

A BIBLIOMETRIC ANALYSIS OF APPLIED TECHNOLOGY DEVELOPMENT OF HALAL FOOD SCIENCES

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Abstract

The purpose of this study is to analyse trends in the development of applied technology in halal food science in 2015-2022. The research method used is bibliometric analysis through three stages: (1) collecting the google scholar database of the number of publications in international journals, (2) selecting data from research publication development maps on google scholar, (3) analysing through the VOS Viewer application. The results of the analysis of the development of applied technology in halal food science 2015-2022 show that the total data for international article publications indexed by Google Scholar is 982 articles. In 2015, it showed the highest number of publications, with 166 publications. The highest number of citations was 662 citations. The themes often used in current research are meat, application, food science, and the food industry. A map of the development trend of applied technology in halal food science based on network visualization is divided into 5 clusters. The results of research on the development of applied technology in halal food science the topic of halal food science show a very strong interaction between the topics of the food industry and food quality. So that the development of applied technology in halal food science is more directed at halal food science, the food industry, and food quality.

Keywords: Bibliometrics, Halal food science, Technology development,
Vosviewer.

1. Introduction

Halal food is defined as an ingredient or product that does not contain haram material or is prohibited for consumption by Muslims [1-3]. The status of halal food includes the process of using food additives, genetic engineering, and other food irradiation [4]. Technology in halal food processing is a scientific discipline that implements a science or knowledge that is closely related to Halal food ingredients both in the process of processing until consumption, more specifically food after harvesting or post-harvesting by using the correct technology method, accurate and maintaining its halal status [5-7].

The development of halal food technology is currently a trend. In 2024, industries in micro, small, and medium enterprises (MSMEs) in Indonesia must have halal certificates for their products, food or drinks in circulation, and imported products traded in Indonesian territory. In essence, a halal certification provides details about whether a food or beverage product is halal or haram, which can be seen on the packaging with a halal logo but does not mean a ban on haram products [8]. So it is necessary to have competence for halal supervisors, such as having broad insight into the development of food technology and understanding the Shari'a regarding halal quality requirements in the field of application of halal food science [9].

Utilization of analysis with bibliometric indicators has a role in assessing the results of scientific research, examining the relationship between science and technology, producing maps of knowledge areas, tracking the development of new knowledge in specific fields, and serving as future indicators for making strategic plans and competitive advantage [10]. Current research on bibliometrics is as follows: scientific publications [11], geotechnics fields [12], and educational research [13].

This study aims to analyse trends in the development of applied technology in halal food science in 2015-2022. Data studies of international scientific article publications through the Google Scholar database from 2015-2022 were analysed with Vosviewer. The data used are from scientific journals with a total of 982 articles. The novelty of this research is the development of applied technology in halal food science with topics that are not widely used in research related to halal food science, food supply chain, blockchain technology, safety, food quality, animals, gelatine, starch, food packaging, and the Muslim community.

2. Methods

The research method used is a bibliometric analysis by collecting data through searching on Google Scholar, the keyword used is "food science, halal food, and technology." Data were collected and selected to meet publication criteria published in international journals and have been cited in the 2015-2022 period. Data analysis of the trend map of technological developments for publication in journals in the field of applied science of halal food technology was analysed using the software VOSviewer [14-16].

3. Results and Discussion

The results of tracing research development data related to developing applied technology in halal food science within the 2015-2022 timeframe. In Fig. 1, the curve shows that the number of published articles in the field of applied technology

development in halal food science has fluctuated. The number of article publications for the 2016-2017 period has decreased, while 2015, 2018, and 2020 have increased, and in 2021-2022 it again decreased.

The highest increase in publication was in 2015 with 166 articles, and the second highest was in 2018 with 154 articles. The highest publication in 2015 was due to the growing trend of the halal industry in the world, and the growing and spreading Muslim community, which now numbers around 1.8 billion people worldwide [17].

The spread of Muslims has increased the demand for goods and services with a halal label. Public belief in the superiority of halal products because they are known to be superior in terms of ethics, health, safety, and the environment. However, from 2021 to 2022 the number of publications will decrease to 26 articles.

The decrease in the number of publications (in 2022) was due to a pandemic case that affected the world's halal industrial sector [18], limited outreach, education [19], and information regarding the importance of halal food science technology [20, 21]. Thus, in 2021-2022 the world trend will focus on handling pandemic cases and the transition period, and the recovery of business actors in the post-pandemic halal industry.

