OORJA
ISSN - 0974-7869 (Print)
ISSN - 2395-6771 (Online)

BIBLIOMETRIC ANALYSIS OF RISK FOR PORTFOLIO CREATION

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Abstract:
Due to the limited availability of comprehensive summaries within the existing literature, this systematic review and bibliometric analysis aim to provide both quantitative and qualitative insights into the evolving domain of risk in portfolio creation. Portfolio construction seeks to identify an optimal combination of securities and other investment instruments to maximize returns while minimizing overall risk. This study offers an extensive evaluation of the literature on risk analysis in portfolio creation using bibliometric techniques. It incorporates a mapping of 1,274 research articles indexed in the Scopus database and published between 2000 and 2024. The review examines emerging trends across subject areas, contributing countries, influential institutions, and highly cited publications that have significantly shaped scientific progress in this field. Based on the top 50 research papers-each employing various risk measures for portfolio development-the findings are organized into eight major categories: publication year, subject area, document type, country, authors, and keywords. The results of this study provide valuable guidance for academic scholars, regulators, and policymakers in understanding the fundamental aspects of risk in portfolio creation and in identifying critical areas that warrant further research.
Keywords: Portfolio Creation, Cluster analysis, Bibliometric Analysis, Systematic literature review.

Introduction

(Sharpe, 1964) A key component of financial management is portfolio creation, which is the thoughtful selection and distribution of assets to meet predetermined investment goals. The assessment and control of risk, which can originate from a number of factors such as market volatility, credit default, liquidity restrictions, and operational failures, is an essential part of this process. (Rolney Baptestone, 2018) A growing number of investors and scholars are using bibliometric analysis to help them negotiate the complexity of risk in portfolio development. (F., J., J., & R., 2019) Portfolio management is the ongoing activity of keeping an eye on and adjusting a portfolio to keep it in accordance with an investor's goals and risk tolerance. This entails tasks like portfolio rebalancing, market condition monitoring, and appropriate adjustment making. (Markowitz, 1952)

Finding the best asset allocation within a portfolio to maximise return for a given degree of risk is the main goal of portfolio optimisation, a subset of portfolio management. (J.C., A., E., & D.V., 2019) To find the most effective portfolio combinations, this frequently entails applying optimisation techniques and mathematical models (Lehar, 2005)

The principles of portfolio formation, management, and optimisation are all interrelated and dependent on one another. (Nurhidayah Bahar, 2022) The choices made at the portfolio building stage will have a big influence on how the portfolio is managed and optimised later on. Due to reasons including rising market volatility, the globalisation of the financial system, and the invention of new financial instruments, the field of risk management in portfolio formation has

advanced significantly in recent decades. (Naveen Donthu, 2022) More advanced methods of risk assessment and management have been required as a result of these advances. Researchers also look into how portfolio creation and management involve risk management, diversification, and performance evaluation (Bogentoft, 2001). Only a small number of literature reviews on various aspects of portfolio construction have been published in the past 20 years prior to this review. The articles mostly pertain to a particular theme. None of them seeks to cover the whole range of portfolio creation. (J. & A., 2022) Furthermore, the researcher was unable to locate any studies that examined the conceptual and intellectual framework underlying this new field of study. (Khalili-Damghani, 2014)These disparities forced researcher to integrate quantitative & qualitative approaches in order to gather body of existing knowledge and offer a research roadmap. (Ou, 2005)This is the first complete evaluation of the literature combined with bibliometric analysis on portfolio development. (Jacobson, 2012)This review summarises the most recent advancements in the subject with the goal of eventually assisting academicians, educators, practitioners, and policymakers.

The following research questions were developed and has served as the study's compass in order to comprehend the connection between risk and portfolio building.

Research Questions:

RQ1. What are current publication trends in portfolio creation in terms of time, journal, disciplines, authors, affiliated countries, type of study & economy?

RQ2. What are the top 50 risk measure analysis?

RQ3. What are the intellectual structure of risk of portfolio creation research?

RQ4. What are the recent research trends in this domain?

RQ5. What are the gaps and areas for future research?

