Journal of Advanced Research in Applied Sciences and Engineering Technology

Journal homepage:
https://semarakilmu.com.my/journals/index.php/applied_sciences_eng_tech/index
ISSN: 2462-1943

Digital Technology in Quality Management: Bibliometric Computational Mapping Analysis

R. Rasto[1,*], Edi Suryadi[1], A. Sobandi[1], Nani Sutarni[1], Yosep Hernawan[1]

[1] Universitas Pendidikan Indonesia, Kota Bandung, Jawa Barat 40154, Indonesia

ABSTRACT

This study used the bibliometric method and computational mapping analysis using VOSviewer to examine the development of research on the use of digital technology in quality management. Article data were obtained from Google Scholar using the Publish or Perish Reference Manager application. Data collection was conducted based on the keywords "quality management" and "digital technology". The search found 779 relevant articles. The study period was the last 20 years (2003–2022) and the articles were indexed by Google Scholar. The results showed that research on digital technology in quality management could be divided into four terms. The first term was "quality management", with 91 links, 1695 total link strength, and 530 related events. The second term was "total quality management", with a total of 84 links, a total link strength of 1386, and 309 related events. The third term was "quality management system", with a total of 61 links, the total link strength of 425, and 121 related events. The fourth term was "digital technology", with a total of 53 links, the total link strength of 551, and 251 related events. The analysis also showed that the number of publications on digital technology in quality management tended to increase over the past 22 years, although it fluctuated every year. The peak occurred in 2020 with 78 articles. The results of this study could serve as a starting point for further research on this topic.

Keywords:
Bibliometric; computational mapping analysis; digital technology; quality management; VOSviewer

1. Introduction

Quality management is a systematic approach to identifying, planning, controlling, and improving the quality of products or services in an organization [1,97]. It involves coordinating and managing all quality-related activities, with the aim of meeting or exceeding customer expectations [2-4]. Digital technology has opened the door for the development of new tools and techniques for quality management. Many research on digital technology has been well-documented [5-20]. The integration of quality management and digital technology has brought many benefits, such as increased automation, process optimization, and system integration between organizational areas.

* *Corresponding author.*
E-mail address: rasto@upi.edu

https://doi.org/10.37934/araset.62.2.154170

With this integration, the capacity of quality tools and methods can also be expanded to achieve better managerial goals [21-23].

Several digital technologies are used in quality management, such as Product Lifecycle Management (PLM), CALS technologies, Enterprise Resource Planning (ERP), Product Data Management (PDM), Laboratory Information Management System (LIMS), Enterprise Asset Management (EAM) systems, Digital Twin Technology, Artificial Intelligence and Robotics, Big Data and Business Analytics, Digital Marketing, Internet of Things (IoT), Quantum Computing, Information Storage Technology, Virtual and Augmented Reality, and Digital Virtual Reality (VR) simulators [23-36]. The integration of digital technology in quality management has gained its importance in recent years because of the increasing demand for quality products and services. However, in the field of research, it is still uncertain whether digital technology for quality management is in a great demand.

Bibliometric analysis is an analytical technique useful for tracking the development of research related to the use of digital technologies in quality management. Bibliometric analysis is a form of meta-analysis of research data that helps researchers study bibliographic contents and analyse citations contained in articles published in journals and other scientific works. Using bibliometric analysis, researchers can gain insight into research trends, the most widely covered topics, and the most important contributors in the field. This technique enables the mapping of relevant research developments and provides a better understanding of previous research in the field of digital technology for quality management [37-39].

Many studies have been conducted on bibliometric analysis in various fields, including chemical engineering [40,41], materials research [42], techno-economic education publications [43], datasets illustrating the decline in the number of scientific publications [44], effectiveness of research in the field at top universities [45], educational research [46], technology acceptance [47], financial technology (FinTech) [48,49], digital marketing [50,51], e-service quality [52,53], Internet of Things (IoT) [54,55], and Total Quality Management (TQM) [56]. To date, research that specifically performs bibliometric computational mapping analyses related to digital technology in quality management remains limited, particularly the bibliometric analysis of research conducted in the last 20 years, from 2003 to 2022, using the VOSviewer application. Table 1 shows previous studies on bibliometric.

To overcome the limitations of previous research, this study aimed to conduct a bibliometric analysis using VOSviewer software on articles indexed by Google Scholar. This research is expected to guide researchers in determining research topics, especially those related to digital technology in quality management, based on mapping and analysis of bibliometric data.

Table 1
Previous studies on bibliometric

No	Title	Ref.
1	Involving Particle Technology in Computational Fluid Dynamics Research: A Bibliometric Analysis	[57]
2	Bibliometric Computational Mapping Analysis of Trend Metaverse in Education using VOSviewer	[58]
3	The Use of Information Technology and Lifestyle: An Evaluation of Digital Technology Intervention for Improving Physical Activity and Eating Behaviour	[59]
4	Strategies in language education to improve science student understanding during practicum in laboratory: Review and computational bibliometric analysis	[60]
5	How language and technology can improve student learning quality in engineering? definition, factors for enhancing students' comprehension, and computational bibliometric analysis	[61]
6	Mapping of nanotechnology research in animal science: Scientometric analysis	[62]
7	Scientific research trends of flooding stress in plant science and agriculture subject areas (1962-2021)	[63]
8	Introducing ASEAN Journal of Science and Engineering: A bibliometric analysis study	[64]
9	A bibliometric analysis of chemical engineering research using VOSviewer and its correlation with Covid-19 pandemic condition	[40]
10	A bibliometric analysis of materials research in Indonesian journal using VOSviewer	[42]

11	Bibliometric analysis of engineering research using VOSviewer indexed by google scholar	[65]
12	Bibliometric computational mapping analysis of publications on mechanical engineering education using VOSviewer	[37]
13	Research trend on the use of mercury in gold mining: Literature review and bibliometric analysis	[66]
14	Domestic waste (eggshells and banana peels particles) as sustainable and renewable resources for improving resin-based brakepad performance: Bibliometric literature review, techno-economic analysis, dual-sized reinforcing experiments, to comparison with commercial product	[67]
15	Bibliometric analysis of educational research in 2017 to 2021 using VOSviewer: Google scholar indexed research	[46]
16	Corncob-derived sulfonated magnetic solid catalyst synthesis as heterogeneous catalyst in the esterification of waste cooking oil and bibliometric analysis	[68]
17	The compleat lextutor application tool for academic and technological lexical learning: Review and bibliometric approach	[69]
18	Use of blockchain technology for the exchange and secure transmission of medical images in the cloud: Systematic review with bibliometric analysis	[70]
19	Computational bibliometric analysis of research on science and Islam with VOSviewer: Scopus database in 2012 to 2022	[71]
20	Digital transformation in special needs education: Computational bibliometrics	[72]

2. Methodology

The data for this study were obtained from articles published in journals indexed by Google Scholar. Google Scholar was chosen as the data source in this study because it is open source and contains a wide range of scientific publications, including articles from indexed journals.

The research was carried out in several stages:

i. collecting publication data using the Publish or Perish application
ii. processing the bibliometric data of the articles obtained using the Microsoft Excel application
iii. administering bibliometric computational mapping analysis of the publication data using the VOSviewer application
iv. analysing the results of the computational mapping analysis [73,74].

The data of this study were collected in June 2023. An article search was carried out using the Publish or Perish application with the keywords "digital technology" OR "quality management" based on the title of the publication. The selected articles were published between 2003 and 2022. The articles that met the search criteria were then exported in two file formats, namely RIS Research Information Systems (RIS) format and comma-separated values (CSV) format. Bibliometric maps were then created using VOSviewer to visualize and evaluate the trends. The article data were mapped using VOSviewer in three mapping variants, namely network visualization, density visualization, and overlay visualization based on the network (co-citation) between existing articles. When creating the bibliometric maps, keywords had to appear at least three times to be included, resulting in 114 terms, and less relevant keywords were removed.

3. Results and Discussion

3.1 Publication Data Search Results

Based on data searches using the Publish or Perish Reference Manager application from the Google Scholar database, 779 articles that met the research criteria were obtained. The data obtained were in the form of article metadata consisting of author name, title, year, journal name,

publisher, number of citations, article links, and related URLs. Table 2 shows some examples of published data used in the VOSviewer analysis in this study. The data sample was from the top 21 articles with the highest number of citations. The number of citations of all articles used in this study was 77011. The number of citations per year was 3850.55. The number of citations per article was 98.86. The average author in the article used was 2.75. All articles had an average h-index of 141 and a g-index of 242.