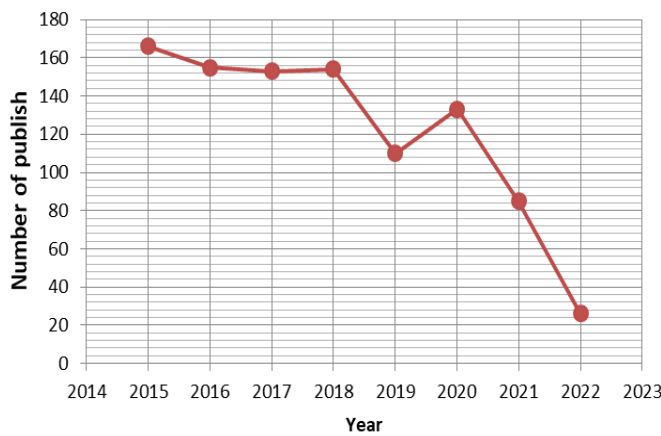


Fig. 1. Curve number of publications.

Search results for articles through the Google Scholar database regarding the development of applied technology in halal food science within the 2015-2022 timeframe with the keyword “food science, halal food, and technology”. Then obtained from a total of 982 article publications, with the highest number of citations, 662 citations.

Table 1 shows three orders of articles with the highest number of citations published by the Elsevier journal with the author’s name W Verbeke, which has the highest number of 662 article citations, the two articles published by the emerald.com journal with the author’s name A. Abd Rahman which has 527 article citations. And third publisher of the Elsevier journal with the author’s name R Eid, H El-Gohary, which has 526 article citations. In addition, the two highest citation-level article publications came from research journals.

Table 1. Highest article citation rates.

Cites	Authors	Title	Year	Source	Publisher
662	W Verbeke	Profiling consumers who are ready to adopt insects as a meat substitute in a Western society	2015	Food quality and preference	Elsevier
527	A. Abd Rahman et al.	Consumers and Halal cosmetic products: knowledge, religiosity, attitude and intention	2015	Journal of Islamic ...	emerald.com
526	R Eid, H El-Gohary	The role of Islamic religiosity on the relationship between perceived value and tourist satisfaction	2015	Tourism management	Elsevier
479	GP Danezis et al.	Food authentication: Techniques, trends & emerging approaches	2016	TrAC Trends in	Elsevier
396	A Pennycook	Translanguaging and semiotic assemblages	2017	International Journal of Multilingualism	Taylor & Francis

Figure 2 shows a network visualization of the topic area studied in each cluster. The results of the analysis of the development of applied technology in halal food science in the 2015-2022 range, the keyword “food science, halal food, and technology” interacts with 5 clusters. An item that is larger than others indicates that the topic of the research study has been explored [22-24]. In contrast, a smaller item indicates that the issue has not been extensively researched [25]. The total power of terms with the keyword “food science, halal food, and technology” shows the results of segmenting 70 categories of item visualization clusters into 5 clusters, which are presented in Table 2.

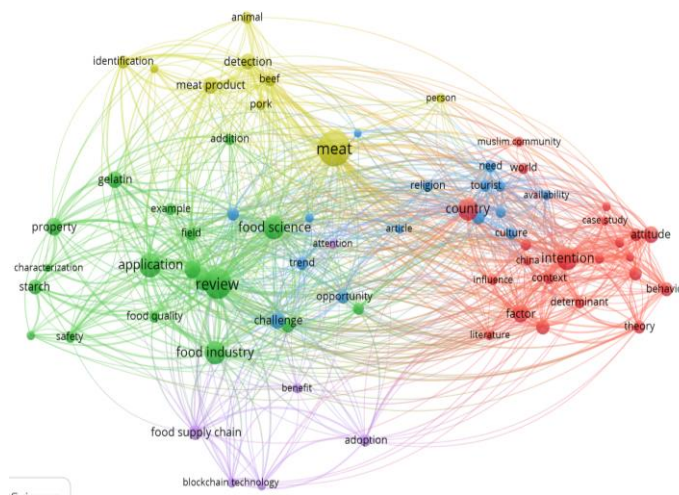


Fig. 2. Network visualization.

Table 2. Network visualization of applied halal food science technology development.

