


Knowledge Evolution and Paradigm Shift in Research on Trade Sanctions Against Russia: A Bibliometric Analysis (2014–2024)

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Abstract. Economic sanctions against Russia have intensified dramatically following the 2022 Russia-Ukraine conflict, transforming academic research from sporadic exploration to explosive growth. However, the epistemological evolution of sanctions research remains inadequately systematized. This study develops a dual-layered analytical framework combining Kuhnian paradigm theory and Bourdieusian field theory to examine knowledge transformation in sanctions scholarship. We hypothesize that sanctions research exhibits crisis-driven paradigm shifts, with geopolitical events triggering fundamental changes in research focus and methodology. Drawing on 368 publications from Web of Science (2014–2024), we employ VOSviewer for knowledge mapping and network analysis. Results reveal three distinct evolutionary phases comprising an incipient period (2014–2018), a developmental phase (2019–2021), and an explosive growth period (2022–2024), with publication volume surging 85 % in 2022. Keyword co-occurrence analysis identifies six principal research clusters encompassing energy security, geopolitical governance, trade implications, sanctions mechanisms, food security, and energy transition. Notably, “energy transition” and “geopolitical risk” evolved from peripheral to central themes. The knowledge landscape exhibits pronounced geopolitical stratification. American scholars dominate sanctions efficacy discourse, Russian scholars focus on defensive frameworks, European scholars emphasize spillover effects, while Chinese scholars provide third-party perspectives. This “epistemological nationalism” reveals the nexus between knowledge production and geopolitical positioning. Our dual-layered framework provides novel analytical perspectives for understanding evolutionary patterns in sanctions scholarship, guiding scholars to navigate research frontiers and facilitate international academic discourse.

Key words: sanctions against Russia; bibliometrics; knowledge evolution; paradigm shift; geopolitical economy.

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1. Introduction

Global economic sanctions have exhibited unprecedented proliferation over the past seven decades, with their status as a cardinal policy instrument in international relations becoming increasingly salient. From the 2014 Crimean crisis to the protracted Russia-Ukraine conflict through 2024, research on trade sanctions against Russia has undergone a metamorphosis from sporadic inquiry to exponential proliferation. By November 2023, Western sanctions had turned Russia into the world’s most-sanctioned country, with over 3,100 Russian companies

and nearly 9,700 individuals listed as targets [1], rendering Russia the most extensively sanctioned state globally. These unprecedented sanctions architecture has catalyzed intensive scholarly examination of sanctioning mechanisms and their multifaceted ramifications. Analytical perspectives have evolved from rudimentary economic impact assessments to encompass multidimensional considerations including geopolitical dynamics, energy security imperatives, and legal compliance frameworks.

While extant scholarship has achieved significant advances in sanctions economic impact assessment [2, 3], sanctions efficacy analysis [4, 5], and sanctions circumvention mechanisms [6], these contributions generally lack systematic reflexivity regarding the epistemological evolution of sanctions research as a scholarly domain. The extant literature exhibits two critical lacunae: first, the absence of systematic bibliometric analysis of knowledge structures and evolutionary trajectories within sanctions scholarship, with most inquiries concentrating on specific sanctions impact assessments while neglecting the holistic developmental patterns of the research domain; second, they overlook the phenomenon of positional stratification among scholarly communities across diverse geopolitical contexts during knowledge production, failing to illuminate the profound nexus between academic inquiry and geopolitical positioning.

This study endeavors to systematically analyze the epistemological evolutionary patterns of research on trade sanctions against Russia through bibliometric methodologies, construct a developmental framework for sanctions research, and elucidate the geopolitical stratification characteristics inherent in knowledge production processes. The inquiry focuses on the pivotal period of 2014–2024, endeavoring to address a fundamental question: How has research on trade sanctions evolved from fragmented policy analysis into a relatively mature academic discipline, and how do scholarly communities from different nations construct differentiated research agendas predicated upon their respective geopolitical positions?

To address these research questions, this study constructs a comprehensive dataset encompassing 368 high-quality publications from the Web of Science Core Collection, employing VOSviewer for knowledge mapping analysis and network visualization. Our findings demonstrate that research on trade sanctions against Russia has traversed three distinct phases—an incipient period (2014–2018), a developmental phase (2019–2021), and an explosive growth period (2022–2024)—with 2022 constituting a critical inflection point marked by an 85 % surge in publication volume relative to the preceding year; epistemological evolution exhibits a paradigm shift from targeted sanctions theorization to comprehensive sanctions analytics; the knowledge production landscape exhibits pronounced geopolitical stratification, with American scholars predominating in sanctions efficacy discourse, Russian scholars concentrating on defensive analytical frameworks, and Chinese scholars contributing third-party equilibrating perspectives.

Research questions:

RQ1: What evolutionary patterns characterize sanctions research development?

RQ2: How do geopolitical events trigger paradigm shifts in sanctions scholarship?

RQ3: What role does geopolitical positioning play in shaping knowledge production?

This study aims to systematically analyze the epistemological evolution of research on trade sanctions against Russia during 2014–2024.

To address the three research gaps identified through our literature review we propose *three hypotheses* addressing paradigm shifts, interdisciplinary integration, and epistemological nationalism respectively:

H1: Research on trade sanctions against Russia exhibits crisis-driven paradigm shifts, with major geopolitical events (particularly the 2022 Russia-Ukraine conflict) precipitating fundamental transformations in research focus, methodology, and conceptual frameworks.

H2: The knowledge structure of sanctions research demonstrates increasing interdisciplinary convergence, particularly integrating energy security, environmental studies, and geopolitical economy perspectives.

H3: Knowledge production in sanctions research exhibits systematic geopolitical stratification, where scholars' national affiliations significantly influence their research agendas, analytical frameworks, and policy implications.

The principal contribution of this study resides in synthesizing Kuhnian paradigm theory (1962) [7] with Bourdieusian field theory (1998) [8] to construct a theoretical analytical framework for understanding the epistemological evolution of sanctions research; employing bibliometric methodologies to systematically delineate six principal knowledge clusters and evolutionary trajectories within research on trade sanctions against Russia; elucidating the phenomenon of “epistemological nationalism” within sanctions research — namely, the differentiated knowledge production patterns emanating from scholars' respective geopolitical positionalities.

