period analyzed, with lower values after 2019. This development suggests either a better match between existing skills and labor market requirements or a reduced perception of the need for training in a dynamic context.

Participation in online courses (NrPartic) remains relatively stable, ranging between 39.86% and 45.22%, with moderate fluctuations, suggesting a constant use of alternative forms of learning, without a marked expansion during the period analyzed.

At the same time, the NEET rate shows a general downward trend, from 8.2% in 2015 to 6.3% in 2023, with some variations during the pandemic, indicating a slight improvement in the educational and professional integration of young people. In terms of employment outcomes, the data show a steady increase in the employment rate, from 59.2% in 2015 to 68.7% in 2023, accompanied by a reduction in the unemployment rate from 8.4% to 5.6%. This development suggests a strengthening of the labor market in Romania, despite the economic shocks during the period under review.

The overqualification rate shows a slight downward trend, from 18.7% in 2015 to 16% in 2023, indicating better use of skills in the labor market. However, the relatively high level of this indicator highlights the persistence of structural imbalances between professional training and occupational requirements.

For a visual summary of the evolution of the main indicators analyzed, (Graphic no. 1) illustrates the general trends in professional training participation and employment outcomes in Romania between 2015 and 2023.



Graphic no. 1. Evolution of professional training and employment indicators in Romania (2015–2023)
Source: Own processing in Microsoft Excel based on Eurostat data

Overall, the period under review is characterized by three main trends: accelerated growth in participation in training after 2020, substantial improvement in employment indicators, and a moderate but persistent reduction in structural imbalances in the labor market.

4.2. Statistical profile of the indicators analyzed (2015–2023)

In order to assess the average levels and degree of variability of the indicators analyzed for the period 2015–2023, arithmetic means and standard deviations were calculated, with the results summarized in Table no. 2. This descriptive analysis provides an overview of the stability and dispersion of the values recorded for each indicator during the analyzed interval.

Table no. 2 Statistical profile of indicators on professional training and employment in Romania (2015-2023)

Descriptive Statistics			
	Mean	Std. Deviation	Analysis N
EducTrain	8.300	2.2842	9
NeedTrain	4.744	.7764	9
NrPartic	42.6211	1.52003	9
NEET	6.678	.8743	9
QualRate	17.078	.9311	9
EmplRate	64.522	3.3648	9
UnemplRate	6.089	1.0799	9

Source: Own processing in SPSS based on Eurostat data

Indicators associated with participation in professional training show differentiated average levels, reflecting the variability of learning behaviors. Participation in education and professional training (EducTrain) has an average value of 8.3%, with moderate variability, indicating relatively low and uneven involvement in training activities. At the same time, the perceived need for training (NeedTrain) has an average of 4.74%, with low dispersion, suggesting a relatively constant perception of the need for skills development.

Participation in online courses (NrPartic) stands at an average level of 42.62%, with limited fluctuations, indicating relatively stable use of digital forms of learning during the period analyzed.

Indicators reflecting difficulties in professional integration show persistent average levels. The NEET rate has an average value of 6.68%, indicating the persistence of a vulnerable segment in relation to education and employment. Similarly, the overqualification rate (QualRate) averages 17.08%, signaling the existence of structural imbalances between acquired skills and occupational requirements.

In terms of employment outcomes, the employment rate has an average value of 64.52%, with moderate variability, reflecting a relatively stable employment dynamic in Romania. The unemployment rate

averages 6.09%, indicating a constant level of unemployment in the medium term, without significant variations.

Overall, the descriptive analysis suggests relative stability in the indicators analyzed, along with the persistence of structural imbalances related to participation in professional training and the use of skills in the labor market.

4.3. Relationships between professional training indicators and employment

Pearson's correlation analysis highlights the structure of the relationships between professional training indicators and employment outcomes in Romania for the period 2015–2023 (Table no. 3). This analysis allows the direction and intensity of associations between variables to be identified, without implying causal relationships.

