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## Examining Enterprise Risk Management Research using Bibliometric Analysis

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### Abstract

The concept of enterprise risk management (ERM) has received attention as a system to manage organisational-wide risk by employing a more integrated and holistic strategy. Due to the complexity of the business environment, emerging risks and the strengthening of business resilience during a crisis, enterprise risk management is relevant, particularly for business organisations. As a result, numerous studies have been conducted to investigate the determinants and implications of adopting or implementing ERM. Thus, this paper examines the nature and current trends of enterprise risk management research using bibliometric analysis. A total of 518 documents were retrieved from the Scopus database. Our analyses provide evidence that enterprise risk management has been explored in various disciplines, mostly business, management, and accounting. The results also reveal the increasing trends of ERM research, which is associated with crises like financial and pandemic outbreaks. More importantly, the result of keyword analysis demonstrates five main themes that best capture the heterogeneous nature of ERM research. However, the business and accounting themes still offer a limited number of keywords. Therefore, this study reveals a promising and multidisciplinary field of research and provides insightful information for future research. It is also a starting point for professionals and researchers to fully understand the elements of ERM research and the potentiality for a more systematic approach.

**Keywords:** Bibliometric Analysis, Enterprise Risk Management, Keyword Analysis, Multidisciplinary, Holistic Approach

### Introduction

Over the past few decades, the effectiveness of risk management systems implemented by organisations has been getting stakeholders' attention. The evolution of the risk management concept can be seen throughout the year from the traditional approach to the more integrated approach of risk management, also known as 'enterprise risk management (ERM)'. The coronavirus disease (Covid 19) brings greater attention globally due to its impact on daily life, individuals' norm, and the organisation's operational activities (Verma & Gustafsson, 2020). Many countries have taken the initiative by declaring a phased lockdown and stay-at-

home policy to reduce Covid 19 cases. In response, businesses need to reduce the effect of the pandemic to avoid poor performance and bankruptcy (Sampaio et al., 2022) and adopt enterprise risk management to strengthen organisational resilient (Marquez-Tejon et al., 2022).

Enterprise risk management is a systematic and integrated approach to the management of the total risks that an organisation faces (Dickinson, 2001). Beasley, Pagach, and Warr (2008) defined enterprise risk management as the process of analysing the portfolio of risks facing the enterprise to ensure that the combined effect of such risks is within an acceptable tolerance. According to Dickinson (2001), ERM happens due to high-profile companies failing and suffering significant losses; as a result, corporate governance should be expanded to include the management of the firm's risks as well as a larger role for shareholder value models in strategic planning. Therefore, it is suggested to conduct risk management based on a holistic approach rather than a silo-based approach (Gordon et al., 2009) by integrating risk management into corporate governance as well as business strategies.

ERM plays an important role in strategic planning. The ERM systems improve operational and strategic decisions and reduce risks' direct and indirect costs (Florio & Leoni, 2017). The boards of directors and senior managers are now more directly accountable for the company's risks, overseeing the enterprise's portfolio risks (Beasley, Clune, & Hermanson, 2005). ERM also creates value for firms when there are real costs to shareholders from idiosyncratic risks (Beasley et al., 2008). ERM has the ability to manage those risks in a dynamic business environment (Gordon et al., 2009). Empirically, ERM can lower a firm's total risks, which later improves performance and increases firm value (Florio & Leoni, 2017).

Despite the growing interest in ERM studies, there have been relatively limited attempts to report the trend of research, particularly those that used a bibliometric approach. A study conducted by Marquez-Tejon et al (2022) conducted a bibliometric analysis that focused mainly on security risk management and found a close linkage between security risk management with ERM in the period between 2009 and 2019. In the situation of globalisation and changing world, organisations are being pressured by emerging risks like technology risks and health risks which demand companies to have more adaptive risk management for organisational resilience. Meanwhile, Nobanee et al (2021) explored the importance of sustainability and risk-associated factors. This paper extends prior research by providing valuable insight into multidisciplinary fields of ERM and the loopholes in the current research and publications. Hence, this study can help future researchers explore the ERM concept more strategically by referring to the current dynamism of ERM research. This study is driven by the following research questions (RQs) RQ1: What is the current state of the article's publication and citation patterns in the ERM studies? RQ2: Which themes and keywords gaining more popularity among scholars of ERM?

