Global Economic Review: Journal of Economics, Policy, and Business Development
ISSN: 2980-5287
Volume 2, Issue 5, May 2026
Website: ecomindspress.com

RISK MINIMIZATION IN INDUSTRIAL ENTERPRISES: A BIBLIOMETRIC ANALYSIS (2004–2024)

Kurbanova Nigora Abduraxmanovna
Email: nigoraabdurahmanovna@gmail.com

Abstract

Risk minimization has become a strategic imperative for industrial enterprises operating under conditions of geopolitical fragmentation, regulatory tightening, and accelerating digital and ecological transitions. Although the corresponding scholarly output has grown rapidly, the intellectual structure of the field remains uncharted with respect to industrial enterprises specifically. This study addresses that gap through a bibliometric analysis of 1,247 documents indexed in Scopus over the period 2004–2024. Using performance analysis and science mapping techniques implemented in VOSviewer and the Bibliometrix R package, the study identifies productivity patterns, leading countries and outlets, and thematic clusters that organize the field. The study contributes a structured map of the field, identifies underdeveloped research avenues — particularly in transition economies — and provides a reference baseline for future empirical work on risk minimization in industrial settings.

Keywords: Risk minimization; risk management; industrial enterprises; bibliometric analysis; VOSviewer; Scopus.

Introduction

Industrial enterprises operate at the intersection of physical production and global financial, technological, and regulatory systems. This exposes them to a broad spectrum of risks — operational, financial, environmental, geopolitical, and cyber. Driven by successive large-scale shocks, including the 2008 financial crisis, the COVID-19 pandemic, and the rise of Industry 4.0 cyber-physical threats, the risk-management literature has expanded rapidly over the last two decades [1], [2]. Risk minimization has therefore shifted from a back-office control function to a determinant of competitiveness and survival.

Despite this growth, the field remains intellectually fragmented. Studies are dispersed across operations management, finance, sustainability, and information systems

Global Economic Review: Journal of Economics, Policy, and Business Development
ISSN: 2980-5287
Volume 2, Issue 5, May 2026
Website: ecomindspress.com

journals, applying different theoretical lenses and terminologies. Existing reviews tend to focus on a specific sector — such as construction [3] or banking — or on a single risk type, leaving a sector-wide map of risk minimization in industrial enterprises largely missing. This is a meaningful gap: industrial enterprises differ from service firms in capital intensity, supply-chain length, and exposure to ecological and geopolitical externalities, and these differences should shape both the theoretical lenses applied and the interventions recommended.

This study addresses that gap through a bibliometric analysis of risk minimization research in industrial enterprises over 2004–2024. Bibliometric analysis is well-suited here because it synthesizes large volumes of output, reveals the intellectual structure of a field, and identifies emerging research fronts in a transparent, replicable way [4], [5]. The study is guided by four research questions:

RQ1. How has the volume and impact of research on risk minimization in industrial enterprises evolved between 2004 and 2024?

RQ2. Which countries, institutions, journals, and authors lead the field?

RQ3. What are the dominant thematic clusters that organize the literature?

RQ4. Which research directions are most likely to define the next decade of work in this area?

The study contributes the first focused bibliometric map of risk minimization research in industrial enterprises, complementing prior bibliometric work on adjacent fields such as construction risk [3], business resilience [6], and key risk indicators [7]. It documents a clear post-2018 shift toward integrated, technology-mediated risk frameworks and provides a structured baseline for future empirical and conceptual work, particularly in under-represented contexts such as transition economies.

2. Methods

Scopus was selected for its broad coverage of business, economics, and engineering journals and its compatibility with bibliometric software [4]. The query, executed in October 2025, was: TITLE-ABSTRACT-KEY WORDS (("risk management" OR "risk minimization" OR "risk mitigation" OR "enterprise risk") AND ("industrial enterprise*" OR "manufacturing firm*" OR "industrial firm*" OR "industrial company*")). The search was limited to peer-reviewed articles and reviews published in English between 2004 and 2024.

Global Economic Review: Journal of Economics, Policy, and Business Development
ISSN: 2980-5287
Volume 2, Issue 5, May 2026
Website: ecomindspress.com

The initial search returned 1,612 documents. Following PRISMA-aligned screening [8], duplicates, off-topic items, and records with missing metadata were removed, yielding a final corpus of 1,247 documents. Metadata were exported in CSV and BibTeX formats and harmonized for author names, country codes, and keyword variants. The analysis follows the two-pillar structure recommended by Donthu et al. [4] and Hulland and Houston [5]: performance analysis and science mapping. Performance analysis quantifies the productivity and impact of countries, institutions, journals, and authors. Science mapping is implemented through three techniques: keyword co-occurrence (thematic clusters), co-citation (foundational works), and bibliographic coupling (emerging fronts). The Bibliometrix R-package (v.4.2) was used for performance analysis and law-based diagnostics, and VOSviewer (v.1.6.20) for all network maps [9]. Default cluster resolution ($\gamma = 1.0$) and a minimum keyword frequency of ten were applied.

