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Business Bankruptcy in Romania: Insights from a Bibliometric Analysis

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Abstract. *Business bankruptcy is a legal process with harmful repercussions for all stakeholders, starting with creditors and moving on to suppliers, workers, customers, and the entire community. Accordingly, the aim of our research was to assess the scientific literature on business bankruptcy in Romania using a quantitative research method, namely, a bibliometric analysis. This approach enabled us to describe, gauge, and monitor the scholars' output on the Romanian business bankruptcy matter. To achieve our goal, we used the Web of Science (WoS) platform, where we searched for scientific documents by using the following topic keywords: ("bankruptcy" OR "insolvency" OR "business failure" OR "corporate failure" OR "company failure" OR "financial distress") AND ("Romania" OR "Romanian"). Although our initial search query identified 189 scientific papers, we selected only studies in the fields of business and economics, resulting in 80 documents spanning from January 2005 to October 2025. Subsequently, the bibliometric analysis was performed in the R programming language. The main outcomes of our analysis revealed that (i) a total of 162 authors provided a notable contribution to the development of research on the topic of business bankruptcy in Romania (mostly of them affiliated with the Bucharest University of Economic Studies from Romania), (ii) most WoS-indexed documents (i.e., 13 articles) were published in 2014, (iii) the three-fields plot, word cloud, and co-occurrence network derived from author's keywords shed light on the fact that scholars are engaged in investigating the challenges that may occur in business activities within Romanian territory (from minor to major ones) as well as how they can be timely foreseen by employing various types of statistical or machine learning methods on financial ratios or raw accounting indicators. All in all, the subject of bankruptcy warrants further study to anticipate potential bankruptcy risks, prevent capital losses, and address financial difficulties as effectively as possible at the earliest stage.*

Keywords: business bankruptcy, insolvency, financial distress, Romania, bibliometric analysis.

Introduction

We live in a world dominated by globalization, where states and economic agents are connected through trade, foreign direct investment, knowledge diffusion, and workforce mobility. Therefore, countries, and, implicitly, companies, are in a race to gain as much as possible from these movements, so that overall innovation, productivity, entrepreneurship, and economic benefits are spurred. These aspects are meaningful in achieving regional competitiveness, economic growth, and development. However, over time, some companies manage to become profitable, while others, for various reasons, become insolvent and eventually go bankrupt.

Bankruptcy represents a legal process in which a borrower (i.e., a legal entity or individual) is unable to repay creditors the amount owed, with total liabilities surpassing total assets (Joshi, 2019). In the case of production, all the debtor's assets are sold to repay as much of the debt as possible, resulting in significant financial losses for shareholders. Another drawback of this issue is that bankruptcy negatively affects owners' credit scores and remains on their credit reports for several years, making it more difficult for them to obtain credit again (Investopedia, 2024).

On the one hand, it is natural that unprofitable entities should be eliminated from the market, thereby making way for more efficient and productive companies to emerge (Prusak,

DOI: 10.2478/picbe-2026-0406
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2018). Nevertheless, on the other hand, a company's bankruptcy has harmful consequences for many stakeholders, starting with creditors and moving on to suppliers, workers, customers, and the entire community (Prusak, 2018). For instance, suppose a vendor does not receive the value of the delivered goods or services because its customer went bankrupt. In that case, its solvency is likely to be affected, and therefore, it may not be able to fulfill its debt commitments to suppliers at an upper level of the supply chain. Failure to comply with payments may be further perpetuated in the supply chain, with a domino effect and even lead to bankruptcy avalanches in some cases (Battiston et al., 2007). Accordingly, the subject of insolvency and bankruptcy is worth further study in order to anticipate potential bankruptcy risks, prevent capital losses, and address financial difficulties as effectively as possible at the earliest stage. Only by taking the right measures can a company survive, thrive, and maintain competitiveness in both domestic and international markets.

Given the high relevance of severe financial distress that may arise within companies, our research aims to assess the scientific literature on the business bankruptcy issue solely in Romania through a bibliometric analysis (a quantitative research method). Our research is motivated by the fact that, although many academic studies use bibliometric methods to analyze financial distress or bankruptcy worldwide (such as Shi & Li, 2019; Plescaci, 2022; Rashid et al., 2024; Chiosea & Hategan, 2024), to our knowledge, no study has evaluated bankruptcy in Romania using a bibliometric approach. Thus, this is the core contribution of the current paper to existing literature.

To achieve our goal, we used the Clarivate Analytics Web of Science (WoS) platform, where we searched for scientific documents by using the following topic keywords: *("bankruptcy" OR "insolvency" OR "business failure" OR "corporate failure" OR "company failure" OR "financial distress") AND ("Romania" OR "Romanian")*. Although our initial search query identified 189 scientific papers, we selected only studies in the fields of business and economics, resulting in 80 documents, spanning from January 2005 to October 2025. The bibliometric analysis was performed in the R programming language. This approach enabled us to describe, gauge, and monitor the scholars' output on the Romanian business bankruptcy matter.

The remainder of this paper is organized as follows. Section 2 provides an overview of the theoretical framework for business bankruptcy risk worldwide, with a particular focus on Romania. Section 3 describes the quantitative research method employed, i.e., the bibliometric analysis. Section 4 highlights the main results of the bibliometric analysis, along with their interpretation. Section 5 comprises conclusions, limitations, and possible future research directions.

Theoretical framework regarding business bankruptcy

Business bankruptcy - general overview

Throughout the years, various global crises or shocks (such as the Great Depression of 1929, Black Monday in 1987, the 2007-2008 Global Financial Crisis (GFC), and the COVID-19 pandemic) have posed serious threats to international stability, including increasing the vulnerability of numerous enterprises, some of them being compelled to restructure their operations or even cease their activities. Given that companies are involved in complex business relationships, the risk of bankruptcy constitutes a significant concern for both internal and external stakeholders of an organization (Gnip et al., 2025). This is because a company's severe financial distress negatively affects all stakeholder groups, yet in different ways (Prusak, 2018). For example, *(i)* for *shareholders*, it might imply the company's inability to pay adequate dividends or sharp declines in share value; *(ii)* for *lending institutions and suppliers*, it indicates the company's failure to make installment payments or settle debts on time; *(iii)* for *employees*, it implies the potential layoffs due to business restructuring; *(iv)* for *broader community*, it reflects the unavailability of certain goods

or services in the marketplace, as the company can no longer sustain production or service delivery since the costs outweigh the benefits. Accordingly, it is salient to accurately and timely forecast major financial distress within a business, especially bankruptcy-related issues, as their occurrence can have detrimental and widespread consequences (Gnip et al., 2025).

