

Impact of European Projects on Human Resources

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Abstract. *In the knowledge-based economy, effective public policies and programs that enhance the quality of human capital are an essential requirement for maintaining the competitiveness of the European economy on a global scale. As regional disparities remain to this day, the Structural Funds aim to promote convergence by improving the economic efficiency of the poorest states. It is normal to analyze and determine the effect that European funding has on the development of human capital in those regions. In order to emphasize the significance of European funding and the relationship between the level of support offered through the implementation of European projects and the development of human capital, we have carried out a bibliometric study of the data available in the WOS database. The 479 scientific articles were extracted using the tag "impact of European projects on human resources" by applying specific filters and keywords. The searches were distributed by year, by country, by affiliated institutions, and by the highest word density of the reviewed articles.*

The stages of the investigation method were based on the PRISMA Statements methodology. The conclusions of the article are a starting point for future analyzes regarding the impact of European funds on human resources, considering that the end of the second programming period of the structural funds accessed directly by Romania was 2023.

Our findings show the existence of 4 separate directions of analysis and substantiation of the results.: cluster 1 contains the impact of European funding on the development of human resources; cluster 2 contains systems for distribution, prioritization and selection of potential beneficiaries; cluster 3 contains references to the specific policies of the European Union, and cluster 4 contains articles that analyze models for the allocation, management and evaluation of European funds. For the specific analysis of a certain field of research, we can have as a starting point a keyword found in the 4 clusters with the links within the clusters and between the clusters to find new topics of interest, new interdisciplinary correlations and new methods of approach.

Keywords: Impact of European projects, human resources, European Structural Funds, Cohesion policy, bibliometric research, Vosviewer

Introduction

Projects financed from non-reimbursable funds of the European Union represent a crucial pillar of social and economic development in the member states. One of the main objectives of the funding in the last decade has been to improve the skills of human resources in the Member States and increase the level of employment.

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The issue of absorption of structural funds is a particularly complex one, which is why this research creates a holistic picture of this process. This research assumes only the realistic, tangible part of the complexity of the realities generated by the processes and regulations that govern the activity of the use of European funds, evoking only the indubitable evidence that leads to certain logical conclusions, “knowledge management being a precondition for the success of a project in the current context, characterized by a dynamic and constantly changing environment” (Ajmal, 2009).

The most important resource in choosing the research theme is the assessment in an equidistant manner of the impact that European funds have in the development of human resources, because extremely heterogeneous, often blunt and contradictory opinions have been issued around this process.

Increasing the level of professional training of the active population. Human resources currently have a degree of training and information that has never been achieved before, in fact which represents an additional asset for the organizations' performances. At the same time, as experience proves it, an organization whose members have a higher training than most employees become more and more critical and much less willing to accept existing regulations and authority. This situation is characteristic of young employees who, in most situations, oppose the resistance of their superiors. Instead, employees more in age continue to conform to traditional social values, often identifying with membership organizations. In this context, the effective management of human resources must value the qualities, knowledge and skills of young people and maintain loyalty to the older ones.

To determine the perception of the impact that the implementation of European-funded projects has on the development of human capital in developing countries, the present analysis was carried out by selecting a relevant source from which the scientific works were identified - the Web of Science database. The constitution of the sample of scientific articles started from the use of the search tag "impact of European projects on human resources". Later, after applying Keyword added and specific filters Web of Science, the selection on which the analysis was made had 479 relevant works. The analysis of the bibliometric data collected about them (distribution by year, states of origin, affiliation of authors, distribution by year, areas covered) was carried out by interpreting the results provided by the Web of Science platform and using the VOSviewer software.

In the framework of the research, a focus is made on the results recorded by educational institutions and companies in the absorption of European funds, the element that led to the choice of this topic is aimed at the poverty of research efforts that accurately capture the impact that the structural funds accessed by these two entities have in the development of human resources.

By researching the scientific articles within the sample, with the help of the VOSviewer software, other aspects besides the usual ones related to the classifications of European funds were revealed by analysing the content and links within and between the resulting clusters. Knowledge (expressed in data) and information are two sides of the same coin: data is the objective side of information, and information is the subjective side of data. Objective data is transformed into information through a subject's perception and interpretation. (Dobrescu, 2010). By choosing filters, keywords, and the number of appearances, the team that researched the proposed theme was able to present an original point of view that would be the basis of discussions based on their own experiences.

Literature review

Classic human resource development activities such as education and training, employment, and job specialization as well as research and development (R&D) are normally freely provided by the market if individuals or companies who purchase them or finance consider them will get more benefit than their cost. All these activities will be offered and developed by private entities if they consider that they can obtain their profit or benefits (Becker, 2009). However, in the case of developing countries, even at a theoretical level, some limitations appear due to the existence of market failures and equity problems, limitations that make public intervention necessary.