The structure of this paper. Section 2 develops the theoretical framework and reviews pertinent literature. Section 3 delineates the bibliometric methodology and data sources. Section 4 presents comprehensive bibliometric findings encompassing publication trends, disciplinary distributions, geographical configurations, research focal points, and epistemological evolution within research on trade sanctions against Russia. Section 5 discusses hypothesis verification and research implications. Section 6 presents the conclusion.

2. Literature Review and Theoretical Framework

2.1. Literature Review: Bibliometric Methods and Research Gaps

Bibliometric analysis furnishes robust technical instruments for evaluating scientific research trajectories, particularly through VOSviewer software. Van Eck & Waltman [9] elucidated the technical advantages of VOSviewer software

in their seminal contribution to Scientometrics. This software facilitates the construction and visualization of network-based maps, principally employed for bibliometric analysis.

Waltman et al. [10] further explicated the unified approach of VOS (Visualization of Similarities) mapping technology, which enables more precise identification of knowledge clusters within research domains through standardized algorithms predicated upon association strength. Kirby [11] observed that the advancement of open-source bibliometric software has furnished researchers with potent exploratory literature research instruments, with VOSviewer demonstrating both technical robustness and relative user-friendliness.

Small [12] co-citation analysis theory established the foundation for identifying research frontiers; analyzing co-citation relationships within literature on trade sanctions against Russia can illuminate the internal architecture of sanctions research. The co-word analysis methodology developed by Callon et al. [13] indicates that evolutionary trajectories of research on trade sanctions against Russia can be elucidated through keyword co-occurrence networks. Van Eck & Waltman's [14] investigation of bibliometric network visualization furnished methodological guidance for comprehending the complex knowledge networks within sanctions research. Zupic & Čater [15] systematically reviewed and assessed bibliometric methodologies within management research, proposing comprehensive analytical processes and guidelines that furnish procedural guidance for this paper's examination of trade sanctions against Russia.

The efficacy of VOSviewer as a bibliometric analytical instrument has been extensively validated within social science research. As exemplified by Martins et al. [16] investigation, VOSviewer's application within educational technology research demonstrates its utility across interdisciplinary inquiries. Moreover, numerous VOSviewer-based bibliometric analyses have further corroborated its effectiveness within bibliometric analysis [17–20].

Nevertheless, bibliometric methodologies possess inherent limitations. As Kirby [11] cautioned, enhanced user-friendliness and flexibility of such software significantly diminish opportunity costs for novice users, precipitating the proliferation of superficial descriptive studies. This underscores the imperative to synthesize bibliometric methodologies with profound theoretical analysis.

While VOSviewer has demonstrated robust analytical capabilities in social science research, its systematic application within sanctions research remains limited, revealing significant research gaps that require theoretical frameworks to address. Felbermayr et al. [21] accentuated the interdisciplinary characteristics of sanctions research and the exigency for theoretical integration, while highlighting the problematic divergence of research perspectives between economics and political science.

Contemporary bibliometric analysis of sanctions research predominantly employs instruments such as CiteSpace. For instance, Sutikno [22] employed

CiteSpace to conduct bibliometric analysis of 345 UN Security Council sanctions publications spanning 1990–2023 within the Web of Science database, identifying three developmental phases and pronounced interdisciplinary characteristics of UN sanctions research; this analytical framework furnishes direct methodological guidance for research on trade sanctions against Russia.

VOSviewer has demonstrated formidable analytical capabilities within international relations and policy research domains. Zahidi & Bin Othman [23] employed VOSviewer to analyze 214 paradiplomacy research publications spanning 1984–2023 within the Scopus database, successfully constructing knowledge mappings encompassing 15 thematic clusters. Within trade policy research, Rejeb et al. [24] utilized VOSviewer to analyze 640 public procurement research publications from 1984–2022, elucidating the knowledge architecture and dynamic evolution of this domain.

Nevertheless, sanctions-related bibliometric analysis employing VOSviewer remains relatively circumscribed. Zolotarev et al. [25] utilized VOSviewer to analyze fluctuations in medical publications and citation patterns in Iran, investigating the impact of US sanctions on scientific publishing activities and their ramifications for Iranian scientific and economic development. Ahlawat et al. [26] employed VOSviewer to analyze 657 Russia-Ukraine conflict-related publications within the Dimensions database, observing that this constituted the inaugural bibliometric investigation of the Russia-Ukraine conflict.

Despite substantial advances in sanctions research, systematic bibliometric analyses of trade sanctions against Russia remain virtually absent from the scholarly literature. The extant literature either concentrates on evaluating sanctions' economic ramifications or exploring their political logic, lacking reflexive analysis of how sanctions research itself has evolved as an epistemic domain.

While Sutikno [22] employed CiteSpace to analyze UN sanctions and Ahlawat et al. [26] utilized VOSviewer to preliminarily examine Russia-Ukraine conflict literature, these investigations either addressed different subjects or possessed limited temporal scope, failing to capture the complete evolutionary trajectory of research on trade sanctions against Russia from the 2014 Crimean crisis through 2024.

More critically, extant bibliometric investigations generally lack profound theoretical underpinnings, predominantly remaining at descriptive analytical levels. While Felbermayr et al. [21] observed disciplinary perspective differentiation, no investigation has yet systematically deployed philosophy of science theories to explicate the epistemological evolutionary mechanisms within sanctions research. Particularly, how the 2022 Russia-Ukraine conflict functioned as a Kuhnian “anomalous phenomenon” catalyzing paradigm shifts within sanctions research constitutes a theoretical question requiring urgent and profound exploration. Concurrently, while positional differentiations among scholars from various nations within sanctions research have been observed, they remain unconceptualized and insufficiently systematized, with the profound nexus between knowledge production and geopolitical positioning remaining opaque.

Based on the above literature review, we identify three critical research gaps that necessitate theoretical framework development and motivate our research hypotheses proposed in the Introduction.

First, existing bibliometric studies document publication trends but lack theoretical frameworks to explain WHY and HOW paradigm shifts occur. This theoretical gap underlies our H1 examining crisis-driven paradigm shifts in sanctions research. Second, insufficient systematic examination exists regarding how interdisciplinary convergence reshapes knowledge architecture, with disciplinary contributions often treated as isolated phenomena. This analytical gap motivates our H2 on interdisciplinary integration dynamics. Third, limited recognition persists of how geopolitical positioning influences research agendas and knowledge production, despite sanctions' inherently geopolitical nature. This geopolitical gap underpins our H3 on epistemological nationalism in sanctions scholarship.

