

# Risk Management on Quality Improvement Project: Literature Review and Bibliometric Analysis

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## Abstract

This article aims to provide an overview of academic studies on Risk Management on Quality Improvement Projects based on Scopus database publications from 2000 to 2020. Several 2000 abstract articles of peer-reviewed journals connected with risk management on a quality improvement project were reviewed. VOS viewer software was used to investigate the bibliometric research method and bibliographic display maps. There are three phases to the bibliometric research process, they are search criteria and source identification, software and data extraction, and then data analysis and interpretation. Based on Bibliometric Analysis, three areas have a lot of great subject areas to publish from 2000 to 2020. The three subject areas are Medicine (1281 works documents, 53%), Engineering (289 works documents, 16,04%), and Computer Science (148 works documents, 6,16%). The results of this analysis indicate that the topic of risk management for quality improvement projects is still carried out separately, namely risk management is discussed separately and quality improvement projects are discussed on the topic of its research. Thus, in this study, we will apply risk management to quality improvement projects in the manufacturing industry.

## Keywords

Bibliometric Analysis, Risk Management, Review, Quality Improvement Project.

## 1. Introduction

Quality improvement is a continuous process, which occurs at all stages of the production process of a product. Therefore, in carrying out the improvement process, the most important thing is to comprehensively find problems at each stage of the process (Florent et al., 2009). Quality is the most important element to produce products by consumer expectations (Okay & Semiz, 2013). The function of quality is to ensure the product meets quality requirements (Li, 2011). Based on ISO 9000, the implementation of risk management is mandatory. Described in the introduction to the general section and appendix B, it is explained that the design and implementation of an organization's quality management system are influenced by: a) the organization's environment, changes in that environment, and the risks associated with that environment; b) different needs; c) special objectives; d) products provided; e) the process used; f) the size and structure of the organization.

Risk includes all human actions, all types of business, and every area of corporate management (Ekwere, 2016). There are several main elements in quality and risk management, namely: (1). Risk assessment; (2). Risk control; (3). Risk review; and (4). Communication risks (Bhattacharya, 2015). In addition, there are two basic principles of quality and risk management, namely: (1). Quality risk assessments should be based on facts and figures; (2) The level of effort, formality, and documentation of the risk management process must be balanced against the level of risk. The next aspect is the risk category in the company, there are risk categories in the company, namely: (1). New product introduction in the production line; (2). Communication between departments. (3). Failure to comply with

the product or service supplier's terms and conditions. (4). Lack of optimal communication with customers and (5). The emergence of unexpected production costs (Bhattacharya, 2015).

The indirect impact of implementing quality improvement projects in manufacturing and service companies is increasing customer satisfaction and company profits. Another positive impact is an additional investment (Chan et al., 2017). Not only positive impacts but there are also negative impacts with quality improvement projects, namely the existence of quality costs. The consequence of failure to implement a quality improvement project is the loss suffered by the company. This provides research opportunities in the area of risk management in quality improvement projects. By considering risks, the consequence is reducing inefficiency caused by a lack of synergy between risk management departments, this will minimize costs (Farrell & Gallagher, 2015).

Quality improvement activities are carried out in quality improvement projects based on problems that occur during the production process and consumer complaints. A quality improvement project will provide great benefits if the results and the effort put into it reach the target. During the implementation of the quality improvement process, the risks that arise are also not ignored. In this study, the aspect of the quality improvement project that will be considered is the risk aspect. The risk aspect relates to possible threats that have an impact on the organization (Dorca et al., 2016).

The previous researchers have studied and reported the recent development regarding risk-based quality management (Malikova, 2017) then developed it into a risk-based quality management system (Samani et al., 2017).