Table 2
Digital technology in quality management publication data

No	Authors	Title	Year	Cites	Refs
1	Kaynak	The relationship between total quality management practices and their effects on firm performance	2003	3000	[75]
2	Ivanov *et al.,*	The impact of digital technology and Industry 4.0 on the ripple effect and supply chain risk analytics	2019	1258	[76]
3	Kim *et al.,*	Relationship between quality management practices and innovation	2012	962	[77]
4	Sadikoglu & Zehir	Investigating the effects of innovation and employee performance on the relationship between total quality management practices and firm performance: An empirical study of Turkish firms	2010	920	[78]
5	Nair	Meta-analysis of the relationship between quality management practices and firm performance—implications for quality management theory development	2006	872	[79]
6	Kwon *et al.,*	Data quality management, data usage experience and acquisition intention of big data analytics	2014	858	[80]
7	Robinson & Malhotra	Defining the concept of supply chain quality management and its relevance to academic and industrial practice	2005	815	[81]
8	Zu *et al.,*	The evolving theory of quality management: the role of Six Sigma	2008	790	[82]
9	Wang *et al.,*	Total quality management, market orientation and hotel performance: The moderating effects of external environmental factors	2012	743	[83]
10	Prajogo & Sohal	The relationship between organization strategy, total quality management (TQM), and organization performance—the mediating role of TQM	2006	733	[84]
11	Prajogo & McDermott	The relationship between total quality management practices and organizational culture	2005	729	[85]
12	Kaynak & Hartley	A replication and extension of quality management into the supply chain	2008	706	[86]
13	Terlaak & King	The effect of certification with the ISO 9000 Quality Management Standard: A signalling approach	2006	696	[87]
14	Fotopoulos & Psomas	The impact of “soft” and “hard” TQM elements on quality management results	2009	671	[88]
15	Baird *et al.,*	The relationships between organizational culture, total quality management practices and operational performance	2011	606	[89]
16	Lin *et al.,*	A structural equation model of supply chain quality management and organizational performance	2005	583	[90]
17	Goonetilleke *et al.,*	Understanding the role of land use in urban stormwater quality management	2005	575	[91]
18	Lakhal *et al.,*	Quality management practices and their impact on performance	2006	574	[92]
19	Wang & Hao	Air quality management in China: Issues, challenges, and options	2012	567	[93]

20	Thai Hoang *et al.,*	The impact of total quality management on innovation: Findings from a developing country	2006	567	[94]
21	Vidon *et al.,*	Hot spots and hot moments in riparian zones: Potential for improved water quality management	2010	554	[95]

3.2 Development of Research on Digital Technology in Quality Management

Table 3 shows the number of research publications on digital quality management in journals indexed by Google Scholar between 2003 and 2008. From 2003 to 2008, the number of publications fluctuated between 17 and 26 per year. From 2009 to 2018, the number of publications fluctuated between 32 and 47 per year. From 2019 to 2022, there were further fluctuations, with the number of publications reaching 60 to 78 articles per year.

Table 3
Research on digital technology in quality management

Year of Publications	Number of Publications
2003	26
2004	22
2005	23
2006	17
2007	17
2008	22
2009	34
2010	35
2011	33
2012	32
2013	33
2014	47
2015	40
2016	39
2017	45
2018	47
2019	63
2020	78
2021	66
2022	60
Total	779
Average	38,95

Figure 1 shows the development of research on digital technology in quality management over the last 20 years from 2003 to 2022. As shown in Figure 1, the development of research on digital technology in quality management fluctuates from year to year. In 2003, 26 relevant studies were published. In 2004, this number fell to 22, rose to 23 in 2005, and fell again to 17 in 2006 and 2007. In 2008, the number of publications increased to 22 and gradually increased each year, reaching a peak of 78 publications in 2020. After 2020, the number of publications decreased slightly to 66 in 2021 and 60 in 2022.

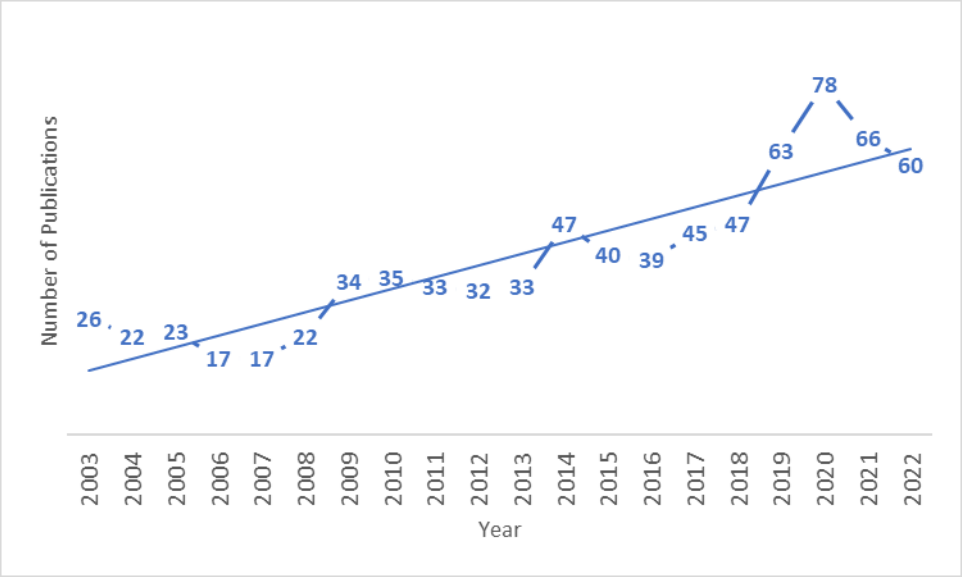

Fig. 1. Level of digital technology in quality management research

3.3 Visualization of Digital Technology in Quality Management Topic Area

Data were computer-mapped using VOSviewer. The mapping results showed that there were 96 items related to the use of digital technology in quality management. All items were successfully grouped into six clusters, each representing aspects related to the use of digital technology in quality management.

i. Cluster 1 consisted of 22 items, shown in red. The items related to adoption, attitudes, benefits, challenges, change, covid, data quality management, development, digital technology, use of digital technology, education, college, information, pandemic, patients, perception, service, teaching, technology, time, university, and employment.
ii. Cluster 2 consisted of 21 items, shown in green. The items related to analysis, approach, business, case study, certification, framework, hospital, implications, integration, ISO, management, QMS, quality, quality management, quality management standards, quality management systems, service quality management, supply chains, supply chain management, uncertainty, and water quality management.
iii. Cluster 3 consisted of 19 items, shown in dark blue. The items related to corporate social responsibility, culture, empirical studies, entrepreneurial orientation, environmental management, enterprise performance, impact, innovation, leadership, mediating effect, mediating role, medium-sized enterprises, organizational culture, organizational performance, performance, quality management practices, small and medium-sized enterprises, and total quality management.
iv. Cluster 4 consisted of 15 items marked in yellow. The items related to applications, construction industry, critical factors, critical success factors, customers, effectiveness, universities, importance, quality management research, quality management tools, strategies, techniques, tools, total quality management implementation, and TQM.
v. Cluster 5 consisted of 11 items, marked in purple. The items related to company, empirical research, industry, knowledge management, operational performance, organization, practice, quality performance, sigma, total productive maintenance, and total and quality management practices.

vi. Cluster 6 consisted of 8 items, shown in light blue. These items related to customer satisfaction, evidence, factors, innovation performance, manufacturing, opportunities, SCQM, and supply chain quality management.

Each cluster in the visualization shows the relationship between terms. Each term is marked by a coloured circle. The size of the label circle indicates the frequency the term appears in the title and abstract; therefore, the larger the circle size, the more often the term is found [40,73]. This study analysed three types of mapping visualization, namely network visualization (Figure 2), density visualization (Figure 3), and overlay visualization (Figure 4).

Figure 2 shows the relationship between terms related to the research topic 'digital technology for quality management' in an interconnected network. The clusters seen in the network visualization indicate that research on 'digital technology for quality management' could be divided into four areas. First, the term "quality management" belonged to Cluster 2, with a total of 91 links, a total link strength of 1695, and 530 related events (see Figure 5). Second, the term "total quality management" belonged to Cluster 3, with a total of 84 links, a total link strength of 1386, and 309 related events (see Figure 6). Third, the term "quality management system" belonged to Cluster 2, with a total of 61 links, a total link strength of 425, and 121 related events (see Figure 7). Fourth, the term "digital technology" belonged to Cluster 1, with a total of 53 links, a total link strength of 551, and 251 related events (see Figure 8).