### **Literature Review**

The bibliometric approach normally analyses the nature of documents in terms of quantity, quality and the structural mapping of the gathered data (Kushairi & Ahmi, 2021). The quantity analysis includes the total number of publications and citations per year and a total number of publications by the categories like source title, source type, country, institution, language, and subject area (Kushairi & Ahmi, 2021). The quality analysis is done by analysing each selected document's contents (Sampaio et al., 2022). Lastly, the structural map by network mapping provides network analysis of the co-occurrence for keywords or authors' names (Ahmi & Nasir, 2019; Kushairi & Ahmi, 2021). The actions can be done by gathering a large

volume of scientific literature (Nobanee et al., 2021), making it more valuable than a systematic literature review.

The bibliometric approach provides several benefits. First, bibliometric analysis is considered an accurate and potentially equitable tool for measuring a paper’s contribution to knowledge advancement (Kushairi & Ahmi, 2021). It portrays the nature and course of specific research (Sampaio et al., 2022). Besides, it helps guide researchers to the most influential works and map a research field without subjective bias (Zupic & Cater, 2015). Bibliometric analysis anticipates a similar form of systematic literature reviews and rigorous techniques that guarantee the quality of the information used and the results’ output generated (Nobanee et al., 2021). Further, it will provide up-to-date data analysis for more reliable results (Sampaio et al., 2022).

### Methods

This study conducts a topic search using the Scopus database, establishes a research protocol, and analyses the collected documents using the bibliometric method (refer to Figure 1).

