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Bibliometric analysis of Financial Risk Management

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Abstract
Financial risk management enhances financialperformance and effectiveness, and it has been recently received research recognition and momentum.This study aims to adopt a bibliometric analysis of financial risk management to identify the research trends and opportunities related to diverse types of research papers published in journals and conferences indexed by Web of Science for the years 2004-2018. The main objectives of this study include finding the research trend of financial risk management publications and citations, top research areas, the most influential papers based on citation count, the top supportive funding agencies, and the future research direction. This bibliometric study indicates that the interest of researchers is increasing in financial risk management every year due to an unpredictable environment and economic situation. The number of citations to financial risk management research papers has been growing. The top research areas in financial risk management include business economics, environmental sciences ecology, engineering, mathematics, and operation research management science. The analysis indicates that the National Natural Science Foundation of China supports most of the financial risk management research by funding the research. This reflects the vast interests and trends of financial risk management among researchers. This study can be a valuable learning point for young researchers to find attractive, relevant research insights withinfinancial risk management.

Keywords: Bibliometricanalysis, Financial Risk Management, web of sciences.

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1. Introduction

Risk management in financial institutions has been discussed in the academic literature and continue to spark interest among practitioners and scholars since the worldwide financial crisis of 2007-08(Hopkin, 2018). It constitutes an essential consideration since it can affect the performance of the organizations and human activities, which involve numerous risk and catastrophe situations that may produce a detrimental impact(Mohammed & Knapkova, 2016). Every human activity involving failure, potential loss, damages, and disruption of protection or stability.Thus, it is a critical part of human life and involves every decision we make (Abdel-Basset, Gunasekaran, Mohamed, & Chilamkurti, 2019; Jirásková, 2017). Risk is the leading cause of uncertainty in any organization(Yoe, 2019). Thus, corporations increasingly focus on managing risk before they affect the business. Without adequately identifying, defining, controlling and mitigating risk, which is the key to the decision, the firm cannot achieve its future objectives(Abdel-Basset et al., 2019). According to (Hull, 2018) risk management practices have continued to evolve in the last three years. It took center stage and became an emerging issue for investors, academicians, regulators and customers (Hopkin, 2017). Risk management issues are today significantly influencing public policy debates on enterprise controls. Risk management is unique among other types of management because it specifically addresses the effect of uncertainty on organization objectives. Risk can only be managed or assessed if the nature and source of uncertainty are fully understood (Pojasek, 2017). Risk management failure leaves firms, financial institutions and households more exposed to shocks than they could be (Rampini, Viswanathan, & Vuillemey, 2019).Corporationsare facing an increasingly complicated and challenging atmosphere to conduct their business. The negative effect of the financial crisis continually challenging both public and private sector organizations(Hopkin, 2018). Furthermore, in many parts of the world such as the recent decision of the UK to exist from the EU added further worldwide uncertainty.

Institutions in developing economies need to be well versed in the dynamic of risk and uncertainty. It is a critical success factor in a rapidly changing age of technological innovation inevery sector (Onyiriuba, 2016). Due to the highly unpredictable atmosphere, institutions must fulfill corporate governance requirements and satisfy stakeholders' expectations with social and ethical responsibilities(Carroll & Buchholtz, 2014).

Given all these developments, the purpose of this research paper to place greater emphasis on the importance of risk management to organizational success is very timely. Successful risk management, including protecting corporate reputation, is a business imperative for all organizations.Successful risk management practices enhance an institution's potential to accomplish objectives and ensure sustainability based on consistent and ethical conduct.

According to Batistič and van der Laken (2019), the bibliometric analysis could be valuable mainly using science mapping. It provides many advantages over meta-analytical and classical qualitative methods. The “bibliometric” review is a research technique that systematically shows the nature of particular disciplines by highlighting and detecting research trends (Zhang et al., 2016). It plays a significant role in business intelligence coined by Alan Pritchard in the 1960s is a methodology that stresses the material aspect or studies text and information, counting books, publications, books, citations, regardless of disciplinary bounds. Content analysis and citation analysis are the most commonly used bibliometric

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methods(De Bellis, 2009). It is used to explore the impact of research in many disciplines of engineering and sciences to study research trends. The objective of the bibliometric analysis is to evaluate literature in a given domain; hence, it applicability is broad to all types of disciplines (Andrés, 2009).