Thus, in developed countries, the level of investment in human resources development activities represents one of the major phenomena of progress and economic development of society, and the yield obtained is also high because companies demand qualified people because they believe that competent people are available, and people individuals invest in education because they believe that organisations will need their knowledge and will be remunerated accordingly (Mateescu& Neagu, 2014).

But in underdeveloped countries the opposite happens; organizations do not demand skills because they do not believe they are available, and individuals do not invest in skills because they do not believe they will be remunerated. Breaking this last vicious cycle requires a long process of adjustment that can only be accelerated by public intervention.

Also, in support of this approach comes the theory of segmentation (Reynolds & Masters, 1987) states that in large companies, operating in an oligopoly, training is rewarded, while in small companies, operating in a competitive environment, training is not so well rewarded.

The need for public intervention is also supported by the fact that the development of human resources has a profound macroeconomic impact on economic growth.

The European Social Fund (ESF) is a way to promote the offer of human resources development, by massively supporting the financing of training, employment and research and development (R&D) activities. The expansion of supply is so significant that it can generate an increase in demand. Furthermore, since most courses offered with ESF support are almost free to those who purchase them, the price of training tends to fall, leading to an increase in demand. Thus, the ESF becomes a very important public support mechanism for the labor market with implications at both the microeconomic and macroeconomic levels.

The study by Vukašina explores how EU structural and investment funds have influenced regional growth and employment in the EU 12. By analysing regional data, the author highlights the significant contribution of these funds to stimulating economic development and job growth in the beneficiary regions emphasizing regional spillover effects. (Vukašina et al, 2022)

In the 2023 paper Crucitti analyses the effect of the ESF on regional disparities and argues that structural fund interventions aimed at promoting the socio-economic integration of marginalized communities, participation in the labor market or the modernization of labor market institutions generate an increase in the aggregate labor supply. (Crucitti et al., 2023)

A moderate conclusion regarding the stimulating effect of the European intervention is given by Eduardo Tomé (2013) who evaluates the intervention of the European Social Fund (ESF) as an instrument of human resource development (HRD) policies on the European labor market. Thus, the article argues that the ESF was mainly a force to absorb funds sent to developing regions and that it is doubtful that the ESF fully pursued its objectives, as the desire to absorb money overshadowed the need to use it effectively.

Marinaş and Prioteasa (2015) analyse the level of the absorption rate for the first programming period in which Romania participated as an EU member state because the attraction

of the funds made available by the European Union is of significant importance in measuring the ability of a state or region to use effectively and efficiently the funds available under the cohesion policy which is considered the most important investment policy of the EU. The paper concluded that the basis of the absorption rate was a series of administrative factors and the national authorities should undertake more measures to increase the degree of absorption, namely: developing effective actions for project preparation and supporting beneficiaries to increase the success rate of projects, increased performance for financial management and control, reduced administrative burden for project promoters and provision of real, real-time and more efficient support for beneficiaries.

Pelucha and his colleagues start their work from the premise that public support for training in companies corresponds to the long-term importance of the quality of human capital in the competitiveness of companies and nations and conclude that from the perspective of public policies the impact made by the ESF is positive and relevant for promoting employment and to define better conditions in the labor markets. (Pelucha et al., 2019)

Balcerzak (2016) conducts a multi-criteria analysis of the quality of human capital in EU countries at the macroeconomic level and claims that there is a visible divergence between the scores of the analysed economies, countries such as Slovenia, Poland, the Czech Republic and Slovakia have managed to significantly improve their scores, in while Hungary, Romania and Bulgaria failed to do so. The divergence is attributed to institutional or political factors.

It is observed in the specialized literature that many works analyse directly or as an indirect factor, the efficiency of European funding on the level of human capital development and that most of these works present a positive and relevant effect of the European intervention within the countries Developing.

Methodology

To highlight the impact of European funding and the connection between the intensity of the support given through the implementation of European projects and the development of human resources, we will perform a bibliometric analysis of the existing data in the WOS database using the World Art and VOSviewer tools. By analysing the definitions, and the links between the notions present in the articles in the sample, we can substantiate new perspectives regarding the impact of the European structural funds in the development of human resources.

In figure 1 we presented the steps of the PRISMA Statements methodology used in the research of this article.

