A Scientometric Analysis of Hajj Service Literature During Covid-19

Nadia Nurul Izza[1]
[1]*Tazkia Islamic University College, Indonesia.*

Hajj is the fifth pillar of Islam and is unique worship so that almost all Muslims want to carry out this worship. During the COVID-19 pandemic, a solution is needed to provide the best service to pilgrims. Every year, new services are developed by utilizing advances in technology and the service industry to help prospective pilgrims who plan to perform the pilgrimage. Research related to the theme of Hajj service is constantly increasing every year. This study aims to determine research trends regarding Hajj service published by dimensions-indexed journals. The method used is descriptive statistical analysis with meta-analysis and bibliometry of secondary data in the form of 142 published papers in the last four years which are then processed using Microsoft Excel 2019. The data is then processed and analyzed using the VOSviewer application to find out the bibliometric map of the Hajj service research development. The results of this study are that digitization in hajj services provides convenience for hajj pilgrims and increases efficiency. This study consists of 6 clusters, with the red cluster being the most significant cluster with 16 authors, namely Nouf Hameed, Osama Hamad, Naif Olaythah, Fareed Ali, Mesfer, Ahmad M., Majed Mohammad, Yousef Ahmed, Abdulrahman Safar, Taha Muhammad, Yasir Abdulraheem, Lamees Essa, Hani Mohammad, Nezar Adnan, Nojoud Adnan, and Wael H. This study opens a new research direction that is practical, which was chosen based on a holistic review of the current technological analytic survey, which is essential to be considered for improving Hajj services and Umrah with today's technology. However, it is also necessary to research the development of the literature.

Keywords: Hajj Service; Bibliometric; VOSviewer

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*Correspondence:
Nadia Nurul Izza
nadian.izza31@gmail.com

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INTRODUCTION

Every Muslim, regardless of location, is required to conduct the Hajj, or annual pilgrimage to Mecca, at least once in their lives. Although the responsibility is conditional—the Muslim is not necessary to undertake the deed beyond their physical or economic means—it originates with God, as revealed in His Holy Quran. According to Qur'an Surah Ali Imran (3):97, Allah says: "There are clear signs and the station of Abraham; whoever enters it becomes secure. Pilgrimage to the House is a duty owed to Allah by all who can make their way to it. As for those who refuse to follow His command, surely Allah does not stand in need of anything."

Hajj is one of the fifth pillars of Islam and is performed annually in Mecca (J. Rahman et al., 2017; Taibah et al., 2018). Hajj is also known as a collective act of submission. Those who are able must respond to the Lord's call. This devotional act is not a community obligation (wajib kifai); instead, it is a personal obligation (wajib aynt) for every individual who possesses the ability and means to complete the journey successfully. The pilgrimage is considered a worldwide gathering since it brings together all Muslims capable of praying to visit holy sites in and around Makkah (Alharthi & Gutub, 2017; Alnabulsi et al., 2018; Fathurrahman et al., 2021; Hussain et al., 2021). Around two million Muslims from more than 180 countries travel to the Holy city of Mecca in Saudi Arabia each year, as pilgrimage is one of Islam's commandments and must be carried out if one possesses the physical, financial, and time capabilities (Alaska et al., 2017; Felemban et al., 2020). As Hoang et al. (2020) mentioned, the pilgrimage must be made at least once in a lifetime and is an obligation for all Muslims who have reached puberty and possess the physical and financial means to do so. This rite is observed in the 12th month (Zulhijjah, the month of Hajj).

The Hajj's activities are now characterized as when Muslims arrive in Mecca. The pilgrimage begins on the first day at the Grand Mosque with the Tawaf ceremony, which revolves seven times around the center structure (Kaaba). The Kaaba, or "house," as the scriptures frequently refer to it, is nothing more than Abraham and Ishmael's role in its building. The Book of Allah, on the other hand, elevated it to a significant position in the emerging Islamic worship, both as a permanent focal point for specific rites, such as the long-established circling of Mecca, and as a qibla, or focal point, from which every Muslim would turn to a new location. Islam prescribes liturgical prayers (Peters, 1995). Two minor hills located east of the Kaaba have now vanished beneath the flat geography of modern Mecca. The southern one is named Safa, and the northern one is called Marwa, and it is between them that one of the ritual acts connected with Mecca's religious life takes place. A different type of circling between two points had somewhat to do with running and was later called "running"/"Sai." After that, the practice is incorporated into the Umrah and Hajj. Following that, Sai continued on his trek to Mina, searching for a spot to stay the night. On the second day, pilgrims travel to the plains of Arafah, approximately eight miles east of Mecca, to do what is known as "standing on Arafah." Afternoon prayers and contemplation are regarded as the apex of Hajj. After dusk, the pilgrims return to Mecca, stopping in Muzdalifa for the night. On the third day, pilgrims perform the Ramy Aljamrat ceremony, which entails throwing stones at a pillar in Mina, Mecca's most populous area. Following that, the pilgrim makes an animal sacrifice (camel, cow, or sheep). Pilgrims stay in Mina on the fourth and fifth days. On the fifth day, they traveled from Mina to Mecca, performed the final farewell rite for Tawaf and Sai, and then left Mecca (M. Aldossari et al., 2019).

According to Jamali (2018), the practise of pilgrimage in Indonesia has increased year after year. As observed, public interest in performing the pilgrimage has improved in quantity. This is demonstrated by the fact that the number of departure quotas available each year is less than the number of pilgrims who register. However, due to the global spread of the Covid-19 virus, Saudi Arabia announced on June 22, 2020, the entry of overseas pilgrims and domestic citizens 65 years and older with chronic illnesses to conduct the pilgrimage (Ebrahim & Memish, 2020; Gautret et al., 2020; S. M. Rahman et al., 2021). This restriction was implemented due to the high financial support among pilgrims in Makkah (Alqahtani et al., 2019; Alrefaei et al., 2022).

