

Quality Improvement on SMEs: Trend and Visualization with Bibliometric Analysis

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Abstract

The purpose of this study is to discover the mapping and research trends of quality improvement in Small and Medium-sized Enterprises (SMEs) that Scopus index. A bibliometric analysis was conducted in this study from 1992 to mid-2022. The keywords quality improvement and SMEs are used in the title, abstract, and keywords for further filtering and screening manually. The analysis results yielded 114 relevant articles with the peak publications in 2019. India became the country with the highest quantity of publications, and the United Kingdom became the country with the most citations. Three cluster topics formed: SMEs' adaptation to consumer desires with quality processes and products, companies' challenges in accommodating the market without sacrificing product quality, and impact quality management to improve community outcomes with standardization. This paper provides an updated overview of research related to quality improvement and SMEs.

Keywords: Bibliometric analysis; Quality improvement; Scopus; SMEs

1. Introduction

Nowadays, it is crucial to increase the quality of products and manufacturing processes if the company stands out from the competition in industries with fierce competition. Unfortunately, small businesses have not been able to properly implement continuous quality improvement (Doshi & Desai, 2017). Saving time, boosting efficiency, making better presentations, exchanging information, enhancing employee abilities, improving internal and external communication inside the organization, and improving access to trade information are all ways to improve the quality of SMEs. Continuous quality improvement tools could be one solution to measure the performance of product and process quality and customer satisfaction. However, quality improvement is a difficult task requiring a lot of knowledge and willpower (Doshi & Desai, 2019).

The limitations of SMEs, such as access to technology, lack of employee skills, management capabilities, access to international markets, the effectiveness of regulations, and access to finance, are obstacles for SMEs in running their business and quality improvement (Singh et al., 2010). On the other hand, SMEs are the backbone of the economy in various countries, both in terms of economic contribution and employment, so continuous quality improvement is essential for SMEs to survive in the industrial world (Thaha et al., 2022).

The need for quality improvement in SMEs is a topic of research carried out by various parties, both academics, government, and industry. This study will analyze the quality improvement and SME literature by extracting various studies and literature from previous articles in international journals. The research data use the Scopus database using the Vosviewer application and a spreadsheet to help with bibliometric analysis.

2. Literature Review

2.1. Quality improvement in SMEs

The concept of quality improvement has been widely researched in health care and medicine. Quality improvement in the business sector is widely discussed and related to quality management in production and manufacturing processes.

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Quality improvement in SMEs needs to be understood as a way to maintain business continuity, complete complex processes in business, and survive in the industry. In the same industry, SMEs compete not just with other SMEs but also with huge corporations. Quality improvement is a challenge for SMEs because of limited resources, but on the other hand, they have high flexibility to make changes compared to large companies (Merchant et al., 2018).

To compete with limited resources, SMEs must define their core business by looking for what consumers need. SMEs can prioritize resource allocation after knowing the core business and consumer needs. Appropriate resource allocation and quality management can accelerate the growth of SMEs and reduce the risk of business failure (Bhat et al., 2020). Quality improvement can be a competitive factor for SMEs as a differentiator from other competitors in order to survive. Quality management in business directly impacts consumer decisions and how consumers perceive companies based on satisfaction (Symmank, 2019).

2.2. Bibliometric analysis

Information science bibliometric studies can identify trends in the use of documents, the growth of literature, or the information sources available in a field. Descriptive studies and evaluative studies are both included in bibliometrics. In order to analyze the production of articles, books, and other formats, descriptive studies look at authorship trends, including author gender, work types, productivity, levels of collaboration, affiliations, and article topics. Evaluative studies can assess the use of literature by counting references or cites in journal articles, books, or other media (Pattah, 2013). In order to present a comprehensive picture of, for instance, a country's research output across several fields, the percentage of those fields, and changes over time, descriptive bibliometrics uses a top-down methodology. Additionally, the evaluative bibliometric is a strategy that involves gathering all pertinent publications from each unit to evaluate smaller units, such as research groups or individuals, using a bottom-up approach (Nicolai, 2010).

