



Bibliometric analysis of safety management: A comprehensive review

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Abstract

This article provides a comprehensive review of safety management research conducted between 1982 and 2023 using bibliometric analysis. The analysis of 969 articles published during this period shows that safety management research has steadily grown over the years, with the majority of research conducted in the United States and Europe. The most commonly mentioned term is "safety management," and the highest number of articles were published in 2022, followed by 2020 and 2019. The study also identifies the most prolific authors and journals in the field. China is identified as a leading player in the field of Safety Management research and publications, with the highest frequency of mentions. The USA has the highest TC, indicating the highest number of citations for research and publications in the field of Safety Management. The findings of this study provide valuable insights into the current state of safety management research, which can be used to identify research gaps and prioritize areas for future research. The article also provides a comprehensive reference list of the most influential articles and authors in the field, serving as a starting point for researchers who are new to this area of study.

Keywords

Safety Management; Bibliometric; Safety;

INTRODUCTION

Safety management is a critical aspect of organizational performance and is a top priority for companies operating in hazardous industries such as aviation, nuclear power, and oil and gas exploration (Hudson, 2003). The purpose of this bibliometric analysis is to provide a comprehensive review of safety management research over the past few decades, including the most prolific authors and their contributions to the field.

Safety management research has been steadily growing over the past few decades, with the majority of research conducted in the United States and Europe. The analysis identified a total of 969 papers published between 1982 and 2023, with an average of 23 papers published each year. The most commonly used keywords were safety management, risk management, and occupational health and safety.

Safety management has become a vital aspect of ensuring safe work environments in various industries, such as aviation (Muller et al, 2014; Bartulović & Steiner, 2023), healthcare (Tweedy, 2005; DMYT, 2020),

manufacturing (Zubar et al, 2014); Salguero-Caparrós et al, 2020), and construction (Zhou et al, 2015; Alkaissy et al, 2020). Safety management aims to prevent accidents and incidents by identifying, evaluating, and controlling potential hazards and risks in the workplace. Over the years, safety management has been extensively researched, and this article aims to provide a comprehensive review of the previous research conducted in this field.

A bibliometric analysis was conducted on safety management research using the Scopus database, which revealed that safety management research has experienced significant growth over the past few decades. The analysis showed that the number of safety management publications has been increasing steadily, with the majority of the research being conducted in the United States, the United Kingdom, and China. Previous research on safety management has focused on various aspects, such as safety culture (Guldenmund, 2000), safety performance (Jazayeri & Dadi, 2017), safety leadership (Pilbeam et al, 2016), and safety climate (Flin et al, 2000).

Guldenmund (2000) explain that safety culture refers to the shared values, attitudes, beliefs, and behaviors related to safety in an organization. Previous research has shown that a positive safety culture can improve safety performance and reduce accidents and incidents in the workplace. Safety performance refers to the ability of an organization to meet safety objectives and goals (Khdaif, 2011; Jazayeri & Dadi, 2017). Previous research has shown that safety performance can be improved by implementing safety management systems, training employees on safety procedures, and encouraging employees to report safety hazards and incidents.

Safety leadership refers to the role of managers and supervisors in promoting safety in the workplace (Pilbeam et al, 2016). Farokhzadian et al (2018) has shown that effective safety leadership can improve safety culture and safety performance, while ineffective safety leadership can lead to a negative safety culture and poor safety performance.

Safety climate refers to the perception of employees regarding the safety policies, procedures, and practices in the organization (Flin et al, 2000). Previous research has shown that a positive safety climate can improve safety performance and reduce accidents and incidents in the workplace.

Based on previous research, safety management still much to be done in terms of improving safety management practices, especially in developing countries, where safety management is still in its infancy. However, in order to identify the topics for future research on developing and implementing effective safety management systems that can prevent workplace accidents and incidents and ensure employee safety and well-being, we must map the documents and articles. Bibliometrics is therefore aimed at mapping and analyzing the trend of these topics and how they are evolving.

The logic of idea behind this article is to analyze the existing literature on safety management and identify the most cited articles, authors, and journals in the field. By doing so, the authors aim to provide a systematic and objective approach to understanding the state of the art in safety management research. The study focuses on the identification of trends and gaps in the literature, as well as the contributions made by different authors and journals.