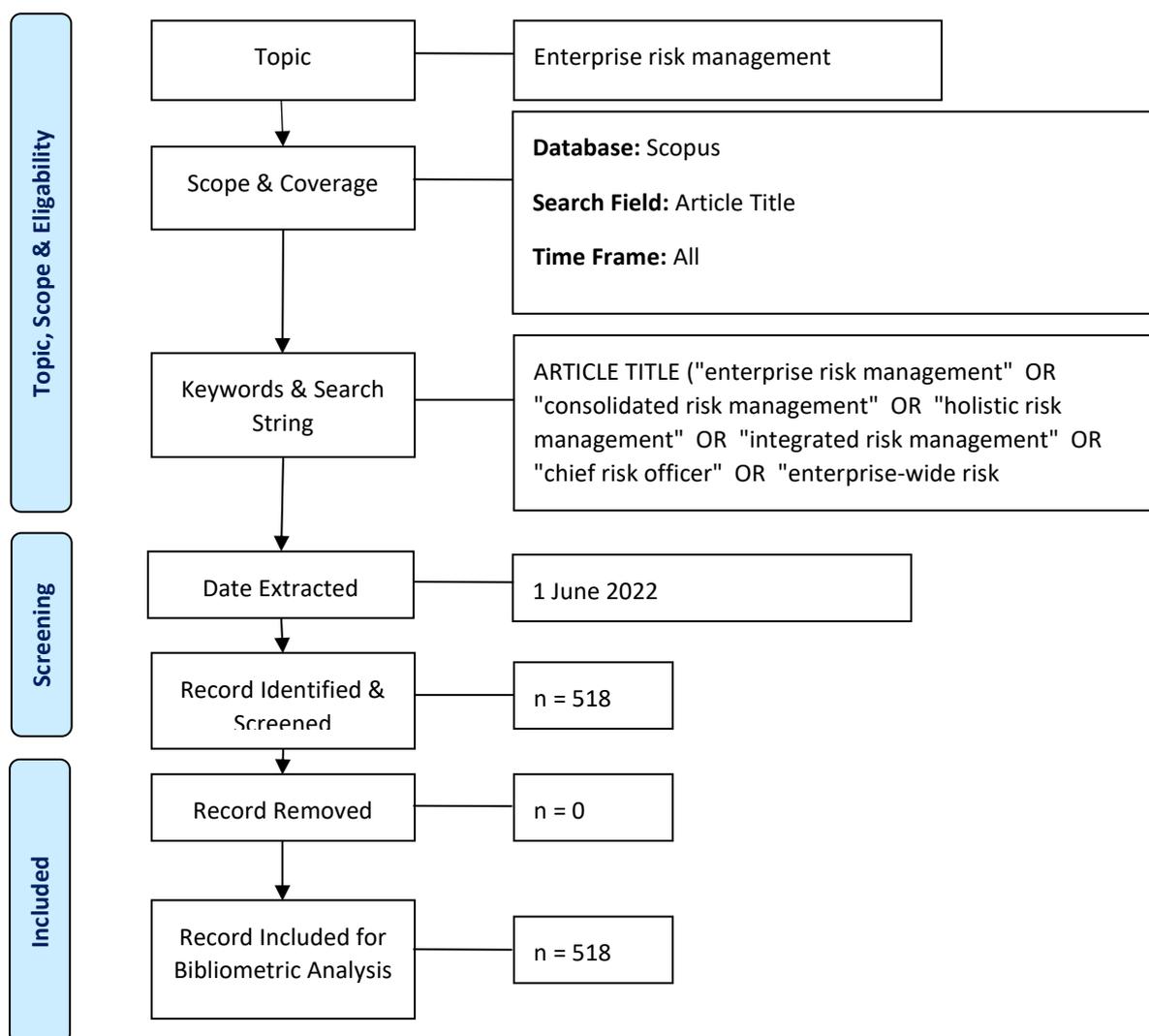


Figure 1. Flow Diagram of the Search Strategy (Kushairi & Ahmi, 2021)

We extracted data from the Scopus database as of 1 June 2022. The following combination of keywords was used: “enterprise risk management”, “consolidated risk

management”, “holistic risk management”, “integrated risk management”, “chief risk officer”, or “enterprise-wide risk management”. The targeted publications are limited to journal articles and conference papers, which led to the final sample consisting of 518 documents. Additionally, the final sample only consists of paper written in English. There is no time limit included in searching for the documents. Then, this study uses Microsoft Excel, Harzing’s Publish or Perish and VOSviewer software for data analysis and visualisation.

### Results

Some general statistics from the data sets are offered to give an overview of the research on ERM. The following criteria were used to analyse all the documents based on the following analysis: documents and source types, growth of publications and citations, distribution of publications by countries, subject area, citation analysis based on authors, and keywords analysis.

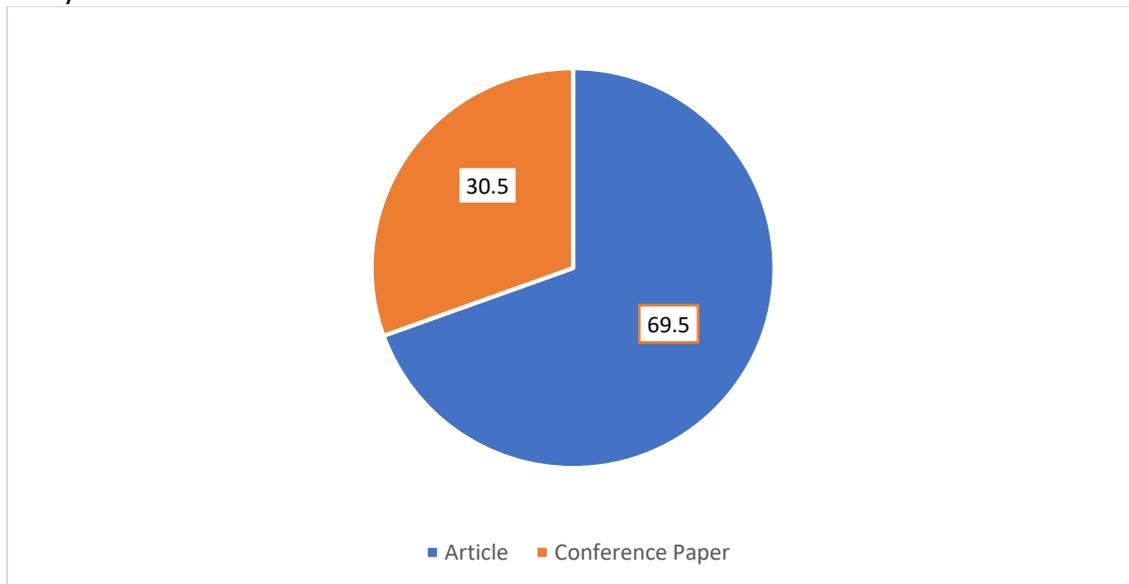


Figure 2. Document Type

Figure 2 presents the total percentage of the document type. 69.5% of the documents are articles, and 30.5% are conference papers.