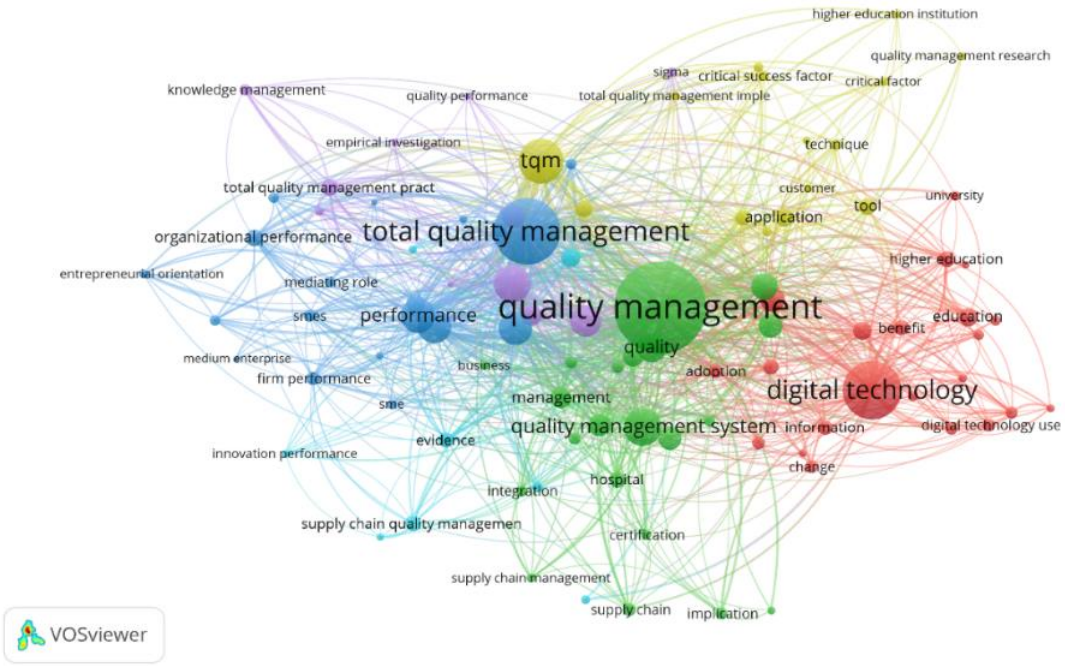

Fig. 2. Network visualization of digital technology and quality management keyword

Figure 3 shows the density visualization, which shows the extent to which a term appears in the research. This density visualization uses a lighter yellow colour scale and a larger diameter circle label to indicate how often the term appears [40,42,96]. This provides an idea of how much research has been conducted on these terms. If a term has a colour that fades closer to the background colour, it indicates that there is relatively little research on the term. From Figure 3, it concludes that terms such as 'quality management', 'total quality management', 'digital technology', and 'quality management system' have a high number of studies. It implies that many studies have been conducted on these terms, indicating the high interest and relevance of research in these areas.

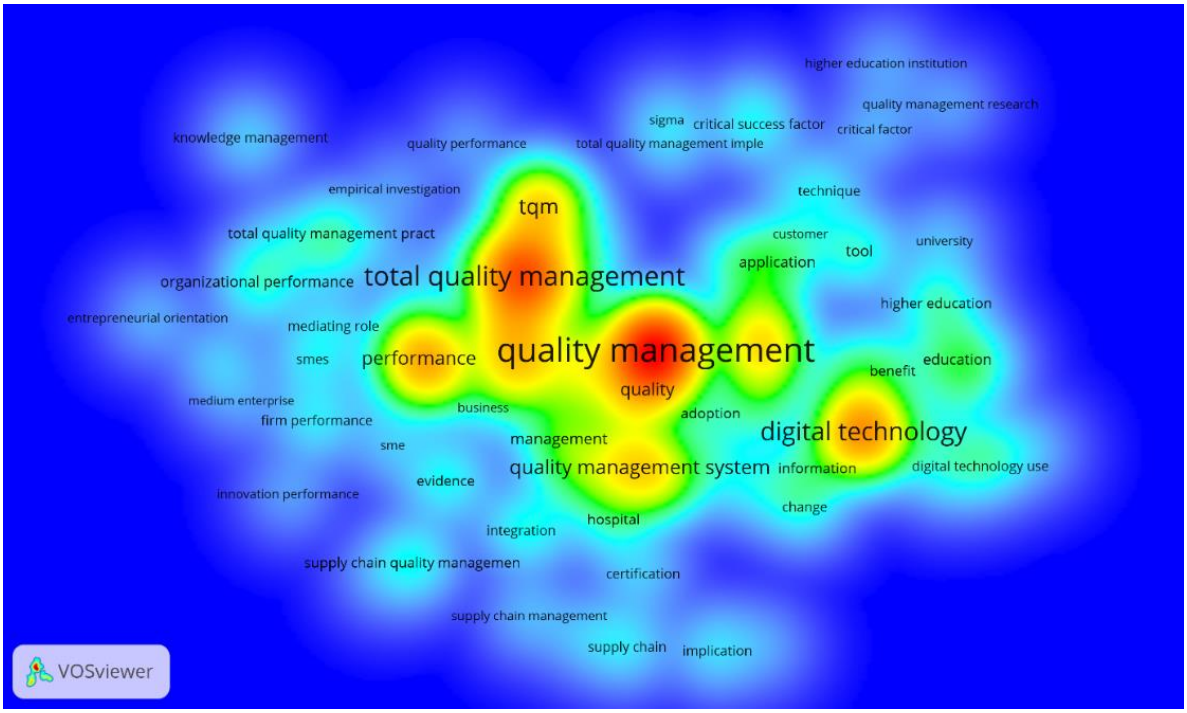

Fig. 3. Density visualization of digital technology and quality management keyword

Figure 4 shows an overlay visualization from a study on "digital technology in quality management". Overlay visualization shows recent developments in terms of this topic [40,42,73]. More specifically, in Figure 9, we can see that research on digital technology and quality management was mainly conducted during the 2017–2018 period. This shows that the term 'quality management' has been popular in research for quite a long time. Therefore, it is easy to conduct research on quality management.

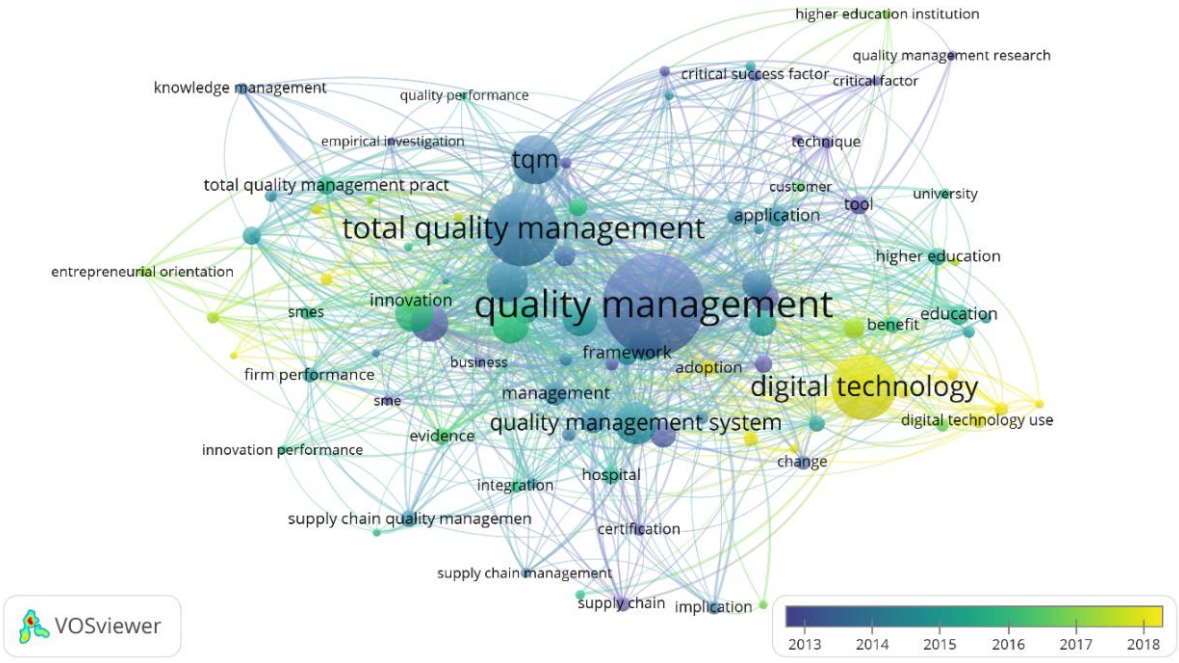

Fig. 4. Overlay visualization of digital technology and quality management keyword

Figure 5 illustrates the network of relationships between "quality management" and various related terms. In the figure, “quality management” is related to terms critical success factors, higher education institutions, quality management research, education, applications, customers, engineering, total quality management, knowledge management, total quality management practice, empirical investigation, organizational performance, performance, corporate social responsibility, environmental management, corporate performance, evidence, innovation performance, management, supply chain quality management, integration, supply chain management, accreditation, supply chain, change, digital technology, technology, adoption, and quality. Overall, this network of relationships reflects the complexity and importance of quality management in different aspects and organizational contexts.