Table no. 3 Pearson correlations between participation in training and labor market indicators in Romania (2015-2023)

Correlation Matrix[a]								
		EducTrain	NeedTrain	NrPartic	NEET	QualRate	EmplRate	UnemplRate
Correlation	EducTrain	1.000	-.667	.284	.163	-.707	.809	-.356
	NeedTrain	-.667	1.000	.057	-.179	.634	-.731	.281
	NrPartic	.284	.057	1.000	-.241	-.138	.092	-.132
	NEET	.163	-.179	-.241	1.000	.207	-.260	.635
	QualRate	-.707	.634	-.138	.207	1.000	-.812	.677
	EmplRate	.809	-.731	.092	-.260	-.812	1.000	-.772
	UnemplRate	-.356	.281	-.132	.635	.677	-.772	1.000
Sig. (1-tailed)	EducTrain		.025	.229	.338	.017	.004	.173
	NeedTrain	.025		.442	.323	.033	.013	.232
	NrPartic	.229	.442		.266	.362	.407	.368
	NEET	.338	.323	.266		.297	.249	.033
	QualRate	.017	.033	.362	.297		.004	.023
	EmplRate	.004	.013	.407	.249	.004		.007
	UnemplRate	.173	.232	.368	.033	.023	.007	
a. Determinant = 4.284E-6								

Source: Own processing in SPSS based on Eurostat data

The results indicate a strong positive correlation between participation in education and training (EducTrain) and the employment rate (EmplRate) ($r = 0.809$, $p < 0.01$). This association suggests that higher levels of participation in training are correlated with higher employment rates. At the same time, EducTrain is negatively correlated with the overqualification rate (QualRate) ($r = -0.707$, $p < 0.05$), indicating an association between participation in training and a better alignment of skills with occupational requirements.

The employment rate also shows significant negative correlations with the overqualification rate ($r = -0.812$, $p < 0.01$), suggesting that skills mismatch is associated with lower levels of employment. Regarding the relationships between training indicators, the perceived need for training (NeedTrain) is negatively correlated with the employment rate ($r = -0.731$, $p < 0.05$) and positively correlated with the overqualification rate ($r = 0.634$, $p < 0.05$). These associations indicate that the perception of skills shortages is more common in contexts characterized by poorer employment outcomes and inefficient use of skills.

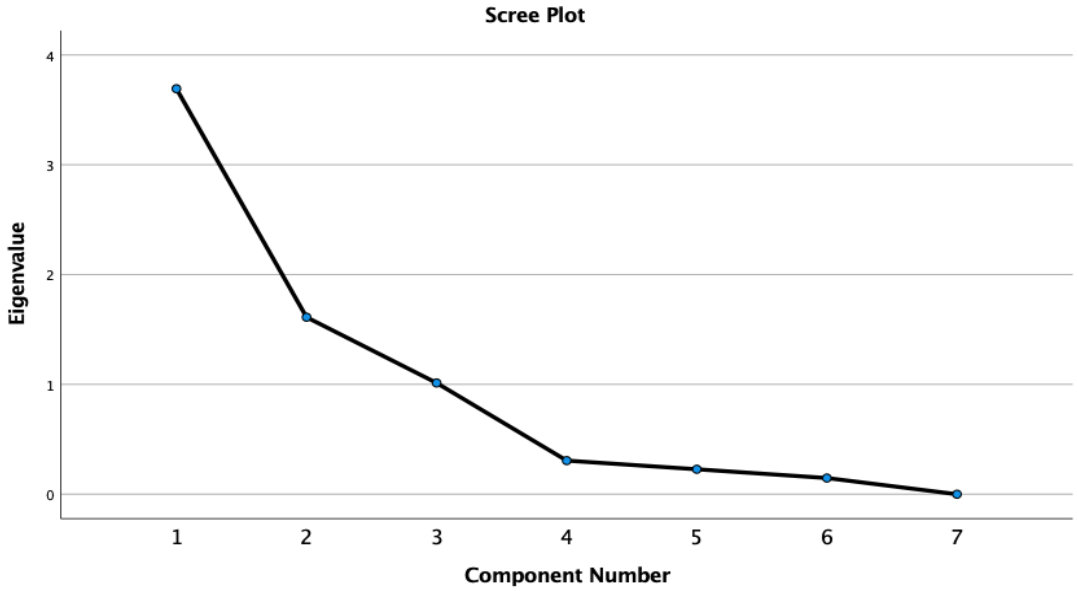
The other correlations are low or moderate in intensity and not statistically significant, indicating weaker or unstable relationships between variables. The results highlight the existence of consistent associations between participation in professional training, skills utilization, and employment outcomes in Romania, as well as a mixed structure of relationships between indicators.