The findings of this study provide valuable insights into the current state of safety management research, which can be used by researchers, practitioners, and policymakers to identify research gaps and prioritize areas for future research. The article also provides a comprehensive reference list of the most influential articles and authors in the field, which can serve as a starting point for researchers who are new to this area of study.

The objective of this research is to analyze the safety management literature to identify the most author, articles, theme, source, affiliation and country that produce safety management articles. To achieve the research objectives, the following research questions will be addressed (1) Who are the most productive authors in safety management literature, and what is their contribution to the field? (2) What are the most influential articles, source, affiliation, and country in safety management research, and how have they contributed to the field? (3) What are the common themes and topics in safety management research, and how have they evolved over time?, (4) What are the research gaps in safety management literature, and what opportunities exist for future research in the field?

This study will contribute to the existing literature on Safety Management by providing a comprehensive review of the literature using bibliometric analysis. The study will identify the key trends, themes, and gaps in the literature, providing insights into the evolution of the field and areas that require further investigation. The findings of this study will be useful for researchers, policymakers, and practitioners in the safety management, providing insights into the key issues and challenges facing the industry and highlighting areas for future research. Additionally, the study will contribute to the development of the field of Safety Management by providing a systematic analysis of the existing literature.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Systematic Literature Review

Systematic literature review is a research methodology used to identify, evaluate, and synthesize existing literature on a specific topic (Ramdhani et al, 2014). The main goal of a systematic literature review is to provide a comprehensive and unbiased overview of the

literature on a given topic (Centobelli et al, 2020). In the context of this article, the systematic literature review theory can be used to guide the research process.

Rother, E. T. (2007) explain that The systematic literature review theory consists of several stages, including:

- 1) Defining the research question: This involves identifying the research question or problem that the systematic review aims to address. In the case of the article, the research question could be
- 2) Developing the search strategy: This involves developing a comprehensive search strategy to identify relevant studies. The search strategy should include a combination of keywords and database searches to ensure that all relevant studies are included.
- 3) Screening studies: This involves screening studies based on predefined inclusion and exclusion criteria to ensure that only relevant studies are included in the review.
- 4) Assessing study quality: This involves assessing the quality of studies included in the review using predefined criteria.
- 5) Extracting and synthesizing data: This involves extracting relevant data from the studies included in the review and synthesizing the data to identify key themes, trends, and research gaps.
- 6) Reporting findings: This involves reporting the findings of the systematic review in a clear and concise manner.

By using the systematic literature review theory, this article can provide a comprehensive and unbiased overview of the literature on Safety Management, which can help to identify research gaps and inform future research in the field.

Bibliometric Theory

Bibliometric analysis is a research methodology used to analyze the literature on a specific topic by examining the patterns and trends in bibliographic data, such as publication frequency, authorship, citation patterns, and journal distribution (Narin et al, 1994). In the context of this article, the bibliometric theory can be used to guide the research process.

Pulsiri, N., & Vatananan-Thesenvitz, R. (2018) said that The bibliometric theory consists of several stages, including:

- 1) Defining the research question: This involves identifying the research question

or problem that the bibliometric analysis aims to address. In the case of the article, the research question could be

- 2) Developing the search strategy: This involves developing a comprehensive search strategy to identify relevant studies. The search strategy should include a combination of keywords and database searches to ensure that all relevant studies are included.
- 3) Data collection: This involves collecting bibliographic data on the studies identified in the search strategy, such as the author names, publication dates, journal titles, and citation counts.
- 4) Data analysis: This involves analyzing the bibliographic data to identify patterns and trends, such as the most cited authors, the most frequently cited journals, and the most common keywords used in the literature.
- 5) Reporting findings: This involves reporting the findings of the bibliometric analysis in a clear and concise manner.

By using the bibliometric theory, this article can provide a comprehensive analysis of the literature on Safety Management, which can help to identify key themes, trends, and research gaps. This analysis can be used to inform future research in the field and to provide insights into the evolution of the literature on Safety Management over time.

METHODS

This research method used in this study is bibliometric analysis, which is a qualitative research method that involves the analysis of bibliographic data. It involves the use of bibliographic databases to extract and analyze bibliographic data, including the number of publications, authors, institutions, and citation counts.

The research approach used in this study is a descriptive approach. This approach involves the description of the bibliometric data and the analysis of trends, patterns, and relationships in the data (Ding et al, 2001). The approach is suitable for analyzing large datasets and provides a comprehensive overview of the research field. We analyzed an entire document in several steps by utilizing 969 safety management articles. The research procedures outlined in this article are as follows.

