# OIL–FINANCE NEXUS IN THE CONTEXT OF PUBLIC ADMINISTRATION: A BIBLIOMETRIC FRAMEWORK FOR SUSTAINABLE GOVERNANCE IN KAZAKHSTAN

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**Annotation.** Oil price fluctuations transmit volatility across equity, currency, and macro-financial markets, yet existing scholarship remains fragmented across methods, regions, and disciplines. This study conducts a bibliometric analysis of 1,969 peer-reviewed articles (2000–2025) from the Web of Science Core Collection, systematically mapping the intellectual structure and thematic evolution of oil–finance research. Using performance indicators and VOSviewer science mapping, we identify leading authors, institutions, journals, and research trends. Results show that scholarly activity surged after the 2014–2016 oil price collapse and again during the COVID-19 pandemic and the 2022 energy crisis, confirming that real-world disruptions stimulate research agendas. Keyword evolution demonstrates a shift from macroeconomic fundamentals and volatility spillovers toward systemic risk, clean energy, and ESG finance. The research enhances its academic value by applying global evidence to develop governance systems for Kazakhstan, which heavily relies on oil production, through three main components: fiscal rules and National Fund operations based on oil-price bands, financial-sector stress tests that assess oil-related contagion, and civil-service training programs focused on spillover measurement and transition finance. The research provides Kazakhstan and other resource-dependent economies with a framework to enhance their methodological standards and regional partnerships and evidence-driven governance decisions for oil market and financial system management.
**Keywords:** oil price fluctuations, financial markets, volatility spillovers, energy finance, systematic risk, bibliometric analysis

**Аңдатпа.** Мұнай бағасының өзгерістері акциялар, валюталар және макроқаржылық нарықтардағы құбылмалылықты тудырады, алайда қазіргі ғылыми зерттеулер әдістер, аймақтар мен пәндер тұрғысынан фрагменттелген болып отыр. Бұл зерттеу Web of Science Core Collection деректер базасындағы 2000–2025 жылдар аралығындағы 1 969 рецензияланған мақалаларға библиометриялық талдау жүргізіп, мұнай мен қаржы саласындағы зерттеулердің зияткерлік құрылымын және тақырыптық эволюциясын жүйелі түрде бейнелейді. Өнімділік көрсеткіштері мен VOSviewer ғылыми карталауын пайдалана отырып, біз жетекші авторларды, институттарды, журналдарды және зерттеу үрдістерін анықтадық. Нәтижелер 2014–2016 жылдардағы мұнай бағасының күрт төмендеуінен кейін және COVID-19 пандемиясы мен 2022 жылғы энергетикалық дағдарыстар кезінде ғылыми белсенділіктің артқанын көрсетті, бұл нақты әлемдегі күйзелістердің зерттеу күн тәртібін ынталандыратынын дәлелдейді. Кілттік сөздердің эволюциясы макроэкономикалық факторлар мен құбылмалылықтың таралуынан жүйелік тәуекел, таза энергия және ESG қаржыландыру бағыттарына ауысқанын көрсетті. Зерттеу өз академиялық маңызын Қазақстан үшін мұнай өндіруге тәуелді басқару жүйелерін әзірлеу арқылы кеңейтеді. Ұсынылған үш негізгі компонент: мұнай бағасының диапазондарына негізделген фискалдық ережелер мен Ұлттық қор операциялары, мұнаймен байланысты тәуекелдерді бағалайтын қаржы секторындағы стресс-тесттер және қаржы өтпелі кезеңі мен тәуекелдердің таралуын өлшеу бойынша мемлекеттік қызметшілерге арналған оқыту бағдарламалары. Бұл жұмыс Қазақстанға және табиғи ресурстарға тәуелді басқа экономикаларға әдістемелік стандарттарын жетілдіруге, өңірлік серіктестікті нығайтуға және мұнай нарығы мен қаржы жүйесін басқаруда дәлелге негізделген шешімдер қабылдауға арналған тұжырымдамалық негіз ұсынады.
**Түйінді сөздер:** мұнай бағасының өзгерістері, қаржы нарықтары, құбылмалылықтың таралуы, энергия қаржыландыруы, жүйелік тәуекел, библиометриялық талдау

**Аннотация.** Ценовые колебания на нефть порождают волатильность на рынках акций, валют и макрофинансовых систем, однако существующие исследования остаются фрагментированными по методам, регионам и

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дисциплинам. Настоящее исследование проводит библиометрический анализ 1 969 рецензируемых статей (2000–2025 гг.) из базы данных Web of Science Core Collection, системно картируя интеллектуальную структуру и тематическую эволюцию научных работ, посвящённых взаимосвязи нефти и финансов. С помощью показателей научной продуктивности и инструмента VOSviewer выделены ведущие авторы, организации, журналы и основные исследовательские тенденции. Результаты показывают, что научная активность резко возросла после обвала цен на нефть 2014–2016 годов, а также во время кризисов COVID-19 и энергетического кризиса 2022 года, что подтверждает: реальные экономические потрясения стимулируют развитие исследовательской повестки. Эволюция ключевых слов демонстрирует сдвиг акцентов от макроэкономических основ и волатильности к изучению системных рисков, чистой энергетики и ESG-финансирования. Исследование расширяет академическую ценность, применяя мировые эмпирические данные для разработки систем государственного управления в Казахстане, экономика которого в значительной степени зависит от нефтедобычи. Предложены три ключевых направления: (1) фискальные правила и операции Национального фонда, основанные на ценовых коридорах нефти; (2) стресс-тестирование финансового сектора для оценки рисков, связанных с нефтяной волатильностью; (3) программы подготовки госслужащих по измерению эффектов распространения и управлению переходным финансированием. Результаты предоставляют Казахстану и другим ресурсозависимым экономикам концептуальную основу для совершенствования методологических стандартов, укрепления региональных партнёрств и принятия основанных на данных управленческих решений в сфере нефтяного рынка и финансовой системы.

**Ключевые слова:** ценовые колебания на нефть, финансовые рынки, распространение волатильности, энергетическое финансирование, системный риск, библиометрический анализ

## Introduction

The energy sector is characterised by recurrent price shocks that transmit instability across macroeconomic and financial systems. Episodes such as the 2014–2016 oil price collapse, the COVID-19 shock, and the 2022 energy crisis demonstrate that oil-market disruptions generate systemic effects comparable to traditional macroeconomic shocks. For resource-based economies, including Kazakhstan, fiscal stability, exchange-rate management, and the sustainability of social spending remain closely tied to oil-price dynamics.