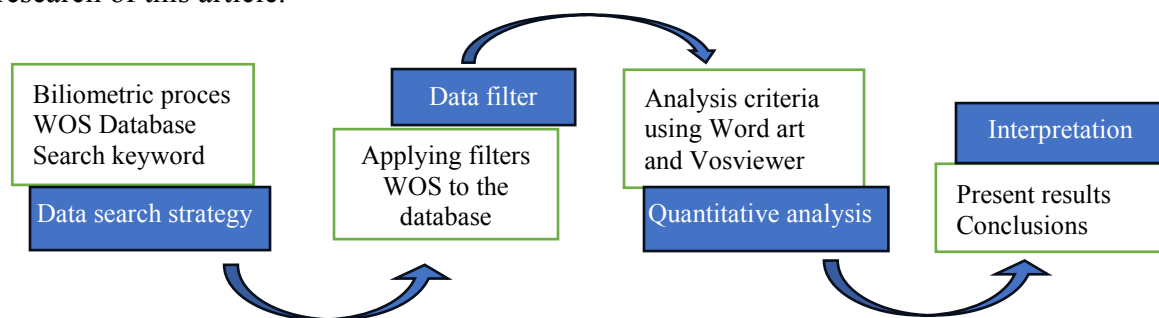


Figure 1 Steps taken in bibliometric analysis of WOS data

Source: Own conceptualization using the PRISMA diagram.

- The PRISMA Statements methodology investigation method was structured in four steps:
- (1) search in the Web of Science database by applying the tag and some additional keywords related to structural and cohesion funds
 - (2) data filtering by applying 3 specific Web of Science filters
 - (3) carrying out the quantitative analysis using Word art and VOSviewer tools
 - (4) interpretation of the data within the specific clusters of the VOSviewer tool.

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement, published in 2009, was designed to help reviewers transparently report how the review was conducted, what steps the authors went through, and what the reviewers found. Following advances in methodology and systematic review, the 2009 model was replaced by the 2020 PRISMA Statement, which includes new reporting guidelines and reflects advances in methods for identifying, selecting, evaluating, and synthesizing studies (Page et al, 2021).

The bibliometric research was based on measurements supported by graphical representations and statistical tables from the Web of Science database, the measurements being used to present the current state and the potential for the development of future classifications of financing from structural funds (Radu et al, 2021).

The WOS database as an open educational resource can be accessed by teachers whenever they want regardless of the country where they carry out their research activity. The term "open" shows free access to scientific publications and research data that are of interest to the international scientific community, including the European Union and its member states (Neagu, 2022).

The specific term "bibliometrics" is the application of mathematical and statistical methods to books and other media to analyse their content. Bibliometric analysis can have some difficulties due to the rapid increase in the amount of information, in the era of digitization, which makes it difficult to capture the entire knowledge structure of a research area, needing a longer period to process.

To establish the future scientific research directions for the analysis of human resources through the lens of the implementation of European-funded projects, the bibliometric analysis should be performed to comprehensively report the current trends and identify the research hotspots of this perspective by evaluating the previously published scientific literature indexed in the WOS database, to provide a brief report on existing progress. (Burdhos-Nergis et al, 2021) Thus we will carry out a quantitative analysis of the number of articles per year, of the countries with the most articles, of the affiliated institutions with the most articles in the European Union and Romania and an analysis of the density keywords and additional keywords. Table number 1 shows the sequence of applying keywords and filters and the evolution of the number of articles.

Table no. 1 Filters used when querying Web of Science

Keywords / Filter applied	Item number in the selection
Keywords "Impact of European projects on human resources"	195
Keyword added "Structural funds"	1411
Keyword added "European Structural funds"	1915
Keyword added "Cohesion policy"	2303
WOS category "Economics"	816
Publication period 2007-2022	701
Countries EU	273

Source: Authors' own research Web of Science database (accessed on 11.09.2023).

To understand the steps used in carrying out the research, choosing the keyword Impact of European projects on human resources and a Keyword added Structural funds, European Structural funds, Cohesion policy and excluding different categories of articles by applying Web of Science filters, so that any reader of article to be able to quickly understand the meaning of the research carried out, in figure 2 we used the PRISMA 2020 diagram for the systematic representation of the searches in the Web of Science database, removing articles from the selection by applying filters and determining the final number of articles for which we will do the bibliometric analysis. We chose the 3 Keywords added because we wanted to capture the funding from the 3 European funds, the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Funds (FC), which together contribute to the cohesion policy of the European Union. The analysis period was 2007-2022 because we wanted to capture the 2 programming periods 2007-2013 and 2014-2020. I did not choose the year 2023 because at the time of the research, September 11, 2023, had not ended and it was not possible to have an image of all the existing articles in the Web of Science database related to this year. The last filter chosen was to select articles written in the countries of the European Union.