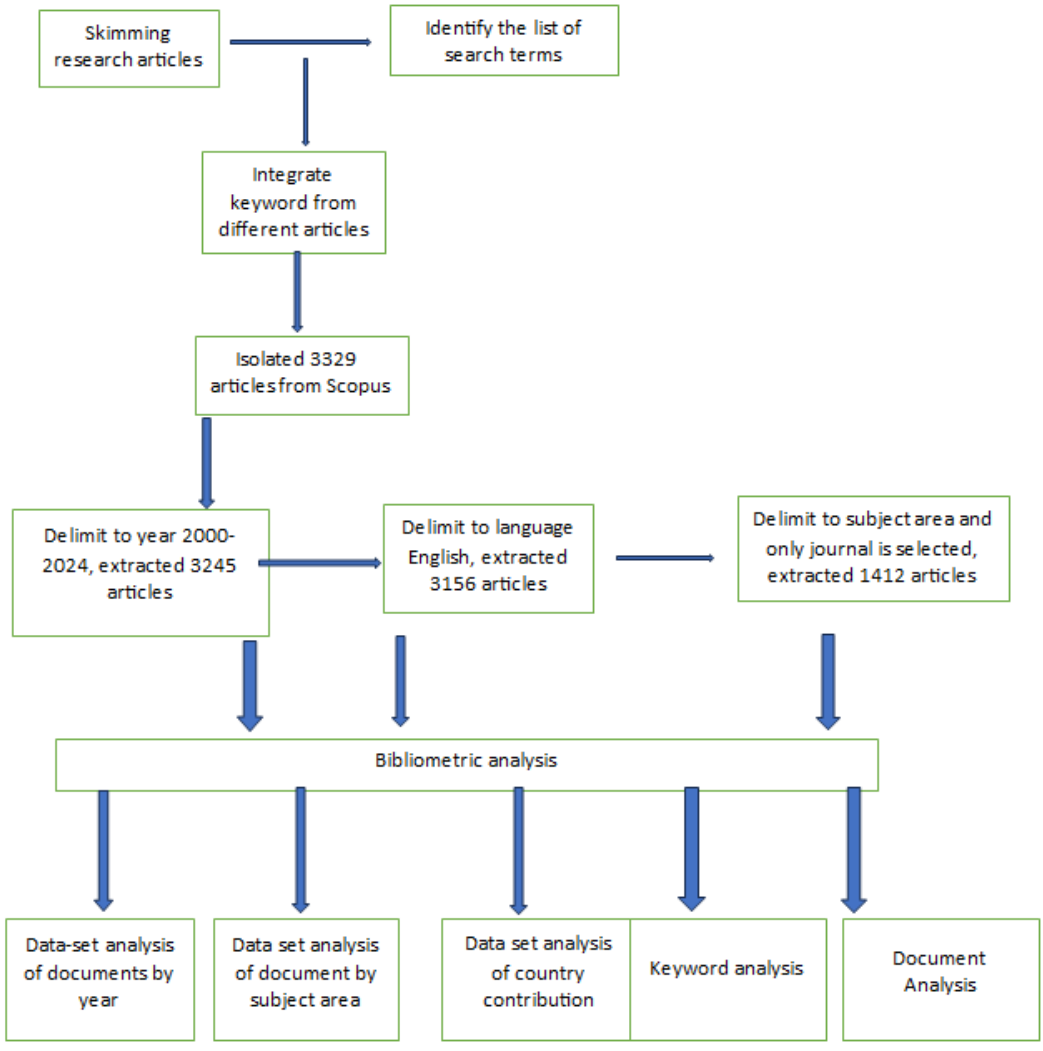
(Kirti Goyal, 2020)To answer these questions, researcher analyzed publication patterns of relevant research over time, identify most prominent journals and examine the contribution of authors from different countries and institutions. (W., S., M.U., A.A.S., & S., 2020) Also, researcher examine top 50 cited paper for most commonly used risk measure and assess their relative importance in portfolio creation. Researcher employ documents by their subject area, clustering analysis, co-citation analysis & network analysis and explore the evolution of research themes over time.

By identifying understudied areas and emerging trends, researcher highlight potential avenues for future research & contribute to the advancement of the field. (M., M., & M., 2019)

The structure of this study is as follows: The study's contextualisation was explained in the introduction, which also highlighted previous research on the topic under examination. It also highlighted the significance of the current work, the research issue, and the gap in the field. In 2022, H. Kent Baker The literature review presents the proposal of the single case study and the methodological methods that will direct data collection and analysis. It also brings the theoretical underpinnings, conceptualising axis, risk, portfolio construction, and research technique. In 2016, O., M., and S. The results' analysis and interpretation will be covered, along with academic and practical contributions. The conclusion of the work lists its limitations and makes recommendations for future research directions.

Model of Bibliometric Analysis

Figure 1: Steps of Bibliometric Analysis



Research Methodology:

Data and Methodology

Firstly, bibliometric analysis comes up with the overcome the solution of the problem as many researches are conducted on the same research area through different dimensions. Bibliometric analysis is a measure by many statistical tools and evaluation of articles, books, journal etc. In the past few years, there has been tremendous interest in bibliometric measures used everywhere from arts to science. However, in the core field of finance within commerce, there are not many bibliometric studies. Particularly, there are lot of paper related to portfolio creation with different types of risk

measure technique. This paper focuses on developing trend determining subject area, country, most cited, institutions which has major influence on advancement of scientific knowledge. The initial step in bibliometric analysis involves gathering data to compile a database of pertinent documents. Then, through brainstorming researcher identify list of search terms includes “Portfolio Creation”, “Risk measure”, “Portfolio management”, “Portfolio optimization”, “portfolio selection”. And CONJUCTIONS AND, OR is used for best optimal documents. (Ghasemzadeh & Archer, 2000). After that, some articles were scrutinized by applying keywords, subject area, type and years to eliminate irrelevant document. And finally, 1302 documents from Scopus are found to study which is one of the largest databases to study in any field.