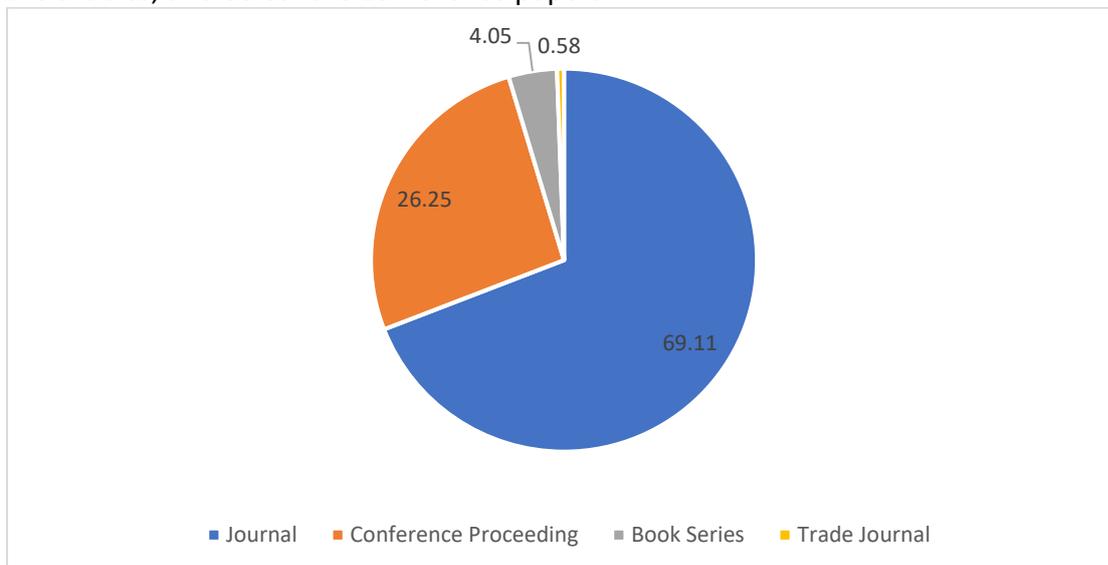


Figure 3. Source Type

Figure 3 reports the source type for all the collected documents. The documents are divided into four sources: journal, conference proceeding, book series and trade journal. Most of the analysed documents belong to the journal article, contributing about 69.11%. The second highest document source comes from conference proceedings which are 26.25%. A few documents in the article and conference proceeding in Figure 2 are split into either the book series or trade journal. However, both sources provide lesser contributions, with the percentage value of book series being 4.05% and trade journal being 0.58%.

### Growth of Publications and Citations

Figure 4 shows the annual growth of total publications for ERM studies. Since ERM is the evolution from the traditional approach of risk management (financial risk management or hedging or financial derivatives), thus only a few researchers participate in the publications of ERM literature before 2000. Interestingly, in 1997 and 1998, there was an event of the Asian financial crisis that expected businesses to be more resilient by adopting a more robust risk management system.