In this light, numerous empirical studies have been conducted over time on the subjects of insolvency and bankruptcy risk, as researchers have consistently sought to better comprehend the causes that lead to severe financial distress, as well as ways to mitigate or even prevent these problems. Since the 1960s, plenty of bankruptcy prediction models have emerged, each with its own advantages and disadvantages and varying levels of complexity; however, some models are now considered outdated or overly simplistic (Aziz & Dar, 2006). As emphasized in Aziz and Dar (2006), bankruptcy prediction models can be categorized into three broad groups: *(i)* statistical models, *(ii)* artificial intelligent expert system models (AIES), and *(iii)* theoretical models (see Figure 1 for an illustration of the different categories of bankruptcy prediction models). Some brief characteristics of these groups are as follows: classical statistical models encompass both univariate and multivariate analysis, with the latter being more commonly employed; AIES models are regarded as automated successors of statistical methods, yet more advanced; while the first two model types focus on establishing symptoms of bankruptcy, the theoretical models seek to identify the underlying causes of a company's failure (Aziz & Dar, 2006).

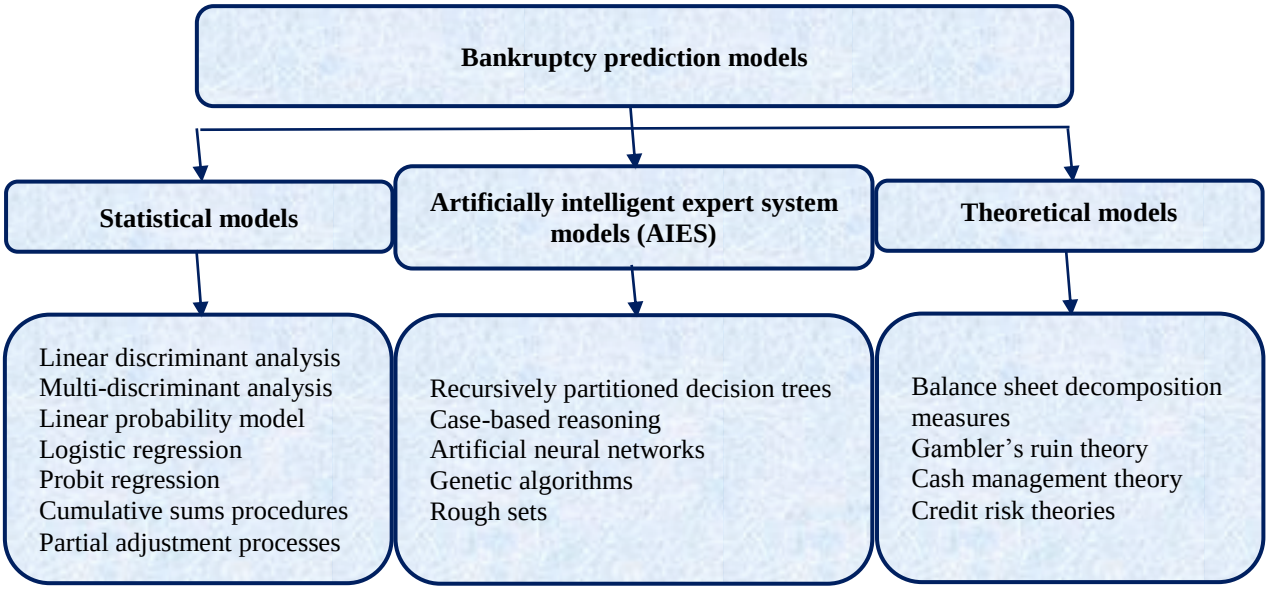


Figure 1. Categories of bankruptcy prediction models

Source: Adapted after Aziz and Dar (2006).

Despite the existence of various models for predicting a business's probability of failure, the Altman Z-score model (which is a multivariate statistical model), developed by Professor Edward I. Altman in 1968 (Altman, 1968), remains one of the most popular and widely used techniques (Altman, 2018). This score is regarded as a balance sheet metric and is computed based on five financial ratios, namely profitability, leverage, liquidity, solvency, and activity ratios, each of which is assigned a different weight (Marais et al., 2014). Initially, it was used to predict bankruptcy risk primarily among USA manufacturing ventures. While many studies have validated the original Altman Z-score model's ability to appraise corporate credit risk, others have cautioned

that its outcomes should be interpreted with prudence (Marais et al., 2014). In this respect, in 2012, in collaboration with Business Compass LLC, Altman developed and launched an improved version of the original score, known as the Altman Z-score Plus, which is applicable to all types of companies: public and private, operating in manufacturing and non-manufacturing sectors, whether in the USA or other countries (Joshi, 2019).

Over the decades, statistical methods have been extensively used in empirical bankruptcy prediction studies. However, with advances in computer science and artificial intelligence, machine learning (ML) techniques have become increasingly popular (Shi & Li, 2019). ML algorithms (commonly categorized into supervised, unsupervised, and reinforcement learning) are already integral to a variety of real-world applications; among their main advantages are their ability to "classify objects, identify patterns, forecast outcomes, and make well-informed decisions", along with performing specific tasks without explicit programming (Sharma, 2024, p. 114). In this respect, quite a few researchers have argued that machine learning techniques offer a greater likelihood of accurate bankruptcy prediction than traditional models (Samara & Shinde, 2025).

Business bankruptcy in Romania

The Commercial Code governing bankruptcy proceedings has been in force in Romania since 1887; however, even though it was not repealed, it lost its validity in 1948 with the establishment of communism (Branch et al., 2010). At that time, Romania transitioned from a market economy to a planned economy, and from 1948 to 1989, the state was the sole stakeholder. Subsequently, in 1989, the dissolution of the Soviet Bloc prompted significant political and economic transformations. Namely, enterprises were no longer owned and operated by the state but by the private sector, hence, being "able to participate in the competitive world of free enterprise" (Branch et al., 2010, p. 3). Roughly one century later, the Romanian Commercial Code of 1887 was abolished and superseded by Law No. 64 in 1995, which was later replaced by Law No. 85 in 2006, which aimed to enhance bankruptcy procedures and harmonize Romania's legal framework with that of the European Community following Romania's accession to the European Union (Branch et al., 2010). At present, insolvency prevention and insolvency proceedings are regulated by Law No. 85/2014, which has been amended in 2014, 2018, and 2022 (Chambers and Partners, November 13, 2025). The goal is to improve access to restructuring measures at the first signs of financial distress, thereby preventing the exclusion of viable enterprises from the economic cycle and encouraging the resumption of economic activity among companies experiencing financial difficulties (Chambers and Partners, November 13, 2025).

Beginning in the latter half of the 1990s, the matter of insolvency and bankruptcy risk began to receive increasing attention in Romania (Dincă & Bociu, 2015). Accordingly, various empirical studies have been conducted on legal entities across different sectors within Romanian territory with the aim of developing bankruptcy prediction models, identifying factors that may indicate the future occurrence of insolvency/bankruptcy, and, hence, allowing for effective measures to be taken in a timely manner.