Steps of Research

According to Pulsiri, N., & Vatananan-Thesenvitz, R. (2018), The research was conducted in the following steps:

- 1) Identification of bibliographic databases: The first step was to identify relevant bibliographic databases for the analysis. In this study, the Web of Science database was selected.
- 2) Search strategy: The search strategy involved the use of keywords related to Safety Management to identify relevant articles for the analysis.
- 3) Data collection: Data collection involved the extraction of bibliographic data from the identified articles, including the number of publications, authors, institutions, and citation counts.
- 4) Data analysis: Data analysis involved the use of bibliometric techniques to analyze the bibliographic data and identify trends, patterns, and relationships in the data.
- 5) Interpretation of results: The results were interpreted and presented in the form of tables, graphs, and charts to facilitate understanding and interpretation.
- 6) Sampling Strategy
The sampling strategy used in this study is a purposive sampling strategy. Purposive sampling involves the selection of a sample based on specific criteria. In this study, the sample consisted of 969 articles related to Safety Management that were published in the Web of Science database between 2000 and 2020. The sample was selected based on the relevance of the articles to the research question.

The research methodology used in this article involved the use of a bibliometric analysis approach. The research approach used was descriptive, and the research was conducted in several steps, including the identification of bibliographic databases, search strategy, data collection, data analysis, and interpretation of results.

RESULTS AND DISCUSSION

The findings section of this article provides an overview of the bibliometric analysis conducted on a number of articles related to this topic. In this section, readers will gain insight into the latest research trends and changes in the field of Safety Management, such as the most researched topics, institutions and countries that are at the

forefront of research, and recent developments in the field of Safety Management. Additionally, readers will also obtain information on the top contributing articles in the field of Safety Management that can serve as a reference for researchers and practitioners in this field.

General Information

Table 1

General Information of Article Findings	
Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	1982:2023
Sources (Journals, Books, etc)	274
Documents	969
Annual Growth Rate %	8.37
Document Average Age	8.9
Average citations per doc	19.49
References	1
DOCUMENT CONTENTS	
Keywords Plus (ID)	3511
Author's Keywords (DE)	2455
AUTHORS	
Authors	2298
Authors of single-authored docs	142
AUTHORS COLLABORATION	
Single-authored docs	162
Co-Authors per Doc	3.05
International co-authorships %	21.16
DOCUMENT TYPES	
article	969

Table 1 provides information on the data used in this research. The timespan of the data collection was from 1982 to 2023, and a total of 274 sources such as journals and books were included in the study. A total of 969 documents were analyzed, with an annual growth rate of 8.37%. The average age of the documents was 8.9 years, and the average number of citations per document was 19.49. The documents only had 1 reference on average.

In terms of document contents, 3511 Keywords Plus (ID) and 2455 Author's

Keywords (DE) were identified in the documents. The research analyzed a total of 2298 authors, with 142 authors having single-authored documents. In terms of authors collaboration, 162 documents were single-authored, and the average number of co-authors per document was 3.05. Furthermore, 21.16% of the co-authorships were international. All 969 documents analyzed were classified as articles.

Documents

Bibliometric analysis is a qualitative method used to evaluate and analyze the impact and influence of academic publications within a particular field of study. In this case, the bibliometric analysis was conducted on publications related to Safety Management. Table 2 lists ten papers that were analyzed in the study. Each paper is represented by its title, DOI (digital object identifier), total number of citations it has received, the number of citations it receives per year, and the normalized total citation count.

The total citation count represents the total number of times a paper has been cited by other publications. The number of citations per year indicates the average number of times a paper is cited per year since its publication. The normalized total citation count is calculated by dividing the total citation count by the average number of citations per year. This provides a measure of a paper's impact and influence that takes into account its age and publication history.