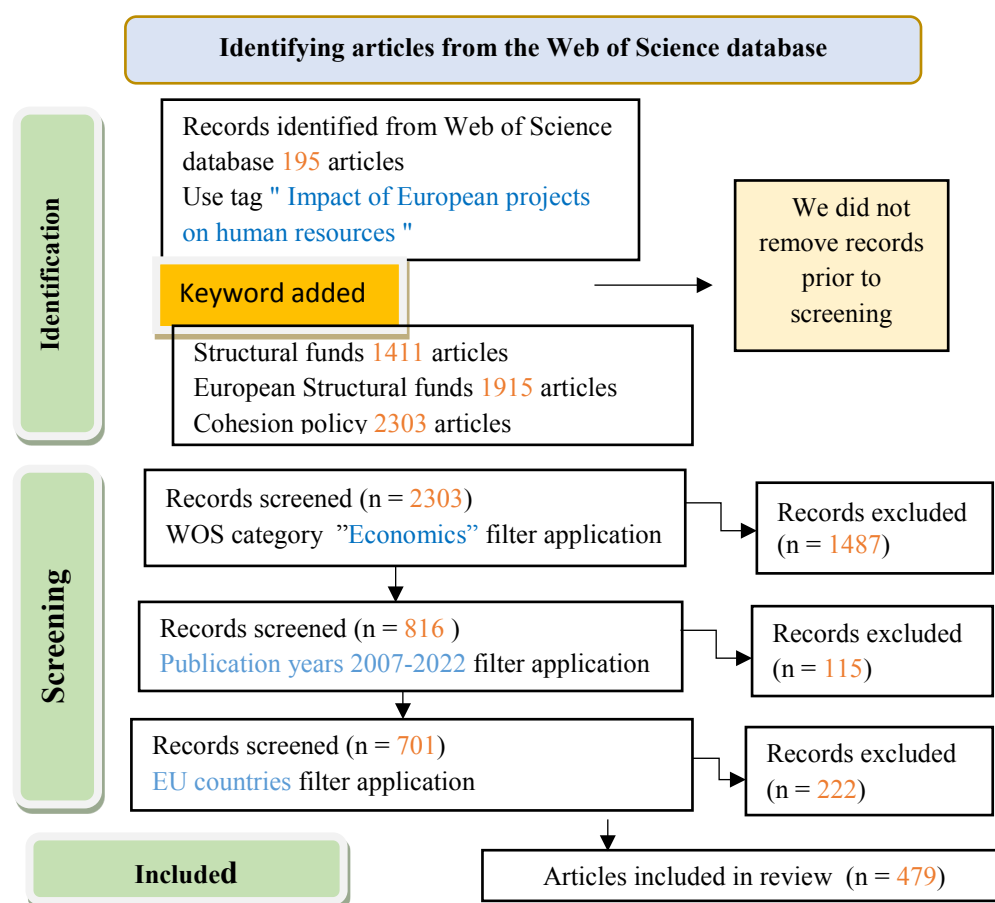


Figure 2 Systematic representation of searches in the database

Source: Authors' own research using the PRISMA 2020 chart and data selected from the Web of Science database (accessed on 09.11.2023)

Within the article, evaluations are presented from a quantitative point of view (number of articles by year, by country, affiliation) as well as qualitatively (frequencies of phrases and words) because the aim was to identify as many relationships as possible within the articles on the topic of the influence of funding from the structural funds on human resources. Considering the new research trends regarding the treatment of new challenges through interdisciplinary study, the application of mathematical theories in the description and analysis of economic phenomena is often encountered. This starts from The Rough Set Theory, created by Zdzislaw Pawlak, which involves extracting knowledge from a database by finding a set, which represents the data set, to generate a set of rules to detect changes in a system (Ignat, 2015), with the help of the WOSviewer software, by analysing the content of the 4 clusters we will try to find criteria for grouping and relating the existing articles in the Web of Science database

We began the bibliometric analysis and density analysis research by analysing the sample of scientific articles by year of publication, by the number of articles per country, and by affiliation. We continued with an analysis regarding affiliation at the level of Romania.

Qualitative analysis continued with as a starting point the density of words represented through the word cloud, to highlight the association of words often used in association with "*Impact of European projects on human resources*", contained in the *title of the articles, the abstract, author keywords and keywords plus*. The Word Art software provided the technical support for the foundation of the analysis.

With the help of the WOSviewer software, we continued the qualitative analysis to identify the density of phrases or words used within the articles in the sample. *Co-occurrence* filters were used, for all keywords, a minimum of *10 co-occurrences*. Co-occurrence networks represent the connection of pairs of articles that used a specific set of co-occurrences and define the criteria set when using the WOSviewer software.