Research in energy finance has shown that oil markets operate through more complex mechanisms than those described by traditional supply–demand models. Oil-price fluctuations affect credit spreads, equity markets, exchange rates, and systemic-risk indicators, with particularly persistent effects in emerging markets (Chen & Zhang, 2023; Tian, Zhao & Zhen, 2025; Alzate-Ortega, Garzón, & Molina-Muñoz, 2024). Recent studies increasingly rely on higher-moment, tail-risk, and connectedness frameworks to capture nonlinear spillovers between oil prices, financial assets, and clean-energy markets (Hao & Pham, 2024; Naeem et al., 2024; Pan et al., 2024; Zhang, Wang & Niu, 2024). This evolution implies that oil-price volatility should be treated as a structural macro-financial risk rather than a temporary external disturbance.

Bibliometric evidence indicates a clear methodological shift toward stress-based analytical approaches that focus on extreme co-movements and crisis-driven transmission. For oil-dependent economies, these methods have direct relevance for fiscal governance and financial supervision. In the context of Kazakhstan, dominant research clusters point to four groups of stress-testing tools compatible with supervisory objectives and data availability: (i) connectedness frameworks based on VAR and TVP-VAR models; (ii) tail-risk and quantile-based spillover measures; (iii) systemic-risk indicators such as CoVaR, ΔCoVaR, SRISK, and MES; and (iv) regime-switching and non-linear dependence models that distinguish between normal and crisis conditions.In practical applications, oil-related stress testing can be organised around a limited set of transparent scenarios, including a sharp oil-price decline with elevated volatility, a macro-financial amplification scenario combining oil shocks with exchange-rate depreciation and higher funding costs, and an external risk-off scenario linking oil-price declines to rising sovereign risk premiums and reduced external liquidity. These scenarios can be monitored using a concise set of indicators covering exchange-rate pressure, credit spreads, non-performing loans in oil-exposed sectors, capital and liquidity ratios, and connectedness or tail-risk metrics. Despite substantial methodological progress, the literature remains fragmented. Most studies focus on individual markets, countries, or modelling techniques, limiting cross-study comparability. Existing bibliometric reviews address volatility spillovers (Bashir, 2022), commodity–finance intersections (Mbarki et al., 2023), or crisis-specific research agendas (Mim, Kathiravan & Maniam, 2024), but do not place oil–finance linkages at the core of governance and policy design. Moreover, oil–finance research indexed in the Web of Science remains geographically concentrated in advanced economies and large emerging markets, while Central Asia-including Kazakhstan-is under-represented, limiting the direct transferability of dominant analytical frameworks.

This study addresses these gaps by systematically analysing 1,969 peer-reviewed articles from the Web of Science Core Collection (2000–2025). Using bibliometric indicators and network-visualisation techniques, it maps influential authors, institutions, journals, and thematic clusters, and traces the evolution of oil–finance research across successive crises. The analysis explicitly links global research trends to governance-relevant domains for Kazakhstan, focusing on fiscal rules and National Fund operations, oil-related financial-sector stress testing, and capacity building for civil servants in spillover analysis and transition finance.

## Literature Review

Research on the connection between oil price fluctuations and financial markets has progressed in three distinct waves.

**Early Phase (2000–2010).** The first wave framed oil primarily as a macroeconomic driver linked to inflation, industrial output, and equity indices. Studies relied on VAR models, cointegration tests, and event analyses to demonstrate that crude oil price fluctuations significantly affected asset prices. However, these studies largely assumed linear relationships and stable transmission mechanisms, paying limited attention to asymmetries, structural breaks, or crisis regimes.

**Expansion Phase (2011–2019).** The second wave reflected growing data availability and methodological advances. Researchers increasingly examined volatility spillovers, hedging behaviour, and cross-market dependence. The global financial crisis of 2008 and the 2014–2016 oil price collapse accelerated interest in how oil-price shocks propagate across financial assets. GARCH-family models, wavelet decompositions, and connectedness indices became dominant analytical tools. Empirical findings showed that oil often acts as a volatility transmitter primarily during periods of market stress rather than under normal conditions (Naeem et al., 2024).

**Transformation Phase (2020–2025).** The COVID-19 pandemic and the 2022 energy-price shock triggered a third wave characterised by a shift toward systemic risk, sustainability, and forecasting innovation. Higher-order moments, including skewness and kurtosis, were shown to carry explanatory power in oil–clean energy linkages under uncertainty (Hao & Pham, 2024). Pandemic- and geopolitics-driven shocks amplified multi-asset connectedness (Benlagha & Omari, 2022), while new evidence emerged on extreme risk spillovers in oil futures markets, including China's INE crude contracts (Liu, Yang & Lee, 2025). At the same time, machine-learning techniques-such as news-augmented models and Transformer-based architectures-improved oil-volatility and return forecasts (Pan, et al., 2024; Zhang, Wang & Niu, 2024). Forecasting. Parallel bibliometric mappings indicate that green finance and ESG assets increasingly co-evolve with oil-price volatility, linking energy shocks to transition risk and policy uncertainty (Razi, Karim & Cheong, 2024).

Several bibliometric studies have attempted to organise this expanding literature. Bashir (2022) demonstrates that macro-instability dominates citation clusters when oil and stock-market volatility are strongly correlated (Bashir, 2022). Other reviews focus on broader commodity–finance interactions (Mbarki et al., 2023) or crisis-driven research agendas (Mim, Kathiravan & Maniam, 2024). However, most existing surveys position oil as one element within general volatility or commodity frameworks, rather than treating oil–finance linkages as a distinct analytical domain.

Literature reviews demonstrate clear thematic progression: early research emphasised macroeconomic fundamentals; the expansion phase focused on volatility transmission and spillovers; and recent studies increasingly integrate systemic risk, ESG finance, and sustainability concerns. Despite this evolution, the literature remains fragmented across methods, regions, and institutional contexts.

A key limitation of the existing body of work concerns its geographic and institutional scope. Empirical evidence is heavily concentrated in advanced economies and large emerging markets with developed financial systems, while oil-dependent economies with different fiscal architectures-such as Kazakhstan-are rarely examined. Differences in sovereign wealth fund design, exchange-rate regimes, and degrees of financial dollarisation limit the direct transferability of dominant oil–finance models to Central Asian contexts.

As a result, the literature provides rich methodological insights but limited guidance on how oil–finance dynamics can be operationalised within public administration and fiscal governance frameworks. This gap motivates the present bibliometric study, which systematically maps the

intellectual structure of oil–finance research and explicitly links its thematic evolution to governance-relevant challenges in oil-dependent economies.

## Methodology

This study follows a structured five-stage bibliometric protocol (Page et al., 2021; Zupic & Čater, 2015).

**Stage 1: Data retrieval.** All records were retrieved from the Web of Science Core Collection. The "Topic" field—which spans titles, abstracts, author keywords, and Keywords Plus—was queried using the following Boolean string:

TS = ("oil price*" OR "crude oil volatil*" OR "oil price fluctuat*" OR "energy price*" OR "oil market*" OR "oil market volatil*") AND TS = ("financial market*" OR "stock market*" OR "equity market*" OR "financial system*" OR "economic impact*" OR "macroeconomic indicator*" OR "investment return*").