***Recommended keyword framework*: (N., 2010)**

Table 1: Steps of Bibliometric Analysis

Stages	Keyword use
1	Portfolio AND
2	Creation OR Management OR Optimization OR Selection AND
3	Risk measure OR
4	Risk measures

Results of Bibliometric Analysis:

Documents by year:

Figure 2 depicts the growth in publications related to portfolio creation in the Scopus database from 2000 to 2024. The number of articles has significantly increased, rising from just 18 in 2000 to 70 in 2024. Notably, research on portfolio creation has experienced a sharp rise since 2020. This surge can be largely attributed to global financial crisis that emerged in 2019, marked by substantial losses, rising household debt, and a liquidity crunch triggered by the COVID-19 pandemic. This macroeconomic shock served as a "teachable moment" for community, emphasizing the need for policies that promote sound risk management practices in portfolio creation. Following the 2008 financial crisis, various countries introduced national financial education strategies as a policy measure to mitigate its long-term impact on investors. Since 2020, publications on portfolio creation have more than doubled, reflecting increased interest in the subject.

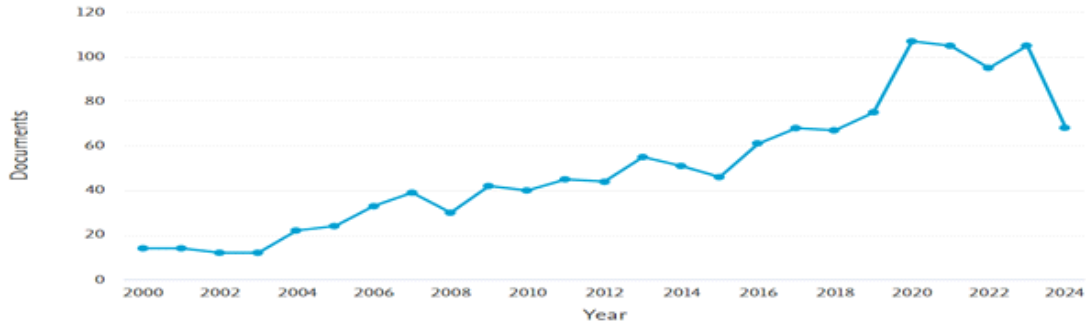


Figure 2: Yearly publication trend of 1302 papers published between 2000 and 2024, retrieved from Scopus

Document type:

Figure 3 presents the distribution of various document types in research related to the risks of portfolio creation. Among the 1,412 papers analyzed, the majority (96.4%) are research articles, while review papers account for only 2.2%, and conference papers make up just 0.9%. This indicates that very few studies originate from sources such as errata or editorial publications.

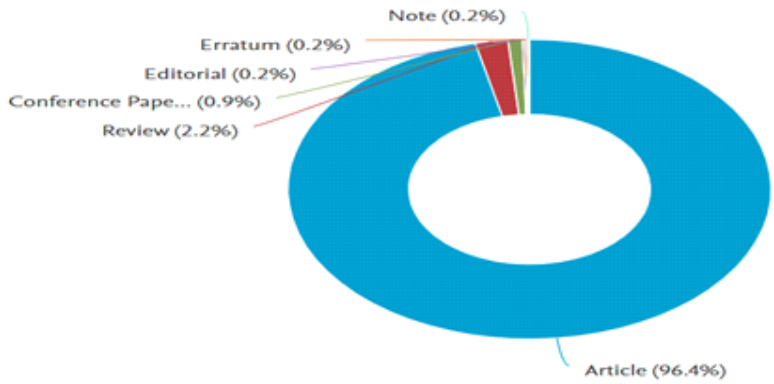


Figure 3: Details of document type

Documents by subject area:

Top 10 subjects are sorted according to publication in different years presented below fig 4. As maximum paper published in economics about 40.5%, in Business & Management 24%, in Decision Science 8.8%, in Mathematics 8.7%, in social science 7%, in Computer Science 3.2%, in Environmental 2%, in Engineering 1.8%, in Energy 1.3%, in Agricultural 0.8%, Others 2%. Except economics, average percentage of all subject is around 5.