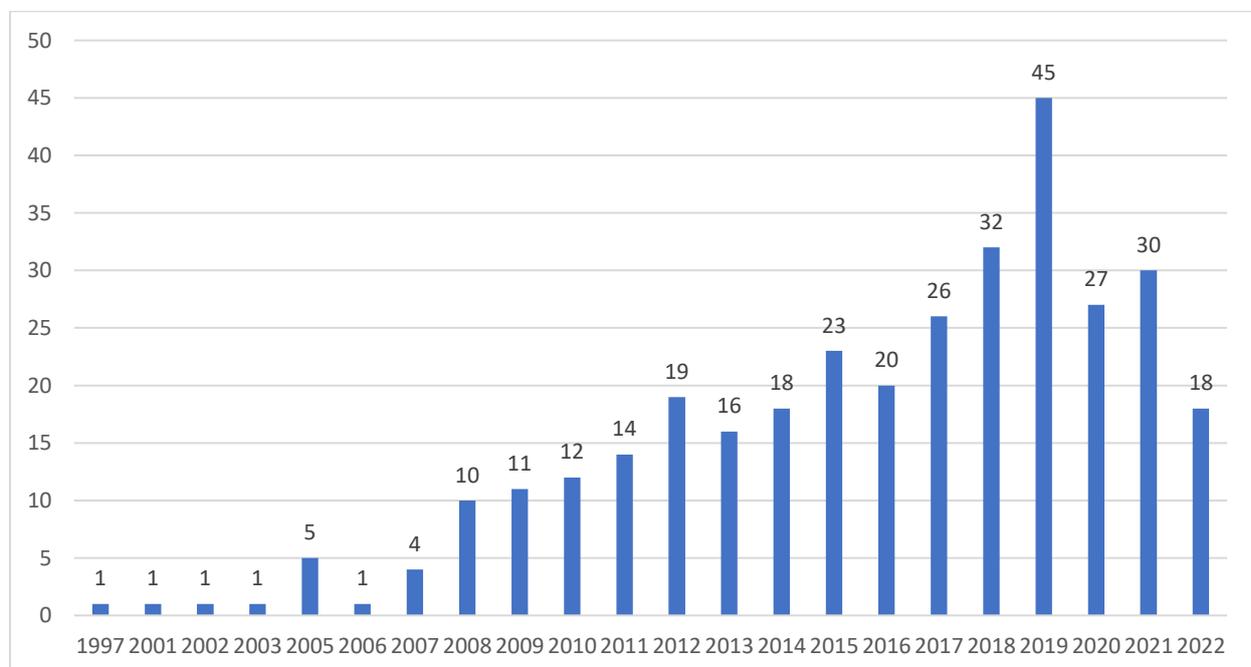


Figure 4. Total Publications by Year

Figure 4 shows slow progress for 10 years after the Asian financial crisis. The situation shows that the ERM approach is getting less attention in explaining that crisis. The range between 2001 and 2010 shows the increasing trends of publications from 2005 onwards. Compared to the Asian financial crisis, by 2008, the world was confronting another global turmoil due to subprime mortgage issues. In the next phase, between 2011 and 2020, we see that ERM or integrated risk management is receiving greater attention among scholars. The year 2019 recorded the highest number of total publications, which is consistent with the event of Covid 19 pandemic. However, the number of publications in the year 2020 dropped slightly. The number of publications shows increasing trends in 2021, and scholars are still showing their interest in ERM studies based on the results of mid-year 2022.

Figure 5 indicates the overall number of total citations from 1997 to 2022. The highest citation in the year 2011 (923 citations). The second highest number of citations in 2015 (628 citations) and third highest in 2010 (544 citations). However, there are also small numbers of citations for the documents published before 2010, although the period is more than 10 years. The results indicate that the documents are typically conceptual papers at the earliest study and have less statistical results. Therefore, it affects on the number of citations.

