

## SENTIMENT ANALYSIS: HALAL APPROVAL BASED ON SCOPUS INDEXED LITERATURE

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### ABSTRACT

The aim of the paper was to ascertain the people's view of the authenticity of Muslim consumers. The approach used is descriptive data analysis combined with meta and viewpoint collected from secondary data in the form of communications data from 157 papers indexed by Scopus in the last 17 years from 2005-2022, which were processed using the Microsoft Excel program 2019 and specifying the appropriate information. According to the sentiment analysis results, expert opinions on halal authentication vary, with positive sentiment accounting for 40.8%, negative sentiment accounting for 26.6%, and neutral sentiment accounting for 30.6%. The findings indicate an increase in scholarly research on halal authentication. Furthermore, this research reveals that working with formal halal standards and innovation capability of verifying and supporting this certificate of completion will ensure compliance with Islamic law and build consumer trust, assisting in the implementation of the Islamic Economic Masterplan 2019-2024, explicitly establishing Indonesia as a producer of world halal products by accelerating sharia economic growth.

**Keywords:** Halal authentication, Sentiment analysis, Scopus

### ABSTRAK

*Penelitian ini dilakukan untuk mengetahui sentimen terhadap halal authentication. Metode yang digunakan adalah analisis statistik deskriptif dengan meta analisis dan analisis sentimen dari data sekunder berupa metadata dari 157 paper yang terindeks Scopus dalam 17 tahun terakhir terhitung dari tahun 2005-2022 yang kemudian diolah menggunakan perangkat lunak Ms. Excel 2019 dan menentukan informasi yang sesuai. Adapun hasil analisis sentimen menunjukkan bahwa perbedaan pendapat di antara para ahli tentang halal authentication yang cenderung variatif, dengan sentimen positif sebesar 40,8%, kemudian sentimen high negatif 2% diikuti sentimen negatif 26,6% dan terakhir sentimen netral sebesar 30,6%. Hasil penelitian menunjukkan bahwa penelitian dengan tema halal authentication dalam literatur ilmiah mengalami peningkatan. Selain itu, penelitian ini juga menemukan dengan mengolaborasikan sertifikasi halal formal dan teknologi yang dapat memverifikasi dan mendukung sertifikasi ini akan memastikan kepatuhan terhadap Hukum Islam dan menghasilkan kepercayaan di antara konsumen sehingga mendukung implementasi dari Masterplan Ekonomi Syariah 2019-2024 yakni mewujudkan Indonesia sebagai produsen produk halal dunia dengan memperkuat rantai nilai halal yang menjadi strategi utama percepatan pertumbuhan ekonomi syariah.*

**Kata Kunci:** Otentikasi halal, Analisis sentimen, Scopus

## INTRODUCTION

Indonesia has the world's largest Muslim population, with 209.1 million people, or roughly 13.1% of the global Muslim population. With this quantity, the concept of halal goods will obviously increase, making them harder to find. Furthermore, worldwide demand for Halal goods, which include processed food, agricultural products, fisheries, cosmetics, medications, and pharmaceuticals, as well as fashion and accessory items, continues to climb year after year. Halal products have evolved as a major and promising component of world commerce, not just among Muslims but also among non-Muslims. The emphasis is not just on Islamic nations, but also on "secular" countries or Muslim minority (Mastuki, 2021).

Halal is based on Islamic principles that emphasize purity and cleanliness to promote overall health. Non-Muslim consumers who are concerned about food governance and sustainability will also find it interesting as well. Although the concept of halal dates back centuries, its modern benefits center on eating healthy and ethically sourced food (Lubis, Mohd-Naim, Alizul, & Ahmed, 2016).

Non-Muslim consumers of various ethnic backgrounds, including Jews (halal consumers), Americans, Europeans, and Asians, are interested in purchasing halal products. Furthermore, as the Muslim community's awareness grows, so does the demand for halal products. To meet this demand, several public and private organizations have attempted to provide halal certification for good (Rohman & Fadzillah, 2018). The halalness of a product is one of the food authentication analyses used to ensure that halal products are not being counterfeited with illicit goods. Halal certification ensures that no haram ingredient is mixed into halal products and that no haram ingredient is contaminated with halal ingredients (Halal MUI).