In this research study, a bibliometric analysis was conducted to examine research trends relevant to financial risk management. The research works published in all web of science journals during 2004-2018 were analyzed and presented regarding the contribution of major world regions. The results could help to understand the global development of research relevant to financial risk management and may lead to considerable attention, especially in emerging countries.

2. Research Methodology

This section describes the following four steps that were used to perform this research.

1. Formulation of Research questions
2. Data Set Extraction
3. Data Preprocessing
4. Data Analysis

2.1. Formulation of Research Questions

Bibliometric analysis was conducted to examine the published papers indexed by the Web of Science core collection. Thomson Reuters maintains the Web of Science (WOS) and is considered one of the core bibliographic data sources(Zhang et al., 2016). A good research question identifies the problems to studies and considered the backbone and soundness of the issue under investigationand determinesthe research quality and leads to the methodology (Ratan, Anand, & Ratan, 2019). A research question is a clear, goal-oriented and specific query relevant to a research problem that needs to be addressed (Nassaji, 2019). The research questions used in this study are mentioned in the following Table 1.

Table 1 Research Questions

Research Questions	Significance
What is the trend of Risk Management publications and citations?	It will help researchers to predict the future pattern in Risk Management.
Which research areas have more Risk Management research based on the number of publications?	It will help researchers determine the research effort in every area of Risk Management, which will help them identify future research directions.
What are the most influential papers in Risk Management according to the number of citations?	It would help to find research studies and methods that may lead to conduct high-quality research work in Risk Management
What are the leading supportive funding agencies of Risk Management papers?	It will help researchers and practitioners initiate any research collaboration or apply

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	for a risk management-related position.
What is the future research direction in the Risk Management domain?	It would help researchers in selecting a research problem in this domain.

2.2.Data Extraction

Web of Science is the world's most trusted, independent and global citation database that fulfills the bibliometric analysis requirement. Based on scope and features such as scientific citation index, high-quality research publication, conference proceedings, and books providean analytical feature to the researchers. Therefore, this study selected the web of science as a data source for data preparation.

Table 2 Research Document Types

Document Types	Records	% of 30948
Article	28614	92.458
Review	2334	7.542
Proceedings paper	657	2.123
Book chapter	61	0.197
Data paper	4	0.013
Early access	1	0.003
Retracted publication	1	0.003

Source: Web of Science

2.3.Data Preprocessing

The number of documents retrieved as per the defined query is 30,948. We includedarticles, reviews and proceeding papers. As per the requirement of the study,30,605 documents were selected for analysis.

2.4.Data Analysis

After the formulation of research questions, data set extraction, data pre-processing, the following analysis is performed in section 3.

1. Temporal Trend of Publications
2. Categorization of Risk Management
3. Top Publishing Sources
4. Top Countries, Organizations and Funding Agencies Working in financial risk management
5. Top relevant Research Areas
6. Citation Analysis

3. Bibliometric Analysis

This section presents the bibliometric analysis of the financial risk management domain. The analysis is performed in a way that will answer the research questions formatted in section 2.1. The study uses the result analysis feature and citation report feature available on the web of science for the analysis, which is standard for this type of study.

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3.1. Temporal Trend of Publications

The first analysis is the temporal trend of publications. Total 30948 publications were found from 2004 to 2018. Figure 1 showsthe time trend in financial risk management. The total numbers of publications in 2004 on the domain of financial risk management were 253, which increase 14 % in 2005, 18 % in 2006 and 2007 respectively, 42% in 2008, 40% in 2009, 21% in 2010, 12% in 2011, 11% in 2012, 10% in 2013, 9% in 2014, 32% in 2015, 11% in 2016, 12% in 2017 and 6% in 2018. It shows that the publication trend of financial risk management is increasing every year which indicates the importance of financial risk management research.

Figure 1 Yearly Publication Trend

3.2. Financial Risk Management Categories

This section analyses the web of science categories in which Financial risk management papers are published. Figure 2 shows the top 10 categories in which business finance is found the top leading category having 5340 papers with a percentage of 17.43 followed by economic with 4592 publications with a percentage of 15. The other lading categories are environmental sciences, management, business, operation research management sciences, public environmental, occupational health and water resources. It is interesting to see that some fields unrelated to risk management with shows arethe multi-disciplinary domain.