Covid-19 is not the first time a lethal virus has spread rapidly around the planet. WHO declared a Public Health Emergency of International Concern (PHEIC) in January 2020, designating Covid-19 as a global epidemic. This pandemic affects individual lives and entire economies and nations, notably Saudi Arabia, hosting the world's largest annual mass gathering. Due to the quick spread of the deadly infection within the society, the authorities responded to the catastrophic situation by limiting the Hajj journey to 1000 residents of the Kingdom, down from 2.5 million the previous

year (Hassounah et al., 2020; Islam et al., 2021; Jokhdar et al., 2021).

In Saudi Arabia, the first COVID-19 case was recorded on March 2, 2020. Since then, more cases have been reported, almost 428,369. Approximately 412,102 people have recovered from the disease, with nearly 7098 deaths by May 2021. Since the beginning of the increase in reported cases, the Saudi Ministry of Health (MOH) has launched many awareness campaigns regarding the nature of the virus, transmission routes, and preventative measures and has provided daily updates. The Saudi government has also taken strict steps to control the virus' spread, such as minimizing social activities (Alrefaei et al., 2022). Not only that, a multidisciplinary Saudi team from the public and private sectors, including the Global Center for Mass Gatherings Medicine, collaborated on the assessment, planning, implementation, and success of this holy event to prevent disease spread. No confirmed cases of COVID-19 were detected during or after Hajj among pilgrims, healthcare staff, and nonmedical employees assisting with the rituals (A. Khan et al., 2021; Zumla et al., 2020). The World Health Organization applauded Saudi Arabia's move to safeguard pilgrims' health and safety and bolster regional and global health security.

At the moment, the Hajj pilgrimage will continue regardless of quota limits. Saudi Arabia's government has formally announced that the 2021 Hajj pilgrimage will occur. Even with a restricted number of quotas and age and health limitations on prospective Hajj pilgrims. Thus, it was determined that numerous challenges faced Hajj services during COVID-19, including health services, counseling for Hajj rituals, digitization, etc.

The future pilgrimage may be organized the same way as the Hajj in 2020. Even the World Health Organization commended Saudi Arabia's efforts to ensure pilgrims' health and safety and regional and global health security due to the absence of Covid-19 hajj cases in 2020.

As Aldossari et al. (2019) mentioned, health authorities in the countries of origin must warn Hajj pilgrims about potential health concerns and avoid them. For example, pilgrims should be informed of the symptoms, transmission mechanisms, complications, and preventive measures associated with infectious diseases. Currently, the Saudi authorities do not personally control the severe Hajj health rules outside their boundaries. Instead, they rely on the pilgrims' host countries to perform that function. For instance, each pilgrim must present a current immunization certificate to get a Hajj visa. Apart from it, Saudi authorities could contribute to implementing Hajj health standards by enhancing the public health systems in pilgrims' host nations. This could take the form of outreach training programs for public health professionals and healthcare providers and research studies on health systems as part of what is known as global health diplomacy. Public awareness of COVID-19 is critical for controlling the virus' spread and treating sick individuals. COVID-19 is a contagious disease, and the Saudi Arabian government has taken significant care and adopted several preventative measures. A high degree of public knowledge will aid in implementing preventive measures, particularly in densely populated areas such as Makkah, Saudi Arabia. Additionally, the Ministry of Health (MOH) has conducted several public awareness programs and distributed free COVID-19 immunizations (Alrefaei et al., 2022).

Finally, Hajj's triumph in 2020 amid the COVID-19 epidemic serves as a cautionary tale for all global organizations. It demonstrates how to plan, execute, and manage influential mass gathering events via the use of technology and ideas such as safe bubbles, tracks, and appointed health officers, in addition to other established preventative measures (Jokhdar et al., 2021).

Technology and digital technologies have facilitated the provision of essential services after introducing these stringent mitigation measures (Hassounah et al., 2020). Efforts are being made to enhance Hajj services continuously. During the COVID-19 epidemic, Saudi Arabia extensively used digital technology in public health, healthcare, and risk communication (Alzhrani & Salem Almalki, 2021).

As is widely known, pilgrims completing the Hajj are susceptible to a variety of severe health problems as a result of the event's short duration and geographical confinement, as well as the large crowds, with population densities reaching seven individuals per m^2 among the millions of participants (M. R. Aldossari et al., 2019). As a consequence, the Saudi government provides all pilgrims with free healthcare. Covid-19 places an unnecessary strain on healthcare systems. Healthcare institutions with more substantial health innovation infrastructures had fewer challenges and controlled Covid-19. Digital technology has been critical in Saudi Arabia's battle against SARS-CoV-2 transmission (Alghamdi et al., 2021).

This current technological adoption is part of the Saudi Arabian Kingdom's vision 2030, which emphasizes the importance of smart systems, artificial intelligence, and the internet of things as primary

contributors to all critical Hajj and Umrah sectors (Shambour & Gutub, 2021).

As noted in 2020, Hajj was performed with a small number of pilgrims and only pilgrims who lived inside Saudi Arabia. Then, the Eatmarna App was developed and published; visitors seeking to do Umrah or prayers were required to register and reserve a specific time slot through the app. They then receive a confirmation message and enter the sacred mosque, despite not being diseased. Recently, the Saudi government implemented a new regulation that restricts access to the holy mosque to those who have been vaccinated. All of these preventative precautions and stringent health measures efficiently safeguard the safety and well-being of Makkah inhabitants, visitors, and pilgrims and prevent COVID-19 outbreaks at religious gatherings (Alrefaei et al., 2022).