In this part of the research, the 4 resulting clusters were analysed by associating them with the criteria for grouping projects with European funding. The words with the highest link strength in each cluster were analysed through a specific graph where the links within each cluster between the component notions and but also the links with the other words in the other clusters were highlighted.

Results and discussions

The analyses that were carried out were done on a sample of 479 articles resulting from the application of keywords and specific filters.

Table 2 shows the distribution by year of the 479 scientific works that will be included in the bibliometric analysis.

Table no. 2 Distribution of the 479 articles retrieved from the Web of Science query

Year	2015	2016	2017	2018	2019	2020	2021	2022
Number articles	39	42	45	36	40	44	31	21
Year	2007	2008	2009	2010	2011	2012	2013	2014
Number articles	12	16	21	17	35	18	26	36

-Source: Web of Science database (accessed on 11.09.2023).

From the analysis of Figure 3 regarding the distribution of articles over the 16 years of the selection, a smaller number can be observed at the beginning of the programming periods and at the end of the programming periods, in the rest of the programming periods showing a clear interest

in the analysis of the impact of the implementation of the financed projects from European funds and the development of human resources.

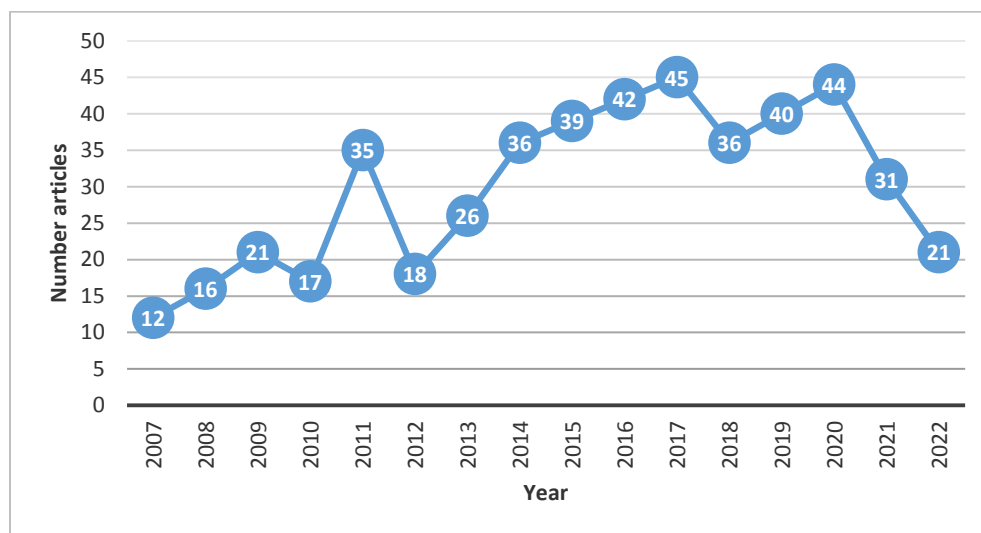


Figure 3 Distribution of articles over the 16 years of the selection

Source: Own conceptualization using data from the WOS database.

We continued the analysis of the sample of 479 articles on the countries of origin of the authors and their affiliations. In figure number 4 we have presented using bibliometric and density analysis the origin of the authors for the first 10 countries and in table 3 the first 10 affiliations of the authors according to the number of articles are presented.