In this respect, the first salient contribution was made by Mânecuţă and Nicolae (1996), who developed a bankruptcy prediction scoring model for 59 metallurgical industry businesses employing discriminant financial ratios. The following remarkable scientific document on the risk of imminent business bankruptcy was conducted by Băileşteanu (1998), who also used financial ratio analysis (the so-called model Bailesteanu). Four years later, Anghel (2002) made a prominent contribution to the field by developing the Anghel model, which is a score-based discriminant analysis model for diagnosing and predicting bankruptcy. Compared to previous models, it was

applied to a larger sample, i.e., 276 enterprises. In the same year, Armeanu et al. (2012) developed a scoring model to forecast bankruptcy likelihood for 60 publicly quoted companies on the Bucharest Stock Exchange (BSE).

Other bankruptcy prediction models that rely upon linear discriminant analysis (but not only) are those proposed by Siminica (2005); Bărbuţă-Mişu (2009, 2012), who proposed a composite financial performance index for 11 firms from the building sector in Galati County; Robu et al. (2014), who assessed the financial distress risk for a sample of 70 companies listed on the BSE; Dincă and Bociu (2015), who predicted bankruptcy risk for 24 publicly listed companies on the BSE by combining two notorious models: the Altman and Anghel models. Similarly, Crăciun et al. (2013) evaluated the adequacy and applicability of the two models mentioned above, in the context of the GFC, using data from 60 Romanian firms. In this sense, the scholars conclude that the scoring function needs to be adjusted to the economic conditions of the assessed period.

An additional noteworthy study was conducted by Megan and Circa (2014) involving a sample of 80 large-scale firms experiencing financial difficulties. In this regard, the authors employed both logit and probit models and determined that increases in uncollected receivables and debt, and decreases in turnover, are significant predictors of insolvency. Furthermore, Brîndescu-Olariu and Goleţ (2013a, 2013b) carried out two comprehensive case studies on corporate bankruptcy prediction during an economic crisis. The study encompassed an initial population of 26,980 Timis County firms (ultimately comprising 4,327 firms) and employed financial ratio analysis (more specifically: discriminant analysis (2013a) and logistic regression (2013b)). In both cases, the models are of practical utility, having a high degree of accuracy. Later, in additional papers, Brîndescu-Olariu (2014, 2016a, 2016b, 2016c, 2017) advanced a financial-ratio-based methodology designed to gauge the risk of bankruptcy among Timis County companies with annual sales of 2,200 euros. The model could classify companies into different risk categories and therefore suggest which companies are more likely to experience financial distress. Other recent studies on the topic of enterprise bankruptcy risk assessment in Romania include those conducted by Hlaciuc (2024) - for insurance companies, using financial ratio analysis; Macovei and Burciu (2025) - for car dealers, applying an improved Altman model; and Toma and Sinoi (2025) - for small and medium-sized enterprises, applying various machine learning approaches.

Overall, it could be concluded that the academic literature body on the prediction of insolvency or bankruptcy within Romania is extensive; however, comparing the scientific documents conducted on companies in Romania with those conducted on companies in other states, such as the USA (i.e., global bankruptcy literature), a large discrepancy is observed. Thus, there is still room for further research at the Romanian level to identify better solutions to prevent, in a timely manner, severe financial difficulties among Romanian companies.

Research methodology

The current research employs bibliometric analysis to assess a vast body of academic papers on the topic of business bankruptcy in Romania. The reason for choosing a bibliometric method instead of a narrative literature review is that the former offers substantial advantages over the latter. As Zupic and Čater (2015, p. 430) pointed out, "bibliometric methods have the potential to introduce a systematic, transparent, and reproducible review process", which considerably improves the review rigor and quality. In other words, prior to delving into a document, the scholar is guided to the most noteworthy studies, thereby gaining a free-from-subjective-bias overview of the research field (Zupic & Čater, 2015).

In any bibliometric analysis, a salient aspect is the choice of the appropriate online database from which scientific documents will be retrieved. In this sense, we opted for the WoS platform because it is one of the most comprehensive and widely recognized sources of bibliographic data, which offers online access to high-quality scientific publications along with their citations (Zupic & Čater, 2015). Although we acknowledge that the WoS database does not cover all existing research on our subject of interest, the rationale for selecting it is that it includes esteemed journals that have undergone rigorous evaluations and, consequently, publish articles of a high standard.

Regarding the search query on the WoS platform, it was performed following the topic keywords: *("bankruptcy" OR "insolvency" OR "business failure" OR "corporate failure" OR "company failure" OR "financial distress") AND ("Romania" OR "Romanian")*. For a comprehensive overview of the search results, access the following link: https://www.webofscience.com/wos/woscc/summary/21cbf3c4-2063-4c79-8fec-bcda370438a7-0183f1064b/times-cited-descending/1. This type of search is designed to look for the abovementioned keywords in the title, abstract, keyword plus, and author keywords of a document. Further on, the only restriction we considered relevant to impose was the exclusion of studies outside the field of business and economics (no other filters were applied). Hence, by reviewing each abstract, we removed works related to law, such as those concerning changes in Romanian legislation, the judicial reorganization procedure, and consumer bankruptcy.

The bibliometric analysis was conducted through the use of the well-known *bibliometrix* package (Aria & Cuccurullo, 2025) in the R programming language, developed by Aria and Cuccurullo (2017).

Results and discussions

This section highlights the most significant findings of the bibliometric analysis on business bankruptcy in Romania. In this sense, Figure 2 synthesizes the outcomes of the bibliometric analysis, offering an overview of the main characteristics of the scientific activity dataset.

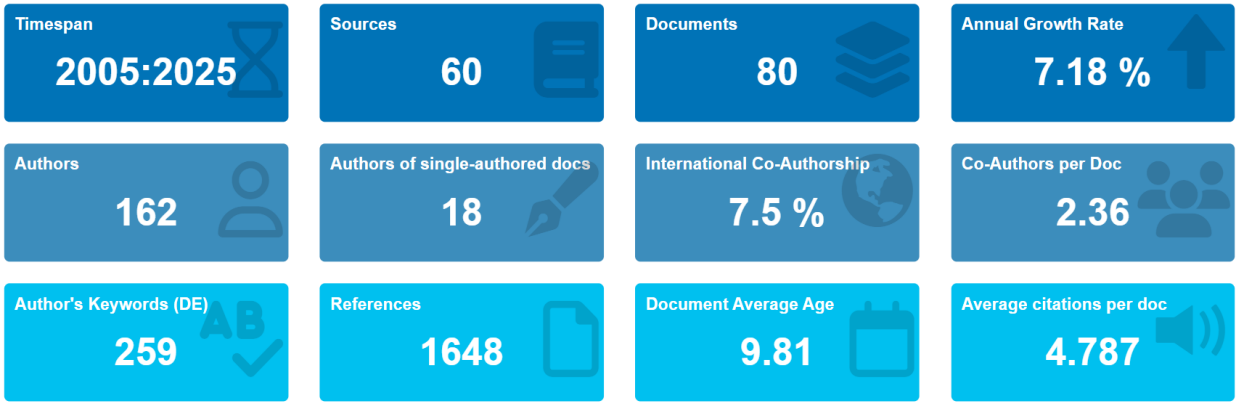


Figure 2. Summary of the bibliometric analysis (January 2005 - October 2025)

Source: Authors' analysis using the Biblioshiny package in R.