Co-word analysis is one of the bibliometric methods for determining the core topic. He (1999) asserts that co-word analysis can be used to determine the amount of keywords from a research document that are present in the article under review at the same time. The author often offers keyword suggestions in research documents. The research document contains more keywords the more closely related the documents are to one another. By taking a quick look at the title and abstract based on the co-occurrence of important or distinctive terms in the article, mapping on a keyword co-word analysis can be seen. The sentences resulting from the topic analysis each represent a thought. Non-standard keyword usage will result in a wide variety of terms. A thesaurus and terms known as descriptors, which reflect concepts, are used to standardize it. To standardize keywords and make sure they are used consistently, use a thesaurus. Concepts with the same name but different representations in texts are those with the same meaning.

3. Method

Bibliometric techniques are used to analyze data and provide a quantitative assessment of scientific productivity (Todeschini & Baccini, 2016). An overview of the mapping and the most recent developments in quality improvement and SME research are planned to be provided by this study. The research procedure follows previous bibliometric research on social media and SMEs (Thaha et al., 2021). The techniques for data gathering, screening, and bibliometric analysis are summarized in Figure 1. The Scopus database will be used in this study's data collection and article search up until mid-2022. "Quality Improvement" and "Small and Medium Enterprises" are the major search terms for this study. To improve the search term used in the Scopus database search:

("quality improvement") AND ("small and medium-sized businesses" OR "small and medium-sized enterprises" OR "small and medium enterprises" OR "SME")

Search strings are included in the title, abstract, and keywords to avoid irrelevant results compared to searches of the entire body of the text article. The string search results yielded 187 articles, conferences, book chapters, and editorials between 1992 - 2022. The search results were then filtered by document type, English, and publication stage, which resulted in 155 documents being followed by manual screening (title, abstract, and keywords). Manual screening of the articles found SME abbreviations, such as superconducting magnetic energy, which are not related to the topic of small and medium enterprises. The final document yielded 114 relevant journals with 1608 citations. The collected articles are created into a bibliographic database for further processing with the VOSviewer program. Co-authors and co-occurrence were used to perform four analyses: 1) Publication and citation; 2) Country affiliation; 3) Subject area; 4) Keywords and cluster topics. The analysis results will be synthesized to obtain trends, patterns, and insights.

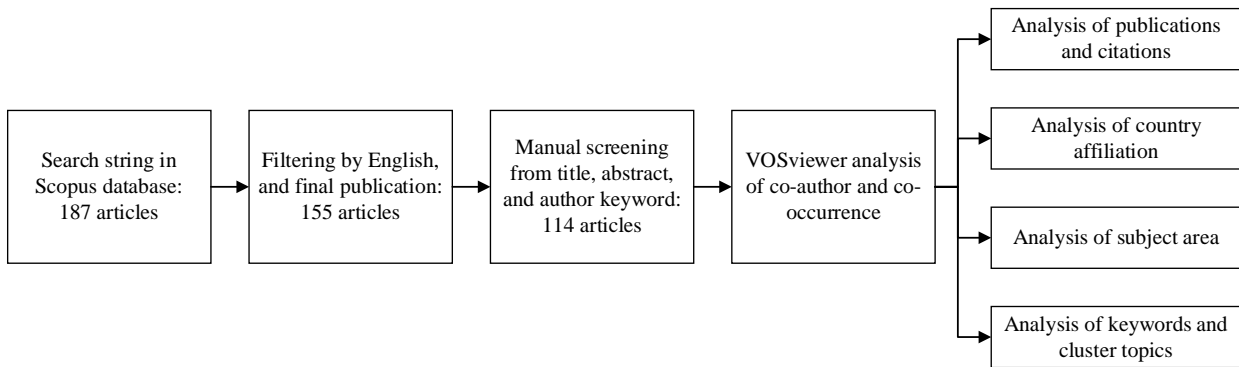


Fig. 1. Bibliometric analysis and data collection procedures

4. Result and Discussion

4.1. Bibliometric analysis of the publications and citations

The number of articles related to research topics has increased since 2006, with a peak of 12 articles in 2019. The quantity and distribution of publications and citations per year are shown in Figure 2. A bar-shaped and left axis indicates the number of publications, while a line-shaped and right axis indicates the number of article citations. In 1996 there was one article with 284 citations, then in 2010, there were two articles with 137 and 135 citations. The articles explained total quality management, continuous improvement, and competitiveness in SMEs. (Chen et al., 2010; Ghobadian & Gallear, 1996; Singh et al., 2010).