### 1.1 Objectives

The aim of this study to provide an overview of academic studies on Risk Management on Quality Improvement Project, based on Scopus database publications from 2000 to 2020. Several 2000 of abstract articles of peer-reviewed journal connected with risk management on a quality improvement project was reviewed. VOS viewer software was used to investigate the bibliometric research method and bibliographic display maps. Hence, the objective of this paper is to review risk management on a quality improvement project using VOS viewer. The bibliometric analysis is a systematic analytical technique to identify the most influential authors, their affiliations, the keywords they use, and more importantly how these attributes link one work to the other (Nagi et al., 2017; Patrick et al., 2020; Sinkovics, 2016; Syed, 2021; H. C. Wahyuni et al., 2019; Xu et al., 2020; Zahra et al., 2021). The network analysis, on the other hand, is a rigorous method to determine the cluster of the research areas, thus revealing the directions and gaps in future research (H. Wahyuni et al., 2019).

## 2. Literature Review

Quality is a key factor in the company's sustainability to survive in an increasingly competitive global industry. Quality is the key to staying competitive (Paraschivescu, 2016). Quality is the most important element and following with consumer expectations (Okay & Semiz, 2013). Quality has an important meaning for producers and consumers (Olusanya & Adegbola, 2014).

The impact obtained on fulfilling consumer expectations is loyalty, increasing profit and customer satisfaction, and increasing the company's brand image. To increase consumer satisfaction and consumer loyalty to the products produced, businesses design their products by considering consumer needs (Joochim & Charoendachanukror, 2018). The customer satisfaction level is important to keep customer loyalty to the company. Quality improvement is the main goal and target of a company that aims to meet consumer requirements; emerging technologies and equipment. The company carries out a series of improvement steps to gradually improve quality (Pan et al., 2018). Quality improvement can shorten the product release cycle, reduce maintenance costs, increase customer satisfaction and market competitiveness using the PDCA cycle approach (Plan, Do, Control, and Action) to increase the level of quality improvement (Ji, 2011). Quality improvement is the main goal and target of a company that aims to meet consumer requirements; technological developments and new emerging equipment. The company carries out a series of improvement steps to gradually improve quality (Ji, 2011).

Risk is a probability in an event that results in a negative impact, directly or indirectly, on quality control, which causes additional costs (Serafini et al., 2016). Calculation of risk, namely the multiplication of the likelihood (possibility) and consequence (consequence), where likelihood is the probability of risk and consequence is the amount of potential loss (Anggrahini et al., 2015). Risk management is becoming increasingly important for the

success in dealing with the risks of each company, and risk has more than one cause and if it happens it has an impact on a project (Segismundo & Miguel, 2008). Risk management is the main function of project-based organizations, and its main objective is to create value for the company (Khameneh et al., 2016).

Quality and risk management is a useful tool for implementing, maintaining, and continuously improving the quality management system effectively (Ágoston et al., 2011). The integration of quality and risk management is a systematic and methodological approach to developing an understanding of the variability of a process or procedure, including all associated hazards and failure modes, and implementing ways of controlling or eliminating risk in a given process or procedure (Niazi, 2018).

### 3. Method

The Scopus search engine was utilized to find extensive literature on a theory's risk management and quality improvement project. Scopus is one of the most comprehensive databases of citations and abstracts for peer-reviewed literature (Zahra et al., 2021). Based on Figure 1, there are three phases to the bibliometric research process, they are search criteria and source identification, software and data extraction, and then data analysis and interpretation. Phase 1, search criteria and source identification with the bibliometric analysis is to get a scientific database and collect information about publications from Scopus databases. Because resources vary and search results may be indexed at different times, each scientific database is different, affecting the investigation's accuracy. The initial search identifies documents with the terms "risk management and quality improvement". On bibliometric search, studies irrelevant to the aims, questions, and scopes were selected using a systemic review approach driven by a set of inclusion and exclusion criteria. As a result, sequentially shortlisted policy research publications in numerous international journals are produced, both for the subscribed and open-access published a year (2000-2020).