4.4. The latent structure of professional training and employment indicators (PCA)

Principal component analysis (PCA) was applied to identify the latent structure of the relationships between professional training indicators and employment outcomes in Romania for the period 2015–2023. The purpose of this analysis is to reduce the dimensionality of the set of variables and highlight the main dimensions that synthesize the common variation of the analyzed indicators. Examination of the values and Graphic no. 2 Scree Plot indicates that the first two principal components have eigenvalues greater than the reference threshold of 1. These two components account for over 70% of the total variation in the data, statistically justifying their retention and the reduction of dimensionality to two principal factors.

The first principal component concentrates a high proportion of the total variation and reflects a dimension associated with labor market performance, integrating the relationships between participation in professional training, the employment rate, and the use of skills. The second component captures a

complementary dimension associated with integration difficulties and skills mismatches, reflected in indicators such as the NEET rate, the overqualification rate, and the unemployment rate.



Graphic no. 2 Scree plot of own values in principal component analysis for Romania (2015–2023)
Source: Own processing in SPSS based on Eurostat data

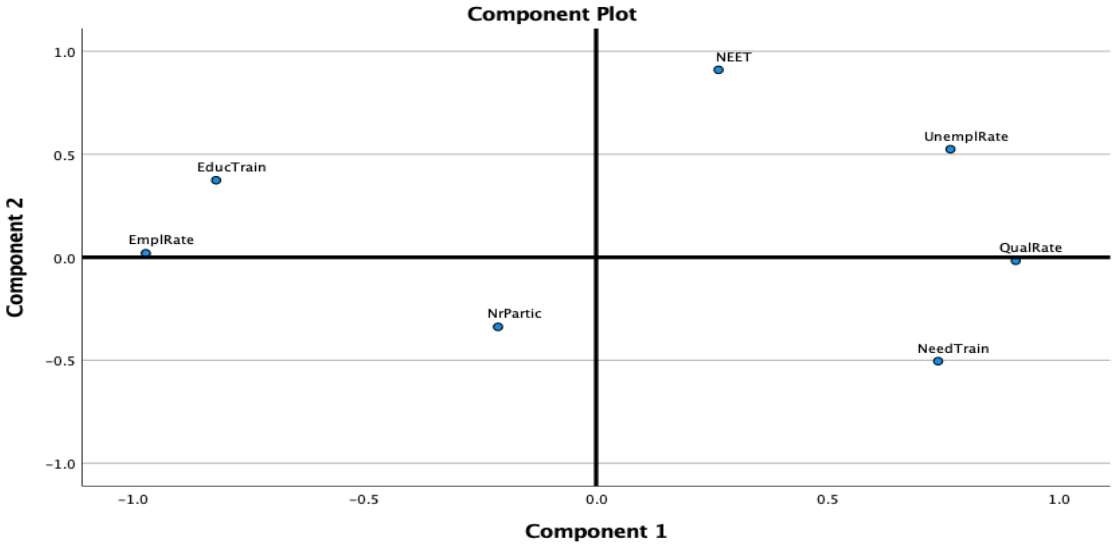
The factorial structure highlighted suggests the existence of two distinct but interrelated dimensions that characterize the relationship between professional training and the labor market in Romania: one oriented towards integration and occupational performance and a second associated with the risks of exclusion and inefficient use of human capital. The PCA results confirm the multidimensional nature of the relationship between professional training and employment outcomes and provide a relevant summary of the interactions between the indicators analyzed in the national context.