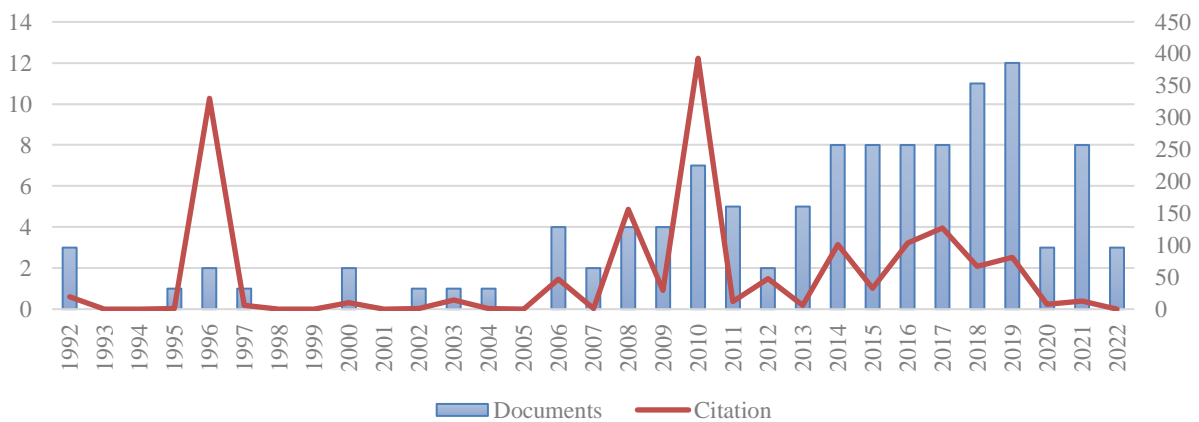


Fig. 2. Trends in quality improvement in SMEs from 1992 to 2022 in the Scopus database.

4.2. Bibliometric analysis of the countries

The search results showed 45 author affiliation nations contributing to the study's issue of quality improvement and SMEs. Table 1 lists the articles from various regions dispersed throughout ten countries with at least three document items. Figure 3 represents the number of documents based on the world map and the color thickness of each country. There are two nations with more than ten papers each: India and the United Kingdom. No certainty that having many publications will result in many citations. Including India, the United Kingdom has more citations than any other nation. These findings suggest that the two nations contributed to research on SMEs and quality improvement. India and the United Kingdom have the most impact on quality improvement research compared to other nations.

4.3. Bibliometric analysis of the subject area

Publications have a variety of study fields as their sources. Figure 3 displays articles about SMEs and quality improvement that are concentrated in two areas: business, management, and accounting (26.3%) and engineering (21.7%). The two areas amount to more than 40% of the shares related to quality improvement and SMEs. In addition to these two areas, other subject areas have many documents: computer science, decision science, and social science.

Table 1. Top ten country with number of documents and citations.

| Num. | Country | Doc. | Citation |
|------|----------------|------|----------|
| 1 | India | 28 | 372 |
| 2 | United Kingdom | 11 | 606 |
| 3 | Indonesia | 8 | 15 |
| 4 | South Korea | 6 | 50 |
| 5 | United States | 6 | 184 |
| 6 | Portugal | 5 | 89 |
| 7 | China | 3 | 3 |
| 8 | Italy | 3 | 26 |
| 9 | Malaysia | 3 | 8 |
| 10 | Pakistan | 3 | 5 |