According to Halal MUI, Prof. Khaswar Syamsu, Ph.D, Chair of the IPB University Center for Halal Studies, haram elements are not permitted in the halal concept at any level (zero tolerance). There are only two options: halal or haram. If the halal status is unclear (syubhat), the authorized and obligated agency must provide halal certification. Khaswar Syamsu went on to say that advances in science and technology in the processing field had led to the suspicion or potential illegality of food, beverage, medical, and cosmetic industrial goods. The restriction may apply to the raw material, supplementary materials, or industrial processing aids. Many raw ingredients, additives, and supporting components are sourced from either pork (porcine substance) or cruelly slain animals, both of which are forbidden under Islamic law. The halal validation technique for a product is critical for consumer protection. The procedure addresses not only religious issues, but also consumer rights. The issue of halal certification encompasses aspects of health, organic, eco-friendly, cruelty-free animal welfare, ethics, and fair trade, all of which have contributed to the popularization and acceptance of the halal concept in all societies (Rohman, Windarsih, Erwanto, & Zakaria, 2020)

The halal industry sector will grow in importance as the Muslim population grows, and the importance of halal certification as a method of verifying a product's halal status must be emphasized. Sri Mulyani, Minister of Finance (Menkeu), also emphasized the halal food industry's growing contribution to the national economy, citing an increase in the halal sector's market share to GDP from 24.3 percent in 2016 to 24.86 percent in 2020. Simultaneously, the government is implementing a halal certification strategy to assist halal businesses through Minister of Finance Law Number 57 of 2021 concerning Public Service Fees Agency Halal Product Assurance Agency Ministry of Religion. Based on this context, the author examines the evolution of sentiment in 157 Scopus-indexed papers on the theme of halal authorization from 2005 to 2022.

Because the concept of halal applies universally, philosophically, and practically, it is a departure from the fourteen-century-old standard operating procedures (SOPs) in Islamic sharia. There are elements of health, safety and security, prosperity, and human dignity in a halal lifestyle (Nur Ayyah & Murniningsih, 2021).

In Islam, strict guidelines for the consumption of food and drink (Halal) have been established (Premanandh & Bin Salem, 2017). Halal is an Arabic term that refers to any product that Muslims are permitted to consume under Sharia law, according to Rohman and Windarsih (2020), (Islamic law). The term halal is derived from the Arabic word halal, which means "to liberate, let go of, and let or get out of something that is haram." It refers to goods produced, processed, transported, or stored using any means or facilities that do not violate Islamic Sharia Law (Premanandh & Bin Salem, 2017).

With a market value of over one trillion dollars, the global halal sector is currently the world's fastest-growing consumer category. This has made the halal sector a major market force among both

Muslims and non-Muslims, as future demand for halal food is expected to remain strong (Lubis, Mohd-Naim, Alizul, & Ahmed, 2016).

According to Minister of Finance (Menkeu) Sri Mulyani, who spoke at the AICIF 2021 Opening Ceremony, the halal business has tremendous potential. According to the Global Islamic Economy Report 2020/2021, Muslim consumers spent US\$2.02 trillion in 2019 on halal food and drinks, halal medicines and cosmetics, Muslim-friendly travel, and living a halal lifestyle. Halal goods, which include food and medicine, are defined as any product that contains substances permissible under Sharia law and meets Sharia law's requirements (Rohman & Windarsih, 2020). In 2019, Indonesia's halal product consumption reached US\$144 billion, making it the world's largest consumer in this category. The Muslim-friendly tourism sector has propelled Indonesia to sixth place in the world, with a value of US\$ 11.2 billion. With a total consumption of US\$16 billion, Indonesia is the world's third largest consumer of Muslim fashion. Indonesia's halal pharmaceutical and cosmetics sectors rank sixth and second, respectively, with total spending of US\$5.4 billion and US\$4 billion (Masitoh, 2021).

Because halal products are the most popular consumer goods, halal brand certification as a form of food product authentication is a major source of concern (Lubis et al., 2016). Arbitrary business practices are becoming more common in the consumer-packaged goods industry. While customers have the right to defend themselves against such tactics, increasing urbanization and industrialization have widened the gap between producers and consumers, raising serious concerns. The operational complexities associated with halal authentication pose serious threats to consumer-packaged goods integrity (Premanandh & Bin Salem, 2017). As a result, because our senses are incapable of detecting halal status, determining it will be difficult (Salahudin, Ramli, Zulkepli, & Razak, 2018). Sensitive, simple, and reliable scientific procedures for screening halal food are required to quickly validate the halal authentication of food products (Lubis, Mohd-Naim, Alizul, & Ahmed, 2016).