The component plot in Graphic no. 3 highlights how the indicators analyzed are distributed across the two main components identified for Romania in the period 2015–2023, providing additional information on the structural relationships between professional training and employment outcomes.

The distribution of variables on the first component axis suggests a clear separation between indicators associated with labor market performance and those reflecting dysfunctions or imbalances. The overqualification rate (QualRate), the unemployment rate (UnemplRate), and the perceived need for training (NeedTrain) are positioned in the same direction of the principal component, indicating a convergence between difficulties in professional integration and the perception of skills shortages.

This configuration suggests the existence of a structural mechanism in which the shortage of relevant skills is associated with poor labor market outcomes. In contrast, participation in education and training (EducTrain) and employment rate (EmplRate) are positioned on the opposite direction of the first component, reflecting a distinct dimension associated with integration and occupational stability. This arrangement indicates that involvement in training activities is correlated with better labor market absorption, but functions as a separate pole from structural vulnerability indicators. The NEET indicator is placed in an intermediate area, with loads on both components, suggesting a cross-sectional role in the factor structure. This position reflects the complex nature of the NEET phenomenon, which is influenced by both participation in training and general labor market conditions.

Participation in online courses (NrPartic) has a moderate contribution and is located relatively close to the center of the axes, indicating a complementary role in explaining the variation in indicators, without dominating the factor structure.



Graphic no. 3 Representation of the main components of professional training and labor market indicators in Romania (2015–2023)

Source: Own processing in SPSS based on Eurostat data

The factorial representation supports the polarization of the relationship between professional training and employment outcomes in Romania, highlighting the coexistence of occupational integration mechanisms and persistent structural vulnerabilities.

5. Discussion

The results highlight a complex and multidimensional relationship between participation in professional training and labor market performance in Romania between 2015 and 2023. Statistical analysis suggests that professional training is associated with favorable employment outcomes, but the intensity and consistency of these effects are conditioned by how the skills acquired are utilized in the labor market structure.

The strong positive correlation between participation in education and professional training and the employment rate ($r = 0.809$, $p < 0.01$) confirms the importance of investing in human capital, in line with Becker's (1993) human capital theory. This association indicates that involvement in training activities can support labor market integration and the adaptability of the workforce to economic requirements. At the same time, the negative relationship between participation in training and the rate of overqualification ($r = −0.707$, $p < 0.05$) suggests that continuing training can contribute to a more efficient use of skills, reducing the mismatch between skill levels and occupational requirements, an aspect also highlighted in the literature on skills development policies (Quintini, 2011; McGuinness et al., 2018).

At the same time, the results highlight structural limitations to the impact of professional training. The positive association between the perceived need for training and indicators of labor market vulnerability, such as overqualification ($r = 0.634$, $p < 0.05$) and unemployment, indicates that the perception of skills shortages is common in contexts characterized by poorer occupational outcomes. This finding is in line with the conclusions of CEDEFOP (2022) and the reports of the European Commission Joint Research Centre (2025), which emphasize that the effectiveness of training depends essentially on the relevance of the skills developed and their correlation with actual labor market demand.

The principal component analysis confirms the existence of two distinct dimensions that structure the relationship between professional training and employment in Romania. The first dimension is associated with integration and performance in the labor market, reflecting the link between participation in training and employment levels. The second dimension captures structural vulnerabilities, including unemployment, overqualification, and the NEET phenomenon, suggesting the persistence of difficulties in professional integration even in the presence of training opportunities.