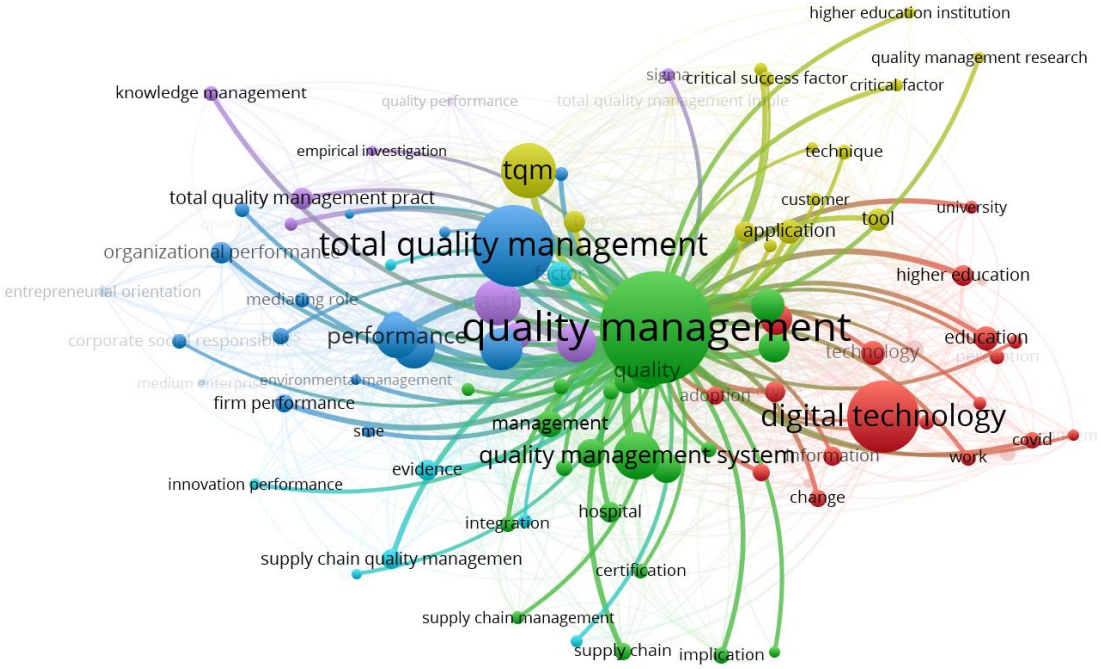

Fig. 5. Network visualization of quality management term

Figure 6 illustrates the network of relationships between the term "total quality management" and several existing terms. These terms include quality management, TQM, Sigma, total quality management implementation, critical factors, critical success factors, higher education institutions, techniques, customers, applications, tools, higher education, education, benefits, services, attitudes, time, covid, costs, quality performance, empirical investigation, total quality management practices, knowledge management, organizational performance, entrepreneurial orientation, mediating role, performance, corporate social responsibility, medium-sized enterprises, corporate performance, business, SMEs, innovation performance, evidence, management, hospitals, manufacturing, supply chain management, supply chain quality management, supply chain, and implications.

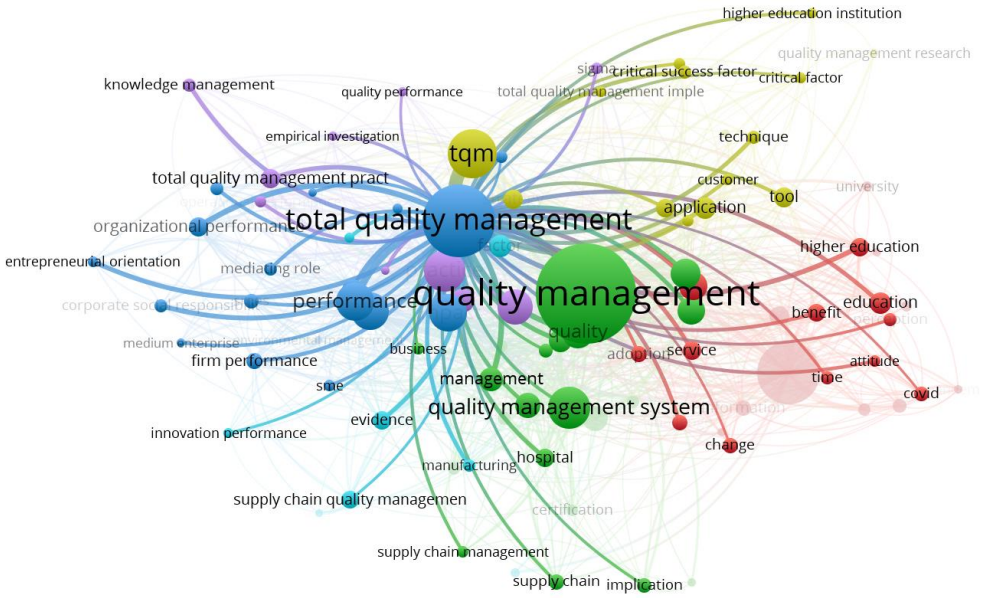

Fig. 6. Network visualization of total quality management term

Figure 7 illustrates the network of relationships between the term “digital technology” and other related terms. The terms associated with 'digital technology' include customer, application, tool, university, college, technology, adoption, information, change, use of digital technology, culture, strategy, factor, organizational performance, customer satisfaction, mediating role, SME, performance, business, quality, management, integration, supply management, supply chain, implication, covid, attitude, perception, benefit, and challenge.

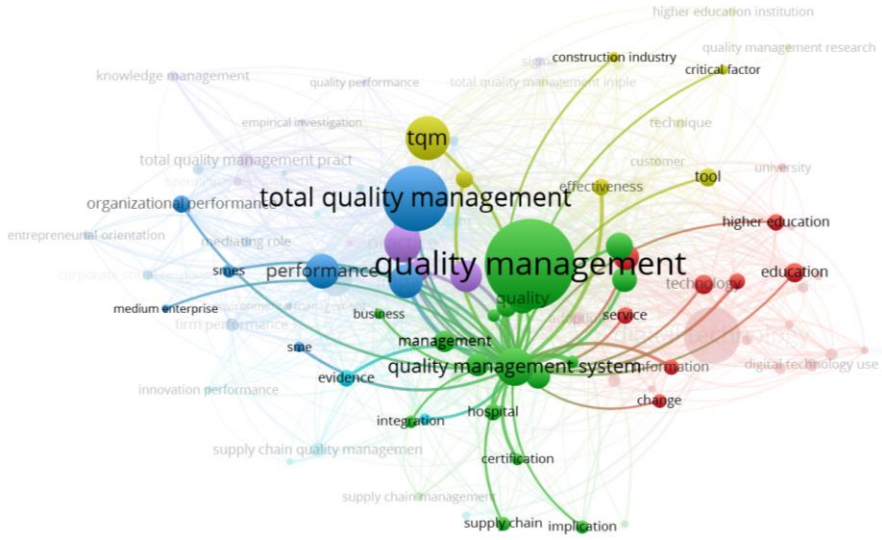

Fig. 7. Network visualization of quality management system term

Figure 8 shows the network of relationships between the term "quality management system" and other related terms, including quality management, total quality management, construction industry, critical factors, tools, effectiveness, universities, technology, services, costs, information, hospitals, certification, supply chain, certification, integration, evidence, management, business, SMEs, medium-sized enterprises, SMEs, and organizational performance.