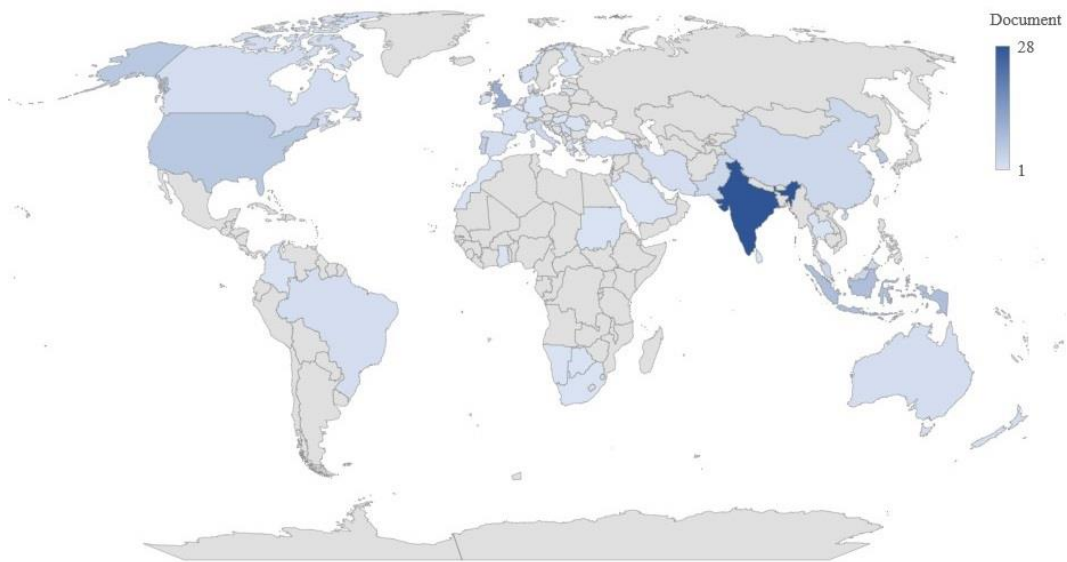


Fig. 3. Heat map distribution of researcher country affiliation.

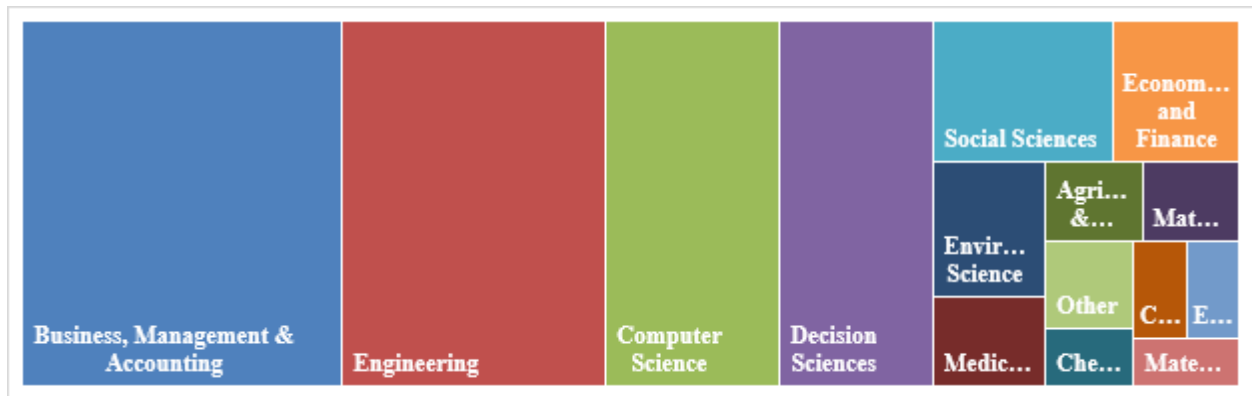


Fig. 4. The subject area of quality improvement and SMEs.

4.4. Bibliometric analysis of keywords and cluster topics

Five hundred thirty-eight keywords made up the original list of article keywords. Additionally, 16 pertinent keywords are displayed due to keyword filtering of at least five occurrences in the article database. The three most common keywords are quality improvement, quality control, and SMEs.