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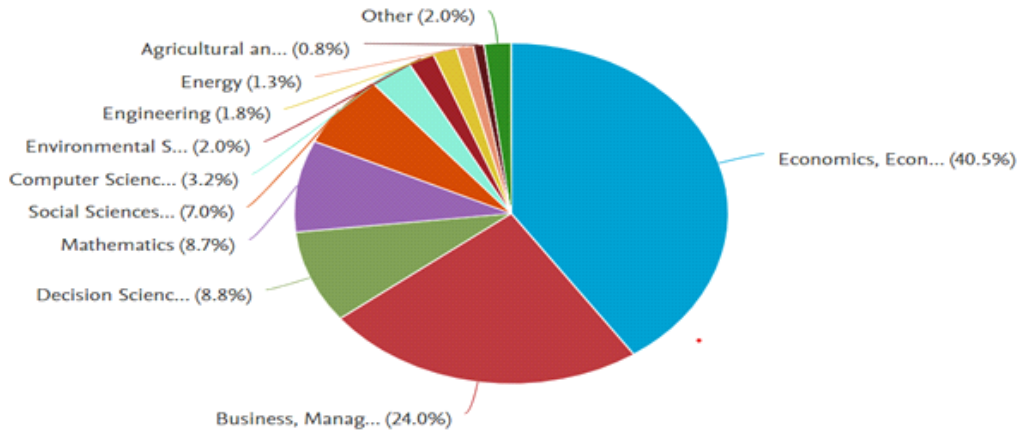
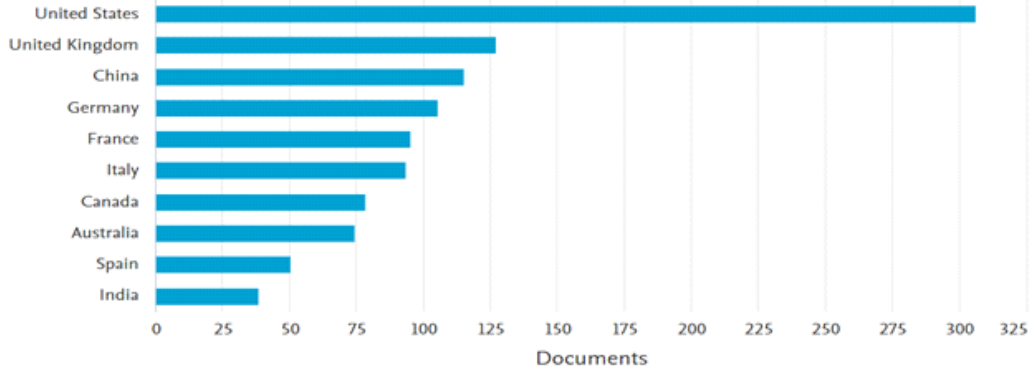


Figure 4: Key Disciplines Of Portfolio Creation Research Across 1302 Papers

Document by country or territory:

Fig 5 portrays the top countries contributing to analysis of risk for Portfolio Creation with leading three being the United States (310 articles), United Kingdom (126 articles) and China (120 articles). Furthermore, Germany, France, Italy, Canada, Australia, Spain, India are other cited countries having articles 110, 95, 93, 77, 74, 50, 35 respectively. Fig. 7 shows top most authors having publication in this field. Fig. 8 chart shows some author having maximum number of publications presented in chart form.



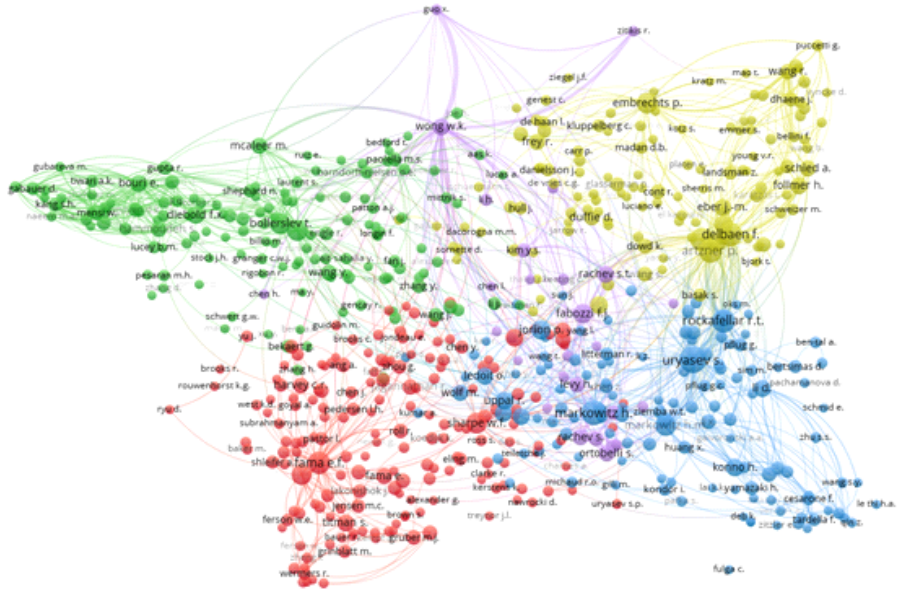


Figure 6: Co-Authorship

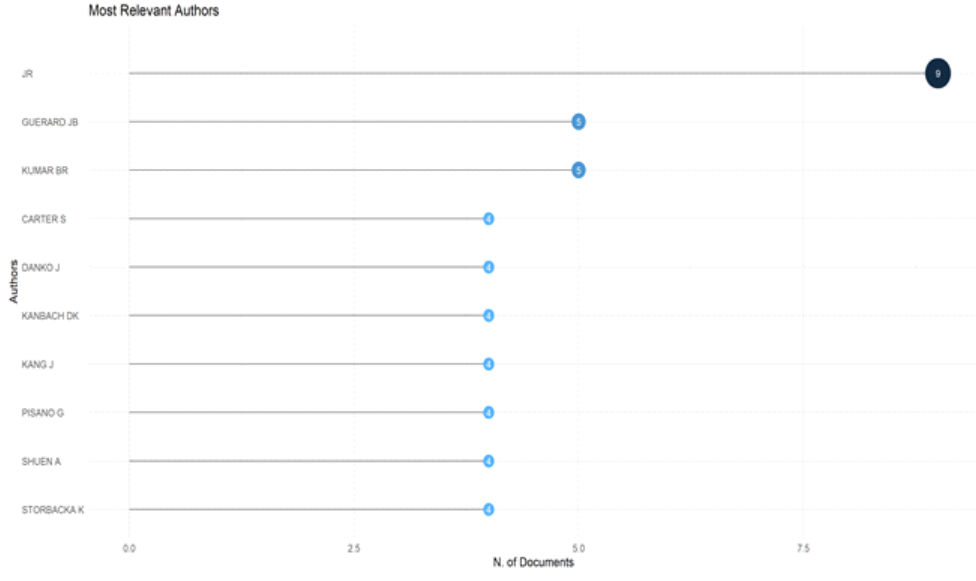


Figure 7: Most Relevant Author Chart

Keyword Analysis:

Keywords are sorted according to number of times occurred. Keyword analysis is important to analyze the frequent uses of these words and how much study is done on this topic. The research publications' themes are reflected in the author's keywords. To investigate the most common topics in

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risk of portfolio development, keyword analysis was done using the VOS Viewer. In 3329 papers, 1412 keywords were found in total.

Table 2 shows the top keywords used in risk of portfolio creation from 2000 to 2024. "Portfolio optimization" is the most frequently used keyword, with most occurrence which indicates that this word alone is used as a termed concept in the literature. The other three most frequently used keywords are Risk management, portfolio selection, and portfolio management. A significant finding from the analysis is that there is no unanimity on the conceptualization of portfolio creation and that a lack of standardized meaning compels authors to most use these terms portfolio optimization, risk management, portfolio selection, portfolio management, value at risk, risk assessment, investments, conditional value at risk. (G.J., From Markowitz to modern risk management, 2009). Measure keyword use in various study related to risk and portfolio creation are given in the table below.

Table 2: Most Commonly Used Keywords In Research Papers

S.No.	Keywords
1	Portfolio Optimization
2	Risk Management
3	Portfolio Selection
4	Portfolio Management
5	Value-at Risk
6	Risk assessment
7	Investments
8	Conditional Value at Risk

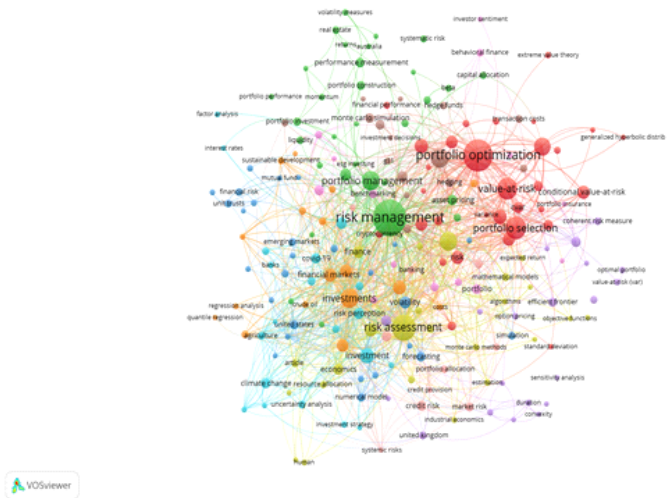

Figure 8: Network analysis of keywords occurrence of risk (Source- Extracted from Vos viewer)

Figure 9 illustrates that portfolio optimization and risk management are closely associated with terms

such as portfolio management, selection, investments, and risk. Additionally, as shown in Figure 8, risk management is linked to concepts like risk assessment and financial markets. With more individuals taking control of their financial well-being after retirement, there has been a noticeable shift from safe investments to riskier ones. Emerging themes in this field include portfolio construction, portfolio performance, portfolio investment, and investment decision-making.

Citation of documents:

Only one out of five highly cited papers is among the top five papers based on citation analysis, according to a comparison of the top ten papers based on citation count and PageRank measure. According to citation analysis, the following four works rank farther up: Conditional autoregressive value at risk using regression quantiles, 2004. These publications were among the most important main research that addressed the risk of portfolio management analysis as the subject developed throughout time.

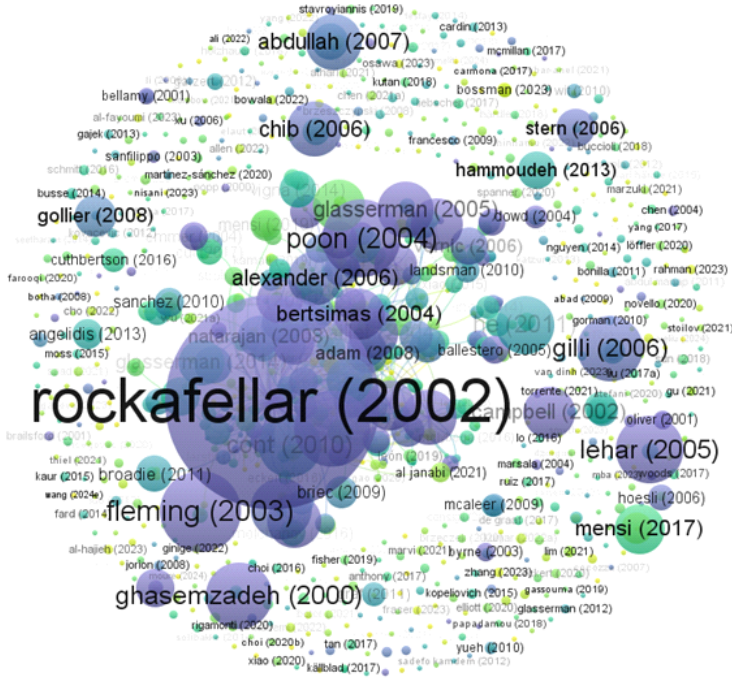

Figure 9: Citation of documents (Source- Extracted from Vos viewer)