The search covered 2000–2025, was limited to English-language publications, and initially left source and document types unrestricted. The final search was executed on May 27, 2025.

Limitations of the data source. Reliance on the Web of Science Core Collection introduces structural limitations. WoS prioritises internationally established journals and English-language publications, which leads to the under-representation of research from Central Asia and other emerging regions. Studies published in Russian or regional outlets are therefore less visible in the retrieved corpus, potentially biasing country-level comparisons and geographic patterns of knowledge production. The bibliometric results should thus be interpreted as reflecting WoS-indexed research rather than the full universe of oil–finance scholarship.

Stage 2: Screening and inclusion. Titles and abstracts were screened to exclude studies focused exclusively on engineering, geology, or energy policy without financial variables. Eligible documents included Articles, Early Access items, Reviews, and Proceedings Papers, while editorials, book reviews, corrections, and meeting abstracts were excluded. Only studies modelling at least one financial variable-such as stock returns, exchange rates, credit spreads, volatility indices, or systemic-risk measures-were retained. After screening, 1,969 peer-reviewed records remained.

Stage 3: Data cleaning. Bibliographic metadata (authors, affiliations, journals, years, keywords, citations) were exported and refined in Microsoft Excel. Cleaning procedures included de-duplication, harmonisation of author and institutional names, standardisation of country labels, and keyword normalisation using a VOSviewer thesaurus (e.g., merging variants of "oil price volatility" and standardising "COVID-19" terms). Generic keywords with limited analytical value were removed.

Stage 4: Science mapping**.** The cleaned dataset was imported into VOSviewer v1.6.20 for bibliometric network analysis (Van Eck & Waltman, 2010). Fractional counting was applied to co-authorship and keyword co-occurrence, while complete counting was used for source-citation density maps. Three maps were constructed:

1. Co-authorship network (≥2 co-authored publications; N = 78).
2. Keyword co-occurrence overlay (≥5 occurrences; fractional counting).
3. Source citation density (journal-level threshold: ≥200 citations).

Overlay visualisations reflect average publication year, allowing the identification of thematic evolution over time. Sensitivity checks confirmed the stability of clusters across alternative threshold settings.

Stage 5: Performance indicators. Descriptive indicators—including annual publication trends, leading journals, authors, institutions, countries, and citation patterns—were computed in Excel and cross-validated using VOSviewer outputs. Institutional and country-level analyses employed Clarivate's organisation-enhanced metadata and fractional counting to avoid double counting. **Citation Topics,** Web of Science Categories, and Sustainable Development Goal (SDG) mappings were used to assess disciplinary breadth and policy relevance.

## Results

This section presents the bibliometric results based on Web of Science data visualised using Excel and VOSviewer.

The annual publication pattern from 2000 to 2025 appears in Figure 1. The number of published articles stayed low during the first part of the 2000s because researchers published less than 10 articles annually until 2005. The research output started to increase after 2008 when the annual

publication numbers expanded from 21 in 2007 to 181 in 2018. The number of publications reached its highest point at 498 during 2022. This surge coincides with major global disruptions, including the COVID-19 pandemic and the 2022 energy crisis. The research output decreased to 379 in 2023 and 324 in 2024 before dropping to 103 in 2025 because of incomplete data and delayed indexing. Overall, publication dynamics confirm the crisis-driven nature of oil–finance research.

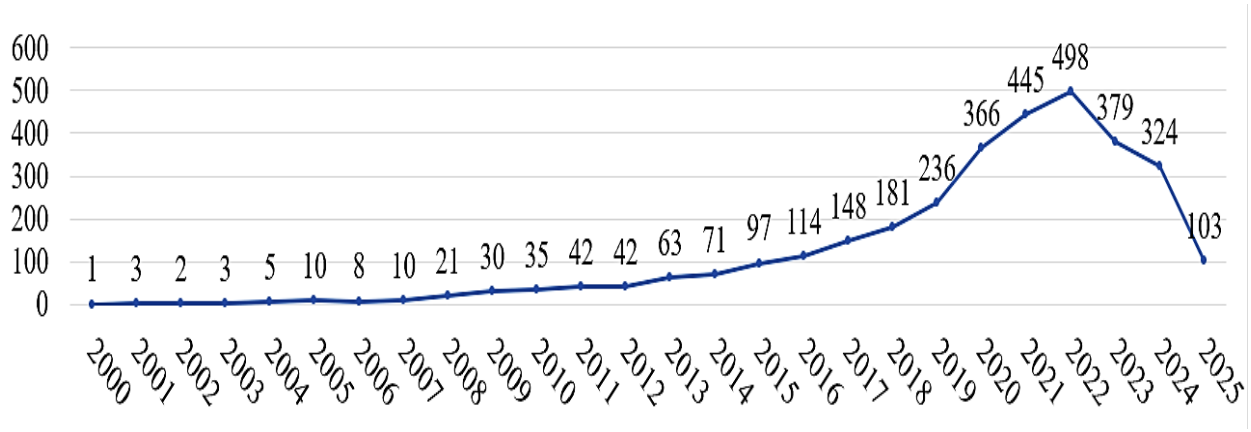


***Figure 1. Annual Publications Included after Screening (2000–2025)***

For policymakers, these publication cycles signal periods when oil-price volatility intensifies fiscal and financial risks, reinforcing the relevance of oil–finance research for governance and regulation.

The field consists mainly of journal articles (n = 3,059) which make up more than 90% of the total documents because peer-reviewed publications dominate this research area. Proceedings papers and Early Access items indicate ongoing and emerging research activity. The relatively small number of review articles suggests scope for further synthesis studies.

Research findings distribution patterns determine how governments function. The majority of research findings appear in academic journals which creates barriers for policymakers and state institutions to access and understand the information. The small number of review studies demonstrates the requirement for Kazakhstan to create local experts who will transform international research into usable policy guidance.

The authors who published the most research about oil–finance include Bouri E. (50 publications) stands as the leading author in the field while Hammoudeh S. (47) and Tiwari A.K. (44) follow him. The list of productive scholars includes Ma F. and Mensi W. who each published 42 papers and Gupta R. who published 40 papers and Vo X.V. and Zhang Y.J. who each published 36 papers and Kang S.H. and Wang Y.D. who published 31 papers each. These authors primarily focus on volatility transmission, systemic risk, and forecasting using advanced econometric methods.

The absence of scholars from Kazakhstan and Central Asia in the top author list demonstrates the requirement for enhanced local research capabilities to handle regional policy matters effectively. The civil service of Kazakhstan along with academic institutions should create research partnerships with international centers to achieve knowledge exchange and policy development that combines worldwide standards with domestic requirements.