These identified gaps form the foundation for our hypothesis formulation and necessitate development of a comprehensive theoretical framework synthesizing paradigm theory with field theory, which we elaborate in the subsequent section.

2.2. Theoretical Framework: A Dual-Layered Analytical Approach

To address the three research gaps identified above, this study develops a dual-layered analytical framework synthesizing Kuhnian paradigm theory with Bourdieusian field theory. Kuhn's (1962) [7] theory explains macro-level paradigm shifts and temporal evolution, while Bourdieu's (1998) [8] theory elucidates micro-level power dynamics and spatial stratification in knowledge production.

At the paradigmatic evolutionary level, Kuhn's [7] paradigm theory illuminates the non-cumulative characteristics of scientific advancement, wherein scientific revolutions effectuate fundamental epistemic reconstruction through paradigm shifts. Scientific development encompasses three phases: pre-scientific states, normal science, and scientific revolution — a tripartite progression that finds full expression within sanctions research. Research on trade sanctions against Russia has traversed an evolutionary trajectory from fundamental conceptual exploration (pre-scientific state, 2014–2018) through theoretical system construction (normal science, 2019–2021) to crisis-driven paradigm shift (scientific revolution, 2022–2024).

Early sanctions theorization was predicated upon rational choice assumptions, positing that economic losses would directly translate into policy modifications (Hufbauer et al. [27]). Nevertheless, the case of sanctions against Russia challenged this simplistic causal nexus. Morgan et al. [28] observe that sanctions may paradoxically consolidate target regimes by catalyzing nationalist sentiment and rally-around-the-flag effects, with this “sanctions paradox” phenomenon propelling a paradigm shift from targeted sanctions theorization toward comprehensive sanctions analytics. The 2022 Russia-Ukraine conflict emerged as the pivotal “anomalous phenomenon” precipitating this transformation — an accumulation

of sanctions scale and complex effects inexplicable through traditional theoretical lenses, ultimately catalyzing a scientific revolution toward multifaceted, dynamic analytical frameworks.

At the knowledge production stratum, Bourdieu's [8] field theory accentuates power relations and positional effects inherent in academic knowledge production. Within research on trade sanctions, scholarly positions across different nations reflect their respective locations within the international political economy system. American scholars predominate in sanctions design and efficacy research, reinforcing legitimacy narratives surrounding sanctions policy, exemplified by Drezner [4] sanguine assessment of sanctions effectiveness. Russian scholars concentrate on sanctions damage assessment, sectoral responses, and economic resilience construction, exemplified by Gurvich & Prilepskiy [29] systematic analysis of sanctions' initial impact during 2014–2015. Chinese scholars emphasize energy network reconfiguration and third-party effects, furnishing relatively equilibrated analytical perspectives. This phenomenon epitomizes “epistemological nationalism” within the academic field—the profound nexus between knowledge production and geopolitical positioning.

The integration of these perspectives furnishes a dual-layered framework where Kuhnian theory explains WHEN and WHY paradigm shifts occur through crisis-driven transformations, while Bourdieusian theory explains WHO produces knowledge and HOW geopolitical positioning influences production. This integrated framework addresses all three research gaps, providing both temporal (vertical) and spatial (horizontal) dimensions for analyzing epistemological evolution in sanctions research.

3. Research Design and Methodology

3.1. Data Sources and Search Strategy

To ensure bibliographic quality, this study derives data from the Web of Science Core Collection, acknowledged as an optimal source for bibliometric research [30, 31], encompassing the temporal scope from January 1, 2014, through December 31, 2024. A dual search strategy was implemented to ensure comprehensive and precise literature coverage. This methodology drew upon the literature retrieval framework proposed by Lim et al. [32], whereupon we further employed a dual search strategy encompassing precise and expanded retrieval approaches to incorporate early pertinent research that did not explicitly reference trade sanctions owing to political sensitivities.

The precise search employed the Boolean expression: TS=(sanction*) AND TS=(Russia*) AND TS=(trade* OR trading OR import* OR export*), generating 286 core publications. The expanded search extended sanctions-related terminology to “sanction* OR embargo* OR ban”, ultimately yielding 368 publications. The expansion of search terminology was predicated upon the terminological diversity within sanctions research, with “embargo” commonly deployed to describe

trade restrictions and energy embargoes, while “ban” encompasses broader prohibitive measures. This expansion strategy referenced the diversified terminological retrieval methodology advocated by Dang & Croft [33].

3.2. Data Processing and Quality Assurance

Data processing adhered to rigorous quality assurance protocols, referencing the bibliometric data processing standards employed by Zhang et al. [34]. Initially, conference proceedings, book reviews, and other non-research publications were excluded to ensure analytical subjects comprised peer-reviewed academic articles. Subsequently, country designations, institutional appellations, and author names were standardized to resolve inconsistencies in nomenclature for identical countries, institutions, or authors. Thirdly, keywords underwent semantic consolidation, with synonymous terms such as “economic sanctions” and “trade sanctions” being harmonized.

3.3. Analytical Methods and Instruments

We employed VOSviewer 1.6.19 for knowledge mapping construction and visualization analysis, with the following parametric configurations: the minimum occurrence threshold for keyword co-occurrence analysis was established at 5 to filter low-frequency noise; the minimum collaborative publication threshold for author cooperation networks was set at 3 to ensure substantive collaborative relationships; cluster analysis employed 1.0 resolution to equilibrate clustering granularity with interpretability.