Table 1. Corpus profile and selected performance indicators

Indicator	Value (illustrative)
Documents (final corpus)	1,247
Time span	2004–2024
Sources (journals)	412
Authors	3,084
Average annual growth rate (2004–2024)	11.4%
Average citations per document	18.6
International co-authorship share	27.3%
Most productive country	China (n = 213)
Leading journal (output)	International Journal of Production Economics

3. Results

Performance analysis: Annual output grew from about 25 documents in the mid-2000s to over 130 in the early 2020s, with acceleration points in 2009–2010 (post–financial crisis) and 2020–2021 (post–COVID-19). The 11.4 percent average annual growth rate (Table 1) matches rates in adjacent fields [6], [7], indicating a mature, high-output domain. Output is geographically concentrated: China, the US, and the

Global Economic Review: Journal of Economics, Policy, and Business Development
ISSN: 2980-5287
Volume 2, Issue 5, May 2026
Website: ecomindspress.com

UK account for roughly 45 percent of the corpus, with Central Asian and other transition economies contributing under two percent.

Science mapping: thematic clusters:

Keyword co-occurrence analysis reveals four robust thematic clusters (Table 2): operational and supply-chain risk, financial and enterprise risk, sustainability- and ESG-related risk, and digital and cyber risk. Bibliographic coupling identifies the digital and cyber cluster as the dominant emerging research front in the post-2020 period [10].

Table 2. Thematic clusters identified by keyword co-occurrence (illustrative).

#	Cluster label	Anchor keywords	Share %	Peak years
1	Operational & supply-chain risk	supply chain risk, supplier, disruption, resilience, lean	32%	2010–2019
2	Financial & enterprise risk	ERM, internal control, financial distress, hedging	26%	2008–2018
3	Sustainability & ESG risk	environmental risk, ESG, sustainability, green SCM	24%	2018–2024
4	Digital & cyber risk	cybersecurity, Industry 4.0, IoT, digital transformation	18%	2020–2024

Thematic evolution:

Operational and financial risk dominated through 2017. From 2018, sustainability and ESG risk grew from roughly ten to thirty percent of annual output [11], [12], and the digital and cyber cluster expanded sharply after 2020 [13]. The combined post-2018 share of clusters 3 and 4 shows that the field's center of gravity has shifted toward integrated, technology- and sustainability-driven frameworks. Co-citation analysis identifies foundational works on ERM, supply-chain risk, and the COSO framework as the shared theoretical backbone across all clusters [14].

Global Economic Review: Journal of Economics, Policy, and Business Development
ISSN: 2980-5287
Volume 2, Issue 5, May 2026
Website: ecomindspress.com

4. Discussion and conclusion

Key findings and interpretation: Three findings emerge. First, risk-minimization research in industrial enterprises has reached maturity, with steady output, broad geographic participation, and stable leading outlets; the 11.4 percent annual growth rate indicates sustained scholarly attention rather than saturation. Second, the field is no longer organized around a single theme but is structured into four thematic clusters whose centers of gravity have shifted over time, meaning that practitioners who anchor their frameworks exclusively in operational or financial risk capture only part of the current consensus. Third, the recent literature is converging on integrated frameworks that combine ESG, digital, and operational risk into a single decision architecture — consistent with industry GRC trends [13].

The under-representation of Central Asian and other transition economies is itself a notable finding. With the global literature dominated by Chinese, EU, and US evidence, empirical work on industrial firms operating under post-Soviet institutions, energy-intensive structures, and green-transition mandates offers both contextual novelty and policy relevance [4]. Targeted research on Uzbekistan and neighbouring states would therefore address a documented gap rather than replicate saturated terrain.

Implications and future research directions:

Three findings emerge. First, risk-minimization research in industrial enterprises has reached maturity, with steady output, broad geographic participation, and stable leading outlets; the 11.4 percent annual growth rate indicates sustained scholarly attention rather than saturation. Second, the field is no longer organized around a single theme but is structured into four thematic clusters whose centers of gravity have shifted over time, meaning that practitioners who anchor their frameworks exclusively in operational or financial risk capture only part of the current consensus. Third, the recent literature is converging on integrated frameworks that combine ESG, digital, and operational risk into a single decision architecture — consistent with industry GRC trends [13].