Additionally, co-occurrence keywords will be examined with the keywords. The strength of association method is used when displaying the network of terms. In Figure 5, in the network visualization display, the VOSviewer application divides and classes terms that appear five times into three groups. Keywords are mapped into corresponding color clusters based on the association's strength. As indicated in Table 2, three clusters result from the keyword analysis.

Table 2. Keyword cluster with the occurrence.

| Cluster | Keyword | Occurrences | Total Link Strength |
|---------|-----------------------------|-------------|---------------------|
| 1 | Quality Control | 12 | 35 |
| | Total Quality Management | 9 | 24 |
| | Customer Satisfaction | 7 | 18 |
| | Industrial Research | 7 | 22 |
| | Surveys | 7 | 25 |
| | Manufacture | 5 | 7 |
| | Process Engineering | 5 | 8 |
| 2 | Quality Improvement | 27 | 56 |
| | Small and Medium Enterprise | 12 | 30 |
| | Competition | 9 | 24 |
| | Cost Reduction | 5 | 8 |
| | Industry | 5 | 8 |
| | Information Systems | 5 | 13 |
| 3 | Quality Management | 7 | 23 |
| | Societies and Institutions | 5 | 13 |
| | Standardization | 5 | 12 |

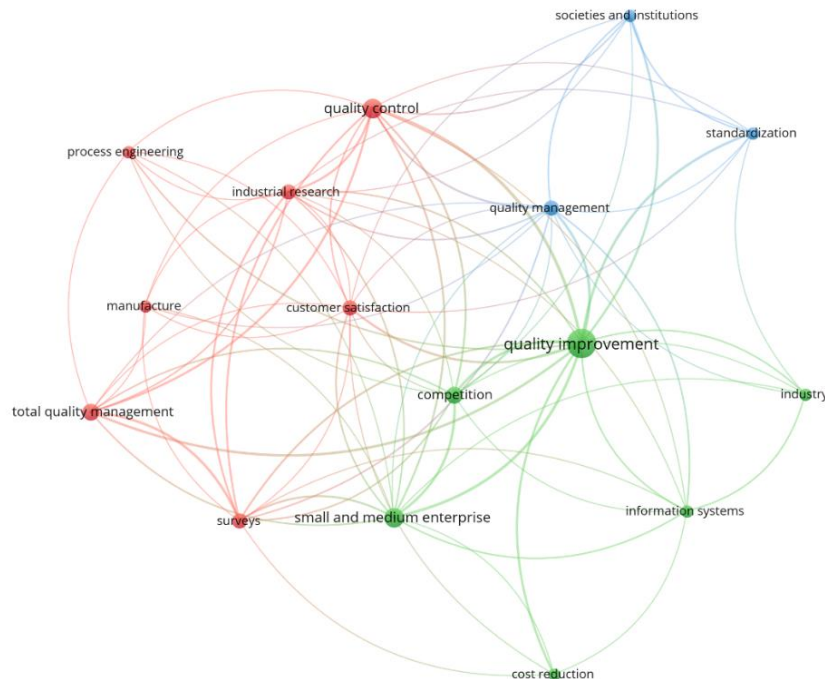


Fig. 5. Network visualization of keyword articles related to quality improvement and SMEs.

The first cluster, highlighted in red, comprises quality control, total quality management, customer satisfaction, industrial research, surveys, manufacture, and process engineering. The set of keywords in the first cluster describes how SMEs adapt to consumer desires with quality processes and products. According to Claver & Tari (2008), SMEs that implement total quality management successfully improve customer results orientation, people results, community results, and quality performance. Training is a significant predictor of total quality management related to quality outcomes. Applying quality standards in SMEs is the foundation for implementing quality improvement. In contrast, the limitations of SMEs in implementing quality improvement are the lack of knowledge or understanding of the system and limited resources (Kumar & Antony, 2008). According to Parast & Safari (2022), information analysis and knowledge management affect customer attention and satisfaction, whereas strategic planning for quality and process quality management considerably and favorably affect customer focus, satisfaction, quality, and operational performance.