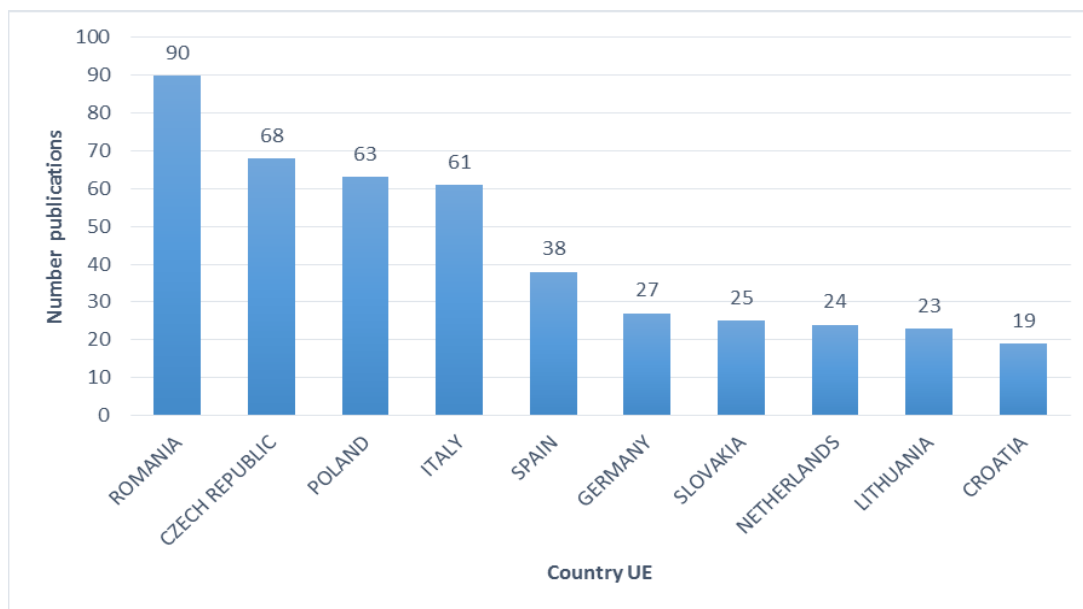


Figure 4 Origin of authors from the top 10 countries resulting from the WOS query

Source: Authors' own research, data processing from WOS.

Table no. 4 Top 10 affiliations by number of articles retrieved from the Web of Science query

Affiliations	Record Count
Bucharest University of Economic Studies	34
European Commission	13
Prague University of Economics Business	13
Technical University of Ostrava	13
Alexandru Ioan Cuza University	9
Tomas Bata University Zlin	9
Lucian Blaga University of Sibiu	8
Polytechnic University of Milan	8
Poznan University of Economics Business	8
University of Bologna	8

Source: Authors' own research, data processing from WOS.

Analysing the results, Romania is the first in the number of articles with 90 articles and in the first 10 affiliated institutions, there are 3 universities from Romania and 3 universities with an economic profile from Europe. In table 5 we have made a classification of the first 10 affiliations in Romania and apart from the Romanian Academy of Sciences, the other institutions are state universities.

Table no. 5 Top 10 affiliations by number of articles retrieved from the Web of Science query

Affiliations	Record Count
Bucharest University of Economic Studies	34
Alexandru Ioan Cuza University	9
Lucian Blaga University of Sibiu	8
Romanian Academy of Sciences	7
University of Craiova	6
University of Oradea	6
Babes Bolyai University from Cluj	5
Stefan cel Mare University of Suceava	3
POLITEHNICA Bucharest	2
Polytechnic University of Timisoara	2

Source: Authors' own research, data processing from WOS.

The first qualitative analysis of the sample of articles was carried out with the help of the word cloud from the Word art program where I included the title of the article, the author's keywords, plus keywords and summaries. When we perform a bibliometric analysis, the keywords plus are as effective as the keywords of the authors, for investigating the structure of knowledge and their relationship in each scientific field. (Rodríguez-Sabiote et al, 2020)

The words with the highest frequency of use were: *Region, Policy, Fund, EU, European, Develop, Cohesion, Structure, Economic, Impact, Growth, Union, Effect, Paper, Level, Country, Analysis, Project, Converge, Invest, Support, Social, Research, Result.*

From the analysis of the frequency of the words, we notice that the scientific articles are oriented towards classifications based on the existing principles at the level of the financial support granted by the European Commission to the member countries. In figure number 5, using the data exported from the Web of Science for the 479 articles, with the help of the Word Art tool I graphically highlighted the words with the highest frequency, according to their size.

Source: WOS database made via <https://wordart.com/>

Source: WOS database, made with the VOSviewer software.

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Table no. 6 Link strength between articles analyzed by Keyword function

Keyword	Occurrences	Total link strength
structural funds	150	468
impact	85	415
convergence	76	371
cohesion policy	109	350
growth	64	273
regional policy	45	201
economic - growth	28	138
European Union	38	126
regional growth	19	117
regional development	24	114

Source: Authors' own research, data processing with the VOSviewer software.

Keywords are grouped in 4 clusters with a total of 47 items. The cluster consists of a set of elements from the bibliometric map, but each article, out of the 479 in our selection, is only in one cluster, but there may be articles that are not included in any cluster if they did not meet the criterion of minimum 10 Occurrences. Table number 7 includes the content of the 4 clusters.

Table no. 7 VOSviewer clusters and related colors

Cluster 1 (16 items)	Cluster 2 (12 items)
discontinuity economic – growth efficiency employment european structural funds government impact innovation investment panel – data productivity quality regional growth regional policy support union	absortion absortion capacity cohesion policy economic growth EU cohesion policy EU funds EU evaluation funds regional disparities regions structural funds
Cluster 3 (10 items)	Cluster 4 (9 items)
cohesion competitiveness convergence disparities european-union growth inequality model policies regional development	allocation European Union EU structural funds governance implementation poland policy politics transfers

Source: Own conceptualization, data processing with VOSviewer.