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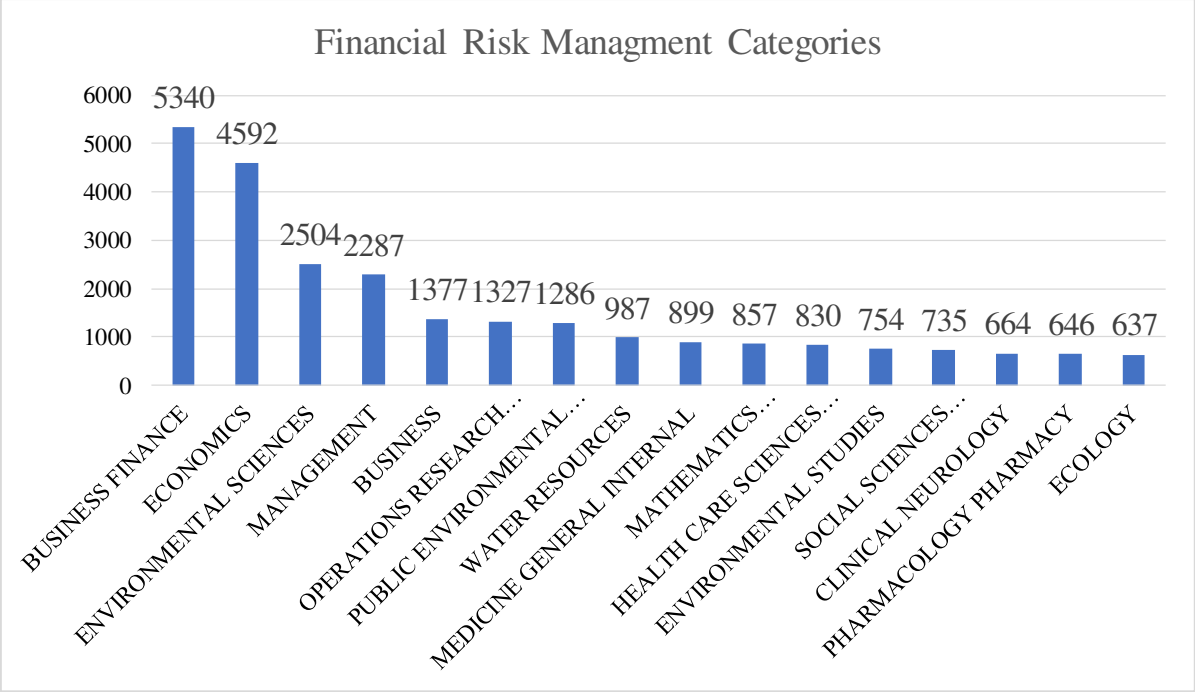

Figure 2 Financial Risk Management Categories

3.3. Top Publishing Sources

Table 3 presents the top 15 publication sources that published papers in Financial Risk Management. The Journal of Banking Finance, Journal of Financial Economics, PLOS ONE, Management Sciences, Review of Financial Studies, European Financial Management and Journal of Financial and Quantitative analysispublished the highest numbers of papers.

Table 3 Source Title

S. No	Source Title	Record
1	Journal of Banking Finance	376
2	Journal of Financial Economics	309
3	PLOS ONE	299
4	Management Sciences	265
5	Review of Financial Studies	224
6	European Financial Management	219
7	Journal of Financial and Quantitative Analysis	179
8	Financial Management	156
9	European Journal of Operational Research	154
10	Insurance Mathematics Economics	152
11	International Review of Financial Analysis	151
12	Journal of Environmental Management	151
13	Journal of Risk and Financial Management	145
14	Quantitative Finance	143
15	Science of the Total Environment	141

Source: Web of Sciences

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3.4. Top Countries, Organizations and Funding Agencies

In this section, the list of the top 15 funding agencies having the highest number of publications is generated. Table 4 shows the list of the top global organization and funding agencies. The National Natural Sciences Foundation of China found the top with 1019 records, following Pfizer with 358 and Novartis with 336 records. Figure 3 shows the top countries with the highest publications in financial risk management. The Figure shows USA published the highest number of papers, i-e, 10690 followed by the UK with several publications, 3535 followed by China, Canada, Germany and Australia with 3211, 2650, 2323 and 2162 publications.