It is essential to note that, although our initial search identified 189 scientific papers (proceedings papers, articles, review articles, and book chapters), as previously mentioned, we retained only the studies that fall within the fields of business and economics, ultimately identifying 80 scientific documents (from 60 distinct academic sources) that are genuinely relevant to our research. The period covered spans from January 2005 (i.e., the publication year of the first WoS-

indexed article on business bankruptcy in Romania) to October 2025 (i.e., the date the current research was carried out). Overall, the average number of citations per article is approximately five (average citations/ document = 4.787), indicating a good scholarly impact. With respect to the authors, a total of 162 scholars have written about corporate bankruptcy in Romania. On average, each paper was authored by about two people (co-authors/ document = 2.36), while 18 out of 80 papers had a sole author. Regarding international collaborations, the percentage is expected to be lower (i.e., international co-authorship = 7.5%), as the research focuses solely on Romanian territory. Therefore, the majority of the collaborations were national, since most of the authors were Romanian. Lastly, the fact that the document's average age is roughly 10 (document average age = 9.81) indicates a relatively mature, well-established existing body of literature on the topic of bankruptcy in Romania, with articles growing at an annual rate of 7.18%.

Further on, Figure 3 illustrates the number of documents published annually from January 2005 to October 2025. An upward trend, followed by a downward trend, can be observed in annual scientific output, with a slight increase in 2025. While most papers (i.e., 13 articles) were published in 2014, no articles were published in 2006, 2007, or 2023. Nevertheless, as stated in the methodology section, it is essential to keep in mind that the bibliometric analysis was performed strictly on WoS-indexed documents. Therefore, the global volume of research on our topic of interest is actually much greater.

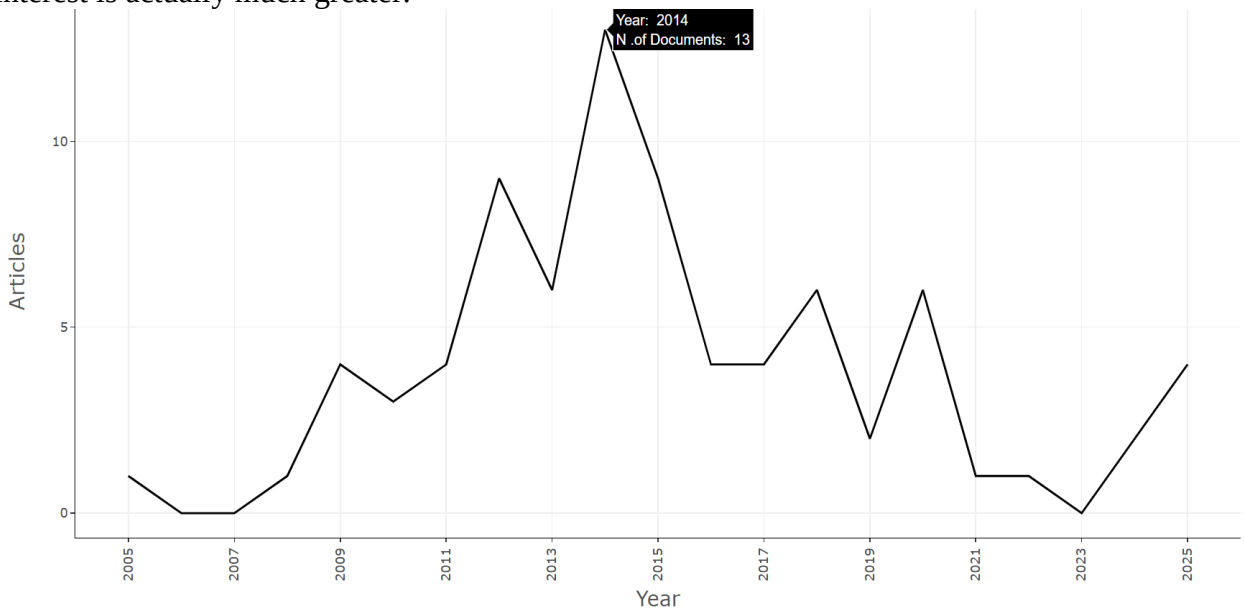


Figure 3. Annual scientific production (January 2005 - October 2025)

Source: Authors' analysis using the Biblioshiny package in R.

As for the 80 scientific documents, only a few are published in the same journal or conference proceedings, while the majority are published in a diverse range of sources. Accordingly, the foremost sources are the following: Proceedings of the International Business Information Management Association Conference (in which six articles were published), Economic Computation and Economic Cybernetics Studies Journal (five articles), Proceedings of the International Conference on Accounting and Management Information Systems (five articles), and Proceedings of the International Conference on Business Excellence (four articles). The top ten most relevant sources are depicted in Figure A.1 from the Appendix section.

In what follows, we focus on those academic works that notably influenced the research field. Hence, we present the top five documents with the highest scientific impact, as reflected by their global citation counts in papers published in WoS-indexed journals (refer to Table 1). Additionally, for each article, we have included citations from Google Scholar, which reveal all citations of an article, both from WoS-indexed and non-WoS-indexed sources.

Table 1. Top five most globally cited publications (January 2005 - October 2025)

Authors (year)	Title	Source	WoS citations	Google Scholar citations
Kliestik et al. (2020)	Remaining financially healthy and competitive: The role of financial predictors	Journal of Competitiveness	95	324
Prusak (2018)	Review of research into enterprise bankruptcy prediction in selected central and eastern European countries	International Journal of Financial Studies	43	110
Dima and Vasilache (2016)	Companies default prediction using neural networks	Romanian Journal of Economic Forecasting	22	34
Podhorska et al. (2020)	Innovations in financial management: Recursive prediction model based on decision trees	Marketing and Management of Innovations	17	62
Männasoo et al. (2018)	Investments, credit, and corporate financial distress: Evidence from Central and Eastern Europe	Emerging Markets Finance and Trade	16	39

Source: Authors' elaboration based on the results provided by the bibliometric analysis in R.