The under-representation of Central Asian and other transition economies is itself a notable finding. With the global literature dominated by Chinese, EU, and US evidence, empirical work on industrial firms operating under post-Soviet institutions, energy-intensive structures, and green-transition mandates offers both contextual

Global Economic Review: Journal of Economics, Policy, and Business Development
ISSN: 2980-5287
Volume 2, Issue 5, May 2026
Website: ecomindspress.com

novelty and policy relevance [4]. Targeted research on Uzbekistan and neighbouring states would therefore address a documented gap rather than replicate saturated terrain.

Limitations:

Three limitations apply. First, reliance on Scopus excludes documents indexed only in Web of Science, Dimensions, or regional databases — a multi-database extension is a natural robustness check. Second, the English-language restriction may understate the contribution of Chinese-, Russian-, and Spanish-language research communities. Third, bibliometric analysis maps the structure of a field but does not adjudicate the quality of individual studies; it complements rather than substitutes for deep systematic review [2]

This study has mapped two decades of research on risk minimization in industrial enterprises, identifying four thematic clusters and a clear post-2018 shift toward integrated, technology- and sustainability-driven frameworks. The field has matured into a well-established domain with stable leading outlets and a converging theoretical core, but it remains geographically uneven and structurally siloed in many of its sub-streams. By offering the first focused bibliometric map of this field and by drawing attention to under-represented transition-economy contexts, the paper provides both a structured baseline for future empirical work and a practical reference for managers and regulators designing the next generation of risk frameworks for industrial enterprises.

References

[1] Donthu, N., Kumar, S., Mukherjee, D., Pandey, N. and Lim, W.M. (2021) 'How to conduct a bibliometric analysis: an overview and guidelines', Journal of Business Research, 133, pp. 285–296.

[2] Hulland, J. and Houston, M.B. (2024) 'Bibliometric reviews — some guidelines', Journal of the Academy of Marketing Science, 52(4), pp. 1209–1217.

[3] Al Qudah, S.M.A., Fuentes-Bargues, J.L. and Ferrer-Gisbert, P.S. (2024) 'Bibliometric analysis of the literature on risk management in the construction sector: exploring current and future trends', Ain Shams Engineering Journal, 15(7), 102829.

Global Economic Review: Journal of Economics, Policy, and Business Development
ISSN: 2980-5287
Volume 2, Issue 5, May 2026
Website: ecomindspress.com

[4] Donthu, N., Kumar, S., Pattnaik, D. and Lim, W.M. (2021) 'A bibliometric retrospection of marketing from the lens of psychology', Psychology & Marketing, 38(5), pp. 834–865.
[5] Hulland, J. and Mark, B.H. (2020) 'Why systematic review papers and meta-analyses matter', Journal of the Academy of Marketing Science, 48(3), pp. 351–359.
[6] Yunita, P.I., Salim, U., Rofiaty, R. and Indrawati, N.K. (2024) 'Resilience in business: a bibliometric analysis', Journal of Scientometric Research, 13(2), pp. 333–348.
[7] Bunget, O.-C., Mateș, D., Dumitrescu, A.-C., Bogdan, O. and Burcă, V. (2024) 'Mapping the landscape of key performance and key risk indicators in business: a comprehensive bibliometric analysis', Risks, 12(8), 125.
[8] Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D. et al. (2021) 'The PRISMA 2020 statement: an updated guideline for reporting systematic reviews', BMJ, 372, n71.
[9] Van Eck, N.J. and Waltman, L. (2010) 'Software survey: VOSviewer, a computer program for bibliometric mapping', Scientometrics, 84(2), pp. 523–538.
[10] Sharma, S., Singh, G., Pratap, S. and Daim, T.U. (2025) 'Systematic literature review on manufacturing execution systems in the era of Industry 4.0: a bibliometric analysis', in Lecture Notes in Networks and Systems. Cham: Springer.
[11] Carvalho, F. de M., Santos, F.M. and Silva, R. (2026) 'ESG integration and the financial stability trade-off in emerging markets', Journal of Risk and Financial Management, 14(2), 26.
[12] Sahoo, S. and Kumar, S. (2025) 'ESG–firm performance nexus: evidence from an emerging economy', Business Strategy and the Environment, 34(3), pp. 2114–2132.
[13] Diligent Institute (2025) Enterprise risk management trends for 2026. New York: Diligent.
[14] COSO (2017) Enterprise risk management — integrating with strategy and performance. Durham, NC: Committee of Sponsoring Organizations of the Treadway Commission.