Clustering by coupling

After analysing all journals, articles, countries, and citations, a cluster analysis can be performed, with the first cluster including portfolio selection, portfolio optimization and artificial intelligence. Second cluster includes risk assessments, optimization, investment. Third cluster includes risk assessment, financial data processing, coherent risk measure. Fourth cluster includes investments, optimization, administrative data processing. By this analysis, researcher can understand centrality and impact of research paper within their network.

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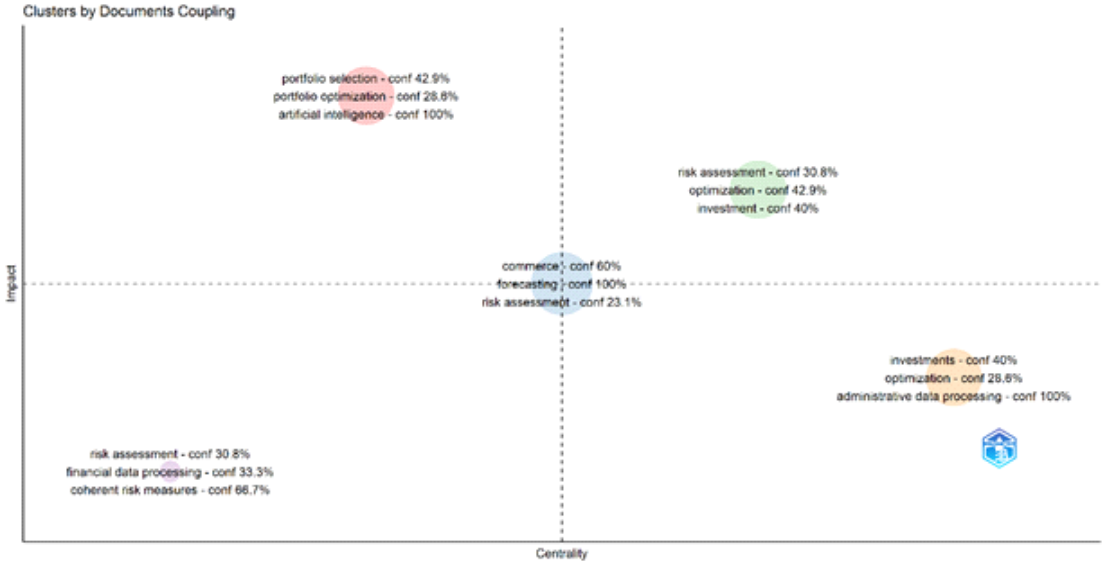
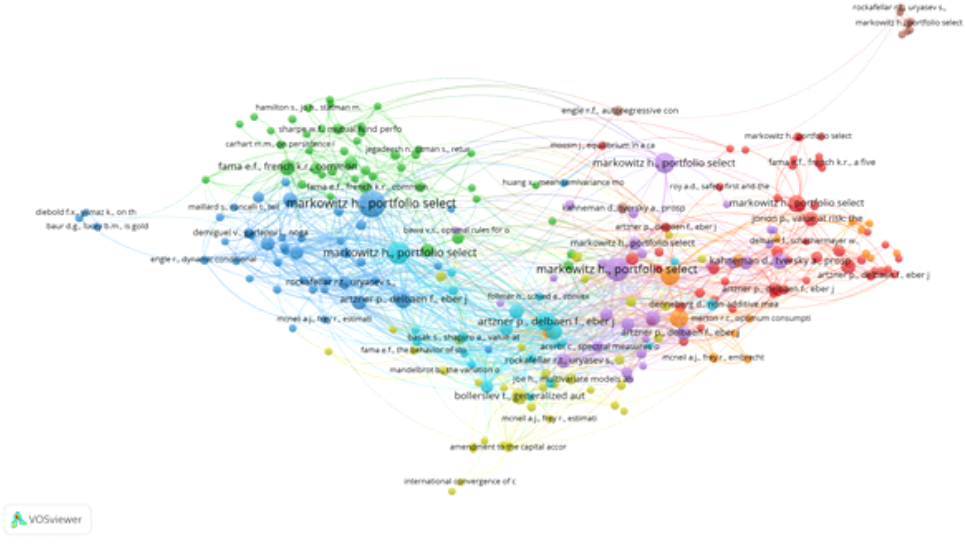


Figure 10: Cluster Analysis Of Top Articles (Source- Extracted from Vos viewer)

Co-citation of References:

Figure 11: Co-citation Analysis Of References Used (Source- Extracted from Vos viewer)



Rank Analysis:

Table 3 - Top 50 research paper publication based on global citation for most commonly used risk measure (Kirti Goyal, 2020) . Before this review, only a limited number of literature review studies had been published on various aspects of portfolio creation over the past two decades. Table 3 presents a list of these reviews, most of which focus on specific themes. However, none of these studies provide

za comprehensive overview of portfolio creation as a whole. Moreover, we could not identify any research that explores the underlying conceptual and intellectual structure within this evolving field. These gaps motivated us to adopt a combination of quantitative & qualitative methods to synthesize existing literature and outline a research roadmap. This study offers a comprehensive viewpoint on the topic as it is the first to combine bibliometric analysis and a systematic literature assessment on portfolio development. It highlights the latest advancements in the field with the goal of benefiting practitioners, policymakers, educators, and researchers.