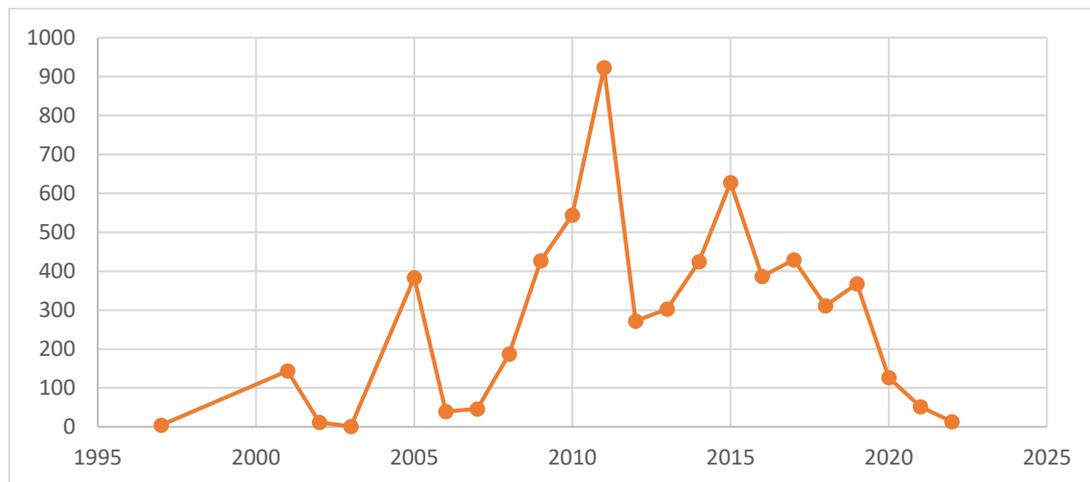


Figure 5. Total Citations by Year

### Distribution of Publications by Countries

Based on the top 20 countries that contributed to the total publications (Table 1), the United States is at the top of the list (130 publications). Three Asian countries ranked among the top 10 of the lists: China (48 publications), Malaysia (44 publications), and Indonesia (17 publications). Three European countries also contributed to the top 10 lists: the United Kingdom, Germany, and Italy. The results prove that ERM publications dominated among researchers from the United States, the pioneering country that introduced the ERM concept. Besides, the ERM framework developed by the Committee of Sponsoring Organisations (COSO) in the United States is adopted by most countries.

Table 1

*Top 20 Countries Contributed to the Publications*

No.	Country	Continent	TP	NCP	TC
1	United States	North America	130	93	3362
2	China	Asia	48	27	140
3	Malaysia	Asia	44	23	186
4	United Kingdom	Europe	36	23	425
5	Canada	North America	30	25	630
6	Australia	Oceania	22	21	487
7	Germany	Europe	22	17	283
8	Italy	Europe	18	15	380
9	Indonesia	Asia	17	8	24
10	South Africa	Africa	16	10	40
11	South Korea	Asia	16	14	138
12	Brazil	South America	14	11	87
13	India	Asia	11	4	23

14	France	Europe	10	7	40
15	Singapore	Asia	10	9	181
16	Taiwan	Asia	10	9	327
17	Austria	Europe	9	8	85
18	Nigeria	Africa	9	6	30
19	Spain	Europe	9	9	103
20	Romania	Europe	7	3	29

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations

### Subject Area

Table 2 presents the distribution of documents based on subject areas. Overall, ERM has been studied in diverse subject areas, including business/management, economics, mathematics, engineering, computer, environment, science, and medicine. Nonetheless, ERM is largely explored in business/management, accounting, economics, econometrics, finance and engineering. Most documents fall under business, management and accounting, representing 62.99% of the total sample documents. Consistently with the term 'management', various researchers in business and management pursue an interest in the ERM. However, ERM is important not only for the business organisation but also for other disciplines such as arts and humanities, public administration, educational institutions and other non-profit organisations. Besides, the managing of environmental issues to ensure global sustainability. In summary, ERM provides an opportunity to be explored in various disciplines and is not specific only to business and management.

Table 2

### Subject Area

Subject Area	Total Publications	Percentage (%)
Business, Management and Accounting	211	62.99%
Economics, Econometrics and Finance	141	42.09%
Social Sciences	63	18.81%
Engineering	52	15.52%
Decision Sciences	45	13.43%
Computer Science	41	12.24%
Mathematics	23	6.87%
Medicine	19	5.67%
Environmental Science	14	4.18%
Energy	12	3.58%
Arts and Humanities	10	2.99%
Pharmacology, Toxicology and Pharmaceutics	4	1.19%
Psychology	3	0.90%
Agricultural and Biological Sciences	2	0.60%
Multidisciplinary	2	0.60%
Biochemistry, Genetics and Molecular Biology	1	0.30%
Chemistry	1	0.30%
Earth and Planetary Sciences	1	0.30%
Nursing	1	0.30%

### Citations Analysis Based on Authors

Table 3 presents the top 20 highly cited articles in the enterprise risk management field. It is based on the number of times being cited. The document entitled 'the value of enterprise risk management' by Hoyt and Liebenberg (2011) receives the highest number of citations, with a total number of citations of 335 and, on average, 30.45 citations per year. The documents written by Beasley et al. (2005), Gordon et al. (2009), and Arena et al. (2010) also received attention from researchers in the ERM field, with a total number of citations of more than 200.