Table 4 Top Funding Agencies

S. No	Funding Agency	Record
1	National Natural Science Foundation of China	1019
2	Pfizer	358
3	Novartis	336
4	National Institute of Health	284
5	AstraZeneca	233
6	NIH	224
7	GlaxoSmithKline	284
8	Medical Research Council	208
9	Bristol Myers Squibb	194
10	National Science Foundation	188
11	European Commission	183
12	Fundamental Research Funds for the Central Universities	177
13	Merck	177
14	Sanofi Aventis	165
15	Roche	160

Source: Web of Science

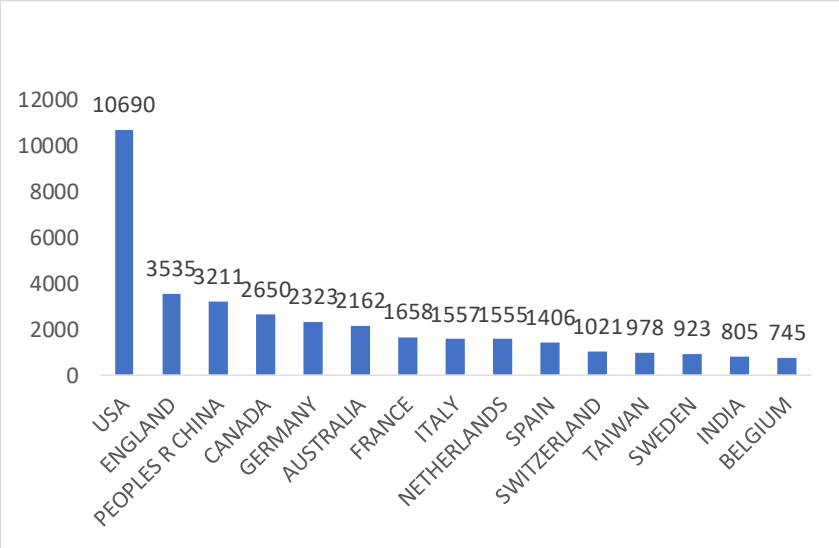

Figure 3 Countries with Highest Publications in Financial Risk Management

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3.5. Research Areas

Figure 4 shows the top 15 research areas in Financial Risk Management with the highest number of publications. Business Finance is at number one with 10702 publications. Environmental Sciences Ecology is at second, and Engineering is at number three with 3315 and 2406 publications. The top research areas are Mathematics, Operations research Management, Public Environmental Occupational Health, General Internal Medicine, Science Technology, Health Care Sciences Services, Water Resources, Agriculture, Computer Sciences, Cardiovascular System Cardiology, Neurosciences and Mathematical Methods Social Sciences.