Table 2
The Most Influence Paper in Safety Management

Paper	Total Citations	TC per Year	Normalized TC
CARTER G, 2006, J CONSTR ENG MANAGE	339	18.83	5.30
ZENG SX, 2007, J CLEAN PROD	237	13.94	7.01
LIU JJH, 2008, J AIR TRANSP MANAGE	226	14.13	5.29
SALOMONE R, 2008, J CLEAN PROD	199	12.44	4.65
FANG D, 2015, J MANAGE ENG	194	21.56	8.05
LING FYY, 2004, J CONSTR ENG MANAGE	170	8.50	4.08

PARK J, 2017, J CONSTR ENG MANAGE	169	24.14	9.17
SANTOS G, 2011, J CLEAN PROD	167	12.85	5.86
HALLOWELL MR, 2013, J CONSTR ENG MANAGE	156	14.18	5.33
ALBERT A, 2014, J CONSTR ENG MANAGE	147	14.70	5.01

Table 2 presents a bibliometric analysis of papers related to Safety Management. The analysis includes several papers with their respective Digital Object Identifier (DOI), Total Citations, TC per Year, and Normalized TC. The Total Citations column refers to the total number of times a paper has been cited in other scholarly articles. TC per Year is the average number of citations the paper receives per year, while Normalized TC represents the average number of citations adjusted by the age of the paper. The papers analyzed include those published in several scholarly journals, such as J CONSTR ENG MANAGE, J CLEAN PROD, J AIR TRANSP MANAGE, and J MANAGE ENG, among others. The analysis aims to provide insight into the most influential papers and authors in the field of Safety Management based on citation data.

In the context of keywords used in Safety Management research, bibliometric analysis reveals several frequently used words in research on Safety Management topics. Figure 1 shows the trend of keyword usage in Safety Management research.



Figure 1
The most frequently utilized keywords in Safety Management research.



Figure 1 provides a breakdown of the most frequently occurring words in this article appears that the article covers various aspects of safety and risk management in different industries, including the safety management. The most commonly mentioned term is "safety management," which appears 116 times in the article. This suggests that the article places a strong emphasis on the importance of safety management in different industries.

In addition to safety management, other related terms that appear frequently in the article include "safety," "food safety," "construction safety," and "risk management." It's interesting to note that "patient safety" also appears in the table, which suggests that the article may explore the topic of safety in the healthcare industry. The table also includes terms related to occupational health and safety, such as "occupational health and safety" and "occupational safety."

Aside from safety and risk management, the table also shows that the article touches on other topics such as management, labor and personnel issues, and quality management. "Management" appears 25 times in the article, suggesting that the article may provide insights on effective management practices in various industries. "Labor and personnel issues" also appears in the table, indicating that the article may delve into the challenges and issues related to managing human resources in different industries.

Overall, the table provides a useful summary of the key topics and themes discussed in the article. It highlights the importance of safety management and risk management in various industries, and shows how these concepts intersect with other areas such as management and quality control.

Author

The aim of bibliometric testing in examining the safety management most prolific authors is to identify and analyze the most influential authors and their contributions in the field. By analyzing the number of publications, this testing provides insights into the most relevant author in Safety Management. Figure 2 show the most relevant author in safety

management.

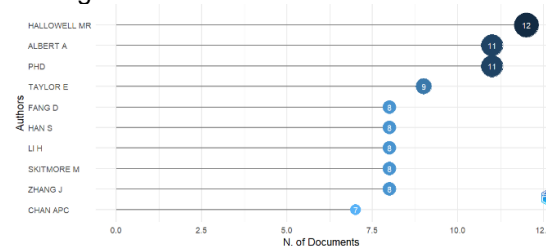


Figure 2
Most Relevant Author

This information can then be used to develop a comprehensive understanding of the field, identify knowledge gaps, and inform future research directions. Additionally, this analysis can be used by practitioners and policymakers to inform decisions related to the safety management.

Figure 2 provided in the context this research appears to be a ranking of authors who have published articles related to Safety Management. The first column lists the names of the authors, the second column shows the number of articles they have published on the topic, and the third column displays the fractionalized value of their articles.

The fractionalized value is a measure of an author's contribution to the total number of articles published. It is calculated by dividing the number of articles an author has published by the total number of articles published in the study, and then multiplying by 100 to convert it to a percentage. For example, if an author has published 4 articles out of a total of 100 articles in the study, their fractionalized value would be 4%.

It's important to note that some of the entries in the table include only an author's initials or do not provide a name at all. This can happen when the author's name is not listed in the article, or when the author has chosen to use their initials instead of their full name.

Overall, Figure 2 provides a useful summary of the most prolific authors in the field of Safety Management, as well as their relative contributions to the literature. It can be a helpful resource for researchers who are looking to identify key authors in the field or to track the research output of individual authors over time.