Interestingly, the most frequently cited publications appear to be those developed in the last decade. Hence, the most highly cited article in WoS journals (with 95 citations) is that of Kliestik et al. (2020), who investigate the potential of different financial ratios to predict corporate financial distress in Romania, as well as in 11 other states of Central and Eastern Europe. Using more than 400 statistical methods, the authors conclude that nations with similar political, market, and economic environments tend to rely on the same financial ratios when developing a bankruptcy prediction model. With less than half of the citations of the aforementioned research (43 citations), Prusak (2018) authored the second most-cited work. In his paper, the author conducts a critical analysis of the scientific literature concerning the development of enterprise bankruptcy prediction research within the countries of the former Eastern Bloc, including Romania. The findings show that the most advanced techniques for bankruptcy forecasting were employed in the research conducted for the instances of Poland, Slovakia, and the Czech Republic. As for Romania, mostly traditional approaches were applied. The third top-cited publication (with 22 citations) belongs to Dima and Vasilache (2016), who study the risk of default for 3,000 companies that applied for credit to an international bank that operates on Romanian territory. By implementing both logistic regression and artificial neural network models, the authors provide evidence that the latter approach has the strongest predictive power for default. With 17 WoS citations, the article of Podhorska et al. (2020) assesses how various types of decision tree algorithms (with a focus on Classification and Regression Trees) can predict enterprise financial distress for a sample of 2,359,731 companies from 17 emerging markets (including Romania). The results confirm that decision tree methods correctly classified 93.2% of the companies, revealing high overall accuracy. Therefore, these methods are reliable and effective in detecting prosperous and non-prosperous enterprises. Following closely in terms of citations (with 16 WoS citations), the paper developed

by Männasoo et al. (2018) scrutinizes the way investment and debt financing led enterprises from three Central and Eastern European states (inclusive of Romania) and two Baltic countries into financial distress during the 2009–2010 GFC. By applying the instrumental probit model, the outcomes disclose a strong negative impact of investment intensity and credit patterns on firms' financial soundness during those years of crisis. In addition to the studies discussed above, five other relevant papers, listed in order of their citation frequency, are authored by Popescu (2014), Voda et al. (2021), Popescu (2015), Achim et al. (2012), and Tudor et al. (2015).

Further, for a more comprehensive analysis of the most relevant authors who have contributed to the literature on firm-level bankruptcy in Romania, Figure 4 presents a three-field plot depicted as a Sankey diagram. This diagram features the first ten authors, ranked by the number of published papers (middle column item), alongside the universities to which they belong (left column item) and the keywords they used in their research. The purpose is to elucidate the primary contributors, their institutional affiliations, and the thematic focus of their scientific documents.

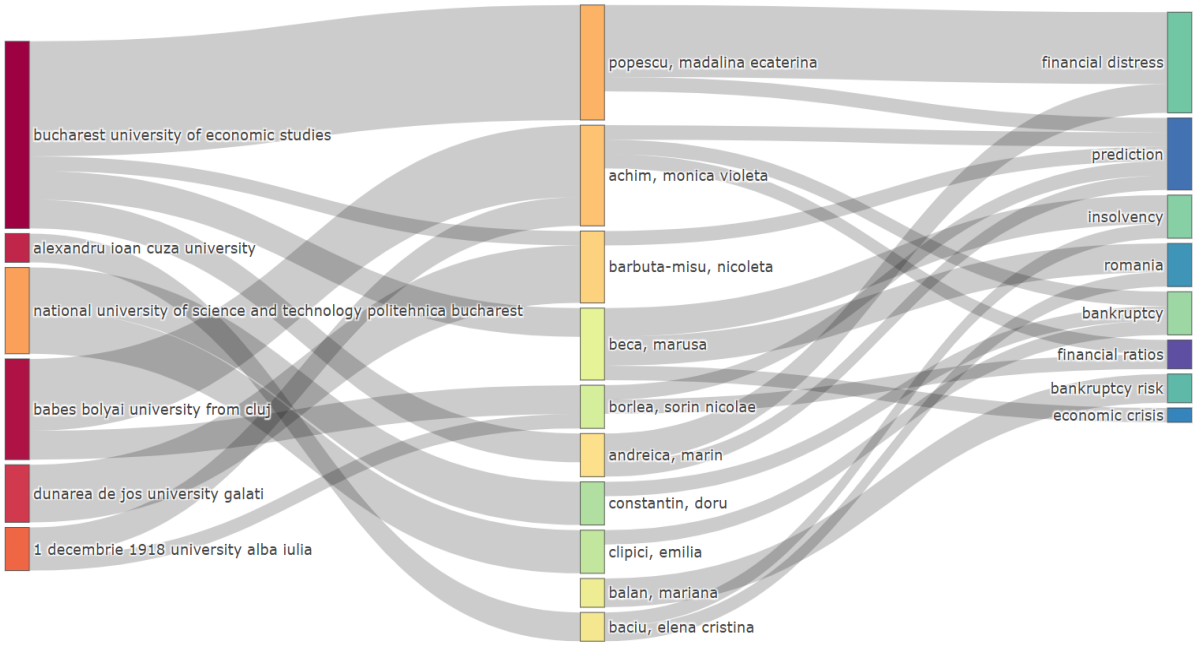


Figure 4. Three-fields plot (Sankey diagram): authors' affiliations (left) – authors (middle) – authors' keywords (right) (January 2005 - October 2025)

Source: Authors' analysis using the Biblioshiny package in R.

Based on the results obtained, we formulate the following statements. A total of 162 authors provided a notable contribution to the development of research on the topic of business bankruptcy in Romania. Among these authors, the first three: *(1)* Popescu Madalina Ecaterina, *(2)* Achim Monica Violeta, and *(3)* Bărbuță-Mișu Nicoleta are the most productive, having authored or co-authored five, four, and three papers, respectively. Eighteen authors are listed in two papers, while the remaining authors (i.e., 141) appear in only one publication. A detailed visualization of the production over time of the top ten most prolific authors is found in Figure A.2 of the Appendix section. Each of these 162 authors is affiliated with one or more institutions, totaling thirty-five: mostly from Romania, and a few in the Czech Republic, Estonia, Italy, North Macedonia, Poland, Serbia, Slovakia, Spain, the Netherlands, the UK, and the USA. Not surprisingly, regarding the most relevant affiliations, most authors are affiliated with three of Romania's most prestigious

universities: the Bucharest University of Economic Studies [ASE] (with 34 authors), followed by Babes-Bolyai University from Cluj-Napoca [UBB] (with nine authors), and Alexandru Ioan Cuza University from Iasi [UAIC] (with eight authors) (refer to Figure A.3 from the Appendix). These outcomes clearly indicate that ASE-affiliated scholars show the highest interest in the issue of Romania's business bankruptcy (i.e., ASE is the most productive institution). With respect to the case of the ten core authors highlighted in the above Sankey diagram, most of them are affiliated with ASE, UBB, Politehnica University of Bucharest, and Dunarea de Jos University from Galati. Furthermore, regarding the authors' keywords displayed in the Sankey diagram, the central themes addressed by the ten leading authors are about "financial distress", "prediction", "insolvency", "Romania", and "bankruptcy". Thereby, all these terms shed light on the fact that scholars are engaged in investigating the challenges that may occur in business activities within Romanian territory (from minor to major ones) as well as how they can be foreseen with the aim of addressing them at an early stage.

Another relevant output of a bibliometric analysis is the word cloud formed on the basis of the author's keywords, as illustrated in Figure 5.



Figure 5. Word cloud based on author's keywords (January 2005 - October 2025)

Notes: The data were cleaned by merging keywords referring to the same concept, including singular/plural forms, as well as synonymous terms. The displayed word count is 50.