Table 3: Existing Review Study

Rank	Year	Author	Risk Measure
1	2002	Rockafellar R.T.; Uryasev S.	Value at risk, Conditional value at risk
2	2014	Diebold F.X.; Yilmaz K.	Variance (F.X. & K., 2014)
3	2004	Engle R.F.; Manganelli S.	Value at risk, Conditional autoregressive value at risk (R.F. & S., Conditional autoregressive value at risk by regression quantiles, 2004)
4	2009	Berger A.N.; Klapper L.F.; Turk-Ariss R.	Regressing measures of loan risk, bank risk, and bank equity capital (A.N., L.F., & R., 2009)
5	2009	Rao S.; Goldsby T.J.	Typology (S. & T.J., 2009)
6	2003	Van Mieghem J.A.	Single and multiple risk-neutral decision, Hedging (J.A., 2003)
7	2003	Fleming J.; Kirby C.; Ostdiek B.	Conditional Covariance Matrix (J., C., & B., 2003)
8	2004	Poon S.-H.; Rockinger M.; Tawn J.	Multivariate approach (S.-H., M., & J., 2004)
9	2006	Rockafellar R.T.; Uryasev S.; Zabarankin M.	Standard Deviation (R.T., S., & M., Generalized deviations in risk analysis, 2006)
10	2006	Madden T.J.; Fehle F.; Fournier S.	Fama-French Method (T.J., F., & S., 2006)
11	2005	Lehar, Alfred	Dynamic and Correlation (A. L. , 2005)
12	2000	Ghasemzadeh F.; Archer N.P.	Project analysis and Selection system (F. & N.P., 2000)
13	2006	Gilli, Manfred, Këllezi, Evis	Extreme value theory, Statistical Modeling (M. & E., 2006)
14	2007	Leten, Bart, Belderbos, Rene , Van Looy, Bart	Binomial regression (B., R., & B., 2007)
15	2010	Cont, Rama, Deguest, Romain, Scandolo, Giacomo	Conditional value-at -risk (R., R., & G., Robustness and sensitivity analysis of risk measurement procedures, 2010)

16	2006	Cont, Rama	Coherent risk measure, convex risk measure (R. C. , Model uncertainty and its impact on the pricing of derivative instruments, 2006)
17	2002	Alexander, Gordon J., Baptista, Alexandre M.	Mean-value at risk (G.J., Economic implications of using a mean-VaR model for portfolio selection: A comparison with mean-variance analysis, 2002)
18	2011	He, Xue Dong, Zhou, Xun Yu	S shaped utility function and probability weighting, large loss aversion degree (X.D. & X.Y., 2011)
19	2007	Abdullah, Fikriyah , Hassan, Taufiq, Mohamad, Shamsher	Sharpe index and adjusted Sharpe index, Jensen Alpha, Timing and selectivity ability (F., T., & S., 2007)
20	2005	Glasserman, Paul , Li, Jingyi	Monte Carlo simulation (P. & J., Importance sampling for portfolio credit risk, 2005)
21	2011	Dawson, Richard J. , Ball, Tom , Werritty, Jonathan , Werritty, Alan, Hall, Jim W. , Roche, Nicolas	Spatial planning (R.J., et al., 2011)
22	2005	Chekhlov, Alexei , Uryasev, Stanislav , Zabarankin, Michael	Conditional Drawdown (A., S., & M., 2005)
26	2000	Jarrow, Robert A., Turnbull, Stuart M.	Martingale probability, Natural Probability (R.A. & S.M., 2000)
27	2005	Kalkbrener, Michael	Capital Allocation (M. K. , 2005)
28	2006	Cressy, Robert	Inverse Gaussian (R. C. , 2006)
29	2002	Campbell, Rachel, Koedijk, Kees, Kofman, Paul	quantile correlation, tail-adjusted mean-variance covariance matrix (R., K., & P., 2002)
30	2019	Buehler, H., Gonon, L., Teichmann, J. , Wood, B.	Machine Learning, Convex risk measure (H., L., J., & B., 2019)
31	2004	Bertsimas, Dimitris, Lauprete, Geoffrey J. , Samarov, Alexander	Standard deviation, VaR, Lower partial moments, and Coherent risk measures (D., G.J., & A., 2004)
32	2004	Biglova, Almira, Ortobelli, Sergio, Rachev, Svetlozar , Stoyanov, Stoyan .	Sharpe Ratio (A. B. , S., S., & S., 2004)
33	2004	Scaillet, O.	Non-Parametric (O. S. , 2004)
34	2017	Mensi, Walid (55607222100); Hammoudeh, Shawkat , Al-Jarrah, Idries Mohammad Wanas, Sensoy, Ahmet, Kang, Sang Hoon	time-varying equi correlations and risk spillovers (W., S., I.M.W., A., & S.H., 2017)