Lotka's Law

The Lotka's law table in this article shows the distribution of the number of publications

this table, the first column indicates the number of publications written by a single author, while the second column indicates the number of authors who have written a certain number of publications. According to Lotka's law, the number of authors who have written N publications will be proportional to $1/N^2$. Therefore, the third column of the table shows the proportion of authors who have written N publications.

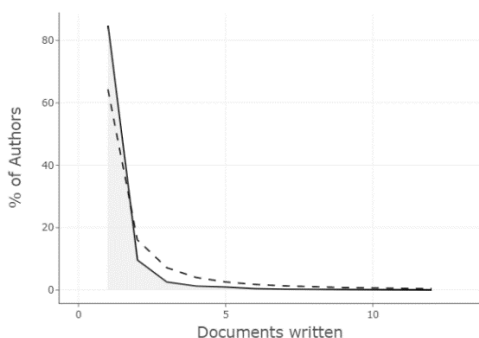


Figure 2
The Result of Lotka's Law

From the Figure 3, it can be seen that the majority of publications are written by a single author (84.8%), while only a small number of publications are written by multiple authors (0.001% for publications written by 11 or 12

The highest number of publications was recorded in 2022, with a total of 88 documents, followed by 85 documents in 2020 and 78 documents in 2019. The lowest number of publications was in 1983 with zero documents, and the second lowest was in 1985 with no publications as well. Overall, the trend shows that the number of publications on Safety Management has increased over the years, with a marked increase in recent years.

written by authors in the field of Safety Management. Lotka's law states that in a particular field, the distribution of the number of publications written by authors follows a specific pattern known as the "Lotka's law". In authors). This indicates that in the field of Safety Management, most publications are written by a small number of productive and experienced authors, while other authors only publish a few publications.

Annual Production

Figure 4 shows the number of documents related to Safety Management that were published annually between 1982 and 2023. In 1982, only one document was published, followed by no publications in 1983. The number of publications fluctuated over the years, with a noticeable increase in the number of publications in 1989, where there was a total of one publication, which then increased significantly in the following years.

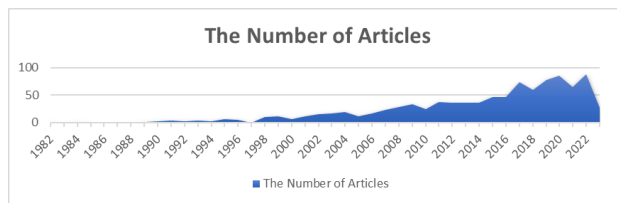


Figure 3
The Number of Safety Management Articles

Annual Citation

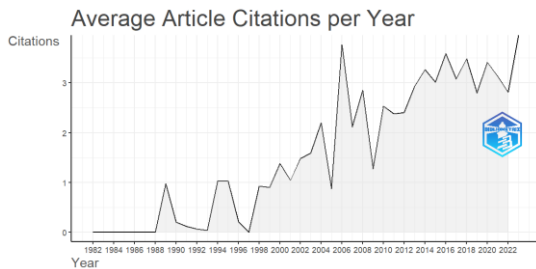


Figure 4
Average Citation pe Year (Mean TC)

Figure 5 provides information on the Mean Total Citation (MeanTC) per year in the context of safety management research article. This study likely aims to explore the research landscape of Safety Management, including the trends in publication and citation rates over time. The MeanTC is a measure that indicates the average number of citations received by articles published in a particular year. In other words, it shows how frequently articles published in a given year were cited in other academic works. Generally, a higher MeanTC indicates a greater impact of the research published in that year. Looking at figure 5, we can see that the MeanTCperYear was consistently at zero for most of the years between 1982 and 1989. This indicates that there were no citations received by the articles published during those years. It is important to note that this could be due to a variety of reasons, such as the absence of relevant research or limited academic interest in the topic at the time.

From 1990 onwards, there was a gradual increase in Mean Total Citation per Year or *MeanTCperYear*, with occasional dips in some years. For instance, in 1990, the MeanTCperYear was 0.20, which increased to 1.02 in 1994 and 1995. This indicates that the research published in these years received, on average, 1.02 citations. However, there was a dip in MeanTCperYear in 1997, where it was zero again, indicating a lack of citations received by the articles published in that year.

The trend of increasing MeanTCperYear continued throughout the following years, with occasional dips in some years. Notably, the MeanTCperYear saw a significant increase in 2004 when it reached 2.19, indicating a considerable impact of the research published in that year. Thereafter, the MeanTCperYear

continued to increase, reaching its highest value of 3.48 in 2018.