Source: Authors' analysis using the Biblioshiny package in R.

As observed, the keywords with the highest frequency of occurrence in the 80 scientific documents are "bankruptcy" (14 appearances), "insolvency" (13 appearances), "financial distress" (9 appearances), "discriminant analysis" (6 appearances), "Romania" (6 appearances), "economic crisis" (5 appearances), "financial analysis" (4 appearances), and "financial ratios" (4 appearances). Although less frequently, the word cloud also features keywords related to a company's financial health and performance (e.g., "credit risk", "insolvency risk", "failure risk", "financial risk", "judicial reorganization", "performance"), bankruptcy prediction models (e.g., "Conan & Holder model", "Anghel model", "early warning models", "diagnosis"), bankruptcy prediction methods (with a focus on machine learning techniques) or other statistical analysis methods (e.g., "decision tree", "boosting", "score function", "cointegration analysis", "comparative analysis"), financial markets and institutions (e.g., "Bucharest stock exchange", "insurance and reinsurance"), and economic outcome (e.g., "economic growth"). Therefore, we conclude that these keywords reflect a growing interest among researchers in detecting potential

future business insolvency or bankruptcy by applying various bankruptcy prediction techniques, ranging from traditional methods to advanced algorithms. Besides, it can be discerned that a diverse range of macroeconomic and microeconomic factors may contribute to a company's success or failure.

Additionally, the author's keyword co-occurrence network is depicted below (see Figure 6). Based on the results, we may acknowledge that the items "bankruptcy" (red cluster), "bankruptcy risk" (green cluster), "insolvency" (blue cluster), and "financial distress" (purple cluster) are key topics in the 80 scientific documents assessed. Although these core concepts differ in meaning, they all point to financial struggles within a legal entity. Furthermore, by examining the links formed between the keywords within each cluster, it is clear that all four clusters revolve around a similar research topic: accurately predicting severe business-level financial issues by employing various types of statistical or machine learning methods on financial ratios or raw accounting indicators (some studies focused solely on legal entities within Romanian territory, while others also included companies from additional countries). The co-occurrence map findings are largely consistent with those of Shi and Li (2019), who performed a bibliometric analysis on intelligent bankruptcy prediction techniques for corporate entities.

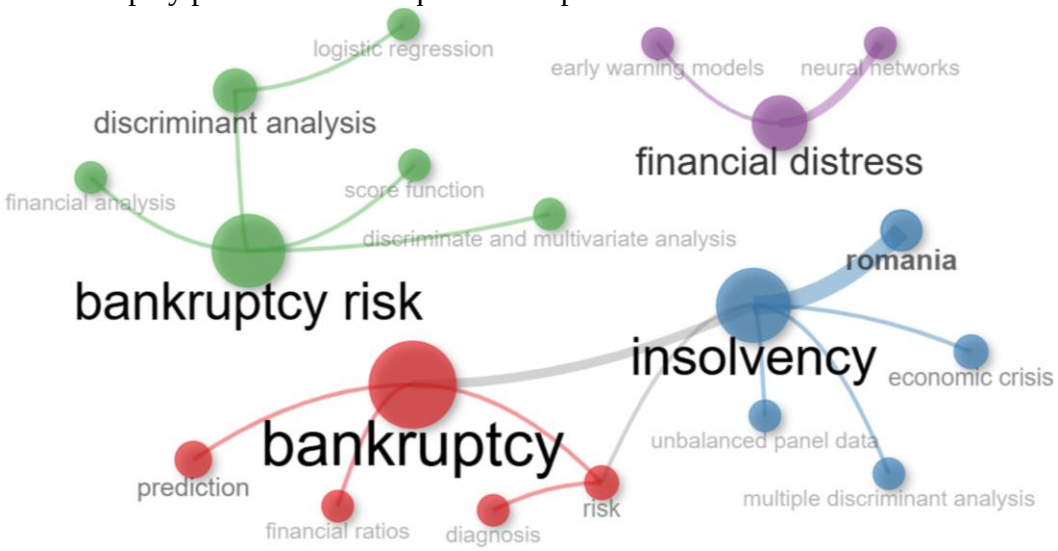


Figure 6. Co-occurrence network derived from author's keywords (January 2005 - October 2025)

Notes: The data were cleaned by merging keywords that refer to the same concept, including singular and plural forms. The clustering algorithm employed is Louvain. The network comprises a total of four distinct clusters.

Source: Authors' analysis using the Biblioshiny package in R.

Finally, but importantly, to illustrate Romania's current situation concerning business financial distress, Figure 7 displays the insolvency rate at the level of legal entities by county between January 1, 2025, and October 31, 2025.

The insolvency rate within a county *i* is calculated according to the following formula:

$$IR_i = \frac{ILE_i}{ALE_i} * 100 \quad (1)$$

Where: IR_i is the insolvency rate in county *i* (expressed as a percentage), ILE_i is the total number of legal entities that entered insolvency in county *i*, ALE_i is the total number of active legal entities in county *i*, $i = 1,\ldots,42$ referring to the Romanian counties.