To view the clusters graphically, I have highlighted the words with the strongest links in each cluster for representation as follows:

- for cluster 1 - "keyword impact with link strength 415", (figure number 7),

- for cluster 2 – "keyword structural funds with link strength 468", (figure number 8),
- for cluster 3 – "keyword convergence with link strength 371", (figure number 9),
- for cluster 4 – "keyword European Union with link strength 126", (figure number 10)

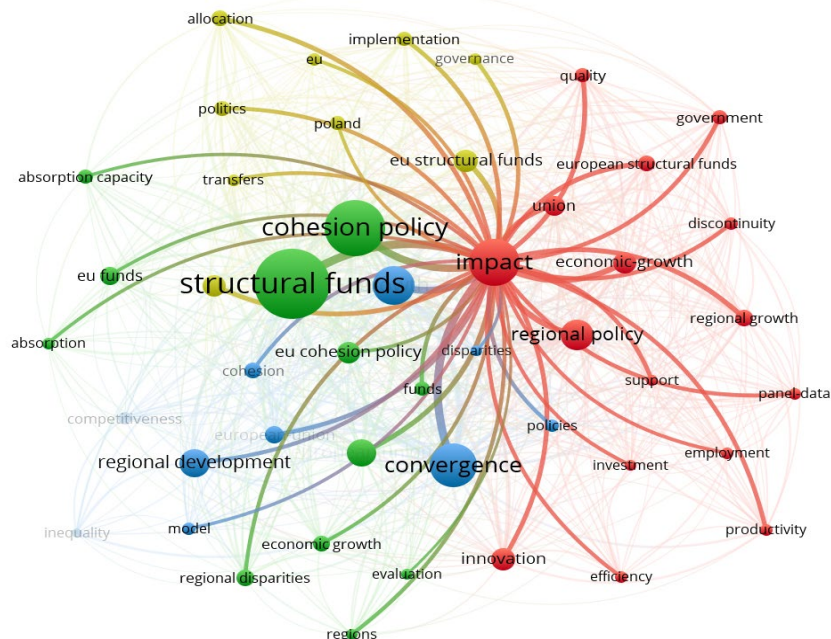


Figure 7. Cluster 1 keyword *impact* with link strength 415

Source: Own conceptualization, data processing with VOSviewer.

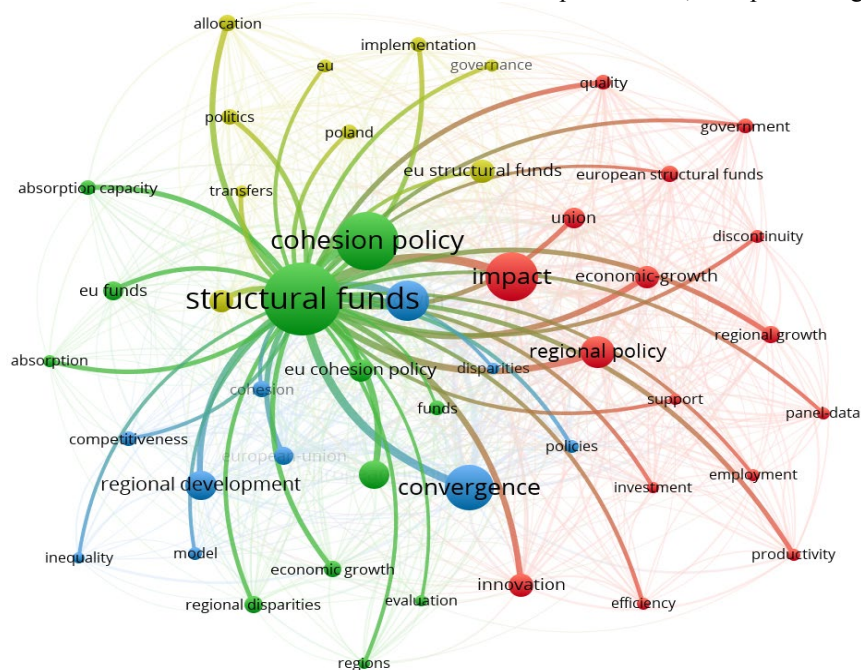
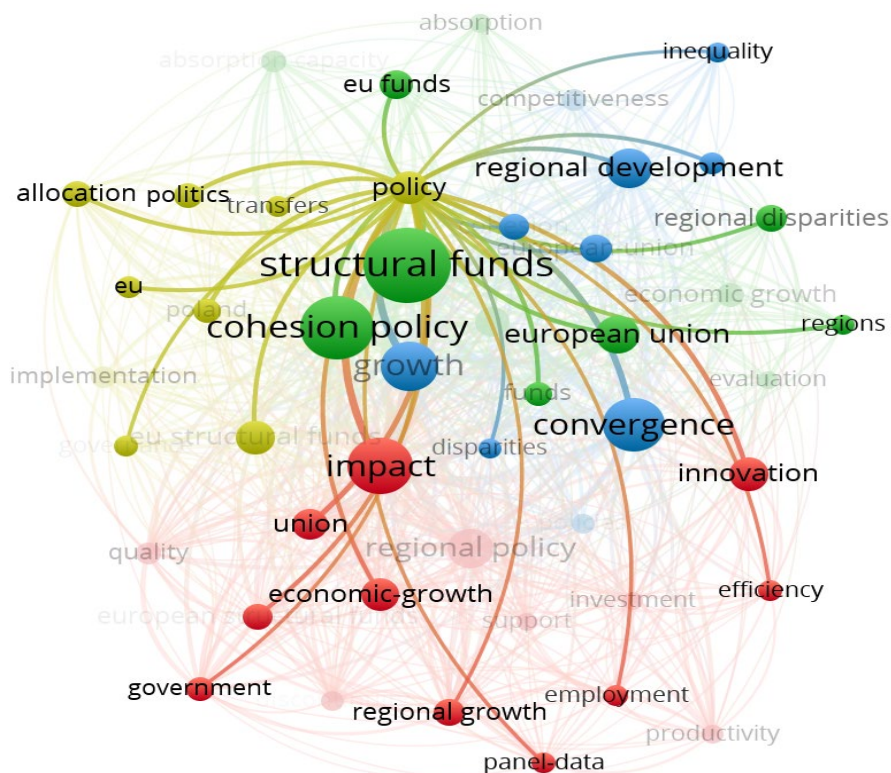