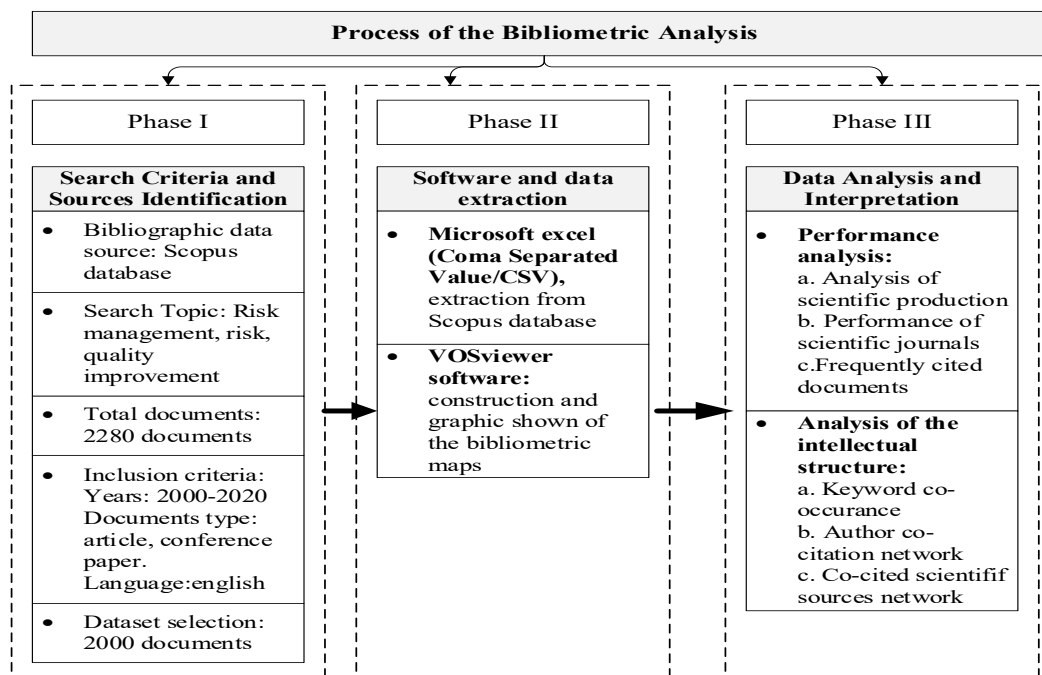


Figure 1. Process of the Bibliometric Analysis

Phase 2 includes software and data extraction. Scopus database was converted to Microsoft Excel in format with comma-separated values (CSV). This is used for database set analysis. Authors, affiliations, titles, publication years, cited publications, abstracts, author keywords, index keywords, references, and other important bibliographic information are included in the downloaded metadata, which must be examined and improved. Records that did not show authorship, duplicate documents, or records with inaccuracies were eliminated for this purpose, result in 2000 documents record on the database. Phase 3, Bibliometric has 2 analysis approaches, there are performance analysis and science mapping (Herrera-franco, 2021). The first focuses on the analysis of scientific production using

bibliometric indicators: contributions by country, frequently cited documents, and the performance of scientific journals (Herrera-franco, 2021). The use of bibliometric approaches to describe the knowledge structure of risk management on a quality improvement project is illustrated. The outcome of VOS viewer software analysis, such as Bibliometric coupling; includes co-citation analysis and keyword co-occurrence.

## 4. Data Collection

The Scopus database has been used to gather data. Using risk management, risk, and quality improvement as keywords. There are 2280 documents from 2000 until 2020 in the Scopus database, according to a search. Articles, conference papers, and journals are types of documents. The article in English was chosen as the language. The data from the Scopus database is extracted as a Comma Separated Value (CSV) file in Microsoft Excel for further processing. Vos Viewer is used to process and analyze the findings of data that has been stored using the CSV data type.