The research domain of oil and finance shows Southwest Jiaotong University as its leading institution through 86 published works according to Figure 2. The Chinese Academy of Sciences follows Southwest Jiaotong University with 68 publications while Central South University publishes 64 papers. The research field receives significant contributions from Middle Eastern and Southeast Asian institutions through Lebanese American University (63) and Ho Chi Minh City University of Economics (57). The list includes European business schools IPAG (55) and Montpellier (55) and Drexel University (49) from the United States. The research activities of Nanjing University of Science and Technology (49) and University of Pretoria (47) demonstrate China's and South Africa's involvement in the field.

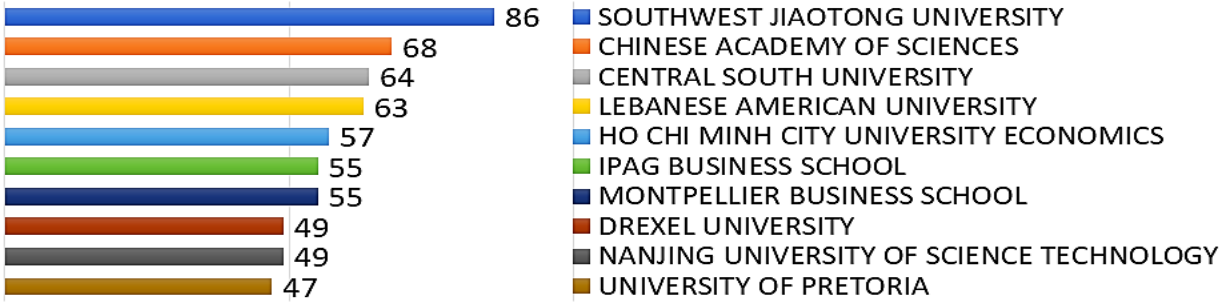


***Figure 2. Top affiliations. Created by the author based on Web of Science data***

Overall, Chinese institutions dominate the field, reflecting China's strong research capacity and strategic engagement in energy and financial markets. At the same time, the diversity of contributing universitiesfom the Middle East, Southeast Asia, Europe, and Africa-illustrates the globalisation of oil–finance research.

Notably, no Kazakhstani universities appear among the leading affiliations. This absence limits the domestic production of policy-relevant knowledge and increases reliance on externally generated frameworks that may not fully reflect Kazakhstan's institutional context. Strengthening research partnerships with leading international institutions and expanding bibliometric and applied policy research within Kazakhstan would enhance local governance capacity and support the training of civil servants in addressing country-specific energy and fiscal challenges.

Figure 3 presents the top publishing countries in oil–finance research. China leads the field, followed by the United States (397 publications). In Europe, France (245) and the United Kingdom (226) are major contributors, while South Asia is represented by India (225) and Pakistan (195). Australia (187), Tunisia (168), Saudi Arabia (155), and Turkey (145) further illustrate the geographic breadth of the literature.

This distribution confirms that oil–finance research has expanded beyond traditional Western centres, involving both oil-importing economies (e.g., China, India, France, the United Kingdom) and oil-exporting countries (e.g., Saudi Arabia, Pakistan, Tunisia). The global nature of oil-price risk is therefore reflected in the diversity of research contributors.

Notably, Kazakhstan does not appear among the leading research-producing countries despite its high exposure to oil-price volatility. This absence increases reliance on externally generated evidence that may not fully capture national institutional and fiscal characteristics. Expanding domestic research capacity and international collaboration would strengthen evidence-based policymaking and enhance the ability of public institutions to anticipate and manage oil-related macro-financial risks.


***Figure 3. Countries/regions with the highest publication output***

Figure 4 shows that oil–finance research is concentrated in a small number of core journals. *Energy Economics* leads the field with 380 publications, followed by *Resources Policy* (216). Other frequently used outlets include *Energy* and *Physica A* (98 each), *International Review of Financial Analysis* (81), *North American Journal of Economics and Finance* (75), *Economic Modelling* and *International Review of Economics & Finance* (74 each), *Energies* (66), and *International Journal of Finance & Economics* (54).

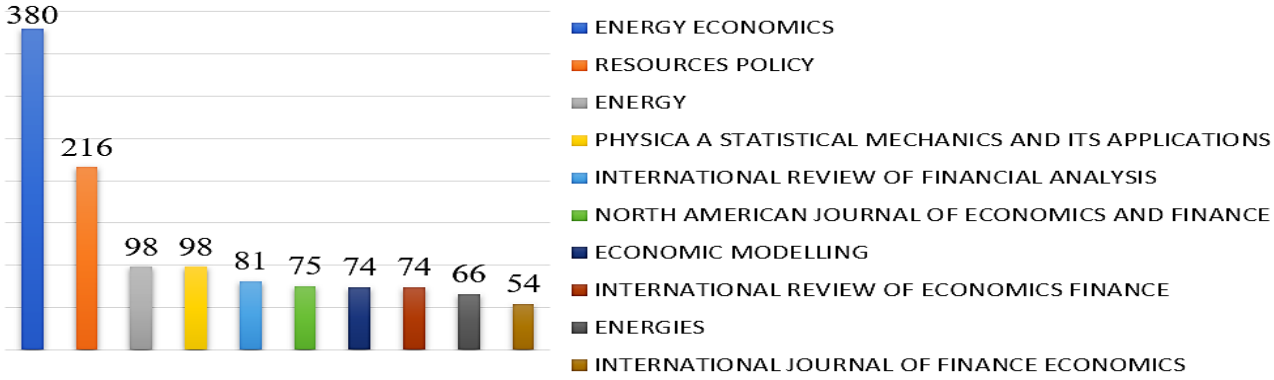


***Figure 4. Most frequent publication titles. Created by the author based on Web of Science data***

These journals reflect the interdisciplinary nature of oil–finance research, bridging energy economics, financial stability analysis, and quantitative modelling. For policymakers, they represent key sources of internationally validated evidence on oil-price volatility and its financial implications. The absence of Central Asian journals among the leading outlets highlights the need to strengthen regional publication platforms to ensure that locally relevant oil–finance research contributes to global policy debates.

The field is dominated by the Economics and Finance core, particularly *Economics* (2,842 records) and *Market Interdependencies* (2,738). Sustainability and energy-transition topics appear as smaller but distinct clusters, including *Carbon Mitigation* (95) and *Renewable Energy Transition* (11). Methodological advances are represented by *Chaotic Time Series* (92) and *Energy Forecasting* (15), while governance-oriented research remains limited, with *Corporate Social Responsibility* (11) and *Bibliometrics* (9).