Hundreds of programs have been developed to assist pilgrims in performing rituals, navigation, translation, Qibla direction, prayer times, weather, money conversion, and points of interest (Felemban et al., 2020). Nowadays, technology plays a more significant role in enhancing service quality. Mobile applications (apps) are a class of technologies that enable the provision of various services. Numerous organizations and individuals have developed various Islamic applications for use on mobile devices to aid worshipers in praying peacefully. New services will be developed to capitalize on technological and service sector advancements each year. One of the emerging technologies is software applications, colloquially referred to as "applications," for mobile devices. Hundreds of apps for the iPhone and Android platforms are available to assist anyone intending to undertake Hajj or Umrah. To optimize the benefits of these applications, they should be investigated and evaluated using particular criteria (E. A. Khan & Shambour, 2018)

Currently, many applications have been found to support and improve efficiency in Hajj services, especially since Covid-19, both from health services, administration, and others.

According to Latif et al. (2016)'s research, technology plays a critical role in enhancing health services. Each year, millions of Muslims come to Saudi Arabia to perform pilgrimage ceremonies. Pilgrims may require healthcare services, which must be provided precisely and in real-time, which requires technological techniques based on prior health information. This study aims to determine the value and viability of IoT implementations for pilgrims' HER retrieval via electronic tags.

According to Hassounah et al. (2020), contact tracing is a critical epidemiological technique for limiting the COVID-19 outbreak and enforcing safe-lifting lockdown plans. The Saudi Data and Artificial Intelligence Authority (SDAIA) accomplished this by releasing two smartphone apps. The first is Tawakkalna, a GPS-enabled app that monitors and restricts persons' movement during curfew hours and allows for exceptions. The second app, Tabaud, which translates as "Distancing," gives deidentified data to individuals who have had close contact with verified COVID-19 cases.

Additionally, as part of their research, Shobri, N. F. M., Ying, C. J., Ramly, R., and Sajak (2020) developed a smart tracking prototype and a health monitoring system for Hajj and Umrah travelers. The prototype is built around the TTGO T-watch, equipped with a GSM/GPS module and a pulse sensor. The technology takes data from the GPS module and pulse sensor on the pilgrims' watches to establish their location (longitude and latitude) and heart rate. The data from the watch is transferred to the Blynk server and subsequently shown in the Blynk-powered application 'iTrack.' It will display the pilgrims' current location and heart rate in real-time. In this way, a smart tracking prototype and a health monitoring system can help reduce the number of pilgrims who go missing and assist pilgrims in remaining more focused on their ritual activity with fewer worries.

According to Islam et al. (2021)'s research, advancements in digital technology in the health sector, massive data, and artificial intelligence (AI) have aided and facilitated several governments throughout the world in their efforts to contain the spread of lethal Covid-19 infections. Research on Saudi Arabia's digital health legislation and regulations from 2021 recommends various mobile health applications for the KSA. Leading authorities, such as the Ministry of Health, design these applications.

Quoted to the Directorate General of Hajj and Umrah Organization (Ditjen PHU) of the Republic of Indonesia's Ministry of Religion, Indonesia is attempting to adapt to the Saudi Arabian government's digitalization agenda in all sectors, including the Hajj sector. One of these is with the launch of the Hajj Smart Card. This is one of the Saudi Arabian Government's digitalization initiatives. It will serve as a model for the Ministry of Religion's Directorate General of Hajj and Umrah (Ditjen PHU) to implement similar innovations to improve future Hajj services.

Additionally, Siskohat was the first Hajj service innovation and is constantly being developed to improve Hajj services. Along with mobile car services, Siskohat is

creating an e-registration method (the electronic registration of regular hajj pilgrims) using the Haji Smart application on their particular smartphones. In general, the registration process followed by Hajj pilgrims thus far consists of two (two) steps: the first deposit at the Recipient Bank for Hajj Travel Expenses Deposits (BPS-Bipih) and the part issuing at the Regency/City Ministry of Religion. This second stage is now underway). become the primary focus of the development of digitized services for Siskohat Hajj pilgrims (Kemenag, 2021). The presence of digitalization in Hajj services is hoped to benefit Hajj pilgrims and increase Hajj service efficiency.

Numerous research on the subject of Hajj service has been conducted. However, research on the growth of the literature is also necessary. The advancement of literature is a challenge in the context of the present state of Hajj service development. The evolution of practice has not been paralleled by the growth of the available literature (Siddiq, 2018). There has been no research to date that attempts to conduct a full review and evaluation of the literature on Hajj service, mainly through bibliometric analysis. This study will conduct a bibliometric analysis of the hajj service literature to address this gap.

To accomplish this purpose, this study focuses on identifying the most influential features of Hajj service, visualizing the bibliometric network, and making some recommendations for future research. As a result, the remainder of this paper is organized as follows. Section 1 summarizes the literature on the Hajj service. Section 2 details the procedure. Section 3 contains the study's findings, including statistical analysis and visualization of the bibliometric data and the authors' conclusions and recommendations. Finally, section 4 summarizes the study's findings.

METHODOLOGY

This study utilizes data from study journals and other study articles published over the last 4 years on Hajj Service, as well as metadata from the Dimensions database (https://www.dimensions.ai/). The data gathering process used the keywords hajj service combined with the article title and abstract categories from 2019 to 2022. As a result, on February 27, 2022, there were 142 publications. This study's approach is qualitative with a descriptive statistical method. Related to hajj service and analyzed with the help of Microsoft Excel 2016. Meanwhile, using the VOSviewer program, hajj service publications' development trends were evaluated.

VOSviewer was created to create and view bibliometric maps and is freely available to the community of bibliometric researchers (see www.VOSviewer.com). This tool provides the reader with a map that enables an in-depth examination of bibliometrics. VOSviewer can generate author maps or journal maps based on co-authorship information and co-occurring keywords, i.e., create author and keyword maps from shared incident data.