## 5. Result and Discussion

### 5.1 Performance Analysis

#### 5.1.1 Scientific Production Analysis

According to Figure 2, the data between 2000 to 2020, a total of 2280 scientific documents met the exclusion and inclusion criteria. According to the type of document, the Risk Management on Quality Improvement Project topic was separated into four groups: article (80,6 %); Conference Paper (18,1 %); Book Chapter (1,0 %), and Book (0,3 %).

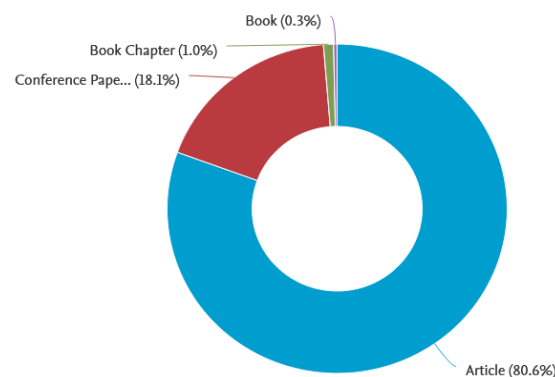


Figure 2. Percentage of publications of Risk Management on Quality Improvement Project in different document types

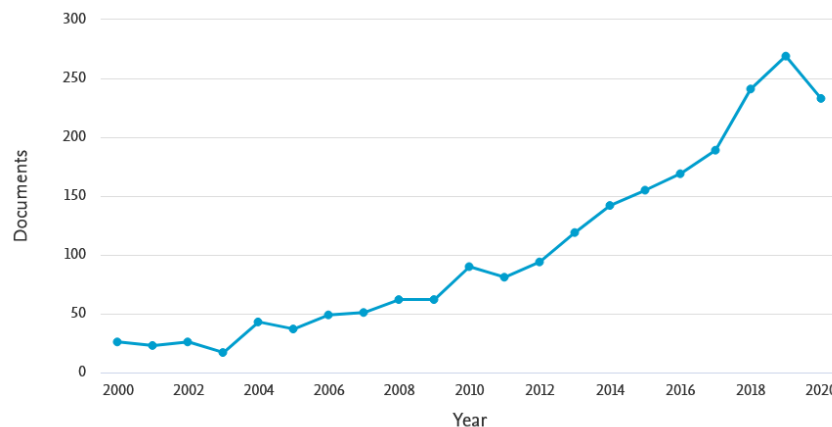


Figure 3. Growth of scientific production relating to Risk Management on Quality Improvement Project

Based on Figure 3, the data between 2000 and 2020, 2280 documents were published in the Risk Management and Quality Improvement Project topic of research, demonstrating an increase in academic interest. From 2000 to 2010, the rate of publication increased moderately, averaging 114 works per year less than the global average. There has been considerable growth from 2012 to 2019. Beginning in 2011, there were 98 documents, and from 2012 through 2020, there were a huge number of publications, exceeding the global average of 114 works each year. In 2019, 299 documents were released, which was the greatest number ever.