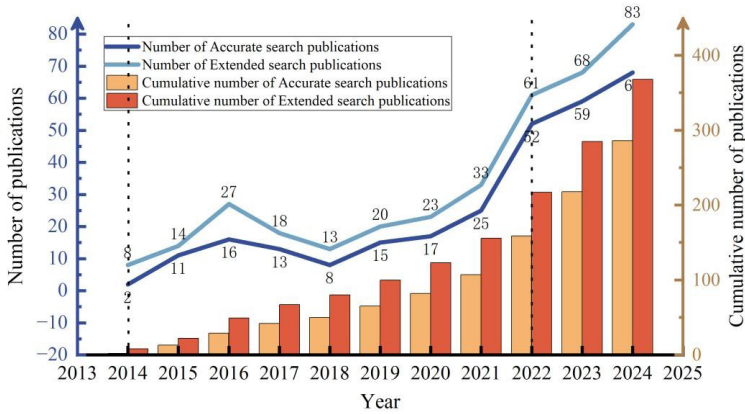
4. Results

4.1. Tripartite Paradigm Shift in Sanctions Research

Based on publication trends and keyword co-occurrence analysis, Figure 1 demonstrates that publication volume characteristics enable clear demarcation into three phases: 2014–2018, 2019–2021, and 2022–2024. Figure 2’s keyword temporal evolution analysis further elucidates the knowledge architectural characteristics of each phase.

Phase I: Foundational Period of Core Issues (2014–2018) — Pre-Scientific State.

The incipient period exhibited an average annual publication of merely 16 articles, primarily responding to initial sanctions measures following the Crimean crisis. Keyword analysis reveals this period encompassed merely six dispersed concepts: “success”, “growth”, “investment”, “food security”, “impacts”, and “choice”, lacking sophisticated theoretical interconnection networks. The constellation of these concepts reflects that research on trade sanctions’ initial preoccupations centered predominantly on fundamental economic development metrics and food security considerations. As Hufbauer et al. [27] observed in “Economic sanctions reconsidered”, early sanctions research predominantly concentrated on



Note: The vertical dashed lines represent the Crimean incident in 2014 and the Russia-Ukraine conflict in 2022.

Figure 1. Annual Publication Distribution of Literature on Trade Sanctions Against Russia

measuring sanctions' economic effects, particularly evaluating their impact on target nations' economic growth and investment environments.

Phase II: Theoretical System Construction Period (2019–2021) — Normal Science.

The developmental phase witnessed annual publications increase to 25 articles, with research perspectives progressively diversifying. This phase witnessed the emergence of numerous keywords, constituting the principal framework of sanctions research. The core concept “trade sanctions” emerged as the predominant network node, signifying the establishment of research on trade sanctions as an autonomous disciplinary domain. The geopolitical dimension fully materialized, with the concentrated emergence of principal actor concepts including “Russia”, “Ukraine”, “European union”, “United states”, “China”, and “Iran”, reflecting research on trade sanctions' transition from technical analysis toward geopolitical analytics. The methodological system progressively matured, with the presence of concepts including “gravity model”, “model”, “determinants”, and “economic impact” indicating increasingly sophisticated research methodologies. Felbermayr et al. [35] furnished crucial support for methodological advancement during this period through constructing a global sanctions database, enabling research on trade sanctions to employ more precise econometric instruments.

Policy instrument diversification became pronounced, with the refinement of specific sanctions mechanism concepts including “embargoes”, “import ban”, “taxation”, and “policy”, reflecting the specialized evolution of research perspectives; this coheres with Portela's [36] theoretical contribution regarding EU sanctions policy instrument taxonomy.

Phase III: Paradigm Shift Breakthrough Period (2022–2024) — Scientific Revolution.

The explosive phase witnessed annual publications surge to 70 articles, attaining a historic zenith of 83 publications in 2024. Publication volume in 2022

Figure 2 distinctly demonstrates the “U-shaped” temporal evolution pattern: from the conceptually sparse period of 2014–2018 (merely 6 core concepts), through the conceptually dense period of 2019–2021 (numerous concepts emerged forming intricate networks), to the conceptually selective period of 2022–2024 (crisis-driven concentration of pivotal concepts).

4.2. Interdisciplinary Characteristics of Disciplinary Configuration

Research on trade sanctions exhibits pronounced interdisciplinary characteristics, consistent with Felbermayr et al. [21] discourse on the interdisciplinary ramifications of sanctions research. Economics predominates with 128 publications, constituting 34.9 %, epitomizing the hegemonic position of economics within sanctions research. This hegemonic position reflects the quintessential attributes of sanctions as economic policy instruments. As Gutmann et al. [40] observed, sanctions engender multifarious economic impacts upon target nations, including diminished per capita income, contracted trade, reduced FDI, curtailed international capital flows, and financial crises.

Table 1. Top Ten Categories by Publication Volume in Research on Trade Sanctions Against Russia (2014–2024)

Rank	WoS Subject Category	Publications	Percentage (%)	Major Research Topics
1	Economics	129	35.0	Economic impact of sanctions, trade diversion
2	Political Science	66	18.0	Political logic of sanctions, domestic political impact
3	International Relations	60	16.3	Great power competition, multilateral sanctions coordination
4	Environmental Studies	36	9.8	Energy transition, climate policy impact
5	Energy Fuels	29	7.9	Energy security, oil and gas trade analysis
6	Area Studies	23	6.3	Eurasian region, post-Soviet space
7	Environmental Sciences	23	6.3	Carbon emissions, sustainable development, green transition
8	Law	21	5.7	International law, sanctions legitimacy, dispute resolution
9	Business Finance	20	5.4	Financial sanctions, payment systems
10	Multidisciplinary Sciences	19	5.2	Interdisciplinary comprehensive research

Source: Web of Science subject category statistics

Note: Some publications involve multiple subject categories; percentages total more than 100 %

Political science and international relations contributed 66 and 60 publications respectively, reflecting the political economy essence of sanctions phenomena. Particularly salient is the prominent positioning of environmental studies (36 publications) and energy fuels (29 publications), a phenomenon accentuating the cardinal role of energy sanctions within the comprehensive sanction’s architecture. Nguyen & Do [41] elucidated the heterogeneous ramifications of sanctions upon Russian product exports, observing that Russian petroleum export values declined by approximately 36.56 %, while non-energy product exports remained largely unaffected. Spiro et al. [42] indicated that diminished energy trade engendered losses of minimally 0.9 % of GDP.

4.3. Evolutionary Trajectories of Research Focal Points

As illustrated in Figure 3, through VOSviewer keyword co-occurrence analysis, we delineated six principal research clusters, with each cluster’s characteristics as follows.

Cluster 1: Energy Security and Geopolitical Risk (Red Cluster).