VOSviewer is capable of displaying maps created using appropriate mapping techniques. VOSviewer takes advantage of the technique of VOS mapping (Van Eck and Waltman 2007a), where VOS stands for visualizing similarity. Van Eck and Waltman (2007b) and Van Eck et al. (2007) are two previous studies that used the VOS mapping technique.

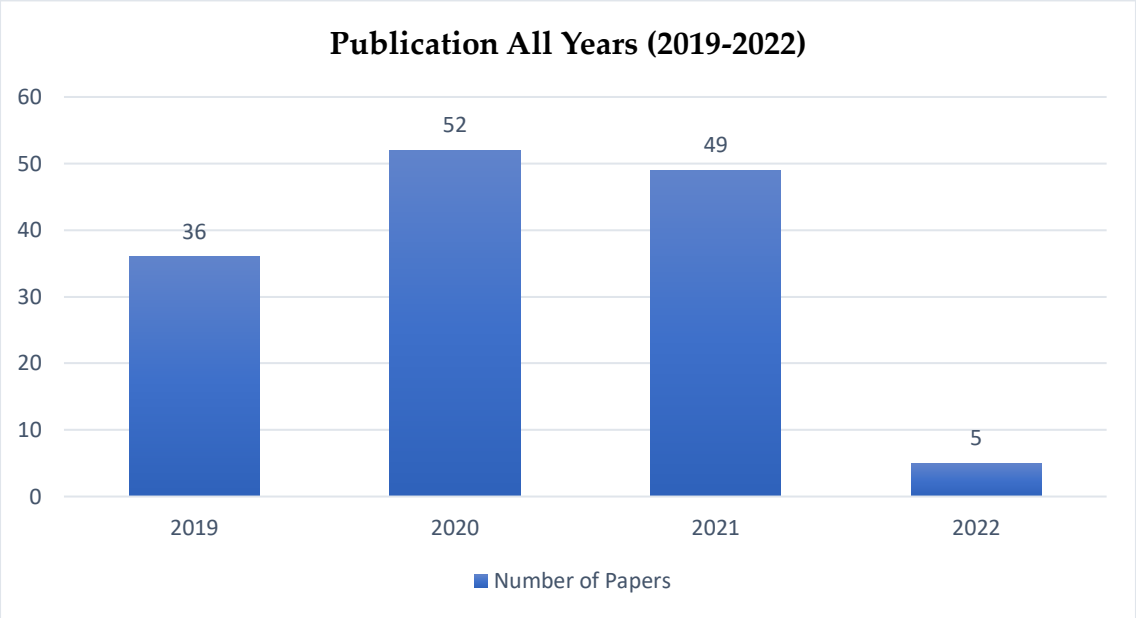
As a result, this application can display maps made by VOS mapping techniques and maps created through multidimensional scaling techniques. VOSviewer is compatible with various hardware and operating systems and maybe launched directly from the internet (Rusydiana, 2019; Izza, 2022).

RESULT AND DISCUSSION

Table 1: Classification of Publications by Year of Publication

Year	Publications
2019	36
2020	52
2021	49
2022	5
Total	**142**

Diagram 1: Publication All Years (2019-2022)



This section discusses papers that have been published with the theme of Hajj Service. As a result, there were 142 papers published in a 4-year observation period from 2019 to 2022. Table 1 presents the distribution of papers per year, which varies over the last 4 years, ranging from 5 to 52 papers. The highest number of papers was published in 2020 with 52 papers (37%) and the least, 5 papers published in 2022.

Based on table and figure 1, there was an overall increase in the number of papers published by various journals with the theme of Hajj Service. From 2019 to 2021, there will be an escalating increase. This means that the theme of Hajj Service is getting more interesting to study along with the development of Hajj. Meanwhile, for 2022, there are five papers because the number of papers does not cover the entirety, considering that data collection for this research was carried out on February 27, 2022

Of the 142 papers published with the theme of Hajj pilgrimage in the last 4 years, the title of the most widely cited extensive paper is 'Health issues in the Hajj pilgrimage: a literature review.' This study provides recommendations on health policies to prevent health risks. The results of this study indicate the need for health management and Hajj services in three main categories, namely communicable diseases, non-communicable diseases, and health services.

Table 2: List of Top 5 Authors

No.	Authors	Number of Paper
1	Yousef Ahmed Alomi	8
2	Yasir Abdulraheem Bamagaus	8
3	Nezar Adnan Yahya Khayat	8
4	Anas A Khan	4
5	Moh'D Khaled Yousef Shambour	3

Table 2 shows the five most prolific authors of papers published with the theme of Hajj Service in the last 4 years. As the table shows, the three authors each wrote eight papers published on the theme of Hajj Service.

Table 3: List of Top 10 Citation

Citations	Title	Author
13	Health issues in the Hajj pilgrimage: a literature review.	Mae Aldossari, Abdullah Aljoudi, David Celentano (2019)
13	Saudi Hajj pilgrims' preparation and uptake of health preventive measures during Hajj 2017	Amani S Alqahtani, Nora A Althimiri, Nasser F BinDhim (2019)
10	Digital Revolution for Hajj Crowd Management: A Technology Survey	Emad A. Felemban, Faizan Ur Rehman, Sardar Asad Ali Biabani, Akhlaq Ahmad, Atif Naseer, et al (2020)
7	Future Heat Stress During Muslim Pilgrimage (Hajj) Projected to Exceed "Extreme Danger" Levels	Suchul Kang, Jeremy S. Pal, Elfatih A.B. Eltahir (2019)
6	Prevalence of Diabetes and Hypertension among Hajj Pilgrims: A Systematic Review	Saber Yezli, Abdulaziz Mushi, Yasir Almuzaini, Bander Balkhi, Yara Yassin, Anas Khan (2021)
5	Progress of IoT Research Technologies and Applications Serving Hajj and Umrah	Mohd Khaled Shambour, Adnan Gutub (2021)
5	COVID-19 in Saudi Arabia: the national health response	Anas Khan, Yousef Alsofayan, Ahmed Alahmari, Jalal Alowais, Abdullah Algwizani, et al (2021)
5	Personal Privacy Evaluation of Smart Devices Applications Serving Hajj and Umrah Rituals	Mohd Khaled Shambour, Adnan Gutub (2021)
5	Smart city planning and sustainable development	Ali Abdulsamea Hameed
4	Crowd Management Services in Hajj: A Mean-Field Game Theory Approach	Nidal Nasser, Ahmed el Ouadrhiri, Mohamed el Kamili, Asmaa Ali, Muhammad Anan (2019)