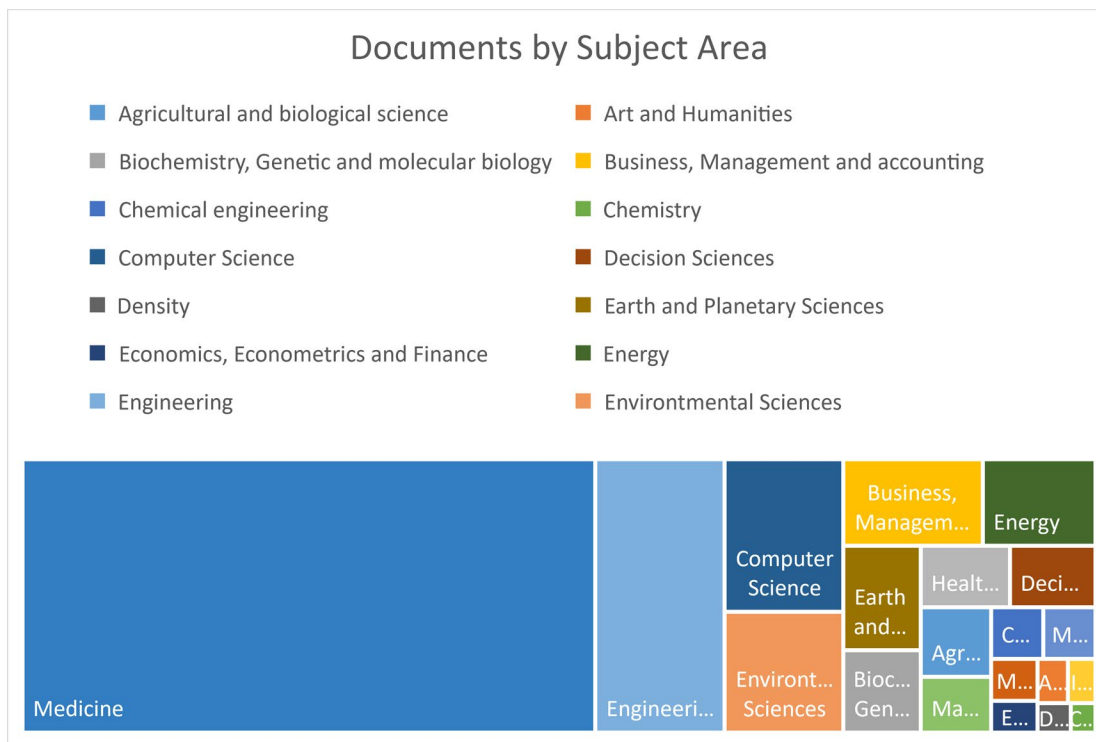


Figure 4. Mapping Document by Subject Area

According to Figure 4, three areas have a lot of great subject areas to publish from 2000 to 2020. Medicine (1281 works documents, 53%), Engineering (289 works documents, 16.04%), and Computer Science (148 works documents, 6.16%) are the top three.

#### 4.1.2 Contribution by Countries

The contributions of many countries allow researchers' knowledge and abilities to be linked to their institutions. The references of a group of documents, specifically the nations involved, were quantified using bibliographic coupling. A threshold of at least one document per country was imposed in the bibliographical coupling of countries; 54 countries used VOS viewer to meet the specified threshold. Table 1 displays the top 15 countries in terms of the number of documents published on the subject of Risk Management and Quality Improvement Project between 2000 and 2020.

Table 1. Top 15 Countries by the number of documents

| Ranking | Country        | Documents | Citation | Total Link Strength |
|---------|----------------|-----------|----------|---------------------|
| 1       | United States  | 521       | 29018    | 551                 |
| 2       | China          | 280       | 13548    | 508                 |
| 3       | United Kingdom | 272       | 14980    | 370                 |
| 4       | India          | 111       | 6698     | 339                 |
| 5       | Australia      | 165       | 8815     | 193                 |
| 6       | Iran           | 80        | 3357     | 171                 |
| 7       | Italy          | 116       | 4487     | 167                 |
| 8       | Taiwan         | 78        | 5153     | 150                 |
| 9       | Denmark        | 45        | 4641     | 149                 |
| 10      | Hongkong       | 73        | 2822     | 148                 |
| 11      | France         | 59        | 2460     | 113                 |
| 12      | Sweden         | 66        | 5835     | 112                 |
| 13      | Turkey         | 56        | 5085     | 109                 |
| 14      | Malaysia       | 50        | 7433     | 107                 |
| 15      | Germany        | 75        | 5835     | 106                 |