This cluster constitutes one of the most extensive, encompassing keywords including “energy”, “energy security”, “crude oil price”, “natural gas”, “renewable energy”, “geopolitical risk”, and “Russia-Ukraine conflict.” This cluster epitomizes energy’s cardinal position within the sanction’s architecture. Western sanctions endeavor to render Russia incapable of sustaining its conflict with Ukraine, with energy sanctions constituting the most pivotal measures (Chen et al. [43]). Sun et al. [44] demonstrates that geopolitical risks precipitated by the Russia-Ukraine

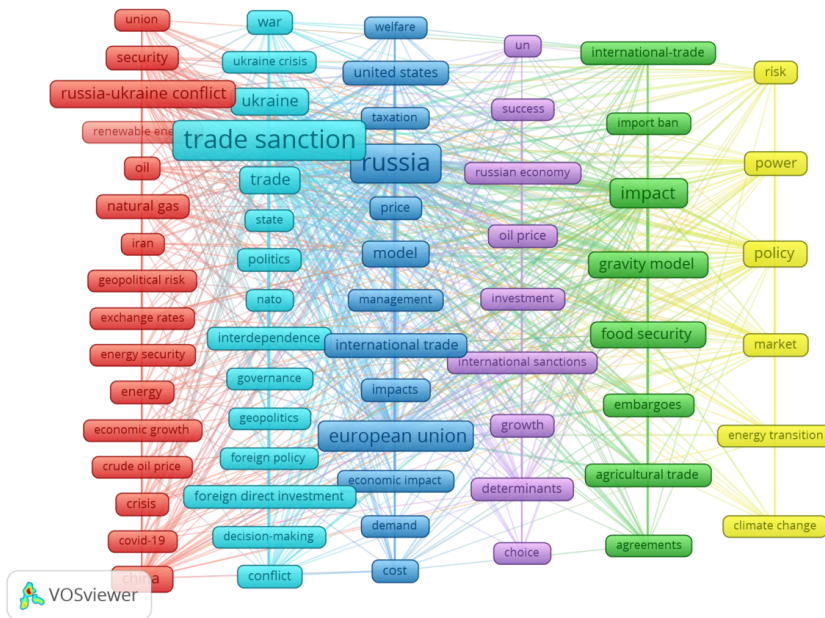


Figure 3. Keyword Co-occurrence in Literature on Trade Sanctions Against Russia

conflict significantly impacted global energy markets, engendering substantial volatility in hydrocarbon prices. Spiro et al. [42] assessed the ramifications and operations of EU import embargoes and G7 price caps on Russian petroleum, revealing that import embargoes exerted the most pronounced impact, price caps failed to achieve efficacious price-limiting effects, functioning merely as partial transport interdictions, with these two sanctions measures exhibiting mutual reinforcement.

Cluster 2: Geopolitical Governance and Foreign Policy (Cyan Cluster.)

This cluster pivots around “politics”, “foreign policy”, “geopolitics”, “governance”, “NATO”, and “Ukraine crisis”, concentrating on the geopolitical logic and governance mechanisms underlying sanctions against Russia, primarily examining the Ukraine conflict’s impact upon geopolitical relationships between Russia and organizations including NATO and the EU. Connolly [45] observed that sanctions against Russia epitomize Western nations’ collective action in preserving international order. Morgan et al. [28] observed that sanctions constitute not merely economic instruments but also cardinal mechanisms of great power competition and geopolitical contestation.

Cluster 3: International Trade and Economic Ramifications (Blue Cluster.)

This cluster encompasses “Russia”, “international trade”, and “European union” as cardinal nodes, incorporating keywords including “economic impact”, “demand”, “cost”, and “taxation.” This cluster primarily concentrates on the comprehensive impact of sanctions against Russia upon international trade configurations and economic architectures. Yalcin et al. [2] observed in their investigation that sanctions against Russia significantly impacted global trade networks, particularly commercial relationships between the EU and Russia. Meissner [46] indicated that the Ukraine conflict has positioned the EU within unprecedented geopolitical, geo-economic, and energy security tensions.

Cluster 4: Sanctions Mechanisms and Economic Determinants (Purple Cluster.)

This cluster encompasses keywords including “international sanctions”, “investment”, “Russian economy”, and “determinants”, primarily investigating sanctions implementation mechanisms and economic determinants. Early [47] accentuated in his sanction’s efficacy research that the cardinal factors for sanctions success reside in target selection and multilateral coordination. Bali et al. [48] determined that sanctions directly impact the sanctioned nation’s currency and interest rates, influencing Russia’s economic growth through transmission mechanisms including inflation.

Cluster 5: Agricultural Commerce and Food Security (Green Cluster.)

This cluster encompasses keywords including “agricultural trade”, “food security”, “embargoes”, and “import ban”, epitomizing sanctions’ profound ramifications upon global agricultural supply chains. As analyzed by Behnassi & El Haiba [49], the Russia-Ukraine conflict and associated sanctions gravely jeopardized global food security, particularly impacting wheat and fertilizer provisioning.

The emergence of the “gravity model” within this cluster signifies researchers’ extensive adoption of this methodology to analyze trade flow transformations.

Cluster 6: Climate Change and Energy Transition (Yellow Cluster).

This cluster encompasses “climate change”, “energy transition”, and “policy” as principal nodes, epitomizing the interactive nexus between sanctions and global energy transition strategies. Gatto et al. [50] observed that sanctions against Russia disrupted energy cooperation and transition both within the EU and between the EU and Russia. Huang et al. [51] posits that the Russia-Ukraine conflict will impact environmental conditions and population health across various regions (particularly underdeveloped areas) through influencing energy commerce.

4.4. Geopolitical Configurations and Stratification Characteristics of Knowledge Production

As illustrated in Figure 4, publishing country distributions exhibit a pronounced “center-periphery” architecture, with this distributional configuration reflecting profound geopolitical logic, demonstrating high congruence with Bourdieu’s [8] theory regarding power relations within academic fields.