Table 3 shows the top 10 papers ranked by total citations from the time of publication to when this research was conducted on February 27, 2022, out of 142 papers published with the theme of hajj service in the last 4 years from 2019 to 2022. The highest-ranking, with 13 citations, is a paper written by Aldossari et al. (2019) with the title 'Health issues in the Hajj pilgrimage: a literature review.' Then in second place with a total of 13 citations written by Alqahtani et al. (2019) with a paper entitled 'Saudi Hajj pilgrims' preparation and uptake of health preventive measures during Hajj 2017'. Meanwhile, in third place, with citations of 10, is a paper written by Felemban et al. (2020) titled 'Digital Revolution for Hajj Crowd Management: A Technology

Survey.' From this explanation, it can be concluded that the writings that refer to Hajj service are interesting to explore as seen from previous works that have been widely cited in recent studies and the development of the topic more deeply.

Bibliometric Analysis

1. Bibliometric of Co-Authorsip Author

Using the VOSviewer software, we discovered the author's bibliometrics, as seen in the accompanying figure.

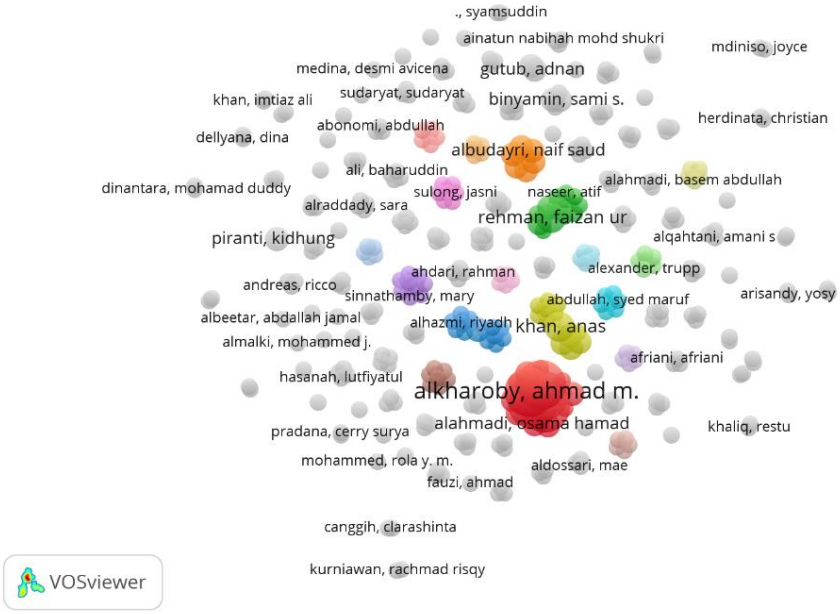


Figure 1: Network Visualization

Co-authorship analysis is a type of analysis that examines the links between items based on the number of documents co-authored by the authors. The authors' unit of analysis is one sort of co-authorship. The program will next analyse the full body of literature to identify a cluster of writers who have written papers on the subject of Hajj Service.

As a consequence of the software processing, the author's name will be shown in a colored circle according to the kind of co-author, a technique known as network visualization. Authors who are linked to one another are highlighted in the same color and separated by a line. The presence of their names in the cluster indicates that they cooperated on their research. The diameter of the circle also represents the number of publications by the writers. The larger the circle, the more publications the author has.

According to the image above, the findings indicate that when the literature is categorized by author's name in a research themed hajj service, the resultant cluster looks like this. Additionally, the image demonstrates the author's engagement in creating a diary on the subject of Hajj Service. There are 379 writers classified into 123 clusters of similar authors, each of which is highlighted in the same color and separated by tiny lines. Clusters of red, green, blue, yellow, brown, purple, and orange are among them. Meanwhile, some writers mentioned in gray circles and not related with other circles did investigations alone and without co-authors. According to the given findings, the red cluster has the most authors (16), including Nouf Hameed, Osama Hamad, Naif Olaythah, Fareed Ali, Mesfer, Ahmad M., Majed Mohammad, Yousef Ahmed, Yasir Abdulraheem, Lamees Essa, Hani Mohammad, Nezar Adnan, Nojoud Adnan, and Wael H.

Alomi et al. (2020) published a study named 'National Mass Gathering Pharmaceutical Care Program in Saudi Arabian Healthcare Institutions'. The paper addresses pharmaceutical care services provided by health organizations in Saudi Arabia during mass pilgrimage (MG) pilgrimages (SA). According to the study's findings, the MG pharmaceutical care program is a relatively recent initiative launched by health organizations in the past four years that offers pharmaceutical care services in a variety of disciplines.