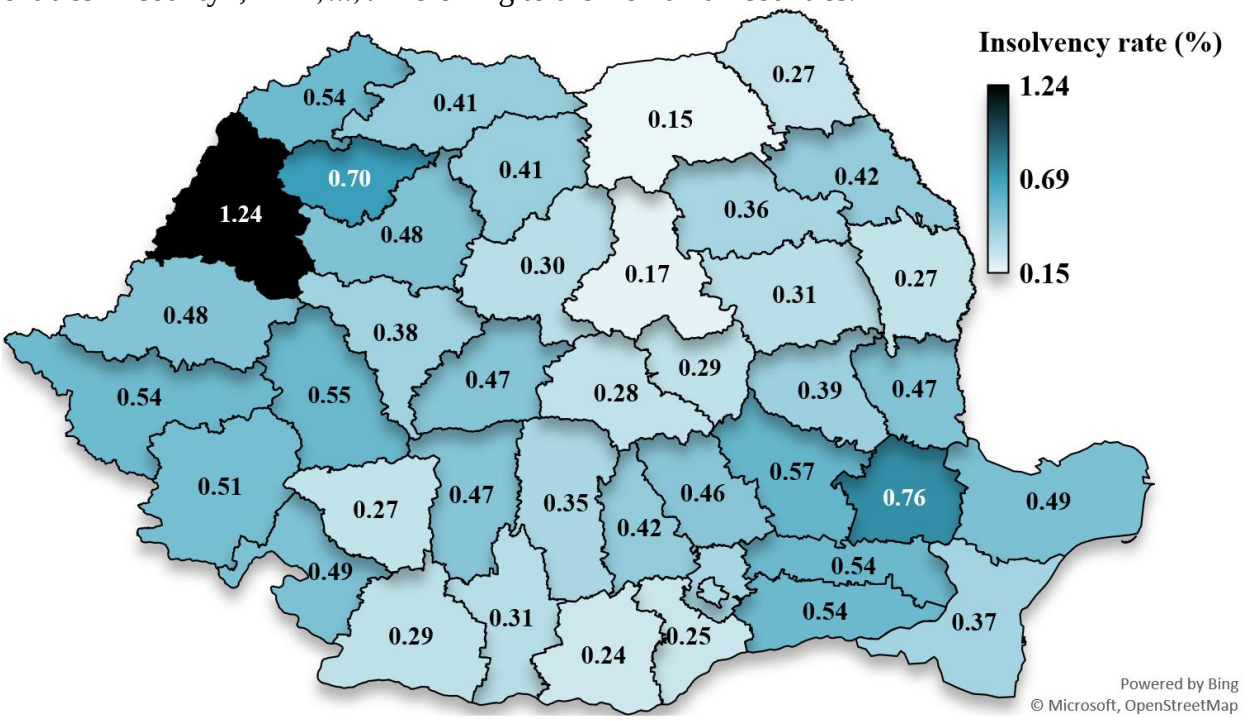


Figure 7. Insolvency rate of legal entities by county in Romania (January 2005 - October 2025)
Source: Authors' computation in Excel based on the Ministry of Justice National Trade Register Office data.

During these 10 months, in Romania, 5,318 insolvent companies and 1,293,138 active legal entities have been registered, which implies an insolvency rate of 0.41% at the country level. As observed, the insolvency rate at the county level varies between 0.15% and 1.24%, with Bihor having the highest rate (with 524 insolvent companies and 42,376 active legal entities, the insolvency rate stands at 1.24%), followed by Braila (with 83 insolvent companies and 10,951 active legal entities, the insolvency rate stands at 0.76%), Salaj (with 69 insolvent companies and 9,827 active legal entities, the insolvency rate stands at 0.70%), and Buzau (with 107 insolvent companies and 18,891 active legal entities, the insolvency rate stands at 0.57%). At the opposite end are Suceava (with 41 insolvent companies and 27,071 active legal entities, resulting in an insolvency rate of 0.15%) and Harghita (with 21 insolvent companies and 12,352 active legal entities, resulting in an insolvency rate of 0.17%). Although there is a clear discrepancy between Romanian counties in terms of insolvency rate, overall, the situation does not raise concerns.

Conclusions

Bankruptcy is a legal process with various harmful consequences for many stakeholders, including creditors, suppliers, workers, customers, and the entire community. Especially in the current era, when humanity faces numerous and diverse challenges, it is paramount that companies forecast potential severe financial difficulties and identify viable solutions to prevent insolvency or, in cases of production, facilitate prompt recovery so they do not go bankrupt.

Bearing in mind the relevance of this subject, our research aimed to appraise the scientific literature on business bankruptcy in Romania by employing a quantitative research method: a bibliometric analysis. To accomplish our objective, we used the WoS platform, where we searched for scientific documents by using the following topic keywords: *("bankruptcy" OR "insolvency" OR "business failure" OR "corporate failure" OR "company failure" OR "financial distress") AND ("Romania" OR "Romanian")*. While the initial search query unraveled 189 scientific papers, we retained only studies in the fields of business and economics, resulting in 80 documents covering the period January 2005 - October 2025. Following this step, the bibliometric analysis was conducted in the R programming language.

The bibliometric analysis findings could be summarized as follows: *(i)* a total of 162 authors have contributed notably to the development of research on the topic of business bankruptcy in Romania (mostly of them affiliated with the Bucharest University of Economic Studies from Romania), *(ii)* most WoS-indexed documents (namely, 13 articles) were published in year 2014, *(iii)* the three-fields plot, word cloud, and co-occurrence network derived from author's keywords highlight the fact that researchers are involved in exploring the challenges that may arise in business in the Romanian territory (from minor to major ones) as well as how they can be timely foreseen by employing various types of statistical or machine learning methods on financial ratios or raw accounting indicators. On the whole, we might state that the subject of bankruptcy warrants further study to anticipate potential bankruptcy risks, prevent capital losses, and address financial difficulties as effectively as possible at the earliest stage.

Among the limitations of the present article, we could list the following aspects: *(i)* the current research was conducted on scientific documents retrieved strictly from the WoS database, however, in reality, many more papers are published on the topic of bankruptcy issues in Romania, which are not indexed in WoS; *(ii)* we excluded works that were outside the economics and business field. Accordingly, for future research, one might employ bibliometric analysis across multiple bibliographic databases, such as WoS, Scopus, and Google Scholar, with the aim of encompassing all existing articles on corporate bankruptcy in Romania. Also, one could remove any filter, so that all research fields are included.

Acknowledgements

This work was conducted as an associate member of ***ECREB*** – East European Center for Research in Economics and Business, Faculty of Economics and Business Administration, West University of Timisoara, J.H. Pestalozzi Street, No. 16, 300115. This work was supported by the ***START GRANT program*** – an integration grant for teaching and research staff of the West University of Timisoara, under contract number 95218/20.12.2023.

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Appendix

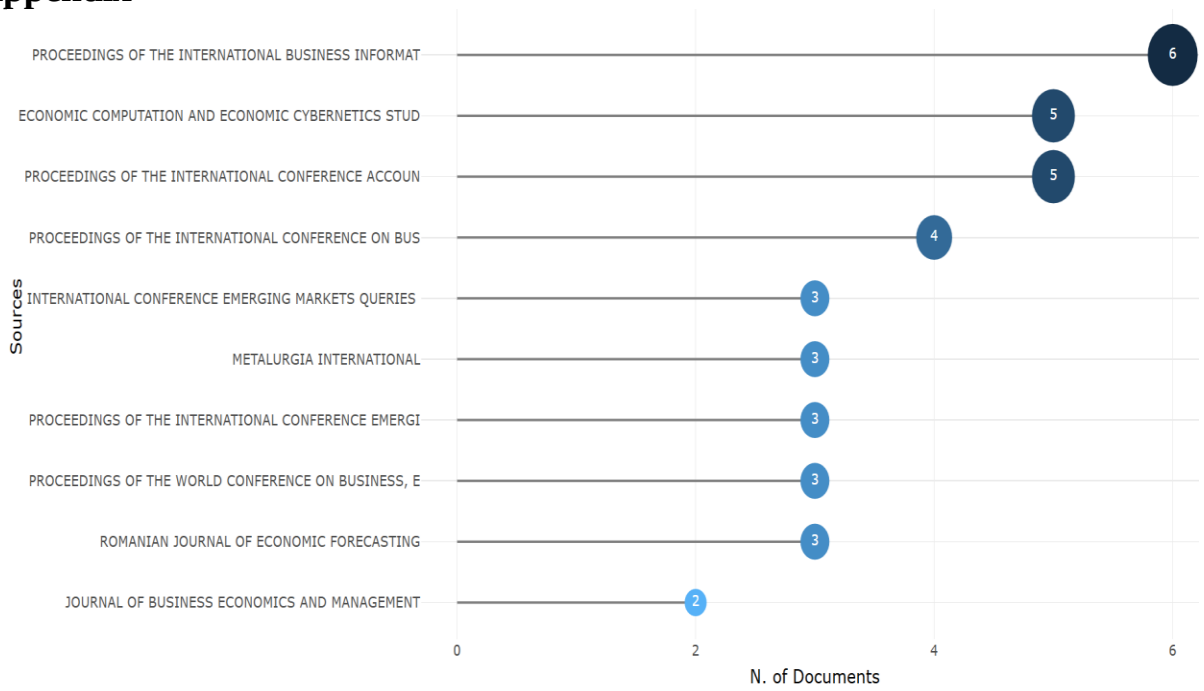


Figure A.1. Top ten most relevant sources (January 2005 - October 2025)

Source: Authors' analysis using the Biblioshiny package in R.