This distribution shows that oil–finance scholarship has expanded beyond volatility and spillover analysis toward sustainability, advanced modelling, and governance-related questions. For Kazakhstan, the dominance of economics and finance reflects the immediate macro-fiscal relevance of oil-price shocks, while emerging sustainability clusters align with national transition and development goals. At the same time, the limited presence of governance-focused topics and Central Asian evidence highlights the need for greater domestic research capacity to support evidence-based public administration during periods of oil-market volatility.

The Social Sciences Citation Index (SSCI) dominates the field with 2,275 records, reflecting the central role of economics, finance, and social sciences. A substantial share of studies is also indexed in the Science Citation Index (SCI) and Emerging Sources Citation Index (ESCI), indicating active contributions from applied mathematics, computational modelling, and environmental sciences. Other indexes-CPCI, SSH, and BCI-account for a smaller number of publications, while AHCI and BSCI include only a limited set of records.

This distribution confirms the interdisciplinary nature of oil–finance research. While economics and finance remain the core domains, methodological and environmental contributions increasingly shape the field. For Kazakhstan, this diversity underscores the need for public administration and policy institutions to integrate evidence from multiple disciplines when designing fiscal strategies, financial regulation, and energy-transition policies. At the same time, the dominance of SSCI publications facilitates the direct translation of research findings into civil-service training and policymaking, while the relatively limited presence of natural science outlets highlights opportunities for closer collaboration with energy forecasting and climate-resilience researchers.

The Sustainable Development Goals (SDGs) analysis shows a strong concentration of oil–finance research around SDG 8 (Decent Work and Economic Growth), which accounts for approximately half of all SDG-tagged records (2,915 observations). This dominance reflects the field's primary focus on macroeconomic stability, employment, and growth-related outcomes of oil-

price fluctuations. Substantial attention is also given to SDG 9 (Industry, Innovation and Infrastructure), SDG 7 (Affordable and Clean Energy), and SDG 13 (Climate Action).

ESG- and clean-energy–oriented studies are mainly associated with SDG 7, SDG 9, and SDG 13, forming a growing but still secondary strand relative to the macroeconomic and financial-stability focus of the literature. Smaller contributions address SDG 12 (Responsible Consumption and Production), SDG 17 (Partnerships for the Goals), and SDG 11 (Sustainable Cities and Communities), while topics related to SDG 1 (No Poverty), SDG 10 (Reduced Inequality), and SDG 3 (Good Health and Well-Being) remain marginal.

This SDG distribution aligns closely with Kazakhstan's national development priorities. SDG 8 corresponds to efforts to stabilise growth and employment in an oil-dependent economy, while SDG 9 supports infrastructure development and innovation. National initiatives in renewable energy and climate adaptation are consistent with SDG 7 and SDG 13. At the same time, the limited attention to poverty and inequality highlights a research gap relevant for public administration. Integrating SDG-based analysis into national planning and civil-service training would support more evidence-driven policies that link oil-price management with inclusive and sustainable development.

Figure 5 presents the distribution of oil–finance research across Web of Science subject categories. Economics dominates the field with 1,528 records (44%), followed by Business Finance with 803 records (23%). Energy & Fuels and Environmental Studies together account for approximately 20% of the corpus, highlighting the importance of energy-related and environmental dimensions. Business and Management studies contribute around 5% each, while Environmental Sciences represent 4%. Smaller shares are observed in Physics Multidisciplinary (3%), Thermodynamics (3%), and Green & Sustainable Science and Technology (2%).

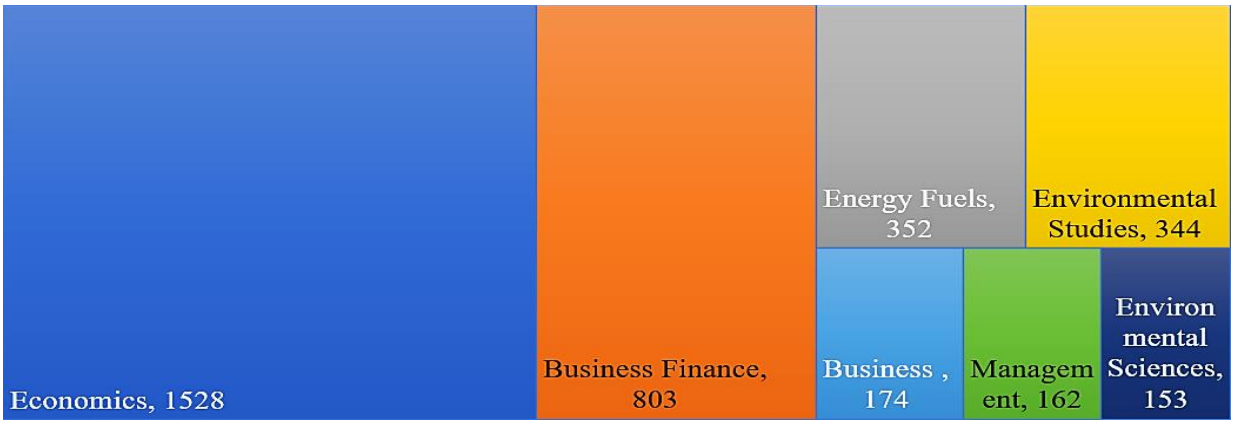


***Figure 5. Web of Science (WoS) categories***

This distribution confirms that economics and finance form the core of oil–finance research, while contributions from environmental sciences, physics, and sustainability studies reflect the increasing methodological sophistication and growing relevance of energy-transition and climate-related issues. For public administration, this interdisciplinarity underscores the need for policy analysis that integrates economic, financial, and environmental evidence.In the case of Kazakhstan, fiscal and regulatory policymaking continues to rely primarily on economic and financial expertise, but effective management of energy-transition and climate risks requires broader analytical capacity. Strengthening cross-disciplinary skills within the civil service would support evidence-based decision-making that balances short-term revenue stabilisation with long-term sustainability objectives.

The co-authorship network map (Figure 6) demonstrates how leading researchers in oil–finance studies work together. The visualization reveals several clusters with average connection strength because researchers within groups work closely but their connections to other regions remain restricted. The most productive authors maintain their position as central nodes in these clusters which demonstrates how their research output leads to increased collaboration influence.