According to Table 2 data, the United States predominates decisively with 95 publications, constituting 25.6 %, epitomizing its scholarly hegemony within the research domain on trade sanctions. This scholarly predominance resonates with the United States’ cardinal role within the global sanction’s architecture,

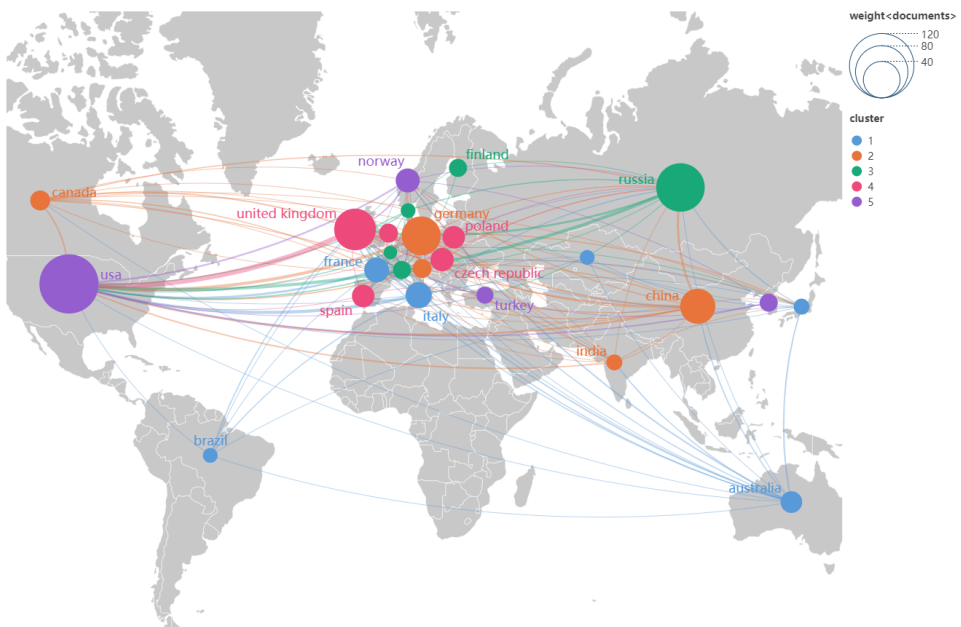


Figure 4. Geographic Distribution of Publications on Trade Sanctions Against Russia

as Yalcin et al. [2] observed in their investigation that the US presently implements comprehensive sanctions regimes against Cuba, North Korea, Iran, Russia, and Syria. Russia, as the sanctioned nation, contributed 63 publications, demonstrating vigorous scholarly response, while Germany and the UK epitomized European perspectives with 44 and 43 publications respectively, and China's ascendance (32 publications) reflects emerging powers' increasingly pivotal role regarding this issue.

American scholars' (95 publications) research concentrates on sanctions design, efficacy, and macroeconomic impact analysis. Hausmann et al. [52] examined the efficacy design of export interdictions against Russia, accentuating the rationality and necessity of sanctions within the policy repertoire. Zhuang & Moore [53] analyzed US export restructuring from agricultural trade perspectives. These investigations generally endorse sanctions policy continuation, constituting a hegemonic narrative reinforcing sanctions efficacy.

Russian scholars (63 publications) concentrate on sanctions damage assessment, sectoral responses, and economic resilience construction. Gordeev & Pyzhev [54] analyzed Siberian timber enterprises' performance under trade restrictions, discovering that certain domestically oriented companies paradoxically benefited. Drapkin et al. [55] investigated Russia-Europe commerce during 2015–2019, emphasizing sanctions' enduring suppressive effects upon bilateral flows. This reality furnished empirical foundations for Russian scholars.

Table 2. Research Characteristics and Discourse Differences of Top 5 Publishing Countries

Rank	Country	Publications	Percentage (%)	Research Characteristics	Discourse Orientation
1	United States	95	25.8	Dominant in sanctions design and effectiveness research	Legitimizing sanctions policy
2	Russia	63	17.2	Defensive research, resilience analysis	Emphasizing adaptability and resistance
3	Germany	44	12.0	Energy security, agricultural impact	Focus on cross-border spillover effects
4	United Kingdom	43	11.7	Financial evasion, policy design	Technical analysis of policy
5	China	32	8.7	Third-party effects, balanced perspective	Structural equilibrium analysis

Source: Web of Science country/region statistics.

Note: Research characteristics and discourse orientations based on content analysis of representative literature from each country

Libman [56] argues that although unprecedented Western sanctions were designed to curb Russia’s capacity to wage war, the Russian war economy has so far proved surprisingly resilient, adapting through domestic reallocation and by redirecting trade toward China and other Global South partners.

European scholars epitomized refined specialization of research agendas: German scholars concentrated on agriculture and food security, with Fedoseeva & Herrmann [57] empirically quantifying German export losses from Russian agricultural embargoes. Svanidze et al. [58] investigated wheat export interdictions’ impact upon market integration. British scholars gravitated toward financial circumvention and policy design, with Zhao & Miao [59] exploring Bitcoin’s role in sanctions evasion. These differentiated agendas correlate closely with both nations’ distinct vulnerabilities within energy and financial domains.

Chinese scholars’ (32 publications) research concentrated on energy networks and geopolitical spillover effects. Zheng et al. [60] analyzed energy sanctions’ global ramifications utilizing complex network theory, emphasizing the eastward migration of Russia’s energy export gravity. Chen et al. [43] explored energy sanctions’ indirect ramifications within the Russia-Ukraine war context. Such research epitomizes third-party nations’ more equilibrated and structured analytical frameworks, resonating with the rapid advancement of China-Russia economic and commercial relations.

Institutional distribution demonstrates Russian academic institutions’ exceptional performance, a phenomenon epitomizing sanctioned nations’ academic communities’ vigorous response mechanisms. The Russian Academy of Sciences predominates with 25 publications, with the Higher School of Economics and Ural Federal University also featuring prominently. This epitomizes the Russian academic community’s intensive attention and systematic response to sanctions issues (Table 3).