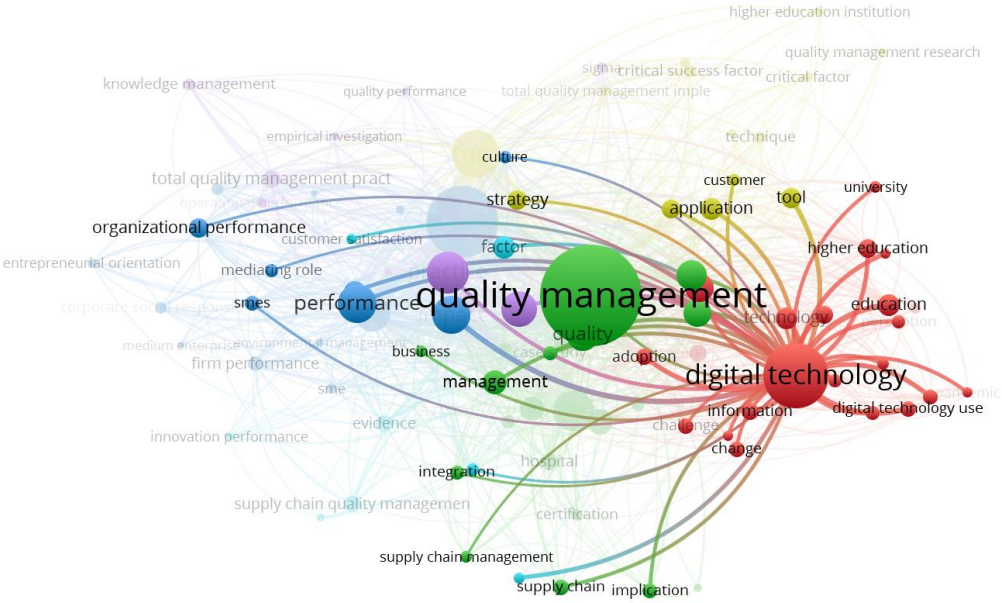

Fig. 8. Network visualization of digital technology term

Figure 9 shows that digital technology has little connection to other areas. Based on the mapping, there were only 53 links for digital technology. This is different from the fields of quality management, total quality management, and quality management systems, which have a high level of relevance and are often linked to other terms. Therefore, it indicates that the field of digital technology has a great potential for further research and links with other fields. More in-depth research in this area could have a greater impact on the future innovation and knowledge development.

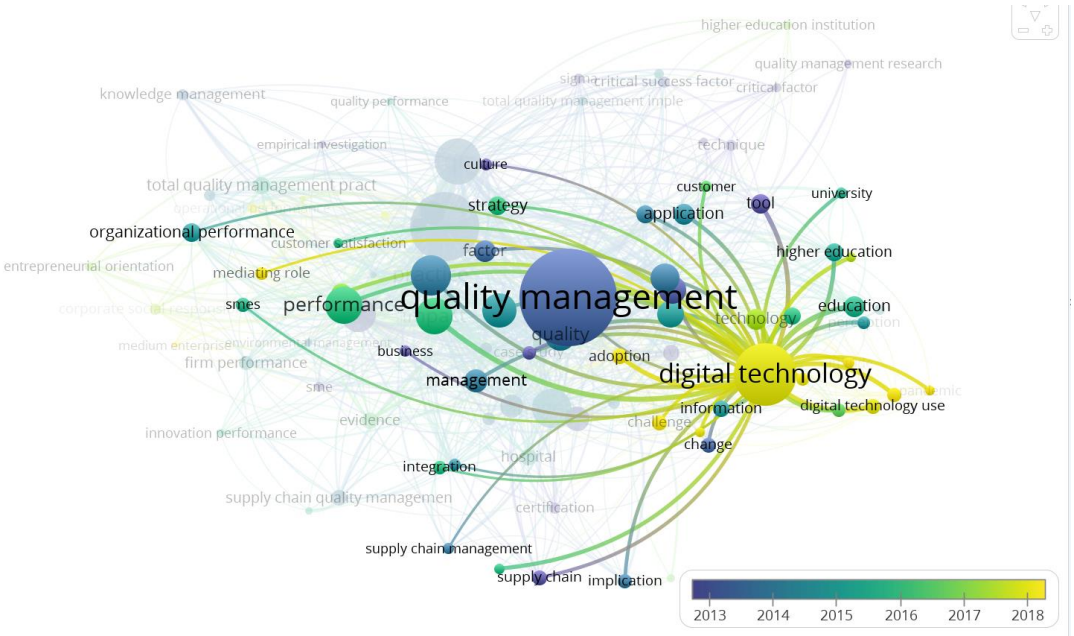

Fig. 9. Overlay visualization of digital technology term from 2017 to 2018

4. Conclusions

The purpose of this study was to analyse the computational mapping of bibliometric data in research articles focusing on the use of digital technology in quality management. This study used the publication theme "digital technology in quality management" and retrieved articles from the

Google Scholar database using Publish or Perish application. The data used in this study were the article titles and abstracts. The search results revealed 779 relevant articles published between 2003 and 2022. This study showed that research on the use of digital technology in quality management tended to fluctuate. This trend peaked in 2020, with 78 publications. The results of this study suggest that there is still a considerable scope for research on quality management and related topics.

Acknowledgement
This research was not funded by any grant.

References
[1] Shaturaev, Jakhongir. "Economies and management as a result of the fourth industrial revolution: An education perspective." *Indonesian Journal of Educational Research and Technology* 3, no. 1 (2022): 51-58. https://doi.org/10.17509/ijert.v3i1.45652
[2] Kowalik, Kamila, and Dorota Klimecka-Tatar. "The process approach to service quality management." *Production Engineering Archives* 18, no. 18 (2018): 31-34. https://doi.org/10.30657/pea.2018.18.05
[3] Rosak-Szyrocka, Joanna, and Ali Abdulhassan Abbase. "Quality management and safety of food in HACCP system aspect." *Production Engineering Archives* 26, no. 2 (2020): 50-53. https://doi.org/10.30657/pea.2020.26.11
[4] Glaveli, Niki, Panagiotis Manolitzas, Stergios Palamas, Evangelos Grigoroudis, and Constantin Zopounidis. "Developing effective strategic decision-making in the areas of hotel quality management and customer satisfaction from online ratings." *Current Issues in Tourism* 26, no. 6 (2023): 1003-1021. https://doi.org/10.1080/13683500.2022.2048805
[5] Nuhu, Kehinde Muritala, Damilola Ashiat Abdulfatai, and Amos Ochayi Onojah. "Undergraduate awareness and perception on the use of digital collaborative tools in facilitating learning in selected universities within the Ilorin metropolis." *Indonesian Journal of Educational Research and Technology* 1, no. 3 (2021): 95-104. https://doi.org/10.17509/ijert.v1i3.38735
[6] Babalola, Ebenezer Omolafe, Charity HM Boor, Gboyega Ayodeji Aladesusi, and Mariam Adenike Shomoye. "Development and validation of digital photo series for the teaching of BT in Ilorin, Nigeria." *Indonesian Journal of Educational Research and Technology* 1, no. 3 (2021): 105-116. https://doi.org/10.17509/ijert.v1i3.38760
[7] Muhabbat, Hakimova, Kalonov Mukhiddin, Hamidov Jalil, Khimmataliev Dustnazar, Turabekov Farxod, Mamarajabov Shavkat, Khakimova Khulkar, and Shaturaev Jakhongir. "The digital frontier: AI-enabled transformations in higher education management." *Indonesian Journal of Educational Research and Technology* 4, no. 1 (2024): 71-88.
[8] Tarisayi, Kudzayi Savious. "Memetized learning: How humor-infused stories can engage geography students in the digital age." *Indonesian Journal of Educational Research and Technology* 4, no. 2: 113-120.
[9] Maulid, Maulana Nur, and Asri Wibawa Sakti. "The effectiveness of learning videos as a source of digital literacy on poster learning in elementary schools." *Indonesian Journal of Multidiciplinary Research* 2, no. 1 (2022): 51-56. https://doi.org/10.17509/ijomr.v2i1.38623
[10] Anh, Doan Huynh Mai. "Factors affecting satisfaction on online education on students digital teaching page in Ho Chi Minh City, Vietnam." *Indonesian Journal of Multidiciplinary Research* 2, no. 1 (2022): 179-186. https://doi.org/10.17509/ijomr.v2i1.39079
[11] Sudaryat, Muhamad Ridwan, Muhammad Fajar Yusuf Firdaus, Adzkia Amatullah Salsabila, Siti Romlah, M. Mardiatunnisa, and Wina Nurhayati Praja. "Utilization of electronic community library as a localhost-based digital library in optimizing learning resources." *Indonesian Journal of Multidiciplinary Research* 2, no. 2 (2022): 291-298.
[12] Ogunleye, Abiola Olatunji. "Postgraduate students' attitude towards the use of digital library repositories for research in Kwara State." *Indonesian Journal of Multidiciplinary Research* 3, no. 2 (2023): 289-296.
[13] Fegarido, Xyra Jin O., Andrea Marie F. Flores, Isiah F. Jamison, Khirtz Rianne Edgar M. Sevelleno, V. Valdez, and Vivialyn Asoy Anamarie. "Digital to face-to-face classes: Students' challenges during the transitions of educational modes." *ASEAN Journal of Science and Engineering Education* 4, no. 2 (2024): 175-180.
[14] Risnandar, R., and Asri Wibawa Sakti. "Optimizing instagram in sociology materials to improve digital literacy for junior high school students." *ASEAN Journal of Educational Research and Technology* 1, no. 1 (2022): 39-46.
[15] Zuyyinasyam, Sophia, Asep Bayu Dani Nandiyanto, Tedi Kurniawan, and Dwi Fitria Al Husaeni. "Implementation of the educational personnel program for elementary school students in the digital age using google classroom." *ASEAN Journal of Educational Research and Technology* 2, no. 1 (2023): 29-34.