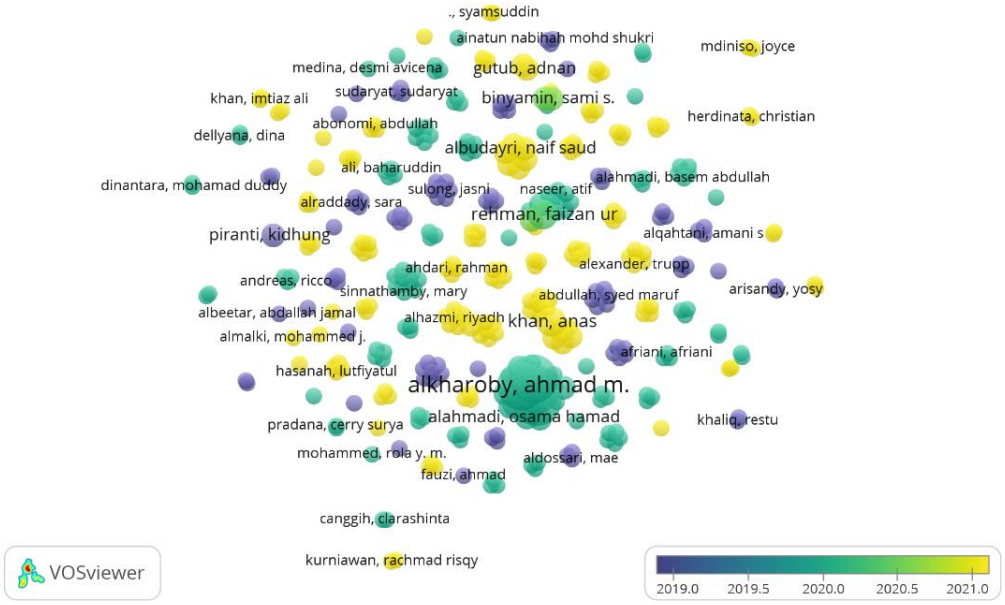


Figure 2: Overlay Visualization

Following that is the kind of overlay visualization in the co-authorship picture, which places the image inside a certain frame (either a circle or a rectangle) and colors it according to the year of publication, rather than the cluster.

The color division in the overlay representation is modified according to the publishing year, with deeper colors representing a longer publication year and lighter colors representing a shorter publication year. While the size is changed in accordance with the frequency of occurrences in the literature.

Hidayat et al., (2019) published the first article on hajj service in their paper titled 'Implementation of RFID as tracking for hajj pilgrims linked to GPS (IM RFID SECURE GPS)'. The identifying mechanism and the location of the carrier model ID card are discussed in this research. A unique number is employed as an identification since RFID tags and readers operate on the basis of radio waves. This approach makes use of technology that anticipates pilgrim loss.

Additionally, the more attentive you are, the deeper the amount of study on the subject of Hajj Service. This is shown by the growing number of new authors who publish studies on the Hajj service. A study titled 'Progress of IoT Research Technologies and Applications Serving Hajj and Umrah' by Shambour & Gutub (2022) is an example. The purpose of this research is to emphasize the critical nature of integrating and adapting technology in order to better serve Hajj and Umrah travelers. The findings of this study pave the way for future research into practical directions determined by a comprehensive analysis of the present technology analytical survey, which is important to consider when it comes to upgrading Hajj and Umrah services using existing technology.

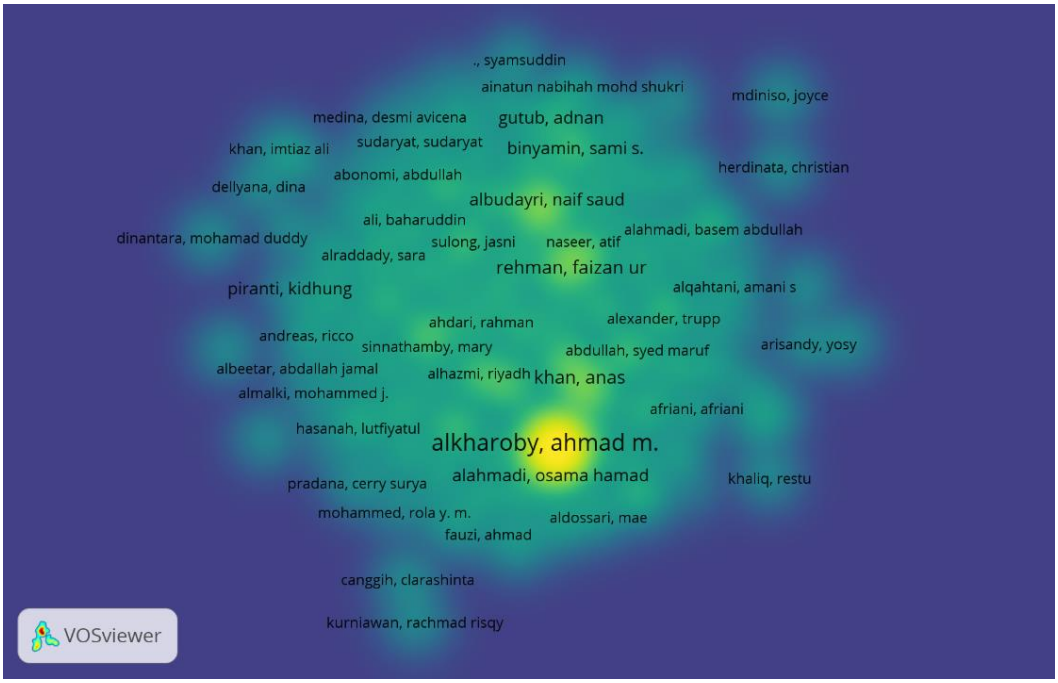


Figure 3: Density Visualization

The VOSviewer program may also display a co-authorship bibliometric map based on density visualization based on the findings presented in this co-authorship picture. As with network and overlay visualizations, things are represented by their labels in item density visualization. Each point in the depiction of item density has a color that corresponds to the item density at that position. Colors vary in temperament from blue to green to yellow. When there are more objects around a point, the weight of the connection between the items increases, and the color tends to be yellow. On the other hand, the fewer objects around the point, the lighter the weight of the association between the items, and the dots tend to be blue in color.