Table 3

#### *Top 20 Highly Cited Articles*

No.	Authors	Title	Cites	Cites Per Year
1	Hoyt & Liebenberg (2011)	The value of enterprise risk management	335	30.45
2	Beasley et al (2005)	Enterprise risk management: An empirical analysis of factors associated with the extent of implementation	327	19.24
3	Gordon et al (2009)	Enterprise risk management and firm performance: A contingency perspective	281	21.62
4	Arena et al (2010)	The organisational dynamics of Enterprise Risk Management	205	17.08
5	Bromiley et al (2015)	Enterprise risk management: Review, critique, and research directions	179	25.57
6	Pagach & Warr (2011)	The characteristics of firms that hire Chief Risk Officers	174	15.82
7	McShane et al (2011)	Does enterprise risk management increase firm value?	157	14.27
8	Dickinson (2001)	Enterprise risk management: Its origins and conceptual foundation	144	6.86
9	Wu & Olson (2010a)	Enterprise risk management: A DEA VaR approach in vendor selection	141	11.75
10	Beasley et al (2008)	Information conveyed in hiring announcements of senior executives overseeing enterprise-wide risk management processes	141	10.07
11	Baxter et al (2013)	Enterprise risk management program quality: Determinants, value relevance, and the financial crisis	119	13.22
12	Paape & Spekle (2012)	The adoption and design of enterprise risk management practices: An empirical study	119	11.9
13	Wu & Olson (2010b)	Enterprise risk management: Coping with model risk in a large bank	111	9.25
14	Florio & Leoni (2017)	Enterprise risk management and firm performance: The Italian case	104	20.8



## Discussion and Conclusion

This study aims to explore the development of the ERM research field using bibliometric analysis. The bibliometric analysis provides an opportunity to evaluate the research's productivity and publications in a specific research domain (Ahmi & Nasir, 2019). This study reports the trends of earlier studies from 1997 until the current year. The analysis covers the annual growth of research based on total publications, numbers of citations, distributions of publications based on countries, the most cited authors and keywords analysis. Five hundred eighteen (518) documents were extracted from a Scopus database, mainly in English.

The annual growth of research shows an increasing trend of ERM studies publications, especially after 2010. The ERM studies started in the 1990s, especially since it became the main concern after the Asian financial crisis of 1997/98. The regulatory reforms also happened, like Sarbanes Oxley Act 2002 and Turnbull report that highlights pertaining to effective corporate governance and risk management (Beasley et al., 2005; Dickinson, 2001). The emergence of corporate failures and governance scandals also pressures companies to strengthen their risk management practices. Besides, the global crisis of 2008 also questioned the effectiveness of financial risk management and was seen as insufficient for managing complex business environments. Therefore, the results of this study show the consistency of increasing publication trends with the complexity of business environments, such as the global financial crisis or numerous risks like a pandemic outbreak and geo-political risks. There is an inconsistent trend for the total number of citations, but the highest citations were recorded in 2011.

Furthermore, the results of this study show that more than 50% of the documents were published in business, management and accounting. Most publications come from authors affiliated in developed countries like the United States, United Kingdom, Canada, Australia, etc. A few countries in emerging economies like China, Malaysia and Indonesia are also listed as the top 10 contributors in the ERM studies. Studies in developed countries receive the largest citations as compared to emerging economies. The situation happens due to the readiness and pressures by the regulators towards ERM implementation in the developed markets. For instance, Standard and Poor's produced ERM quality ratings for insurance companies (McShane et al., 2011) and practitioners' contribution in assessing ERM effectiveness (Farrell & Gallagher, 2015; Grace et al., 2015). Based on the distribution of keywords, ERM studies covered various disciplines. Five themes are discovered: business and accounting, economics and finance, information management and technology, construction and project management, and organisational behaviours.

Despite the enlightening results, this study has several limitations, mostly because of the sources of the documents obtained from the Scopus database. Prior studies also employed other databases like the Web of Sciences and Google Scholar to obtain documents, although Scopus is one of the large databases that index scholarly works (Ahmi & Mohd Nasir, 2019; Sampaio et al., 2022). Secondly, the results only emerged from the keywords related to ERM and specified only documents' titles. The main reason is to ensure only pertinent papers associated with ERM will be examined and to eliminate irrelevant materials. Despite these limitations, this study has contributed to the knowledge by presenting the ERM research trends that cover multidisciplinary fields. This study also has the turning points to guide future researchers in exploring research avenues in ERM.

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