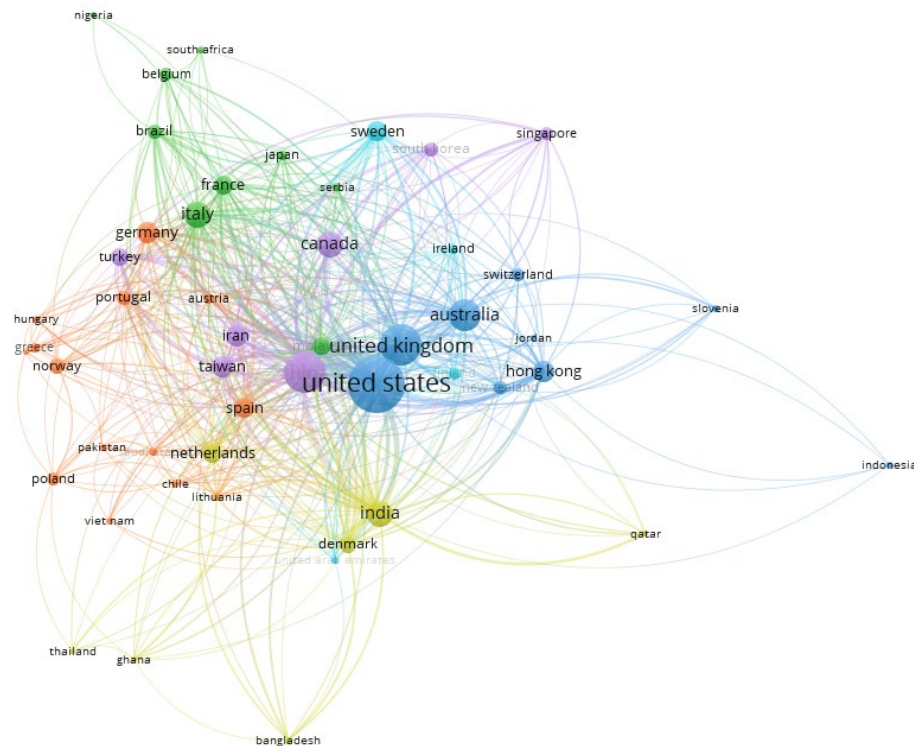


Figure 5 Bibliographic Coupling of Countries

Figure 5 depicted a bibliographical coupling study of countries, with the United States (521), China (280), and the United Kingdom (272) as the most notable nodes. The distinction between the number of citations and the number of documents is underlined by nation. The United States received the most citation correspondence (29018), followed by the United Kingdom (14980) and China (13548). The lines connecting the nodes represent the existing connections between countries, i.e., the strength of collaboration.



## 4.2 Intellectual Structure Analysis

#### 4.2.1 Co-Occurance Network of Author Keywords

Table 2. Co-occurrence network of authors keywords

| Cluster   | Name  | Number of Concepts |
|-----------|---|--------------------|
| Cluster 1 | Agile manufacturing, AHP, ANP, Balanced Scorecard, Big Data Analysis, Fuzzy-AHP, Fuzzy TOPSIS, Game Theory, ISO 9001, Lean Six Sigma, RPN, Decision Making, Human, risk management, failure analysis, etc | 277                |
| Cluster 2 | Architecture design, automobile manufacturing, Climate change, energy conservation, energy planning, health, renewable energy, etc  | 216                |
| Cluster 3 | Blood glucose, automobile driving, diabetes, cost effectively analysis, epidemiology, ethnology, hypertension, severity illness index, etc  | 198                |
| Cluster 4 | Accident occupational, clinical practice, cost control, conceptual frameworks, leadership, etc  | 176                |
| Cluster 5 | Accident prevention, error, fatigue, policy, prevention and control, probability, etc   | 113                |
| Cluster 6 | Technology  | 1                  |