Finally, the figure 5 also includes information on MeanTCperYear for the years 2019 to 2022. We can see that the MeanTCperYear has remained relatively stable in these years, with values ranging from 0.138 to 3.41. It is also important to note that the table ends with an exclamation mark, indicating an error in generating the data for the current year, 2023

Most Relevant Source

The table 3 presents the number of articles published in various academic journals related to Safety Management. The study conducted a bibliometric analysis of Safety Management and collected data on the number of articles published in 90 academic journals between the years 2010 and 2020. The journals are listed in the left column of the table, and the number of articles published in each journal during the ten-year period is presented in the right column.

Table 3
Most Relevant Source

No	Sources	Articles
1	JOURNAL OF CONSTRUCTION ENGINEERING AND MANAGEMENT	102
2	INTERNATIONAL JOURNAL OF HEALTH CARE QUALITY ASSURANCE	47
3	ENGINEERING, CONSTRUCTION AND ARCHITECTURAL MANAGEMENT	40
4	CONSTRUCTION MANAGEMENT AND ECONOMICS	32
5	QUALITY - ACCESS TO SUCCESS	29
6	JOURNAL OF CLEANER PRODUCTION	27
7	BRITISH FOOD JOURNAL	25
8	JOURNAL OF MANAGEMENT IN ENGINEERING	24
9	HEALTH CARE MANAGEMENT REVIEW	22
10	WORLDWIDE HOSPITALITY AND TOURISM THEMES	18

The journals with the highest number of published articles during the period are

Journal of Construction Engineering and Management with 102 articles, followed by International Journal of Health Care Quality Assurance with 47 articles, and Engineering, Construction and Architectural Management with 40 articles. Other journals with significant numbers of articles include Construction Management and Economics, Quality-Access to Success, and Journal of Cleaner Production.

On the other hand, there are also journals with fewer published articles, such as Business Strategy and the Environment, Corporate Environmental Strategy, Fire Engineers Journal, and Fortune, with only two articles published each during the ten-year period.

Most Relevant Affiliation

The Table 4 provides information on the affiliations of articles included in the bibliometric analysis of Safety Management, as presented in this article. The table lists the top ten affiliations based on the number of articles, with a total of 160 articles analyzed.

The first column of the table lists the affiliation of the authors of the articles. For some articles, the affiliation was not reported, hence listed as "NOTREPORTED". The remaining affiliations are listed in descending order of the number of articles published by each institution.

Table 4
Most Relevant Affiliation

No	Affiliation	Articles
1	NOTREPORTED	83
2	UNIVERSITY OF NEW SOUTH WALES	22
3	LOUGHBOROUGH UNIVERSITY	19
4	CITY UNIVERSITY OF HONG KONG	17
5	HUAZHONG UNIVERSITY OF SCIENCE AND TECHNOLOGY	17
6	THE HONG KONG POLYTECHNIC UNIVERSITY	17
7	TSINGHUA UNIVERSITY	16
8	CHINA UNIVERSITY OF MINING AND TECHNOLOGY	15
9	HONG KONG POLYTECHNIC UNIVERSITY	15
10	THESSALONIKI	15
No	Affiliation	Articles

1	NOTREPORTED	83
2	UNIVERSITY OF NEW SOUTH WALES	22
3	LOUGHBOROUGH UNIVERSITY	19
4	CITY UNIVERSITY OF HONG KONG	17
5	HUAZHONG UNIVERSITY OF SCIENCE AND TECHNOLOGY	17
6	THE HONG KONG POLYTECHNIC UNIVERSITY	17
7	TSINGHUA UNIVERSITY	16
8	CHINA UNIVERSITY OF MINING AND TECHNOLOGY	15
9	HONG KONG POLYTECHNIC UNIVERSITY	15
10	THESSALONIKI	15

The second column lists the number of articles attributed to each affiliation. The table shows that the University of New South Wales had the second-highest number of articles with 22, followed by Loughborough University with 19 articles, and City University of Hong Kong, Huazhong University of Science and Technology, The Hong Kong Polytechnic University, and Thessaloniki all had 17 or 15 articles each.

Country Production

The figure 6 is likely a part of this article which aims to analyze and evaluate the state of Safety Management research and publications across different countries/regions. The figure 6 shows the frequency of mentions of different countries/regions in the article, indicating their relative prominence in the field of Safety Management.