The second cluster, highlighted in green, contains quality improvement, small and medium enterprises, competition, cost reduction, industry, and information systems. These keywords indicate the second cluster topic related to companies' challenges in accommodating market demand without significantly sacrificing product quality. According to Kharub et al. (2018), quality management practices will generally align with competitive cost leadership in developing country SMEs. Through the rapid repair process, quality problems significantly contribute to costs. This method helps to overcome inefficiencies in processes and provides an opportunity to reduce costs by implementing small organizational changes (Dhingra et al., 2019).

The third cluster contains quality management, society and institutions, and standardization. The third cluster keyword marked in blue indicates that quality management can improve community outcomes and create standardization in SMEs (Claver & Tari, 2008). The cultural dimension is the emphasis of SMEs on quality development. SMEs with ISO certificates or standard ownership strengthen good quality management tools and processes, although not yet at a further level related to continuous improvement (Sainis et al., 2016).

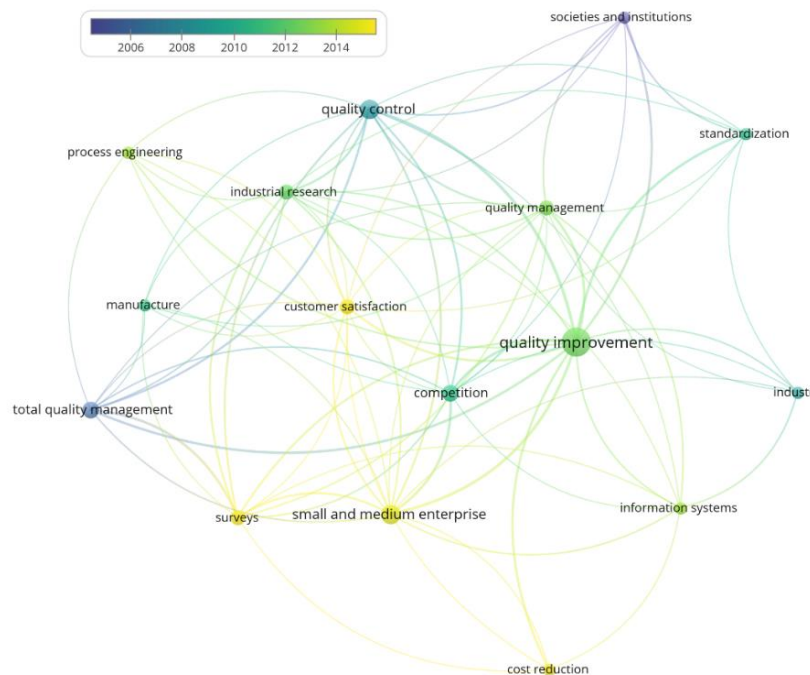


Fig. 6. Network overlay of keyword articles related to quality improvement and SMEs.

Figure 6 visualizes the topic of quality improvement and SMEs from the beginning of the research to the current topic. The color of the keyword node in the image indicates the period of research on that keyword or topic. The yellower the color of the node, the more recent the research. From the figure, keywords such as cost reduction, customer satisfaction, surveys, and SMEs are the latest research topics. This figure shows that the topic of quality improvement and SMEs has evolved from quality management and people to efficiency and customer-centered.

5. Conclusion

Using bibliometric analysis provides an overview of the topics for publication of quality improvement and SMEs on Scopus. The search results for string quality improvement and SMEs on Scopus need to be screened manually because the abbreviation SME is not only a small and medium business. The analysis results show that articles on quality improvement and SMEs began in 1992 and continued to grow from 2006 to 2022. India became the country with the most affiliations of article writers, and the UK became the most citation affiliate.

Keyword analysis resulted in three topic clusters. The first relates to how SMEs adapt to consumer desires with quality processes and products, the second refers to companies' challenges in accommodating market demand without significantly sacrificing product quality, and the third relates to quality management can improve community outcomes and create standardization. This study result provides an updated overview of research related to quality improvement and SMEs.

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