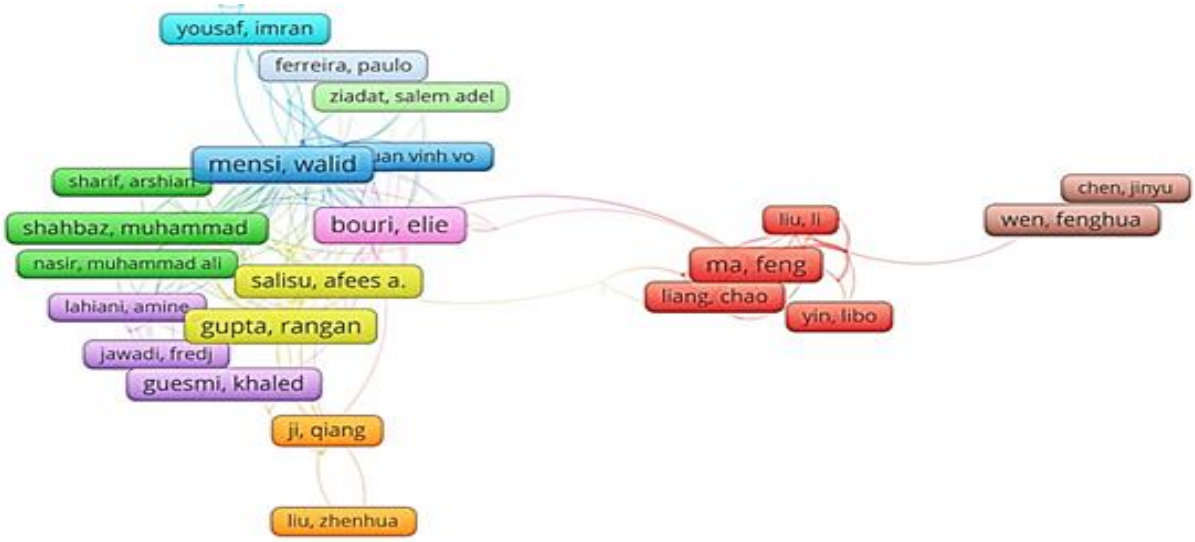


***Figure 6. Co-authorship network (authors ≥ two co-authored publications; N=78)***

1. Blue cluster – The research group of Mensi Walid (42 publications) includes Vo Xuan Vinh and Yousaf Imran and Paulo Ferreira and Ziadat Salem Adel. The researchers study financial contagion effects and volatility transmission and market connection patterns. Mensi Walid demonstrates his dual role as a leading researcher who produces many publications and maintains active collaboration with other scientists.
2. Green cluster – The research group of Shahbaz Muhammad (47 publications) works with Sharif Arshian and Nasir Muhammad Ali. The researchers study how macroeconomic factors create financial instability and how policy decisions affect emerging markets. Shahbaz maintains his position as a leading worldwide researcher and South Asian and Middle Eastern collaboration expert through his extensive publication record.
3. Purple cluster – The research group of Guesmi Khaled and Lahiani Amine connects North African institutions with European institutions through their work on energy–finance integration.
4. Yellow cluster – The authors Gupta Rangan (40 publications) and Salisu Afees A. work together to develop forecasting techniques and econometric models and study oil price volatility. Their dual appearance in productivity and collaboration rankings demonstrates their leadership in methodological research.
5. Orange cluster – The research focus of Ji Qiang and Liu Zhenhua centers on East Asian market connections and energy disruption effects while they provide specialized knowledge about this region but lack connections with other areas.
6. Red cluster – The research cluster consists of Chinese scholars who include Ma Feng (42 publications) and Liu Li and Liang Chao and Yin Libo. The cluster investigates Chinese financial system vulnerability to worldwide oil market disturbances through volatility modeling techniques. The research hubs based in China receive significant attention because Ma Feng appears in both productivity and collaboration metrics.
7. Brown cluster – The research of Chen Jinyu and Wen Fenghua investigates systematic risk and macroeconomic transmission channels in China but they do not work with external partners.
8. Pink cluster – Bouri Elie leads the network through his 50 publications which make him the most productive author. His research about volatility spillovers and systematic risk and oil–finance policy analysis positions him as the network's leading contributor and structural connector.

The co-authorship map shows a complex system which consists of multiple separate parts that continue to evolve. Bouri and Mensi and Shahbaz and Gupta and Salisu serve as connectors between different research areas and geographical locations because they produce many publications and maintain important positions in the network. The research output of Ma Feng and Liu Li remains significant within their home region although they lack worldwide academic connections.

The research findings show two main issues which Kazakhstan needs to handle. The lack of Kazakhstani researchers in these worldwide research clusters enables foreign experts to lead domestic policy discussions instead of using local research data. The establishment of stronger ties between Kazakhstani research institutions and leading international centers would enable the country to enhance its risk prediction abilities and deliver contemporary training to public officials and develop policies that unite international expertise with national requirements.

The co-occurrence analysis of keywords demonstrates the primary research topics and their progression in oil–finance studies. The overlay map (Figure 7) uses color to show time progression where dark blue nodes represent studies from 2019 and turquoise-to-green nodes represent studies from 2020-2021 and bright yellow nodes represent the most recent studies from 2022.

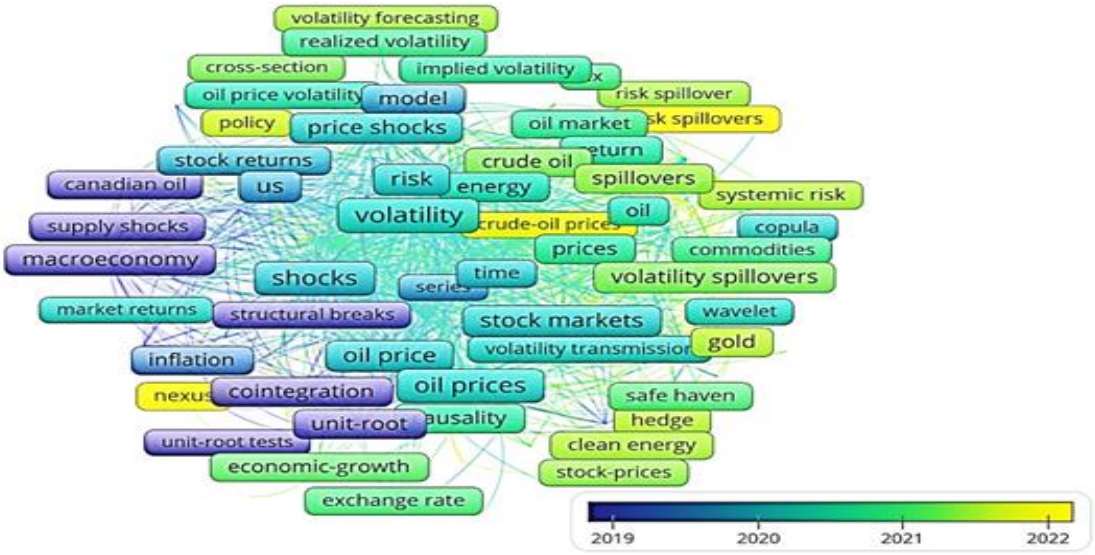


*Figure 7. Keyword co-occurrence (overlay visualisation)*

- The first section of the research (blue, ~2019) concentrated on studying macroeconomic elements through conventional econometric methods. The main terms in this period included macroeconomy and supply fluctuations and cointegration and inflation and unit-root tests.
- The research focus during the green period (2020–2021) concentrated on studying price behavior and developing models for volatility prediction. The research adopted advanced econometric and time-series methods through keywords such as “oil prices” and “volatility” and “stock markets” and “spillovers” and “volatility transmission” and “stock returns.”
- The current research focuses on systematic risk and financial stability and sustainability in its research findings. The new terms in research include systematic risk and risk spillovers and policy and clean energy and hedge and haven and ESG/green finance.