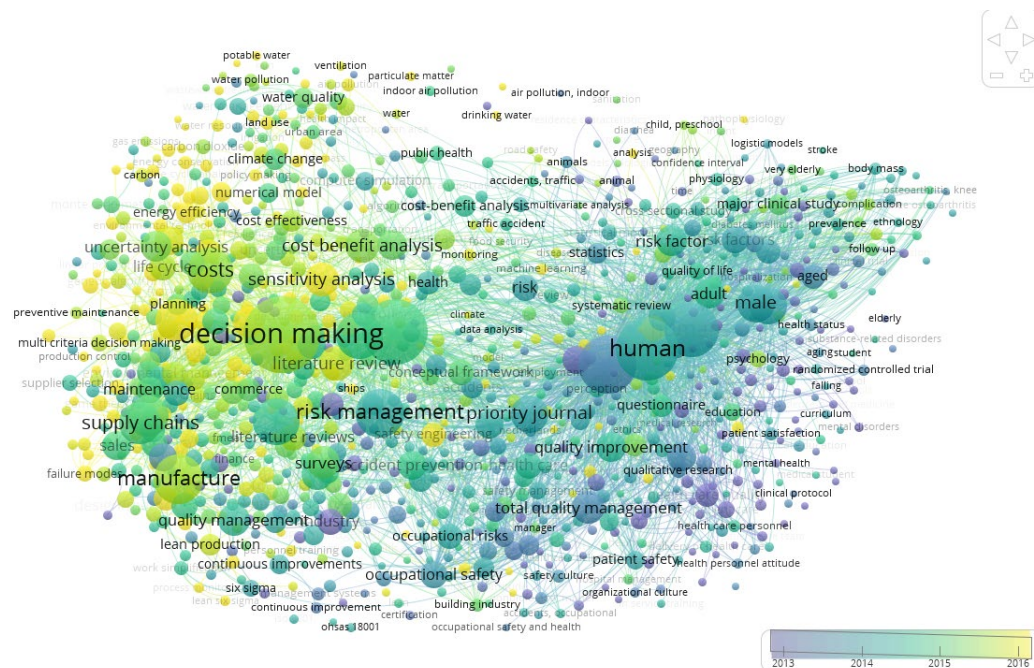


Figure 6. Co-occurrences Network of Author Keywords

Based on Table 2 there are six clusters. Based on Figure 6, Cluster 1 show the most extensive study topic has 277 idea publications on subjects related to risk management and/or quality improvement methods. Cluster 2 is concerned with the subject area and has 216 idea documents. Cluster 3 is an object area with a concept of 198 documents. Cluster 4 is concerned with connection-related object areas and has 176 document concepts, Cluster 5 is concerned with risk mitigation and has 113 document concepts, and Cluster 6 is concerned with technology and has one document idea.

#### 4.2.2 Cited Author Co-Citation Network

This type of research allows for the identification of a research field's structure, revealing the most active research topics, rising trends, and knowledge dissemination methods. With VOS viewer, the suggested bibliometric network was built by analysing data linked to co-citations using a measure of similarity termed association strength.



Figure 7. Author's co-citation map

Table 3. Top 15 authors co-cited in references of Risk Management on Quality Improvement Project

| Ranking | Author         | Citation | Total Link Strength |
|---------|----------------|----------|---------------------|
| 1       | Sarkis, J      | 582      | 56000               |
| 2       | Li, J          | 258      | 49272               |
| 3       | Govindan, K    | 395      | 37776               |
| 4       | Tolio, T       | 86       | 32983               |
| 5       | Zhu, Q         | 295      | 30934               |
| 6       | Wang, J        | 452      | 29866               |
| 7       | Liu, Y         | 274      | 27717               |
| 8       | Colledani, M   | 75       | 27537               |
| 9       | Gershwin, S.B  | 59       | 26531               |
| 10      | Meerkov, S.M   | 54       | 25431               |
| 11      | Zhang, I       | 198      | 24940               |
| 12      | Wang, X        | 328      | 24176               |
| 13      | Gunasekaran, A | 266      | 23923               |
| 14      | Zhang, Y       | 269      | 22818               |
| 15      | Li, Y          | 312      | 22466               |

The references utilized by the document being examined/observed will be visualized via co-citation. If the references are used in the same article, they will be linked. This analysis helps determine the most common references utilized by the set of articles under consideration. If the tested/observed articles have the same references, they will be shown and networked. This analysis demonstrates the stud's closeness between related materials. Figure 7 and Table 3 show the 15 most cited authors in risk management on quality improvement projects. With Sarkis, J (582), Liu, Y (452), and Govindan, K, Figure 5 displayed bibliographical coupling research of author co-citation (395). The authors emphasize the distinction between the number of citations and total link strength. Sarkis, J (56000), followed by Li, J (49272) and Govindan, K (37776). The lines linking the nodes reflect the strength of collaboration by representing the existing links between authors.