The positioning of the NEET indicator in an intermediate area of the factor structure highlights its complex nature, which cannot be explained solely by a lack of participation in training. This observation supports approaches in the literature that recommend integrated policies, combining professional training with active employment measures and targeted social interventions (Eurofound, 2012; Scarpetta et al., 2010). For Romania, where the NEET rate fluctuated between 5.6% and 8.2% during the period analyzed, with a notable increase during the pandemic (2020-2021), the results suggest the need for multisectoral strategies that address both educational and economic and social barriers.

Overall, the results indicate that, although professional training plays an important role in improving employment outcomes in Romania, its effectiveness depends on the quality of the programs, the relevance of the skills developed, and the labor market's capacity to absorb skilled labor.

The increase in participation in training from 6.6% in 2015 to 12.3% in 2023 was accompanied by a substantial improvement in the employment rate (from 59.2% to 68.7%), but the persistence of high levels of overqualification (16% in 2023) and NEET rates (6.3%) signals the need for qualitative, not just quantitative, adjustments to the training offer. In the absence of complementary interventions to address structural imbalances, policies focused exclusively on increasing participation in training may have limited effects.

6. Conclusions

Overall, the analysis indicates that participation in professional training is consistently associated with favorable employment outcomes in Romania during the period 2015–2023. Engagement in education and training activities correlates positively with the employment rate ($r = 0.809$, $p < 0.01$), suggesting that investments in continuing learning are accompanied by better occupational integration. At the same time, the negative association between participation in training and the rate of overqualification ($r = -0.707$, $p < 0.05$) indicates a possible improvement in the match between skills and job requirements in the context of increased involvement in training activities.

The correlation results and the structure revealed by the principal component analysis confirm the multidimensional nature of the relationship between professional training and employment. The analysis highlights the coexistence of a dimension associated with integration and occupational performance, reflected in the link between participation in training and employment levels, and a dimension correlated with structural vulnerabilities such as unemployment, overqualification, and the NEET phenomenon. This structure suggests that improving employment outcomes depends not only on intensifying training, but also on the labour market's ability to effectively capitalise on the skills acquired.

At the same time, the results indicate the persistence of barriers that may limit the impact of professional training on employment. The still relevant level of overqualification (16% in 2023, compared to 18.7% in 2015) signals the existence of gaps between the structure of available skills and occupational demand, and the positioning of indicators associated with vulnerability highlights the fact that certain segments of the population remain at risk of exclusion, even in the presence of training opportunities. The NEET rate (6.3% in 2023) and the unemployment rate (5.6%) indicate the need for interventions complementary to training.

The analysis also presents important methodological limitations that must be considered when interpreting the results. First, the use of nationally aggregated data does not allow for the capture of sectoral, regional, or individual differences, which could reveal significant variations in the effectiveness of professional training. Second, the small size of the longitudinal sample ($n = 9$ years) limits the statistical power of the analyses. Third, the methods applied, based on correlations and factor analysis, highlight associations and latent structures without supporting causal inferences; it cannot be established with certainty whether participation in training leads to improved employment or whether people who are already employed have more opportunities to participate in training.

From an applied perspective, improving results depends mainly on the relevance and quality of professional training, not just on expanding participation. Three courses of action are needed: (1) closer alignment of training provision with the actual demand for skills in the labor market, (2) updating training content in line with technological and structural changes, and (3) strengthening cooperation between training providers, public institutions, and the business community through strategic partnerships. At the same time, reducing the vulnerabilities associated with unemployment and the NEET phenomenon requires integrating training with active employment measures and support for the transition to work, including career counseling services and mentoring programs.

Future research directions could build on these findings by using micro- or sector-level data, which would allow for a more detailed analysis of differences across economic sectors, regions, and socio-demographic groups. The application of advanced quantitative methods could help to test the causal relationships between participation in professional training and employment outcomes.

Qualitative approaches, such as interviews with training program beneficiaries, employers, and training providers, could also provide relevant information on the barriers and facilitators of training participation and skills transfer in the professional context. Investigations into the quality of training programs and the relevance of the skills developed would thus contribute to a deeper understanding of the role of professional training in occupational integration in Romania.

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