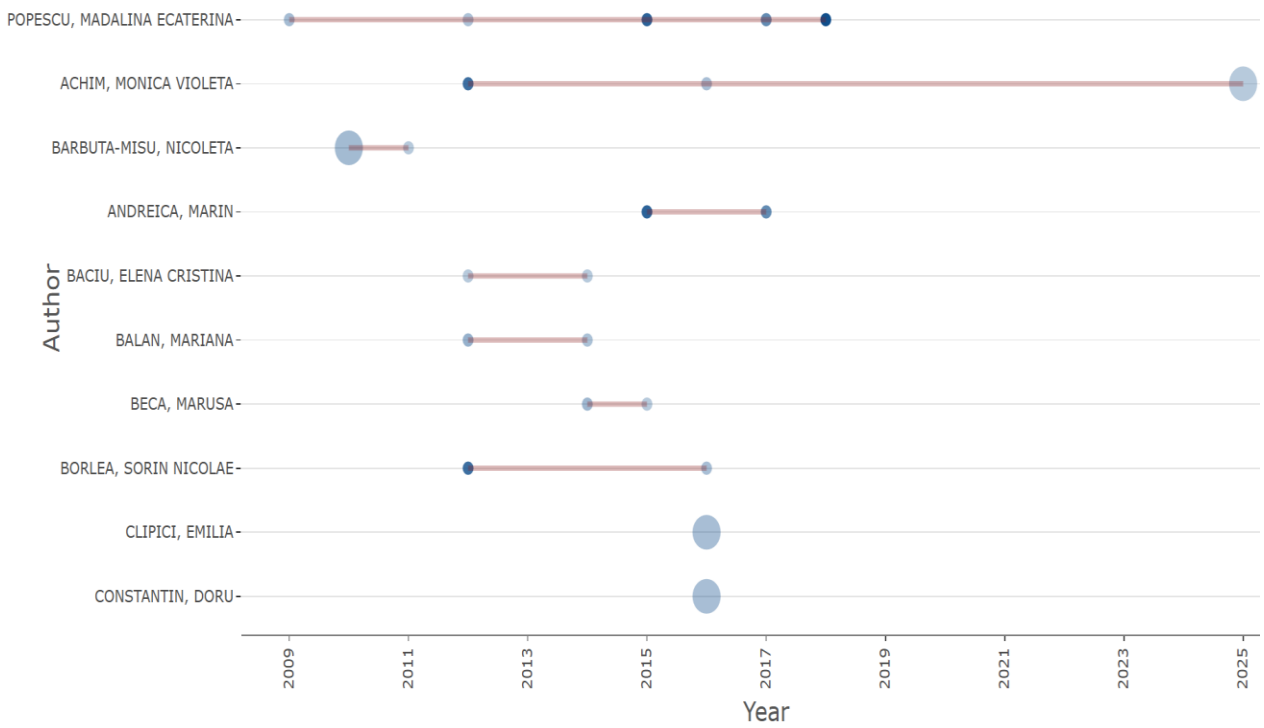


Figure A.2. Top ten authors' production over time (January 2005 - October 2025)

Notes: Small circles indicate one published article, while large circles indicate two published articles. The darker a circle, the more citations the author received in that particular year. Total citations/ year range from 0 to 1.

Source: Authors' analysis using the Biblioshiny package in R.

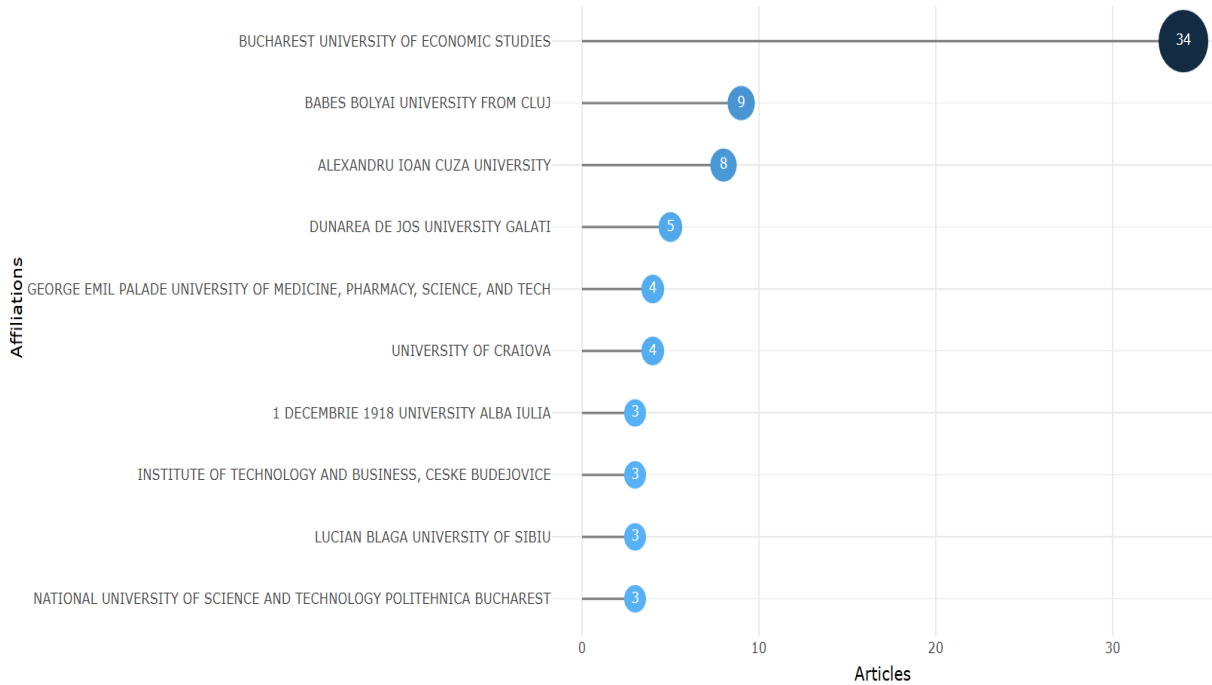


Figure A.3. Top ten most relevant affiliations (January 2005 - October 2025)

Source: Authors' analysis using the Biblioshiny package in R.