#### 4.2.3 Co-Citation of Journal Cited

Based on bibliometric data, we used VOS viewer software to perform graphical analysis for research related to risk management on quality improvement project. We visualized the co-citation of journals and co-occurrence of keywords. The network interconnections are used to highlight which journals are highly co-cited, and the graph of journal co-citation is used to illustrate the most cited journals.

Table 4. Top 15 authors co-cited in references of Risk Management on Quality Improvement Project

| Ranking | Source   | Citation | Total Link Strength |
|---------|--|----------|---------------------|
| 1       | International journal of production research   | 1237     | 104865              |
| 2       | International journal of production economics  | 1376     | 100979              |
| 3       | European journal of operational research       | 1243     | 94301               |
| 4       | Journal of operations management               | 1187     | 77550               |
| 5       | Journal Clean Production                       | 1575     | 69230               |
| 6       | Expert system with applications                | 1223     | 66276               |
| 7       | International journal production Economic      | 1088     | 61641               |
| 8       | Accounting education: an international journal | 253      | 49619               |
| 9       | Management science                             | 750      | 46742               |
| 10      | Issues in accounting education                 | 159      | 38499               |
| 11      | Journal of cleaner production                  | 567      | 35062               |
| 12      | Omega  | 575      | 34994               |
| 13      | Expert system application                      | 595      | 33819               |
| 14      | International Journal Prod.Res                 | 485      | 33571               |
| 15      | International Operation Management             | 567      | 32862               |

Table 4 shows the 15 most cited authors in reference to risk management on quality improvement projects. International journal of production economics (1376); European journal of operational research (1243) and International journal of production research (1237). Table 4 displayed bibliographical coupling research of author co-citation. The source of references emphasizes the distinction between the number of citations and total link strength. International journal of production research (104865), followed by International journal of production economics (100979) and European journal of operational research (94301). The lines linking the nodes reflect the strength of collaboration by representing the existing links between authors.

Whereas the implementation of risk management in quality improvement projects is still universal in the quality management object, and the dialogue between risk management and quality improvement is still partial, according to document by area released.

## 5. Conclusions

By using bibliometric and network analysis, this paper provided an overview of the distribution of publications on risk management and quality improvement project. By querying the Scopus database with predefined keywords, a set of 2280 document papers published. There are three-phase, first search criteria and source identification, second software and data extraction, and third data analysis and interpretation.

In conclusion, the academic literature using VOS Viewer was determined theory-related risk management on quality improvement projects. The study's first objective identified how much risk management on quality improvement project research publications explicitly apply theory in their investigations. The second objective outlined the contours of theory-related risk management on quality improvement project research and determined the risk management on quality improvement project aspects being studied or overlooked. Generally, the study discovered that discussion on theory-related risk management on quality improvement project research is relatively limited, with lopsidedly divided towards selected study areas. Hence, there is a need to apply a systematic and theory-driven approach in determining risk management on quality improvement project development effectiveness. The present study provided insights into theory-related risk management on quality improvement project researches in various international journals.

In the quality management object, a risk management application in quality improvement projects is still general, and the discussion between risk management and quality improvement is still partial and not yet integrated using the ISO 9000 and ISO 31000 frameworks. Furthermore, the integrating the two, it will be possible to identify the factors that influence the success of a quality improvement project and what potential risks can be prevented to reduce losses and increase productivity, and built the framework risk management on a quality improvement project.

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## Biographies

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