According to Sarno et al. (2020) in their study titled 'Detecting Pork Adulteration in Beef for Halal Authentication Using an Optimized Electronic Nose System,' authentication is a process in which food is confirmed according to the label description. Each approach to authentication testing and analysis is appropriate and relevant to addressing a specific defined problem.

The government is currently focusing on three areas for halal industry growth: infrastructure development, a halal guarantee system, and expanding halal's contribution to the trade balance. Furthermore, the halal business in Indonesia is expected to expand as a result of research and development (Siaran Pers, 2022). According to Salahudin et al. (2018)'s research, 'Issues in Halal Meat Product and Authentication Technology from Islamic Perspectives,' halal authentication must rely on very sophisticated, up-to-date technology and analytical instrumentation. Halal authentication technology can help to overcome this issue, allowing legal experts to determine product status with greater accuracy. It is also critical to use laboratory analysis to more accurately detect the presence of illegal substances. Although laboratory testing may establish the absence of illicit chemicals in components, the findings are inadequate for halal certification. Scientific reasoning and laboratory analysis findings, on the other hand, offer academics with extra information in establishing its halalness (Salahudin, Ramli, Zulkepli, & Razak, 2018).

This was also stated in a study written by Sarno et al. (2020), entitled 'Detecting Pork Adulteration in Beef for Halal Authentication Using an Optimized Electronic Nose System,' that authentication is a process in which food is confirmed according to the label description. Each approach to authentication testing and analysis is appropriate and relevant to addressing a specific defined problem.

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According to Salahudin et al. (2018)'s research, 'Issues in Halal Meat Product and Authentication Technology from Islamic Perspectives,' halal authentication requires advanced, reducing technology and analytical equipment. Halal authorization technology can help to overcome this issue, allowing legal experts to determine product status with greater accuracy. It is additionally extremely crucial to use laboratory analysis to identify the presence of illicit substances more accurately. Although laboratory tests can confirm the absence of illegal substances in ingredients, the results are insufficient for halal assurance. Scientific justification and laboratory analysis results, however, continue to provide scholars with additional information in determining its halalness (Salahudin, Ramli, Zulkepli, & Razak, 2018).

## METHODOLOGY

Data for this study were gathered from halal authentication research journals and other research publications published between 2005 and 2022. These journals, as well as Scopus metadata, can be obtained or accessed online from halal authentication journals published in the last 17 years. This study used a qualitative method approach with descriptive statistics on 157 halal authentication publications as its methodology. A post-positivist philosophy underpins qualitative research methods. In contrast to experiments, it is used to investigate the state of natural objects with the researcher acting as the primary instrument. Explorative collected information was used to collect triangulated (mixed) data, and qualitative research findings highlighted meaning rather than generalization (Sugiyono, 2010). In contrast, qualitative research is a subset of descriptive research. The data collected is not used to support or refute the hypothesis (if any). Visual symptom descriptions, rather than numerical values or correlation coefficients between variables, can be used to draw research conclusions (As-salafiyah, Rusydiana, & Mustafa, 2021).