Table 3. Research Perspectives and Contribution Differences of Top Publishing Institutions

Rank	Institution	Publications	Percentage (%)	Research Focus	Major Contributions
1	Russian Academy of Sciences	25	6.8	Official position, systematic research	Comprehensive assessment of sanctions impact
2	Leibniz Association (Germany)	17	4.6	European perspective, policy-oriented	Energy policy analysis
3	National Research University Higher School of Economics (Russia)	9	2.5	Domestic enterprise research	Micro-transmission mechanisms of sanctions

End of table 3

Rank	Institution	Publications	Percentage (%)	Research Focus	Major Contributions
4	University of London (UK)	9	2.5	International relations theory	Sanctions theory development
5	Czech University of Life Sciences Prague	8	2.2	Transition economy expertise	Central and Eastern European perspective
6	IFO Institut (Germany)	8	2.2	Quantitative economic analysis	Economic modeling of sanctions
7	Ural Federal University (Russia)	7	1.9	Regional research perspective	Local economic impact
8	Southern Methodist University (USA)	7	1.9	Sanctions theory research	Theoretical framework construction
9	Peoples' Friendship University of Russia	6	1.6	Multicultural perspective	International relations analysis
10	University of California System (USA)	6	1.6	Interdisciplinary integration	Comprehensive research

Source: Web of Science institutional statistics

Note: Institution names have been standardized, merging different name variants of the same institution

German institutions' robust performance epitomizes Europe's cardinal position within sanctions research. As Europe's preeminent economy, Germany has sustained substantial economic costs in sanctions against Russia, particularly within the energy domain. Chen et al. [43] demonstrates that energy sanctions against Russia engendered economic losses of 1.488 % for the EU, while Russia's losses reached 4.8 %, with energy commerce between the EU and Russia migrating toward Asian markets including China and India.

5. Discussion

5.1. Crisis-Driven Paradigm Shifts

The empirical findings support *H1*'s proposition of crisis-driven paradigm shifts. Our findings reveal that the evolutionary trajectory of research on trade sanctions against Russia exhibits pronounced crisis-driven characteristics. From the exploratory period of 2014–2018 encompassing merely 6 dispersed concepts,

through the formation of a comprehensive theoretical system centered upon “trade sanctions” during 2019–2021, to the paradigm shift precipitated by the 2022 Russia-Ukraine conflict, this progression comprehensively exemplifies the scientific development paradigm delineated by Kuhn [7]. 2022 emerged as a pivotal inflection point, with the 85 % publication surge reflecting a fundamental transformation in research perspectives — from technical targeted sanctions analysis toward comprehensive sanctions research within complex systems frameworks. When “energy transition” and “geopolitical risk” vaulted from peripheral concepts to cardinal issues, research on trade sanctions had transcended conventional policy instrument analysis, becoming a pivotal lens for comprehending global political-economic restructuring.

The concepts during the incipient phase remained relatively autonomous and dispersed, lacking intricate associational networks, epitomizing the characteristics of “pre-paradigmatic” or “proto-paradigmatic” science delineated by Kuhn [7]. Conceptual network density increased markedly during the developmental period, with intricate interconnections materializing among concepts, conforming to the archetypal characteristics of “normal science” efflorescence within Kuhnian theory. This developmental pattern validates the cardinal tenet of Kuhnian paradigm theory: paradigm shifts constitute not linear knowledge accumulation, but rather saltatory development through “anomaly accumulation — theoretical crisis — paradigm revolution.” The 2022 Russia-Ukraine conflict functioned as a pivotal “anomalous phenomenon”, with its unprecedented sanctions magnitude ultimately catalyzing a paradigm shift from targeted sanctions theorization toward comprehensive sanctions analytics.

Sutikno [22] documented post-2022 publication increases but did not explain the underlying epistemological dynamics. Our Kuhnian framework addresses this gap by demonstrating how geopolitical crises precipitate paradigm transformations.

5.2. Interdisciplinary Integration Dynamics

H2 receives support from disciplinary distribution and keyword cluster analysis. Concurrently, interdisciplinary synthesis is reconstructing the knowledge architecture of sanctions research. While economics maintains formal predominance at 34.9 %, the profound engagement of political science, international relations, environmental studies, and energy science has rendered research on trade sanctions an authentically interdisciplinary domain. Particularly salient is the energy-environment dimension’s prominent positioning, epitomizing how contemporary sanctions have evolved from rudimentary economic punishment instruments into systemic forces influencing global energy transition and climate governance.

Keyword co-occurrence analysis delineated six principal knowledge clusters encompassing energy security and geopolitical risk, geopolitical governance, international trade ramifications, sanctions mechanisms, agricultural commerce and food security, and climate change with energy transition, further elucidating

the systematic evolution of knowledge architecture in research on trade sanctions. The cardinal position of the energy security cluster epitomizes energy weaponization as a pivotal characteristic of contemporary sanctions; the autonomous existence of the agricultural commerce cluster corroborates food security's strategic significance within geopolitical contestation. The precipitous ascendance of the climate change cluster signifies that sanctions have profoundly impacted the global sustainable development agenda. Each cluster epitomizes a distinctive analytical perspective, collectively constituting a comprehensive tableau for comprehending sanctions' multifaceted ramifications.

Ahlawat et al. [26] noted disciplinary diversity but analyzed disciplines separately. Our cluster analysis reveals integration mechanisms through shared conceptual nodes, particularly evident in the fusion of energy security with environmental and climate considerations.

5.3. Epistemological Nationalism in Knowledge Production

Geographic distribution patterns documented in Section 4.4 provide compelling evidence for epistemological nationalism hypothesis *H3*. The United States, Russia, Germany, the United Kingdom, and China contributed 75 % of global research output (368 publications analyzed), yet more intellectually provocative are the systematic differentiations within these nations' research agendas. American scholars' (95 publications, 25.6 %) concentration on sanctions design and efficacy, Russian scholars' (63 publications) focus on damage assessment and resilience construction, European scholars' specialization in spillover effects (German: agriculture; British: financial circumvention), and Chinese scholars' (32 publications) emphasis on energy networks and third-party perspectives demonstrate how geopolitical positioning systematically structures knowledge production.

This depoliticization of knowledge production constitutes a structural inevitability illuminated by Bourdieusian field theory, wherein scholarly capital accumulation cannot be divorced from researchers' positioning within international power architecture. The "sanctions efficacy" narrative constructed by American scholars resonates with their role as architects of the global sanctions architecture; Russian scholars' concentration on "economic resilience" research epitomizes sanctioned nations' survival strategies; European scholars' attention to "spillover effects" emanates from their quandary within the sanctions regime; the "third-party perspective" furnished by Chinese scholars epitomizes emerging powers' distinctive positioning in reconstituting the international order. The stratification of scholarly agendas and conclusions across different nations profoundly mirrors their disparate positions and interest calculations within the international sanction's architecture.