Bibliometric of Co-Occurrence

The image below illustrates the visual mapping of a paper published on the subject of Hajj Service. The findings of the keyword mapping study serve as the foundation for mapping the co-occurrence of significant or unique phrases found in specific articles. Mapping is a technique that allows the recognition of knowledge items and their arrangement, dynamics, interdependence, and interactions.

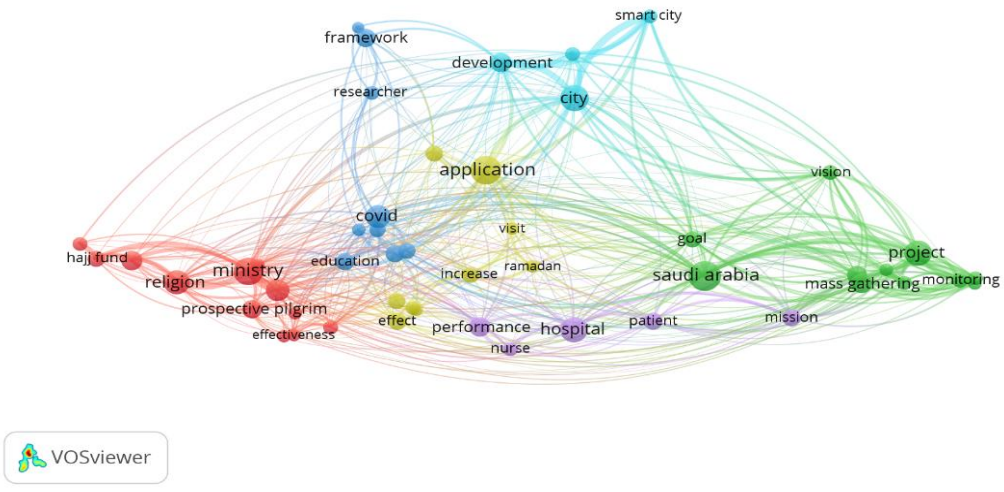


Figure 4: *Co-Occurrence Network Visualization*

Science mapping, like bibliometrics, is a technique for visualizing a subject of science. This visualization is accomplished by creating a landscape map on which science-related subjects may be shown. Figure 4 above illustrates the outcomes of the visualization of the co-word map network for the purpose of publishing the Hajj service themed paper.

The following are the 50 keywords that often occur in the Hajj service focused document issued on February 27, 2022 and are grouped into six clusters:

- **Cluster 1** in red consists of 12 keywords, namely: bpkh, effectiveness, fund, hajj fund, hajj pilgrimage, hajj service, indonesia, lack, ministry, prospective pilgrim, religion, siskohat
- **Cluster 2** in green consists of 11 keywords, namely: goal, Kingdom, mass, mass gathering, monitoring, new inititive, new initiative project, part, project, saudi arabia, vision
- **Cluster 3** in blue consists of 9 keywords, namely: covid, education, framework, health service, knowledge, pandemic risk management, participant, researcher, response
- **Cluster 4** in yellow consists of 9 keywords, namely: application, customer, customer satisfication, effect, increase, ramadhan, service quality, user, visit
- **Cluster 5** in purple consists of 5 keywords, namely: hospital, mission, nurse, patient, performance
- **Cluster 6** in blue consists of 4 keywords, namely: city, concept, development, smart city

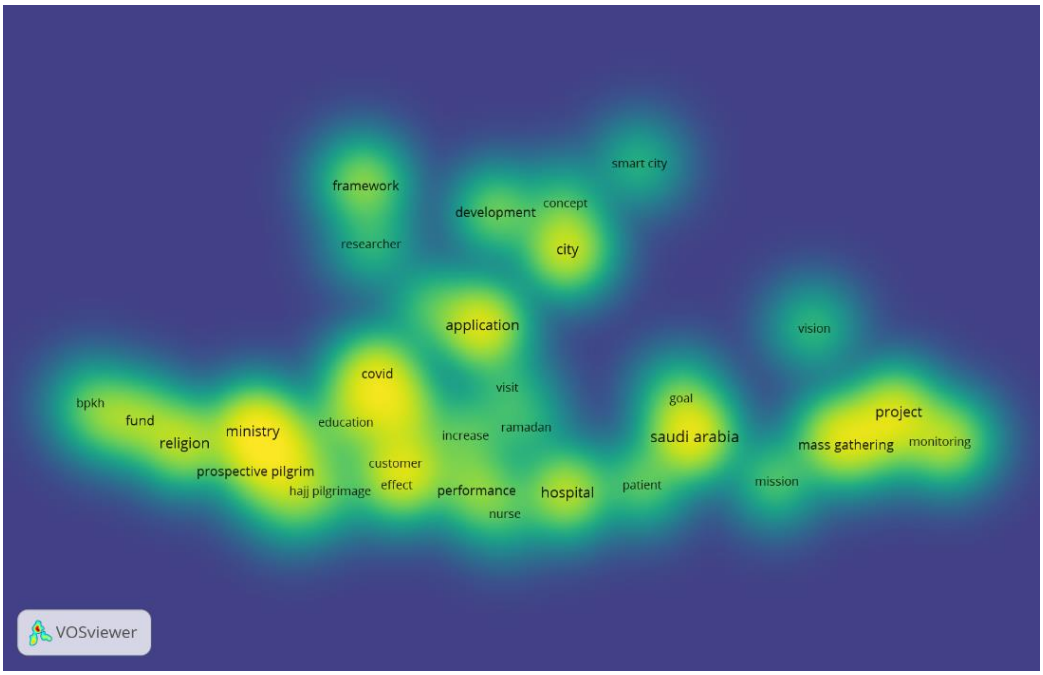


Figure 5: Co-Occurrence Density Visualization

VOSviewer program can display a co-authorship bibliometric map based on density visualization based on the findings presented in this co-occurrence picture. As with network and overlay visualizations, things are represented by their labels in item density visualization. Each point in the item density visualization is colored to indicate the density of items at that location. Colors vary in temperament from blue to green to yellow. When there are more objects around a point, the weight of the connection between the items increases, and the color tends to be yellow. On the other hand, the fewer objects around the point, the lighter the weight of the association between the items, and the dots tend to be blue in color.