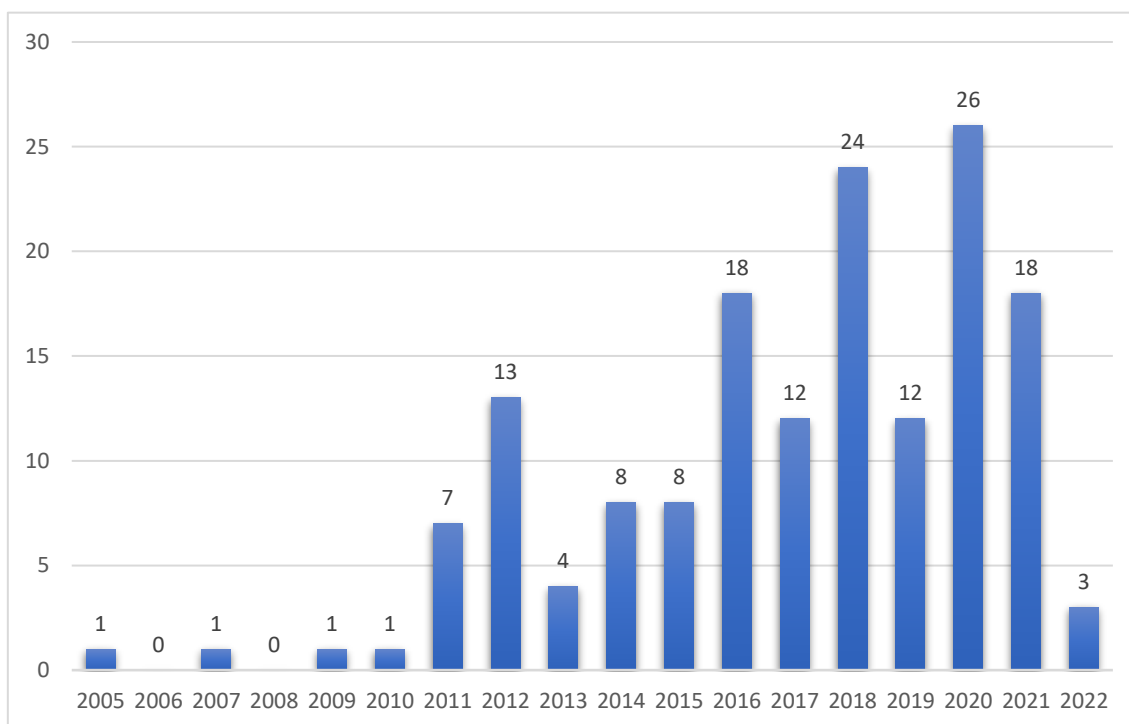
Data analysis is a statistical subfield that gathers, summarizes, and reports summary research data. Qualitative research or opinion advancement was used in this study. Sentiment analysis is a type of research that is commonly used to determine public opinion on a specific topic. Text analysis, simply put, is intended to process words rather than numbers. Subjectivity Classification has three distinct sentiment analysis post: detection orientation, holder opinion, and target detection. The majority of sentiment classification research has been conducted in English due to the large number of tools and materials available in that language. SentiWordNet and WordNet are two popular sentiment analysis resources. The primary goal of sentiment analysis is to classify the polarity of text on documents, phrases, or features and to determine whether the opinions expressed in documents, phrases, and feature entities are positive, negative, or neutral at the aspect level. Sentiment analysis can be expressed emotionally as sad, happy, or angry in order to construct a study that can be used to generate opinions about specific themes. Microsoft Excel 2019 is used to analyze trend data on halal authentication publications and top authors. They house research artefacts from previously published papers. The author extensively employs SentiStrength software in sentiment analysis research to create a sentiment map based on the findings of the literature on halal authentication perception.

## RESULTS AND DISCUSSION

### Meta Analysis

**Table 1. Shows the Number of Publications Per Year**

| <b>Year</b>  | <b>Number of Publication</b> |
|--------------|------------------------------|
| 2005         | 1                            |
| 2006         | 0                            |
| 2007         | 1                            |
| 2008         | 0                            |
| 2009         | 1                            |
| 2010         | 1                            |
| 2011         | 7                            |
| 2012         | 13                           |
| 2013         | 4                            |
| 2014         | 8                            |
| 2015         | 8                            |
| 2016         | 18                           |
| 2017         | 12                           |
| 2018         | 24                           |
| 2019         | 12                           |
| 2020         | 26                           |
| 2021         | 18                           |
| 2022         | 3                            |
| <b>Total</b> | <b>157</b>                   |



**Graph 1. Number of Publications Per Year**

The table and graph above show the number of papers on the theme of halal authentication published by Scopus indexed journals. There were 157 published papers in the 17-year observation period, from 2005 to 2022 with various ranges, starting from 0, then the highest range, namely 1 publication which occurred in 2005, 2007, 2009, and 2010. Then followed by the number of publications which amounted to 3, 4 and 7 respectively in 2022, 2013 and 2011. After that in consecutive years namely 2014 and 2015 it was found that 8 papers were successfully published. Basically, the number of paper publications fluctuates from year to year. The papers on the theme of halal authentication were most widely published in 2020, namely 26 papers and the fewest publications were in 2006 and 2008 where there was no publication quantity index in that year. Meanwhile, in 2022 the number of papers will not cover all of them, considering that data collection for this research was conducted in January 2022.