Cluster	Item	Colour	Total Link Strength	Occurrence
Cluster 1 (22 items)	Attitude, behavior, case study, China, consumer behavior, context, country, determinant, evidence, factor, halal cosmetic, influence, intention, knowledge, literature, Muslim community, Muslim consumer, non-Muslim, relationship religiosity, theory, world.	Red	1187	536
Cluster 2 (18 items)	Application, area, characterization, example, food science, Field, food safety, gelatine, food industry, property, food quality, quality, review, safety starch, food packaging.	Green	1307	658
Cluster 3 (15 items)	Article, availability, challenge, concept, culture, property, halal tourism, characterization, starch, apple, Islam, kosher, Muslim tourist, need, opportunity, religion, tourist, trend, and type.	Light blue	598	297
Cluster 4 (9 items)	Animal, beef, detection, halal authentication, Identification, meat, meat product, person, and pork	Yellow	701	349
Cluster 5 (4 items)	Adoption, attention, benefit, blockchain, blockchain technology, and food supply chain.	Purple	243	101

The results of the Overlay Visualization trend analysis in Fig. 3 show that the latest research topic is related to the development of applied technology in halal food science span of 2015-2022 with keywords "food science, halal food, and technology" items displayed in yellow and green, while the category research topics that are often researched are displayed in items in blue and purple. The latest category of research articles focuses on food packaging, food supply chain, food science, blockchain technology, halal tourism, trends, opportunities, and applications.

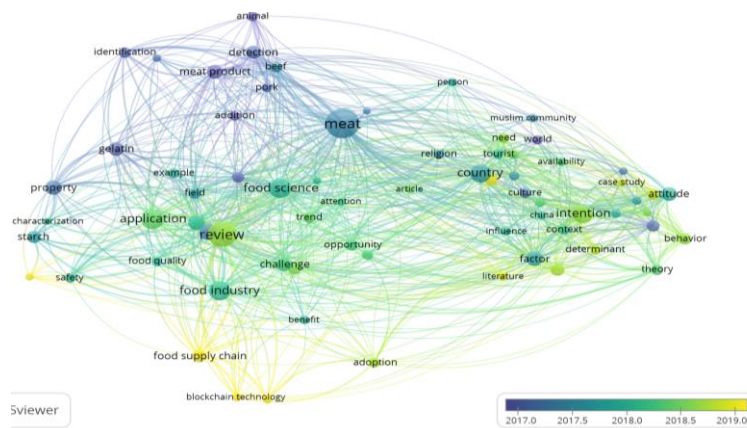


Fig. 3. Overlay visualization.

Figure 4 shows density visualization analysis of research development trends by VOSviewer on the topic of applied technology development of halal food science in the 2015-2022 timeframe with the keyword "food science, halal food, and technology" indicates that the more yellow the item, the more often it is studied, and becomes a frequently researched topic. Conversely, the greener the item, the less research is done. Items that have been commonly studied, based on the results of density, namely regarding the topic of meat, application, food science, review, culture, China, food industry, country, tourist, and knowledge. Meanwhile, topics that have not received much attention are food supply chains, blockchain technology, safety, food quality, animals, gelatine, starch, food packaging, the Muslim community, articles, people, and religion. this study gives additional data for the use of bibliometric in giving research trend, as discussed in other reports [26-33].

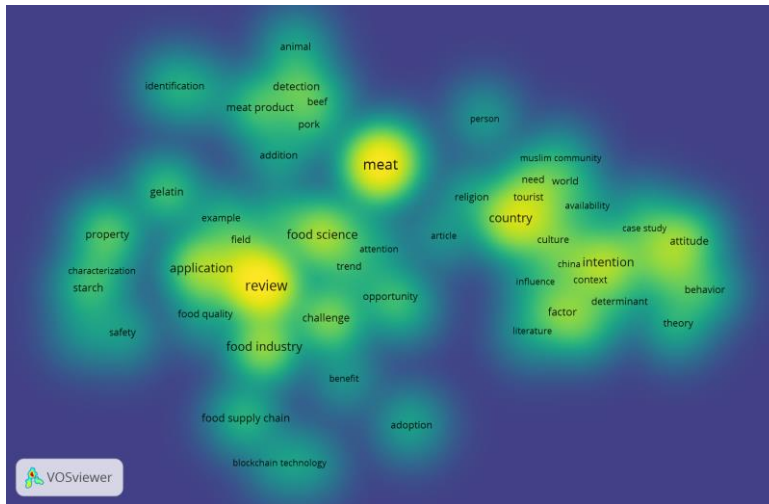


Fig. 4. Density visualization.

4. Conclusion

Based on bibliometric analysis using VOSviewer on the topic of applied technology development in halal food science in 2015-2022, it shows that the total data for international article publications indexed by Google Scholar is 982. In 2015, it showed the highest number of publications, with 166 publications with the highest number of citations 662 citations. The themes often used in current research are meat, application, food science, and the food industry. A map of the development trend of applied technology in halal food science based on network visualization is divided into 5 clusters. The results of research on the development of applied technology in halal food science the topic of halal food science show a very strong interaction between the topics of the food industry and food quality. So that the development of applied technology in halal food science is more directed at halal food science, the food industry, and food quality.

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