[16] Damayanti, Fairuz Nabila, Putri Kusmawati, Vivi Navia, and Senny Luckyardi. "Readiness the owner of small medium enterprises for digital financial records in society 5.0 Era." *ASEAN Journal of Economic and Economic Education* 1, no. 1 (2022): 1-8.
[17] Ariyanti, Levina Sari, and Asep Bayu Dani Nandiyanto. "Distance teaching of stress materials to junior high school students using digital media." *ASEAN Journal of Community Service and Education* 1, no. 1 (2022): 7-14.
[18] Hidayat, Aulia Zahrotunnida, and Asep Bayu Dani Nandiyanto. "Socialization of digital literacy in compiling a balanced healthy menu to members of POKJA III the PKK Movement Team of Purwakarta Regency." *ASEAN Journal of Community Service and Education* 1, no. 1 (2022): 77-82.
[19] Musayaroh, Siti, Neti Asmiati, Yuni Tanjung Utami, Dedi Mulia, Sistriadini Alamsyah Sidik, Reza Febri Abadi, Toni Yudha Pratama, Sayidatul Maslahah, and Anggoro Suryo Pramudyo. "A Digital Accessibility and Inclusive Design-Based E-Module in Higher Education: Does it Work in A Classroom with A Deaf Student?." *ASEAN Journal of Community and Special Needs Education* 2, no. 1 (2023): 55-60.
[20] Al Husaeni, Dwi Fitria, and W. Wahyudin. "Digital transformation in special needs education: Computational bibliometrics." *ASEAN Journal of Community and Special Needs Education* 2, no. 2 (2023): 97-110.
[21] Thach, Nguyen Ngoc, Hoang Thanh Hanh, Dinh Tran Ngoc Huy, and Quynh Nam Vu. "technology quality management of the industry 4.0 and cybersecurity risk management on current banking activities in emerging markets-the case in Vietnam." *International Journal for Quality Research* 15, no. 3 (2021): 845. https://doi.org/10.24874/IJQR15.03-10
[22] Nezdoyminov, Sergii, Ganna Bedradina, and Andrii Ivanov. "Digital technology in the management of quality service in tourism business." *International Journal of Engineering and Advanced Technology* 9, no. 1 (2019): 1865-1869. https://doi.org/10.35940/ijeat.A1001.109119
[23] Aleksandrova, Svetlana V., Victor A. Vasiliev, and Gennady M. Letuchev. "Digital technology and quality management." In *2018 IEEE International Conference" Quality Management, Transport and Information Security, Information Technologies"(IT&QM&IS)*, pp. 18-21. IEEE, 2018. https://doi.org/10.1109/ITMQIS.2018.8525075
[24] Rodionov, Nikita, and Lyudmila Tatarnikova. "Digital twin technology as a modern approach to quality management." In *E3S Web of Conferences*, vol. 284, p. 04013. EDP Sciences, 2021. https://doi.org/10.1051/e3sconf/202128404013
[25] Aithal, P. S., and Shubhrajyotsna Aithal. "Management of ICCT underlying technologies used for digital service innovation." *International Journal of Management, Technology, and Social Sciences (IJMTS)* 4, no. 2 (2019): 110-136. https://doi.org/10.47992/IJMTS.2581.6012.0077
[26] Firdiarahma, Farah. "The use of virtual reality as a substitute for the pre-school students' field trip activity during the learning from home period." *Indonesian Journal of Educational Research and Technology* 1, no. 2 (2021): 57-60. https://doi.org/10.17509/ijert.v1i2.33410
[27] Ekunola, Gbadebo Temitope, Amos Ochayi Onojah, Ahmed Fahdilat Talatu, and Moyosore Olakunle Bankole. "Colleges of education lecturers' attitude towards the use of virtual classrooms for instruction." *Indonesian Journal of Multidiciplinary Research* 2, no. 1 (2022): 187-194. https://doi.org/10.17509/ijomr.v2i1.39396
[28] Bugarso, John Marc S., Ramel E. Cabantugan, D. Tapiculin Que-ann, and Amera C. Malaco. "Students' learning experiences and preference in performing science experiments using hands-on and virtual laboratory." *Indonesian Journal of Teaching in Science* 1, no. 2 (2021): 147-152. https://doi.org/10.17509/ijotis.v1i2.41122
[29] Azizah, Elza Varih, Asep Bayu Dani Nandiyanto, Tedi Kurniawan, and Muhammad Roil Bilad. "The effectiveness of using a virtual laboratory in distance learning on the measurement materials of the natural sciences of physics for junior high school students." *ASEAN Journal of Science and Engineering Education* 2, no. 3 (2022): 207-214.
[30] Ekunola, Gbadebo Temitope, Omotayo Olabo Obielodan, and Ebenezer Omolafe Babalola. "Lecturers perceived proficiency in the use of virtual classrooms for instruction in colleges of education." *ASEAN Journal of Educational Research and Technology* 1, no. 1 (2022): 7-16.
[31] Sison, Arnolfo Jade Ryan N., Jason M. Bautista, Janine L. Javier, Renee Juselle B. Delmonte, and Rizalyn B. Cudera. "Development and acceptability of virtual laboratory in learning systematics." *ASEAN Journal of Educational Research and Technology* 3, no. 1 (2024): 9-26.
[32] Rivky, Muhammad, Moh Rizqy Khottibul Fajar, and Aa Ragha Pangestu. "Utilization of virtual reality chat as a means of learning communication in the field of education." *ASEAN Journal of Community Service and Education* 1, no. 1 (2022): 23-30.
[33] Bangkerd, Paweena, and Thosporn Sangsawang. "Development of augmented reality application for exercise to promote health among elderly." *Indonesian Journal of Educational Research and Technology* 1, no. 3 (2021): 77-80. https://doi.org/10.17509/ijert.v1i3.33643
[34] Albar, C. N., M. Givaldi Widiansyah, S. Mubarok, M. A. Aziz, and Hanhan Maulana. "Application of augmented reality technology with the fuzzy logic method as an online physical education lecture method in the new normal

era." *Indonesian Journal of Multidiciplinary Research* 1, no. 1 (2021): 35-40. https://doi.org/10.17509/ijomr.v1i1.33762

[35] Soko, Yohane, Mubanga Mpundu, and Tryson Yangailo. "Determinants of learning management system (LMS) adoption by university students for distance learning." *Indonesian Journal of Educational Research and Technology* 4, no. 2 (2024): 171-186.

[36] Al Husaeni, Dwi Novia, and Daris Hadianto. "The influence of spada learning management system (LMS) on algorithm learning and programming of first grade students at Universitas Pendidikan Indonesia." *Indonesian Journal of Multidiciplinary Research* 2, no. 1 (2022): 203-212. https://doi.org/10.17509/ijomr.v2i1.42906

[37] Al Husaeni, Dwi Fitria, and Asep Bayu Dani Nandiyanto. "Bibliometric computational mapping analysis of publications on mechanical engineering education using vosviewer." *Journal of Engineering Science and Technology* 17, no. 2 (2022): 1135-1149.

[38] Choudhri, Asim F., Adeel Siddiqui, Nickalus R. Khan, and Harris L. Cohen. "Understanding bibliometric parameters and analysis." *Radiographics* 35, no. 3 (2015): 736-746. https://doi.org/10.1148/rg.2015140036

[39] Ellegaard, Ole, and Johan A. Wallin. "The bibliometric analysis of scholarly production: How great is the impact?." *Scientometrics* 105 (2015): 1809-1831. https://doi.org/10.1007/s11192-015-1645-z

[40] Nandiyanto, Asep Bayu Dani, D. N. Al Husaeni, and D. F. Al Husaeni. "A bibliometric analysis of chemical engineering research using vosviewer and its correlation with covid-19 pandemic condition." *Journal of Engineering Science and Technology* 16, no. 6 (2021): 4414-4422.

[41] Nugraha, Egan Reyhansyah, and Asep Bayu Dani Nandiyanto. "Analysis of titanium dioxide nanoparticle synthesis research for photocatalysis using vosviewer." *Open Soil Science and Environment* 1, no. 1 (2022): 8-14.

[42] Nandiyanto, Asep Bayu Dani, and Dwi Fitria Al Husaeni. "A bibliometric analysis of materials research in Indonesian journal using VOSviewer." *Journal of Engineering Research* (2021).