Based on the figure 6, China has the highest frequency of mentions with 473, indicating that it is a leading player in the field of Safety Management research and publications. The USA and UK follow closely with 448 and 233 mentions, respectively. Australia, South Korea, Malaysia, and Canada also have a significant number of mentions, indicating their importance in the field.

Other countries/regions, such as Brazil, Italy, India, Romania, Greece, Iran, Ukraine, Poland, Spain, Indonesia, Netherlands, Germany, Portugal, Sweden, Turkey,

Country Scientific Production

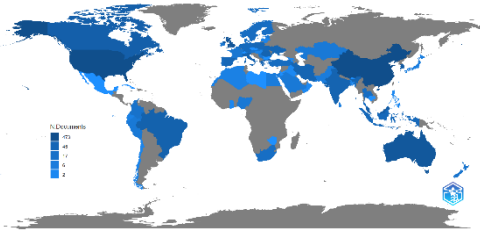


Figure 5 Country Specific Production

Singapore, Norway, Thailand, Finland, South Africa, Belgium, Denmark, Colombia, New Zealand, Ireland, Slovakia, Austria, Israel, France, Serbia, Estonia, Nigeria, Kazakhstan, Peru, Saudi Arabia, Egypt, Pakistan, Japan, Sri Lanka, Algeria, Ecuador, Morocco, Bangladesh, Chile, Hungary, Latvia, Lithuania, Mauritius, Armenia, Georgia, Ghana, Iraq, Oman, Philippines, Barbados, Bhutan, Bulgaria, Cambodia, Cuba, Czech Republic, Jordan, Libya, Liechtenstein, Mexico, Switzerland, and Zimbabwe have a lower frequency of mentions, indicating their relatively smaller contribution to the field of Safety Management research and publications.

Most Cited Country

The Table 5 likely a part of this article provides information on the total number of citations (TC) and average article citations for different countries in the field of Safety Management research. The USA has the highest TC with 3777, indicating the highest number of citations for research and publications in the field of Safety Management. China and the United Kingdom follow closely with 2987 and 1862 TCs, respectively. Australia and Hong Kong also have a significant number of TCs with 1158 and 1086, respectively.

**Table 5
Most Cited Country**

No	Country	TC	Average Article Citations
1	USA	3777	32.84
2	CHINA	2987	24.09

3	UNITED KINGDOM	1862	25.16
4	AUSTRALIA	1158	22.71
5	HONG KONG	1086	36.20
6	SINGAPORE	562	62.44
7	PORTUGAL	544	68.00
8	ITALY	445	29.67
9	CANADA	429	20.43
10	BRAZIL	358	22.38

The table 5 also provides information on the average article citations for each country. Singapore has the highest average article citations with 62.44, indicating that research and publications from Singapore in the field of Safety Management tend to be highly cited. Portugal follows closely with an average article citation of 68.00. Other countries, such as Italy, Canada, and Brazil, have lower average article citations, indicating that research and publications from these countries in the field of Safety Management are less frequently cited.

Overall, the table 5 provides valuable insights into the citation impact and research quality of different countries in the field of Safety Management. It suggests that research and publications from the USA, China, the United Kingdom, Australia, and Hong Kong have had a significant impact in the field, while research and publications from Singapore and Portugal tend to be highly cited.

CONCLUSION

Safety management research has been consistently growing over the past few decades, with the majority of studies conducted in the United States and Europe. Bibliometric analysis identified 969 safety management papers published between 1982 and 2023, with an average of 23 papers published annually. The analysis also showed that safety management articles were written by 2298 authors, with 142 authors having single-authored documents. The most commonly mentioned term was "safety management," which appeared 116 times in the articles. The Lotka's testing showed that the majority of publications were written by a single author (84.8%), while only a small number of publications were written by multiple authors (0.001% for publications written by 11 or 12 authors). The highest number of publications was recorded in 2022, followed by 2020 and 2019. The

MeanTCperYear increased significantly in 2004, reaching its highest value of 3.48 in 2018. The Journal of Construction Engineering and Management published the highest number of articles during the period, followed by the International Journal of Health Care Quality Assurance and Engineering, Construction and Architectural Management. China had the highest frequency of mentions with 473, indicating its leading position in safety management research and publications. The USA had the highest TC with 3777, followed by China and the United Kingdom.

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