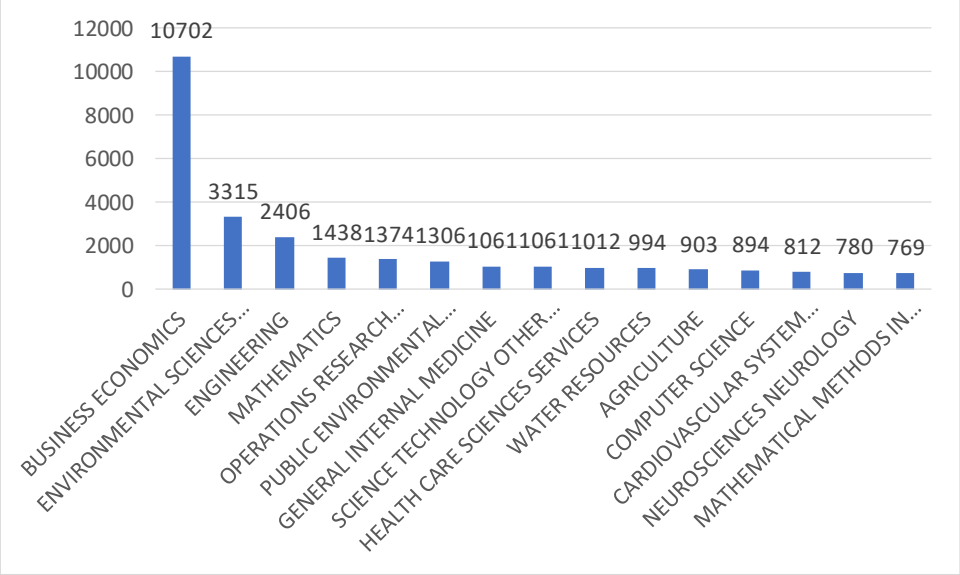

Figure 4 Research Area

Table 5 Top 10 Highest Cited Papers

Title	Authors	Year of Publication	Source Title	Total Citations
The economic implications of corporate financial reporting	(Graham, Harvey, Rajgopal, & economics)	2005	Journal 0f Accounting & Economics	1592
Modelling asymmetric exchange rate dependence	(Patton)	2006	International economic review	758
The impact of traumatic brain injuries: A global perspective	(Hyder, Wunderlich, Puvanachandra, Gururaj, & Kobusingye)	2007	NeuroRrehabilitation	698
Effect of procalcitonin-guided treatment on	(Christ-Crain et al.)	2004	Lancet	692

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antibiotic use and outcome in lower respiratory tract infections: cluster-randomised, single-blinded intervention trial				
CAViaR: Conditional autoregressive value at risk by regression quantiles	(Engle, Manganelli, & Statistics)	2004	Journal of business & economic statistics	602
The relationship between corporate social responsibility and shareholder value: An empirical test of the risk management hypothesis.	(Godfrey, Merrill, & Hansen)	2009	Strategic management journal	588
Substitution of doctors by nurses in primary care	(Laurant et al.)	2005	Cochrane database of systematic reviews	487
25 years of time series forecasting	(De Gooijer & Hyndman)	2006	International journal of forecasting	483
In Search of Distress Risk	(Campbell, Hilscher, & Szilagyi)	2008	Journal of finance	480
The severity of supply chain disruptions: Design characteristics and mitigation capabilities	(Craighead, Blackhurst, Rungtusanatham, & Handfield)	2007	Decision sciences	452

Source: Web of Science

3.6.Top Publishing Institutions

Figure 5 shows the top 10 organization which published most papers in the domain of financial risk management. The University of California System was found with the highest articlepublished, i.e. 977, followed by the University of London with 829, Harvard University with 803, the University of Toronto with 609 and the University of Texas System with 507. The other leading organization are State University System of Florida, VA Boston Health Care System, Pennsylvania Commonwealth System of Higher Education PCSHE, University of Pennsylvania and Erasmus University Rotterdam with 446, 433, 407, 407 and 400 publishing respectfully.

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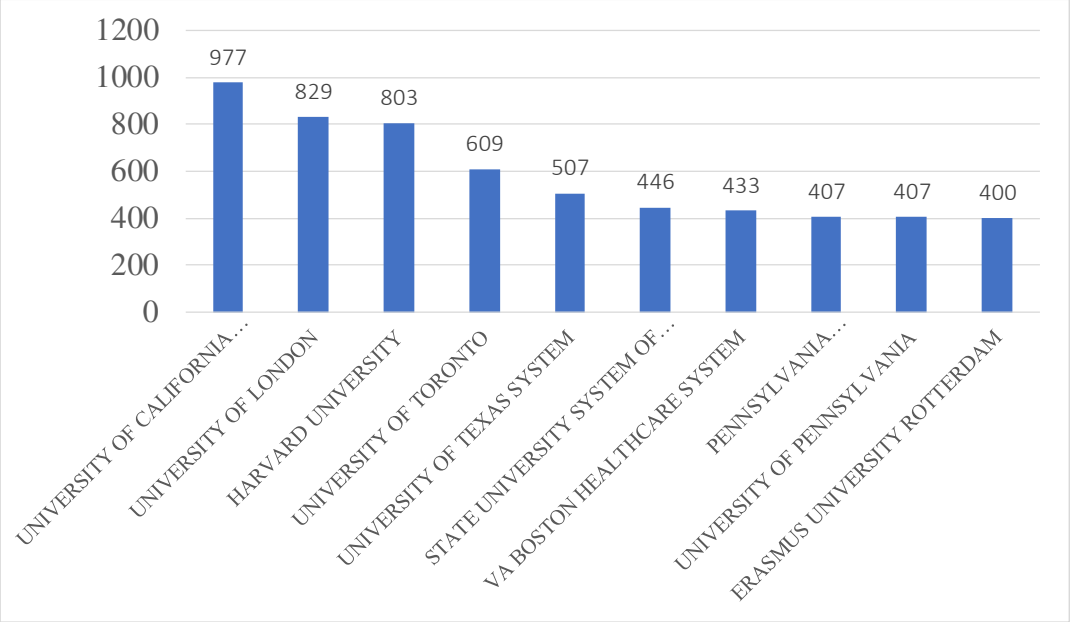