Furthermore, this section discusses the publication of papers based on journals, which include a variety of Scopus-indexed international journals. Among the 157 studies, halal authentication research may be found in the following journals:

**Table 2. Journal Classification**

| Focus of Study   | Total |
|--|-------|
| Food Analytical Methods                                  | 8     |
| Food Research  | 8     |
| Meat Science   | 7     |
| International Journal of Food Properties                 | 7     |
| Food Control   | 5     |
| Indonesian Journal of Chemistry                          | 5     |
| Journal of the Science of Food and Agriculture           | 4     |
| Journal of Advanced Gastroenterology and Animal Research | 4     |

Based on the table above, there is a tendency for disparity in contributions from journals in articles that discuss halal authentication. As for multidisciplinary topics such as chemistry, food analysis, veterinary and veterinary medicine, and biology are all areas of research that are interesting in the role played in halal authentication. Thus, in the data set, various journals with various scientific disciplines are presented, such as Food Analytical Methods which has a total superiority over the others, reaching 8 journals, this number is the same as fields of knowledge related to Food Research. Next is the focus of study related to Meat Science which reached a total of 7 where the International International Journal of Food Properties also reached 7 papers. Finally, with a total of 5, journals that have a focus of study related to food control and the Indonesian Journal of Chemistry have been classified. And the lowest total is the field of study related to the Journal of the Science of Food and Agriculture and the Journal of Advanced Veterinary and Animal Research with a total of 4. The number of papers attached to the table above is still large, allowing it to change and increase along with the development of science and the increasing trend of halal authentication in the world of research. Therefore, this is a recommendation for future researchers to be able to review new information related to halal authentication.

**Table 3. Top Writers**

| Authors          | Number of Papers |
|------------------|------------------|
| Abdul Rohman A.  | 32               |
| Shuhaimi Mustafa | 14               |
| Ali Md. Eaquib   | 14               |
| Yuny Erwanto     | 10               |
| Any Guntarti     | 8                |

Table 3 shows the five most productive authors or succeeded in publishing the most superior number of works compared to other authors related to the theme of halal authentication in the last 17 years. From the table it can be clearly seen that Abdul Rohman A. is the writer with the greatest number of papers compared to the other four writers (in this case Abdul Rohman A. being the most productive) with the most publications, namely 32 publications. Further achievements were followed by writers named Shuhaimi Mustafa and Ali Md. Eaquib with a total of 14 publications. The next one is a writer named Yuny Erwanto who has succeeded in publishing 10 papers and Any Guntarti with her achievement papers totaling 8 papers.

One of the articles written by Rohman et al. (2020) with a paper entitled "Review on Analytical Methods for Analysis of Porcine Gelatin in Food and Pharmaceutical Products for Halal Authentication". This paper examines gelatin, a component that is commonly used in various products, but explanations and information on unclear labels regarding the actual source of gelatin in products have become a major concern among the public in terms of religion and health aspects, therefore it is necessary for a method to describe the authentication. The results of this study show that physico-chemical methods as well as biological methods such as PG and BG screening include chemical precipitation, functional groups (FTIR spectroscopy), amino acid composition (liquid chromatography), DNA detection and quantification (real-time polymerase chain reaction/RT-PCR), molecular weight distribution (electrophoresis), and protein (Enzyme-linked immunosorbent assay, ELISA) can be used for gelatin differentiation with a view to halal authentication studies.

**Table 4. Most Citation Publications**

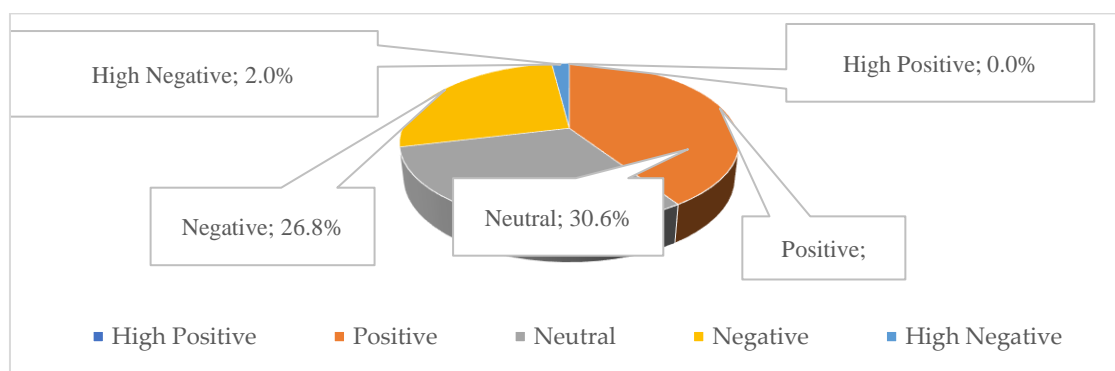
| Citation | Paper Name  | Year |
|----------|---|------|
| 158      | Problems with Halal authenticity in meat and meat products                            | 2012 |
| 139      | Polymerase chain reaction analysis of raw pig meats and fats for Halal authentication | 2005 |