FINDINGS

In this chapter, we will describe the findings found through a literature review with an in-depth bibliometric approach related to Hajj services. These findings provide important insights into various aspects of Hajj services, from operational management to their social and economic impact.

One of the main findings in the literature is the importance of efficient operational management in the

provision of Hajj services. This includes management of the Hajj pilgrims, accommodation, transportation and overall logistics. Studies highlight the challenges in managing these operations, such as managing the large number of Hajj pilgrims and ensuring their comfort and safety (Haase, 2016). The studies that have been conducted consistently highlight various challenges associated with this aspect of management. One of the main challenges is managing the large number of Hajj pilgrims, which often reach thousands or even millions of people in one Hajj season (Henderson, 2011). Efficient and organized arrangements for the registration process, accommodation allocation, and provision of transportation are essential in maintaining the smooth running of the Hajj event (Muneeza & Mustapha, 2021; Owaidah et al., 2023). Apart from that, ensuring the comfort and safety of Hajj pilgrims is also a top priority, including overcoming problems such as regulating food portions, health facilities, and a strict security system to protect pilgrims from potential risks during their journey (Raj & Bozonelos, 2020). In the context of operational management of Hajj services, continuous efforts are needed to ensure that every aspect of the Hajj organization runs smoothly and safely for all participating Hajj pilgrims.

Subsequent findings reveal the increasingly important role of information and communication technology (ICT) in the implementation of the modern Hajj. The use of various ICT technologies, including mobile applications, online platforms, and automation systems, has improved the efficiency and smoothness of organizing the Hajj. Mobile applications allow pilgrims to access important information such as prayer schedules, location guides, and emergency information easily through their devices (Mitchell et al., 2013; Elazhary, 2017). Online platforms provide facilities for online registration, making it easier for pilgrims to obtain tickets, reserve accommodation, and even track their family or travel companions (Nabil et al., 2013). In addition, the automation system has enabled more efficient data management, including inventory management, food distribution, and monitoring the health of pilgrims (Thibaud et al., 2018).

Apart from helping to make Hajj more efficient, ICT technology also creates a better experience for pilgrims. They can easily access up-to-date information, avoid long queues, and communicate with their families around the world through mobile applications. Thus, ICT technology has made a significant contribution in making the pilgrimage more organized, comfortable, and up to date. This is proof of how the adoption of technology in the context of religion and ritual can provide significant practical benefits.

This finding clearly highlights that safety and health are the two main pillars in the overall implementation of the Hajj. The important role of this security and health system cannot be ignored, considering the large scale of travel and gathering of pilgrims in one location which is often an important moment in the life of Muslims (Alaska et al., 2017). In terms of security, every effort is made to ensure that pilgrims can carry out their journey without facing unnecessary risks. This includes close oversight of all aspects of transportation, from vehicle maintenance to driver training, as well as organized traffic management. At holy sites, security has been tightened with intense surveillance and video monitoring to identify and address potential security threats. All of these measures are aimed at protecting pilgrims and ensuring that they can perform their pilgrimage safely (Taibah et al., 2020).

Health is also a top priority, especially in facing emergency or pandemic scenarios like what the world has experienced in recent years. Strict health surveillance, disease prevention, and quick treatment if a disease case arises are crucial steps in maintaining the health of pilgrims (Memish et al., 2014). Ready-to-use medical facilities, provision of medicines, vaccinations, and quarantine protocols are all part of the implemented health strategy (Jokhdar et a., 2021; Niu, 2023). Sustained efforts in these two areas are a prerequisite for the successful organization of a safe and sustainable Hajj in the future.

The findings in this research also emphasize the importance of international cooperation in organizing the Hajj. Cooperation between countries that receive pilgrims, hajj authorities and other related parties is very important in ensuring the smooth and safe journey of the haj (Muneeza & Mustapha, 2021). As such, these findings provide an important basis for further research in this area and help inform efforts to improve the organization of the Hajj in the future.

CONCLUSIONS

This study provides an overview of the meta-analysis in tables and graphs of the trend toward increased Hajj service literature over the last four years, specifically from 2019 to 2022. This study is organized into six clusters, with the red cluster containing the most authors (16), including Nouf Hameed, Osama Hamad, Naif Olaythah, Fareed Ali, Mesfer, Ahmad M., Majed Mohammad, Yousef Ahmed, Yasir Abdulraheem, Lamees Essa, Hani Mohammad, Nezar Adnan, Nojoud

Adnan, and Wael H. The content of each category is analyzed based on the number of publications per year. The findings indicate that the number of research publications on Hajj service has increased in the last four years, suggesting that it is worthwhile to continue studying and developing. In terms of bibliometric analysis, digitization of Hajj services benefits pilgrims and increases service efficiency.

It should be noted that the purpose of this research is to establish a new research direction in a practical manner, which was chosen after conducting a comprehensive review of the current technological analytic survey. To enhance Hajj and Umrah services through the use of cutting-edge technology. The government must innovate to comply with the Saudi government's digitalization policy across all sectors, including Hajj. Additionally, an evaluation of Hajj health services is necessary, as are recommendations for their improvement.

It should be noted that although the objective of this research is to provide an overview of research trends in the Hajj Service theme, the period covered is just 4 years. While the research was conducted using specific bibliometric indicators to provide readers with a broad overview of the most significant facts, the results presented are dynamic and subject to change over time. Further research should undertake a complete bibliometric analysis with additional study materials or various tools to generate more comprehensive results.

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