The keyword timeline demonstrates how research topics evolved from studying macroeconomic elements to complex volatility analysis before shifting toward sustainability and risk management studies. The research field of ESG considerations has developed into its own distinct field because sustainability-related terms (ESG, green finance, clean energy and transition risk) maintained a single cluster throughout 2020–2025. The field of oil–finance research has evolved into a more complex methodological framework while incorporating multiple academic disciplines throughout its development.

The citation analysis by sources (Figure 8) demonstrates which academic journals play the most significant role in oil–finance research. The density map reveals that Energy Economics and Resources Policy and Physica A: Statistical Mechanics and its Applications stand out as the most referenced publications. The Energy Journal and International Journal of Finance and Economics and Research in International Business and Finance and Journal of Economic Studies receive regular citations from researchers. These academic publications unite knowledge from energy economics and finance and quantitative application fields.

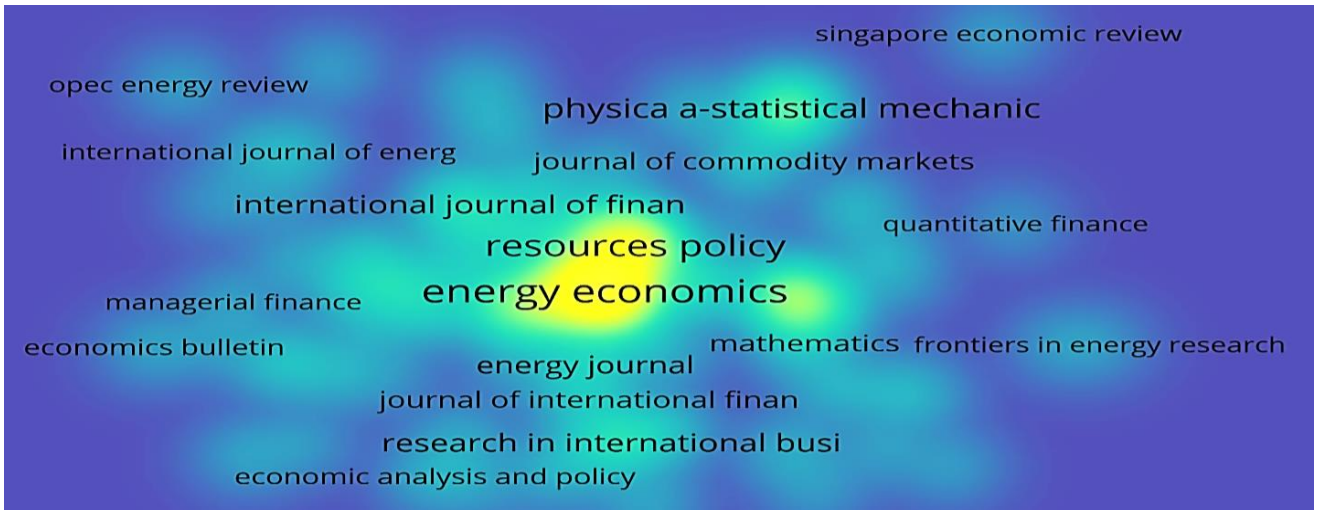


***Figure 8. Citation by sources (density visualisation). Created by the author using VOSviewer.***

The density map shows that researchers who study oil–finance base their work on publications found in energy and finance journals. The field now attracts researchers from different disciplines because Quantitative Finance and Mathematics and Frontiers in Energy Research receive increasing numbers of citations.

Academic research now focuses mainly on public administration problems because keywords in governance studies show this trend. The ESG-focused strand of this policy strand holds significance for Kazakhstan because it presents oil-price volatility as a financial risk which affects both macroeconomic stability and clean energy development through a unified governance system. The study of inflation and macroeconomic shocks during the first period directly supports the work of fiscal planners. The research on volatility transmission during the middle period matches the duties of financial regulators and central banks. The present focus on ESG finance and systematic risk and clean energy research matches Kazakhstan's sustainable development initiatives. The identified thematic patterns enable civil servants and policymakers to identify which worldwide research topics address their current policy requirements.

The citation data supports the observed pattern. The two journals Energy Economics (380) and Resources Policy (216) receive the majority of citations because they function as the fundamental publications in the field. The three energy-focused journals Energy (98) and Physica A (98) and Energy Economics (380) and Resources Policy (216) together generate more than 60% of the most cited publications. The International Review of Financial Analysis (81) and Economic Modelling (74) and International Review of Economics and Finance (74) represent the 30% of finance-oriented publications. The remaining publications originate from journals which unite economic research with mathematical and physical and policy-oriented studies.

## Discussion

The bibliometric analysis demonstrates that oil–finance research systematically intensifies during periods of major market disruption, confirming that oil-price shocks are perceived in the literature as structural macro-financial risks rather than short-term disturbances. The observed publication surges following the 2014–2016 oil price collapse, the COVID-19 pandemic, and the 2022 energy crisis illustrate how real-world shocks reshape academic agendas and methodological priorities.

A key finding of the analysis is the methodological transition from linear volatility models toward connectedness, tail-risk, and systemic-risk frameworks. This shift reflects growing awareness that average correlations fail to capture crisis-driven transmission mechanisms. Instead, recent studies emphasise non-linear spillovers, regime changes, and extreme-risk dependencies, which are particularly relevant for oil-dependent economies facing sudden revenue and financial shocks.

From a governance perspective, these methodological advances support a move away from equilibrium-based policy tools toward stress-based analytical frameworks. The bibliometric clusters directly correspond to supervisory applications that focus on monitoring oil–financial spillovers, identifying tail-event contagion, and assessing system-wide capital vulnerabilities under adverse oil-

price scenarios. This reinforces the relevance of connectedness and systemic-risk measures for macroprudential oversight in oil-exporting economies.

The analysis also reveals a pronounced geographic imbalance in knowledge production. Research leadership is concentrated in China, the United States, and selected Middle Eastern and South Asian economies, while Central Asia remains largely absent from influential authorship and collaboration networks. This imbalance limits the direct transferability of dominant oil–finance models to institutional contexts characterised by different fiscal rules, sovereign wealth fund arrangements, and exchange-rate regimes, such as Kazakhstan.