|     |   |      |
|-----|---|------|
| 131 | Using mitochondrial DNA, meat species identification and Halal authentication are investigated.   | 2009 |
| 114 | Molecular assay for meat product fraud detection  | 2014 |
| 108 | Meat authentication: A novel HPLC-MS/MS-based method for detecting horse and pork in highly processed foods   | 2014 |
| 107 | The electroscope and a gas chromatography mass spectrum analyzer with a headspace analyzer were used to quickly identify pork for halal authentication. | 2011 |
| 74  | Methods for Species Identification in Foods and Feeds: The Present, Previous, and Future of Halal Forensics   | 2012 |
| 66  | Identification of patulin throughout gelatine and gelatine-containing processed food products-Halal/Kosher certification                                | 2012 |
| 60  | The identification of a porcine-specific peptide in heat-treated pork using LC-QTOF-MS identifies candidate markers for meat species determination.     | 2016 |
| 60  | Using pcr analysis of samples and cooked traditional Turkish foods, meat species identification and halal certification were achieved                   | 2013 |

The paper with the highest citations was published by Nakyinsige et al (2012) and was titled "Halal honesty difficulties in beef.". The table above includes additional publications from the top ten most cited categories. Other publications included in the top ten most cited categories are listed in the table above.

### Sentiment Analysis

Furthermore, the authors attempt to calculate sentiment with the theme of halal authentication from Scopus-indexed journals. Sentiment analysis is a type of research that is commonly used to assess popular sentiment toward a topic. SentiStrength was used as a data processing tool in this study. As a data source, 157 specific documents from articles and journals about halal authentication were chosen. The following graph depicts the results of sentiment analysis on halal authentication:



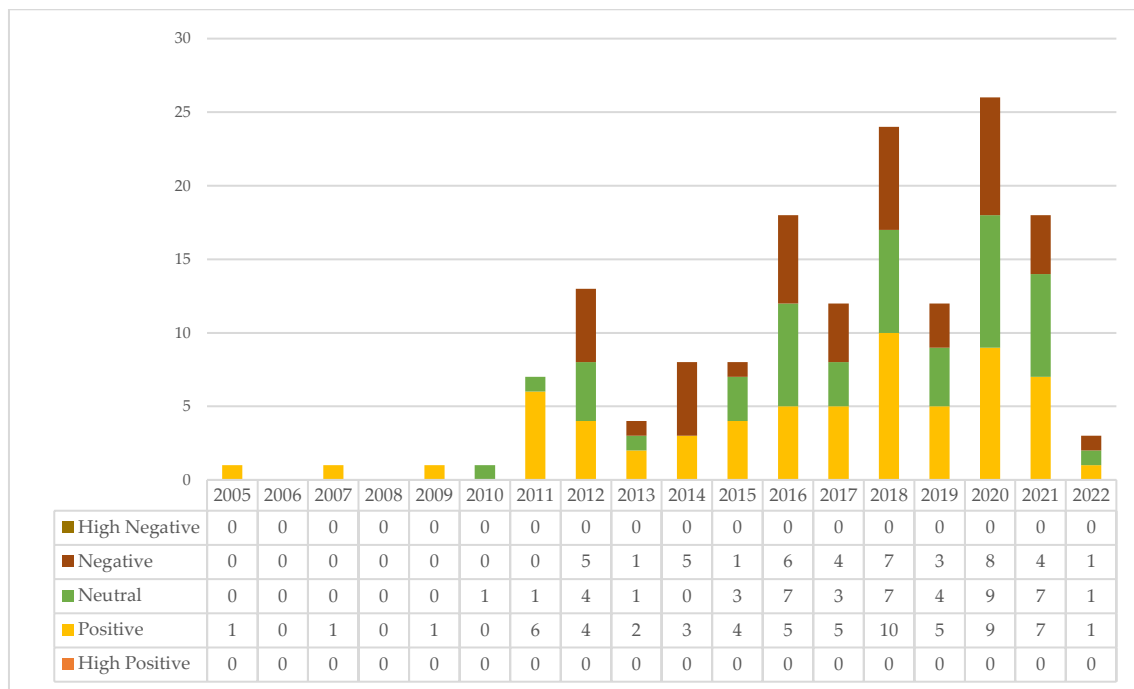
**Figure 1. Halal Authentication Sentiment Analysis**

Scopus communications data selected articles are used to generate sentiment results. The processed collected data are sorted from extremely negative (-5) to amazingly positive (5) intervals, with 0 representing neutral. The sentiment scores of each phrase registered on SentiStrength are added to calculate the scoring rate.