[43] Ragadhita, Risti, and Asep Bayu Dani Nandiyanto. "Computational bibliometric analysis on publication of techno-economic education." *Indonesian Journal of Multidiciplinary Research* 2, no. 1 (2022): 213-222. https://doi.org/10.17509/ijomr.v2i1.43180

[44] Nandiyanto, Asep Bayu Dani, Muhammad Kunta Biddinika, and Farid Triawan. "How bibliographic dataset portrays decreasing number of scientific publication from Indonesia." *Indonesian Journal of Science and Technology* 5, no. 1 (2020): 154-175. https://doi.org/10.17509/ijost.v5i1.22265

[45] Nandiyanto, Asep Bayu Dani, Muhammad Kunta Biddinika, And F. A. R. I. D. Triawan. "Evaluation on research effectiveness in a subject area among top class universities: a case of Indonesia's academic publication dataset on chemical and material sciences." *Journal of Engineering Science and Technology* 15, no. 3 (2020): 1747-1775.

[46] Al Husaeni, Dwi Novia, Asep Bayu Dani Nandiyanto, and Rina Maryanti. "Bibliometric analysis of special needs education keyword using VOSviewer indexed by google scholar." *Indonesian Journal of Community and Special Needs Education* 3, no. 1 (2023): 1-10. https://doi.org/10.17509/ijcsne.v3i1.43181

[47] Al-Emran, Mostafa, and Andrina Granić. "Is it still valid or outdated? A bibliometric analysis of the technology acceptance model and its applications from 2010 to 2020." *Recent advances in technology acceptance models and theories* (2021): 1-12. https://doi.org/10.1007/978-3-030-64987-6_1

[48] Li, Bo, and Zeshui Xu. "Insights into financial technology (FinTech): a bibliometric and visual study." *Financial innovation* 7 (2021): 1-28. https://doi.org/10.1186/s40854-021-00285-7

[49] Nasir, Adeel, Kamran Shaukat, Kanwal Iqbal Khan, Ibrahim A. Hameed, Talha Mahboob Alam, and Suhuai Luo. "Trends and directions of financial technology (Fintech) in society and environment: A bibliometric study." *Applied Sciences* 11, no. 21 (2021): 10353. https://doi.org/10.3390/app112110353

[50] Krishen, Anjala S., Yogesh K. Dwivedi, N. Bindu, and K. Satheesh Kumar. "A broad overview of interactive digital marketing: A bibliometric network analysis." *Journal of Business Research* 131 (2021): 183-195. https://doi.org/10.1016/j.jbusres.2021.03.061

[51] Dunakhe, Kedar, and Chetan Panse. "Impact of digital marketing–a bibliometric review." *International Journal of Innovation Science* 14, no. 3/4 (2022): 506-518. https://doi.org/10.1108/IJIS-11-2020-0263

[52] Ali, Javed, Ahmad Jusoh, Norhalimah Idris, Alhamzah F. Abbas, and Ahmed H. Alsharif. "Everything is Going Electronic, so do Services and Service Quality: Bibliometric Analysis of E-Services and E-Service Quality." *IJIM* 15 (2021): 148-167. https://doi.org/10.3991/ijim.v15i18.24519

[53] Chen, W., and C. H. You. "Visualizing the intellectual structure and evolution of e-service research." In *Computational Social Science*, pp. 237-241. Routledge, 2022. https://doi.org/10.1201/9781003304791-36

[54] Sadeghi-Niaraki, Abolghasem. "Internet of Thing (IoT) review of review: Bibliometric overview since its foundation." *Future Generation Computer Systems* 143 (2023): 361-377. https://doi.org/10.1016/j.future.2023.01.016

[55] Li, Xiang, Chanil Pak, and Kexin Bi. "Analysis of the development trends and innovation characteristics of Internet of Things technology–based on patentometrics and bibliometrics." *Technology Analysis & Strategic Management* 32, no. 1 (2020): 104-118. https://doi.org/10.1080/09537325.2019.1636960

[56] Subagio, Hartono. "Integrating Diffusion Perspective of Total Quality Management Improvement in SMEs Indonesia Sector: a Bibliometric Analysis." *Journal of Entrepreneurship and Business* 4, no. 2 (2023): 82-92. https://doi.org/10.24123/jeb.v4i2.5476

[57] Nandiyanto, Asep Bayu Dani, Risti Ragadhita, and Muhammad Aziz. "Involving particle technology in computational fluid dynamics research: A bibliometric analysis." *CFD Letters* 15, no. 11 (2023): 92-109. https://doi.org/10.37934/cfdl.15.11.92109

[58] Muktiarni, M., Nur Indri Rahayu, Affero Ismail, and Amalia Kusuma Wardani. "Bibliometric computational mapping analysis of trend metaverse in education using vosviewer." *Journal of Advanced Research in Applied Sciences and Engineering Technology* 32, no. 2 (2023): 95-106. https://doi.org/10.37934/araset.32.2.95106

[59] Rahayu, Nur Indri, Adang Suherman, and M. Muktiarni. "The use of information technology and lifestyle: An evaluation of digital technology intervention for improving physical activity and eating behavior." *Journal of Advanced Research in Applied Sciences and Engineering Technology* 32, no. 1 (2023): 303-314. https://doi.org/10.37934/araset.32.1.303314

[60] Fauziah, Siti Pupu, Irman Suherman, Mega Febriani Sya, Martin Roestamy, Amirullah Abduh, and Asep Bayu Dani Nandiyanto. "Strategies in language education to improve science student understanding during practicum in laboratory: Review and computational bibliometric analysis." *International Journal of Language Education* 5, no. 4 (2021).

[61] Al Husaeni, D. F., D. N. Al Husaeni, R. Ragadhita, M. R. Bilad, A. S. M. Al-Obaidi, A. Abduh, and A. B. D. Nandiyanto. "How language and technology can improve student learning quality in engineering? Definition, factors for enhancing students comprehension, and computational bibliometric analysis." *International Journal of Language Education* 6, no. 4 (2022): 445-476. https://doi.org/10.26858/ijole.v6i4.53587

[62] Kumar, Kutty. "Mapping of nanotechnology research in animal science: Scientometric anlaysis." *Kumar (22021) Mapping of Nanotechnology Research in Animal Science: Scientometric Analysis. ASEAN Journal of Science and Engineering* 1, no. 2 (2021): 111-126. https://doi.org/10.17509/ajse.v1i2.35092

[63] Nurrahma, Arinal Haq Izzawati, Hana Haruna Putri, and Ray March Syahadat. "Scientific research trends of flooding stress in plant science and agriculture subject areas (1962-2021)." *ASEAN Journal of Science and Engineering* 3, no. 2 (2023): 163-178. https://doi.org/10.17509/ajse.v3i2.46148

[64] Nandiyanto, Asep Bayu Dani, Dwi Novia Al Husaeni, and Dwi Fitria Al Husaeni. "Introducing ASEAN journal of science and engineering: A bibliometric analysis study." *Journal of Advanced Research in Applied Sciences and Engineering Technology* 31, no. 3 (2023): 173-190.

[65] Nandiyanto, Asep Bayu Dani, and Dwi Fitria Al Husaeni. "Bibliometric analysis of engineering research using vosviewer indexed by google scholar." *Journal of Engineering Science and Technology* 17, no. 2 (2022): 883-894.

[66] Nandiyanto, A. B. D., R. Ragadhita, D. N. Al Husaeni, and W. C. Nugraha. "Research trend on the use of mercury in gold mining: Literature review and bibliometric analysis." *Moroccan Journal of Chemistry* 11, no. 1 (2023): 11-1.