Figure 5Top Publishing Institutions

4. Discussion about Research Questions

This section answers the research questions set in the research methodology

RQ1: What is the trend of Financial Risk Management publications and citations?

Figure 1 and Table 5 show the publication and citation trends of Financial Risk Management, from where we can get some valuable insights. It is indicated in Figure 1 that the annual number of publications in financial risk management is increasing in recent years. After the global financial crisis, there is a drastic change in 2007 and 2008 and expecting the same trend in 2018-19. It also shows that Financial Risk Management is a highly emerging field and has a promising future for researchers. Table 5 shows the highly cited papers in the domain of financial risk management.

RQ2: Which research areas have more Financial Risk Management research based on the number of publications?

All retrieved papers from the web of sciences within the domain of financial risk management are classified based on different research areas in this section. Figure 4 shows the research areas based on the total number of publications concerning the ranking of each area. Business Economics was found the most significant research area with 10702 research papers, followed by Environmental Science Ecology, Engineering, Mathematics and Operation Research Management Science with 3315, 2406, 1438, and 1374articles, respectively.

RQ3: What are the most influential papers in Financial risk management according to the number of citations?

The top ten most cited papers in financial risk management indexed by Web of Science are shown in Table 5. The article written by (Graham et al., 2005) "The economic implication or corporate financial reporting," published in the Journal of Accounting & Economics, found the most cited paper with a total citation of 1592.

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RQ4: What are the leading supportive funding agencies of Financial risk management papers?

The list of funding agencies in the field of financial risk management is shown in Table 4. Natural Science Foundation of China (NSFC) was found with the highest investment in financial risk management, followed by Pfizer and Novartis, respectively.

RQ5: What is the future research direction in the Financial Risk Management domain?

Based on this research and analysis of data, the study suggests important directions in financial risk management for future research. This studyidentifies some other areas such as environmental science ecology, Public Environmental Occupational health, Health Care Sciences Services, Water Resources, Agriculture, Computer Sciences, Cardiovascular System Cardiology and Neuroscience. Hence, the practical assessment of financial risk management is an essential component of financial institutions and other fields as a whole. Therefore, it has received considerable interest from scholars across finance, engineering, medical and mathematics.

5. Conclusion and Future Work

This research presents a detailed bibliometric analysis on the financial risk management domain. Thirty thousand one hundred eighty-one papers retrieved from Web of Science with the time horizon of 2004-2018. The bibliometric analysis approach was adopted and examinedthe total publications and citations, top research areas, the most influential papers, the most popular publication venues, the top supportive funding agencies and the future research direction in financial risk management. The study results indicated that the interest of researchers is increasing every year in the field of financial risk management due to the uncertain situation of the world. After the worldwide financial crisis of 2007-08 the number of citations to financial risk management has been proliferating. The most critical research areas of financial risk management are Business Economics, Environmental Science Ecology, Engineering, Mathematics and Operational Research Management. “The Economics implication of corporate financial reporting” written by (Graham et al., 2005) published in the Journal of Accounting & Finance, were found the most influential which received the highest average citation per year.The National Natural Sciences Foundation of China was found the most supporting funding agency in financial risk management. The potential future research study may include a detail research study on highly cited papers concerning the technical aspect and replication of similar research study using different literature database like Scopus to check the similarity of this study.

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