Figure 8. Cluster 2 keyword *structural funds* with link strength 468

Source: Own conceptualization, data processing with VOSviewer.

Source: Own conceptualization, data processing with VOSviewer.



Source: Own conceptualization, data processing with VOSviewer.

Conclusion

Human resource management is part of the current strategic change at the European level. Thus, recruitment, selection and training decisions are interdependent and simultaneous with those related to the growth, diversification, and specialization of production or the organization. The integrated approach to human resources management explains the success of numerous strategies adopted at the level of European organizations generating significant changes in its content, such as:

- broadening the perspective of the field of human resources activity;
 - labor market segmentation and individualization of human resources according to new trends;
 - adapting recruitment and employment management practices to new needs and challenges;
 - decentralization and participation in the implementation of the "Human Resources" function.

The bibliometric analysis carried out in this article was the basis of the analysis of the current state of the impact of the implementation of projects with European funding on the development of human resources in the EU member states, analysed by the first treatment of this aspect in the scientific articles in the Web of Science database.

Analysing the content of the keywords in the 4 clusters and considering all the results in this article, we can separate 4 directions of analysis and substantiation of the results:

- cluster 1 contains the impact on human resources of funding from European funds;
- cluster 2 contains systems for distribution, prioritization and selection of potential beneficiaries;
- cluster 3 contains references to the specific policies of the European Union.
- cluster 4 contains articles that analyse allocation, management, and evaluation models of European funds.

Our findings are in line with the bibliometric analysis of green human resource by Shah et al (2024, p. 18) who conclude that there still exists room for improvement regarding collaborative work in underdeveloped countries.

We also support the conclusions expressed by Danvila-del-Valle et al 2019 and Faisal 2023 that even if journals focused primarily on human resources constitute the majority of published works, publications from disciplines like organizational behaviour, psychology, strategy, and management can also play a significant role by providing a multidisciplinary perspective on the topic at hand.

For the specific analysis of a certain field of research, we can have as a starting point a keyword found in the 4 clusters with the links within the clusters and between clusters to find new topics of interest, new interdisciplinary correlations and new methods of approach.

The research subject can be nuanced on the 2 programming periods 2007-2013 and 2014-2020 now when their closing dates at the European level will be public.

Limitations of the study

For the results of a bibliometric analysis to be of high quality, the authors must also specify the limits of the research. It can be said that certain aspects were missed because the analysis was based on scientific articles from the Web of Science platform. Perhaps to capture more correlations in further studies other databases of scientific articles should be accessed such as: Scopus, Central and Eastern European Online Library, Dimensions, ResearchGate or Sciendo.

Also, by associating an article to only one cluster by VOSviewer, some links and correlations with other articles may be lost. That is why the connections with the other clusters of dominant

words and the manner of appearance of the dominant words and phrases must also be analysed better.

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