Previous bibliometric studies acknowledged geographic disparities in sanctions scholarship but attributed them primarily to resource distribution [22] or disciplinary traditions [26], rather than recognizing their epistemological significance. Our findings reveal that these patterns reflect systematic rather than contingent

relationships between geopolitical positioning and knowledge production. This extends Bourdieu's [8] field theory into international policy research domains, demonstrating how geopolitical structures function as constitutive forces shaping not merely research topics but fundamental analytical frameworks and normative orientations. The concept of “epistemological nationalism” advanced here differs from conventional critiques of national bias — rather than denouncing partiality, we analyze how scholars' embeddedness in national contexts necessarily provides distinctive vantage points while simultaneously constraining conceptual horizons, making knowledge production an inherently geopolitically situated enterprise.

5.4. Research Limitations and Future Directions

This study confronts several limitations. Our reliance on Web of Science potentially excludes relevant publications in regional databases, particularly Russian-language works in eLibrary.ru and Chinese-language scholarship in CNKI. The keyword co-occurrence methodology reveals thematic patterns but cannot capture nuanced theoretical debates within texts. We focused on journal articles, excluding books and policy reports that constitute significant portions of sanctions discourse.

Future research could examine citation networks to identify influential gatekeepers, conduct qualitative discourse analysis of highly cited publications, or pursue comparative analysis across multiple sanctions regimes (Iran, North Korea, Venezuela) to test whether observed patterns represent general dynamics in sanctions scholarship. Extending temporal coverage to post-Cold War sanctions evolution would provide broader historical context.

6. Conclusion

Through systematic bibliometric analysis, this investigation elucidates the epistemological evolution and paradigm shifts experienced by research on trade sanctions against Russia during 2014–2024, corroborating and extending the explanatory efficacy of Kuhn's (1962) scientific paradigm theory and Bourdieu's (1998) academic field theory within policy science domains.

Our empirical findings substantiate three principal conclusions.

First, sanctions research exhibits pronounced crisis-driven paradigm shifts, with the evolutionary trajectory advancing from 6 dispersed concepts during the exploratory period (2014–2018), through comprehensive theoretical frameworks centered on “trade sanctions” (2019–2021), to the paradigm transformation precipitated by the 2022 Russia-Ukraine conflict — publication volume surged 85 % in 2022, while “energy transition” and “geopolitical risk” vaulted from peripheral to cardinal themes.

Second, interdisciplinary synthesis is reconstituting the knowledge architecture, with six research clusters — energy security and geopolitical risk, geopolitical governance, trade implications, sanctions mechanisms, food security, and

energy transition — demonstrating dynamic convergence rather than disciplinary silos, rendering sanctions research an authentically interdisciplinary domain.

Third, knowledge production manifests systematic “epistemological nationalism,” wherein American, Russian, European, and Chinese scholars’ geopolitical positioning systematically structures their research agendas, analytical frameworks, and normative orientations.

The theoretical contribution of this study resides in corroborating Kuhnian paradigm theory’s applicability within policy science domains and conceptualizing “epistemological nationalism” as a cardinal innovation for understanding geopolitical attributes of scholarly knowledge production. This phenomenon manifests not merely in geographical distribution of publication volumes, but more profoundly in systematic differentiations across research topic selection, analytical framework construction, and conclusion proclivities. Methodologically, the dual retrieval strategy ensured data comprehensiveness, while the synthesis of VOSviewer cluster analysis with temporal evolution analysis achieved dual comprehension of static architecture and dynamic evolution, furnishing replicable analytical frameworks for bibliometric investigations of complex policy issues.

These findings bear significant implications for both scholarship and policymaking. For researchers, recognizing how geopolitical embeddedness shapes analytical horizons necessitate greater methodological reflexivity and cross-national scholarly dialogue to transcend epistemological fragmentation. For policymakers, acknowledging that academic assessments of sanctions efficacy inevitably reflect researchers’ positioning within international power architecture underscores the importance of consulting diverse scholarly perspectives rather than relying exclusively on domestic expertise.

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Эволюция знаний и сдвиг парадигмы в исследованиях торговых санкций против России: библиометрический анализ 2014–2024 гг.

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Аннотация. Экономические санкции против России резко усилились после конфликта между Россией и Украиной в 2022 г., превратив академические исследования из спорадических исследований в стремительный рост. Однако эпистемологическая эволюция исследований санкций остается недостаточно систематизированной. В данном исследовании разрабатывается двухслойная аналитическая структура, объединяющая теорию парадигмы Куна и теорию поля Бурдьё, чтобы изучить трансформацию знаний в сфере санкционной политики. Мы предполагаем, что исследования санкций демонстрируют кризисные сдвиги парадигмы, а геополитические события вызывают фундаментальные изменения в фокусе и методологии исследований. Опираясь на 368 публикаций Web of Science (2014–2024), мы используем VOSviewer для картирования знаний и анализа сетей. Результаты выявили три различных эволюционных этапа, включающие начальный период (2014–2018), фазу развития (2019–2021) и взрывной период роста (2022–2024), при этом объем публикаций вырос на 85 % в 2022 г. Анализ совместимости ключевых слов выделяет шесть основных исследовательских кластеров, охватывающих энергетическую безопасность, геополитическое управление, торговые последствия, механизмы санкций, продовольственную безопасность и энергетический переход. Примечательно, что «энергетический переход» и «геополитический риск» эволюционировали от периферийных к центральным темам. Ландшафт знаний демонстрирует выраженную геополитическую стратификацию. Американские ученые доминируют в дискурсе об эффективности санкций, российские — на защитных рамках, европейские — на влиянии санкций, а китайские ученые предлагают сторонние взгляды. Этот «эпистемологический национализм» выявляет связь между производством знаний и геополитическим позиционированием. Наша двухуровневая структура предоставляет новые аналитические перспективы для понимания эволюционных закономерностей в санкционных исследованиях, помогая ученым ориентироваться на границах исследований и способствовать международному академическому дискурсу.

Ключевые слова: санкции против России; библиометрия; эволюция знаний; сдвиг парадигмы; геополитическая экономика.

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