According to the graph above, halal authentication has a positive (40.8%) sentiment, a negative (26.8%) sentiment, and a neutral (neutral) sentiment. 30.6%. That is, most of the literature on the topic of halal authentication is positive.

A good (positive) sentiment is an abstract sentiment from related literature that is positive and tends to be optimistic in responding to halal authentication in various parts of the world by agreeing on the most up-to-date methods of identifying a product to ensure its halal authentication.

Meanwhile, bad/very bad sentiment (negative/high negative) is an abstract sentiment from related literature that really is negative in nature and tends to be pessimistic in addressing products that are branded, certified, or sold as halal but are not, among other things.



**Graph 2. Halal Authentication Sentiment Intertemporal Analysis**

The development of the world of research related to halal authentication can be seen in Graph 2 above. The numbers of people who support halal authentication research vary from year to year. This means that this topic is frequently discussed in the literature, and it is fascinating to observe the evolution of sentiment toward it.

Meanwhile, the year with the most positive sentiments was 2018. Saputra et al. (2018)'s paper "Profiling of Wavelength Biomarkers of Pure Meat Samples from Different Species Using Fourier Transform Infrared Spectroscopy (FTIR) and PCA Techniques" is one of the papers with positive sentiment. This research looks at the infrared spectroscopy (IR) analysis method, which is well-known for being a reliable way to test authentication. This study found that FTIR has the advantages of high sensitivity, high throughput energy, and fast spectrum capture. When combined with computers and modern chemometric software, FTIR can even be used to easily convert spectrum data. Biomarkers are indicators that can be used to quickly, simply, and efficiently determine the status and phase of a biological process. They include DNA/RNA, protein, metabolite profiles, or a combination of profiles of some of these components.

Furthermore, we can see a fluctuating curve towards negative sentiment regarding the topic of halal authentication from 2012 to 2020. The year 2020 saw the highest number of negative sentiments. One of the papers with negative sentiment is "The Investigation of Meat Classification Based on Significant Authentication Features Using Odor-Profile Intelligent Signal Processing Approach" by Majid et al. (2020). This paper discusses meat, which is known as the most profitable livestock product and is many people's first choice for animal protein. However, the circulation of meat with questionable authentication has become a public concern, particularly among Muslim consumers. As a result, the goal of this study was to identify two types of meat: beef and pork. According to the findings of this study, the Electronic Nose (E-nose) is present as an important authentication feature when used in conjunction with an odor profile intelligent signal processing approach to measure the odor profile of meat.



## CONCLUSION

This research examines to see the extent to which the research has been carried out by the authors with the theme of halal authentication, of course the discussion that has been developed in the literature which has a scientific nature does not sufficiently impact the research results without further research on the focus of study which is felt to have an urgency for improvement in the organization which he participated in. The results of this research show that there have been numbers of paper publications on the theme of halal authentication in the last 17 years from 2005 to 2022, namely with 157 studies equipped with a Scopus indexed Digital-Object-Identifier (DOI). In addition, a sentiment analysis of a comprehensive review of interdisciplinary research on halal authentication published since 2005 is included in this review. Halal authentication has a positive sentiment of 40.8%, a high negative sentiment of 2%, a negative sentiment of 26.8%, and an impartial sentiment of 30.6% internationally. This demonstrates that there are differences of opinion among experts in the scientific literature regarding halal authentication, and the tendency of researchers still varies, with positive sentiment dominating, followed by positive sentiment, and then the negative sentiment.

It should be mentioned that the purpose of this study is to provide an overview of halal authentication assumptions in the academic field, however the limits are confined to the past 17 years of publishing. Although research was done utilizing specialized meta-analysis and sentiment analysis indicators to give readers with a basic representation of the most important facts, the findings provided are still dynamic and may vary over time as new trends emerge or variables are added. during the next several years.

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