[67] Nandiyanto, Asep Bayu Dani, Risti Ragadhita, Meli Fiandini, Dwi Fitria Al Husaeni, Dwi Novia Al Husaeni, and Farid Fadhillah. "Domestic waste (eggshells and banana peels particles) as sustainable and renewable resources for improving resin-based brakepad performance: Bibliometric literature review, techno-economic analysis, dual-sized reinforcing experiments, to comparison..." *Communications in Science and Technology* 7, no. 1 (2022): 50-61. https://doi.org/10.21924/cst.7.1.2022.757

[68] Mardina, Primata, Hesti Wijayanti, Rinna Juwita, Meilana Dharma Putra, Iryanti Fatyasari Nata, Rowina Lestari, Muhammad Faqih Al-Amin, Regi Abizar Suciagi, Oktefani Kusuma Rawei, and Liza Lestari. "Corncob-derived sulfonated magnetic solid catalyst synthesis as heterogeneous catalyst in the esterification of waste cooking oil and bibliometric analysis." *Indonesian Journal of Science and Technology* 9, no. 1 (2024): 109-124. https://doi.org/10.17509/ijost.v9i1.64219

[69] Abduh, Amirullah, Ade Mulianah, Besse Darmawati, Fairul Zabadi, Umar Sidik, Wuri Handoko, Karta Jayadi, and Rosmaladewi Rosmaladewi. "The compleat lextutor application tool for academic and technological lexical learning: Review and bibliometric approach." *Indonesian Journal of Science and Technology* 8, no. 3 (2023): 539-560. https://doi.org/10.17509/ijost.v8i3.63539

[70] Lizama, Maria Guzman, Jair Huesa, and Brian Meneses Claudio. "Use of blockchain technology for the exchange and secure transmission of medical images in the cloud: Systematic review with bibliometric analysis." *ASEAN Journal of Science and Engineering* 4, no. 1 (2024): 71-92. https://doi.org/10.17509/ajse.v4i1.65039

[71] Al Husaeni, Dwi Novia, Dwi Fitria Al Husaeni, Asep Bayu Dani Nandiyanto, and Abdulkareem Sh Mahdi Al-Obaidi. "Introducing ASEAN Journal of Science and Engineering Education: A bibliometric analysis study for understanding internationalization." *Data and Metadata* 1 (2022): 82-82. https://doi.org/10.56294/dm202282

[72] Al Husaeni, Dwi Fitria, and W. Wahyudin. "Digital transformation in special needs education: Computational bibliometrics." *ASEAN Journal of Community and Special Needs Education* 2, no. 2 (2023): 97-110.
[73] Al Husaeni, Dwi Fitria, and Asep Bayu Dani Nandiyanto. "Bibliometric using Vosviewer with Publish or Perish (using google scholar data): From step-by-step processing for users to the practical examples in the analysis of digital learning articles in pre and post Covid-19 pandemic." *ASEAN Journal of Science and Engineering* 2, no. 1 (2022): 19-46. https://doi.org/10.17509/ajse.v2i1.37368
[74] Azizah, Nissa Nur, Rina Maryanti, and Asep Bayu Dani Nandiyanto. "How to search and manage references with a specific referencing style using google scholar: From step-by-step processing for users to the practical examples in the referencing education." *Indonesian Journal of Multidiciplinary Research* 1, no. 2 (2021): 267-294. https://doi.org/10.17509/ijomr.v1i2.37694
[75] Kaynak, Hale. "The relationship between total quality management practices and their effects on firm performance." *Journal of operations management* 21, no. 4 (2003): 405-435. https://doi.org/10.1016/S0272-6963(03)00004-4
[76] Ivanov, Dmitry, Alexandre Dolgui, and Boris Sokolov. "The impact of digital technology and Industry 4.0 on the ripple effect and supply chain risk analytics." *International journal of production research* 57, no. 3 (2019): 829-846. https://doi.org/10.1080/00207543.2018.1488086
[77] Kim, Dong-Young, Vinod Kumar, and Uma Kumar. "Relationship between quality management practices and innovation." *Journal of operations management* 30, no. 4 (2012): 295-315. https://doi.org/10.1016/j.jom.2012.02.003
[78] Sadikoglu, Esin, and Cemal Zehir. "Investigating the effects of innovation and employee performance on the relationship between total quality management practices and firm performance: An empirical study of Turkish firms." *International journal of production economics* 127, no. 1 (2010): 13-26. https://doi.org/10.1016/j.ijpe.2010.02.013
[79] Nair, Anand. "Meta-analysis of the relationship between quality management practices and firm performance—implications for quality management theory development." *Journal of operations management* 24, no. 6 (2006): 948-975. https://doi.org/10.1016/j.jom.2005.11.005
[80] Kwon, Ohbyung, Namyeon Lee, and Bongsik Shin. "Data quality management, data usage experience and acquisition intention of big data analytics." *International journal of information management* 34, no. 3 (2014): 387-394. https://doi.org/10.1016/j.ijinfomgt.2014.02.002
[81] Robinson, Carol J., and Manoj K. Malhotra. "Defining the concept of supply chain quality management and its relevance to academic and industrial practice." *International journal of production economics* 96, no. 3 (2005): 315-337. https://doi.org/10.1016/j.ijpe.2004.06.055
[82] Zu, Xingxing, Lawrence D. Fredendall, and Thomas J. Douglas. "The evolving theory of quality management: the role of Six Sigma." *Journal of operations Management* 26, no. 5 (2008): 630-650. https://doi.org/10.1016/j.jom.2008.02.001
[83] Wang, Cheng-Hua, Kuan-Yu Chen, and Shiu-Chun Chen. "Total quality management, market orientation and hotel performance: The moderating effects of external environmental factors." *International journal of hospitality management* 31, no. 1 (2012): 119-129. https://doi.org/10.1016/j.ijhm.2011.03.013
[84] Prajogo, Daniel I., and Amrik S. Sohal. "The relationship between organization strategy, total quality management (TQM), and organization performance—the mediating role of TQM." *European journal of operational research* 168, no. 1 (2006): 35-50. https://doi.org/10.1016/j.ejor.2004.03.033
[85] Prajogo, Daniel I., and Christopher M. McDermott. "The relationship between total quality management practices and organizational culture." *international Journal of operations & production management* 25, no. 11 (2005): 1101-1122. https://doi.org/10.1108/01443570510626916
[86] Kaynak, Hale, and Janet L. Hartley. "A replication and extension of quality management into the supply chain." *Journal of operations management* 26, no. 4 (2008): 468-489. https://doi.org/10.1016/j.jom.2007.06.002
[87] Terlaak, Ann, and Andrew A. King. "The effect of certification with the ISO 9000 Quality Management Standard: A signaling approach." *Journal of economic behavior & organization* 60, no. 4 (2006): 579-602. https://doi.org/10.1016/j.jebo.2004.09.012
[88] Fotopoulos, Christos B., and Evangelos L. Psomas. "The impact of "soft" and "hard" TQM elements on quality management results." *International Journal of Quality & Reliability Management* 26, no. 2 (2009): 150-163. https://doi.org/10.1108/02656710910928798
[89] Baird, Kevin, Kristal Jia Hu, and Robert Reeve. "The relationships between organizational culture, total quality management practices and operational performance." *International journal of operations & production management* 31, no. 7 (2011): 789-814. https://doi.org/10.1108/01443571111144850

[90] Lin, Chinho, Wing S. Chow, Christian N. Madu, Chu-Hua Kuei, and Pei Pei Yu. "A structural equation model of supply chain quality management and organizational performance." *International journal of production economics* 96, no. 3 (2005): 355-365. https://doi.org/10.1016/j.ijpe.2004.05.009

[91] Goonetilleke, Ashantha, Evan Thomas, Simon Ginn, and Dale Gilbert. "Understanding the role of land use in urban stormwater quality management." *Journal of environmental management* 74, no. 1 (2005): 31-42. https://doi.org/10.1016/j.jenvman.2004.08.006

[92] Lakhal, Lassâad, Federico Pasin, and Mohamed Limam. "Quality management practices and their impact on performance." *International Journal of Quality & Reliability Management* 23, no. 6 (2006): 625-646. https://doi.org/10.1108/02656710610672461

[93] Wang, Shuxiao, and Jiming Hao. "Air quality management in China: Issues, challenges, and options." *Journal of Environmental Sciences* 24, no. 1 (2012): 2-13. https://doi.org/10.1016/S1001-0742(11)60724-9

[94] Thai Hoang, Dinh, Barbara Igel, and Tritos Laosirihongthong. "The impact of total quality management on innovation: Findings from a developing country." *International journal of quality & reliability management* 23, no. 9 (2006): 1092-1117. https://doi.org/10.1108/02656710610704230

[95] Vidon, Philippe, Craig Allan, Douglas Burns, Tim P. Duval, Noel Gurwick, Shreeram Inamdar, Richard Lowrance, Judy Okay, Durelle Scott, and Steve Sebestyen. "Hot spots and hot moments in riparian zones: potential for improved water quality management 1." *JAWRA Journal of the American Water Resources Association* 46, no. 2 (2010): 278-298. https://doi.org/10.1111/j.1752-1688.2010.00420.x

[96] Mulyawati, Isah Bela, and Doni Fajar Ramadhan. "Bibliometric and visualized analysis of scientific publications on geotechnics fields." *ASEAN Journal of Science and Engineering Education* 1, no. 1 (2021): 37-46. https://doi.org/10.17509/ajsee.v1i1.32405

[97] Hasim, Nur Aiman Hanis, Suriati Akmal, Sayed Kushairi Sayed Nordin, Ruzy Haryati Hambali, Mohd Fauzi Mamat, Abdulla Thamer Jumma Aldharif Alshamsi, and Supawi Pawenang. "Modelling Total Quality Management in the Malaysian Composite Manufacturing Industry." *Malaysian Journal on Composites Science and Manufacturing* 7, no. 1 (2022): 11-22. https://doi.org/10.37934/mjcsm.7.1.1122