Rather than indicating a lack of relevance, this gap highlights the need for adaptation. The findings suggest that global oil–finance methodologies should be calibrated to national institutional settings instead of being adopted mechanically. For Kazakhstan, this implies tailoring stress-testing frameworks, fiscal-rule design, and governance tools to domestic data availability, regulatory capacity, and public-sector decision-making structures.

Overall, the discussion underscores three central insights. First, oil–finance research has evolved toward crisis-oriented and governance-relevant frameworks. Second, methodological sophistication has increased, but institutional heterogeneity remains underexplored. Third, bridging this gap requires translating bibliometric evidence into standardised analytical toolkits and capacity-building mechanisms that align global research with national policy needs. These insights position bibliometric analysis not as an end in itself, but as a strategic instrument for strengthening evidence-based public administration in oil-dependent economies.

## Policy Implications

The bibliometric evidence highlights several policy-relevant implications for public administration, fiscal planning, and financial governance in resource-dependent economies such as Kazakhstan.

First, oil price volatility remains a structural source of macro-fiscal instability. Kazakhstan’s heavy reliance on oil revenues constrains its ability to stabilise public investment and social spending during downturns. The literature strongly supports fiscal rules based on oil-price bands or conservative benchmark prices, under which budget planning and National Fund transfers are decoupled from short-term market fluctuations. Such rules reduce pro-cyclicality and protect intergenerational savings. Accordingly, accumulation and withdrawal rules of the National Fund should be explicitly linked to oil-price stress scenarios rather than discretionary adjustments.

Second, the dominance of volatility spillover and systemic-risk research indicates that fiscal frameworks relying on fixed or backward-looking oil-price assumptions are increasingly misaligned with observed risk dynamics. Embedding oil-price stress scenarios directly into fiscal planning and National Fund operations allows oil shocks to be treated as structural macro-financial risks rather than temporary disturbances.

Third, at the financial-sector level, oil-price volatility operates as a systemic risk channel through exchange rates, sovereign risk, and bank balance sheets. In line with the leading methodological clusters identified in the bibliometric analysis, oil-related stress testing in Kazakhstan should prioritise connectedness-based and tail-risk approaches that capture non-linear contagion during extreme oil-price movements. These tools complement traditional balance-sheet stress tests by focusing on crisis-driven transmission mechanisms rather than average historical correlations.

Fourth, capacity building within public administration is essential for translating analytical advances into policy practice. The Academy of Public Administration and related institutions should integrate oil–finance analytics into civil-service training, with emphasis on interpreting spillover measures, stress-test outputs, and transition risks. Training programs can be structured around three core modules: (i) oil-price volatility and spillover analysis for policy use; (ii) fiscal and financial applications, including budget planning, National Fund operations, and financial supervision; and (iii) ESG and transition finance, focusing on green-finance instruments and transition-risk assessment. Short executive courses and targeted workshops allow regular updating in line with evolving research.

Finally, the geographic concentration of oil–finance research in China, the United States, and selected Gulf economies raises concerns about policy transferability. Kazakhstan’s limited presence in global research networks underscores the need to strengthen engagement with international organisations (IMF, World Bank, OECD, IEA) while investing in domestic research capacity.

Increased participation in international research collaborations would improve the alignment between global analytical frameworks and national institutional realities, enhancing evidence-based oil–finance governance in Central Asia.

## Conclusion

This study applied bibliometric analysis to map the intellectual structure and thematic evolution of oil–finance research based on 1,969 Web of Science publications from 2000 to 2025. The results demonstrate that oil–finance scholarship is strongly crisis-driven, with major surges in publication activity following the 2014–2016 oil price collapse, the COVID-19 pandemic, and the 2022 energy crisis. These dynamics confirm that oil-price shocks are increasingly treated as systemic macro-financial risks rather than temporary market fluctuations.

The analysis shows that while economics and finance remain the core disciplinary foundations of the field, research has progressively shifted toward systemic risk, ESG finance, and clean-energy finance. Quantitatively, SDG-related mapping reveals that approximately half of all SDG-tagged publications are associated with SDG 8 (Decent Work and Economic Growth), underscoring the dominant focus on growth, employment, and macroeconomic stability. In contrast, SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action) represent a smaller but rapidly expanding share of the literature, indicating that sustainability and transition risks are becoming structurally embedded within oil–finance research rather than treated as peripheral topics.

A key structural finding concerns the unequal global distribution of knowledge production. Research output is concentrated in institutions from the United States, China, and selected Middle Eastern and South Asian economies, while Central Asia—including Kazakhstan—remains largely absent from leading authorship and institutional networks. This imbalance implies that prevailing analytical frameworks may insufficiently reflect the fiscal rules, sovereign wealth fund arrangements, and governance constraints of oil-dependent economies in the region.

From a policy perspective, the bibliometric evidence supports three operational directions for Kazakhstan. First, fiscal frameworks and National Fund operations should incorporate oil-price stress scenarios rather than rely on fixed or backward-looking benchmark prices. Second, the dominance of connectedness, tail-risk, and systemic-risk models in the literature provides a clear methodological basis for oil-related stress testing in the financial sector. Third, the growing prominence of ESG and transition-finance research highlights the need for targeted civil-service training that integrates sustainability considerations into macro-fiscal and financial decision-making.

The main contribution of this study lies in translating fragmented oil–finance scholarship into a structured governance-oriented framework. Rather than proposing a new theory, the paper demonstrates how bibliometric evidence can be used to identify dominant methodologies, expose regional research gaps, and guide the adaptation of global analytical tools to national institutional contexts. The findings should be interpreted with caution, as Web of Science coverage and the English-language filter may under-represent Central Asian scholarship. Future research could strengthen the practical relevance of this framework by incorporating regional databases, Kazakhstan-specific case studies, and empirical validation of the proposed stress-testing and governance applications.

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**МҰНАЙ МЕН ҚАРЖЫНЫҢ ӨЗАРА БАЙЛАНЫСЫ МЕМЛЕКЕТТІК БАСҚАРУ КОНТЕКСІНДЕ: ҚАЗАҚСТАНДАҒЫ ОРНЫҚТЫ БАСҚАРУ ҮШІН БИБЛИОМЕТРИЯЛЫҚ ТАЛДАУ**

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**ВЗАИМОСВЯЗЬ НЕФТИ И ФИНАНСОВ В КОНТЕКСТЕ ГОСУДАРСТВЕННОГО УПРАВЛЕНИЯ: БИБЛИОМЕТРИЧЕСКИЙ АНАЛИЗ ДЛЯ УСТОЙЧИВОГО УПРАВЛЕНИЯ В КАЗАХСТАНЕ**

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