35	2007	Barczak, Gloria, Sultan, Fareena, Hultink, Erik Jan	Web based tools and software (G., F., & E.J., 2007)
36	2000	Neftci, Salih N.	Central limit theorem, Value at risk (S.N., 2000)
37	2005	Zhang, Xueqing	Literature review, Case studies and Interview with experts (X. Z. , 2005)
38	2000	Cai, Xiaoqiang, Teo, Kok-Lay, Yang, Xiaoqi ; Zhou, Xun Yu	I8 function (X., K.-L., X., & X.Y., 2000)
39	2014	Glasserman, Paul ; Xu, Xingbo	Relative entropy, Monte Carlo simulation (P. & X., Robust risk measurement and model risk, 2014)
40	2012	Pflug, Georg Ch., Pichler, Alois, Wozabal, David	Markowitz portfolio selection model , Conditional Value-at-Risk (G.C., A., & D., 2012)
41	2020	Elsayed, Ahmed H. ; Nasreen, Samia, Tiwari, Aviral Kumar	Optimal weights and Hedge ratios (A.H., S., & A.K., 2020)
42	2000	Jensen G.R.; Johnson R.R.; Mercer J.M.	Markowitz optimization (G.R., R.R., & J.M., 2000)
43	2008	Quaranta A.G.; Zaffaroni A.	Conditional value at risk (A.G. & A., 2008)
44	2002	Frey R.; McNeil A.J.	Non-coherence of value-at-risk (R. & A.J., 2002)
45	2008	Natarajan K.; Pachamanova D.; Sim M.	Asymmetry-Robust VaR (K., D., & M., 2008)
46	2008	Gollier C.	Correlation (C., 2008)
47	2003	Mansini R.; Ogryczak W.; Speranza M.G.	Markowitz model, mean variance (R., W., & M.G., 2003)
48	2008	Adam A.; Houkari M.; Laurent J.-P.	Moment-based, distortion & spectral (A., M., & J.-P., 2008)
49	2022	Sawik T.	Multi-portfolio approach and scenario-based stochastic MIP (T. S. , 2022)
50	2006	Jianakoplos N.A.; Bernasek A.	Observation and Survey (N.A. & A., 2006)

Conclusion

A large and varied corpus of research on risk management and portfolio construction is shown by the bibliometric analysis. Significant progress has been achieved in integrating both conventional and innovative risk indicators during the last 20 years, and new approaches are always being developed. The paper emphasises how advances in computer methods and a better comprehension of financial markets are driving the growing complexity of risk management in portfolio theory. The multidisciplinary methods and worldwide scope of study point to a future trajectory where risk analysis in portfolio construction will advance by using various data sources and machine learning

methodologies.

Result and discussion:

1. Trend in Publications Over Time

The bibliometric analysis reveals a steady growth in the number of publications related to portfolio creation and risk analysis over the past two decades, with a particularly sharp increase in the years following 2010. The surge in publications from 2010 to 2024 can be attributed to several factors, including increased globalization of financial markets, the evolution of more advanced financial theories & the growing complexity of risk management techniques.

The overall trend suggests that the importance of risk analysis in portfolio creation has been progressively recognized, with a substantial academic interest in understanding and quantifying various forms of financial risks.

2. Subject Areas

The research articles in the study predominantly belong to the Finance and Economics disciplines, reflecting the centrality of these fields in portfolio creation and risk analysis. However, significant contributions were also observed from fields like Mathematics/Statistics, Operations Research, and Computer Science/Artificial Intelligence. This interdisciplinary collaboration highlights the increasing reliance on quantitative techniques, statistical models, and technological innovations in optimizing portfolios and analysing risks.

3. Type of Publications

The majority of the 1274 publications analysed were journal articles, followed by conference papers and working papers. Journal articles were the dominant type of publication, suggesting that peer-reviewed research with rigorous methodologies remains the primary vehicle for disseminating knowledge in the field.

4. Country Distribution

The United States emerged as the leading country in terms of published articles, followed by China, United Kingdom, and India. This aligns with the global financial dominance of the US and the rapid growth of financial research institutions in China and India. The distribution of publications across different countries reflects the global interest in optimizing investment portfolios and mitigating associated risks.

5. Author Contributions and Collaborations

The top authors in the field of portfolio creation and risk analysis were identified based on publication frequency and citation impact. Many of these authors have significantly influenced the development of portfolio optimization models, risk assessment metrics, and quantitative risk management.

6. Keywords and Key Themes

The keywords identified in the bibliometric analysis provide valuable insight into the most relevant and evolving topics in portfolio creation and risk analysis. (T., S., H., & Y., 2023)These keywords include:

- Portfolio Optimization
- Risk Management

- Value at Risk (VaR)
- Conditional Value at Risk (CVaR)
- Expected Shortfall
- Monte Carlo Simulation
- Machine Learning
- Financial Risk

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