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Application of the Halal and Thayyib Concepts in Ethical Testing in Organoleptic Research

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ABSTRACT

Organoleptic testing is widely used to evaluate the sensory quality of food and beverages through human panelists. Although existing ethical guidelines primarily emphasize participant safety and informed consent, they rarely incorporate halal assurance as an ethical requirement for Muslim participants. This study aims to develop an ethical framework for organoleptic testing by integrating the principles of *halal* and *thayyib* into research ethics involving human subjects. The study employed a normative legal approach through a literature review of scientific publications, ethical guidelines, food regulations, and halal-related legislation. The analysis identifies ethical criteria that should be fulfilled before conducting organoleptic testing. From the *halal* perspective, the tested products should originate from halal ingredients, be processed without non-halal contamination, and, where applicable, possess valid halal certification. From the *thayyib* perspective, products should be safe for consumption by considering potential allergens, toxic or carcinogenic substances, appropriate use of food additives, hygienic processing, sanitary handling, and compliance with food safety regulations, including relevant food registration requirements. The proposed framework demonstrates that integrating *halal* and *thayyib* principles extends conventional research ethics beyond participant protection to include respect for religious values and consumer confidence. This framework provides practical guidance for researchers, ethics review boards, and food laboratories in designing organoleptic studies involving Muslim participants while contributing to the development of ethical standards for sensory evaluation in halal food research.

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INTRODUCTION

Research involving human participants is fundamental to the advancement of scientific knowledge across various disciplines. However, such research cannot be conducted successfully without the voluntary participation of individuals who are willing to contribute their time, experiences, and personal information. Consequently, researchers have an ethical obligation to respect participants' autonomy, dignity, and rights throughout the

research process. Participants may experience inconvenience, discomfort, or even potential risks resulting from their involvement in research; therefore, obtaining informed consent, protecting confidentiality, and ensuring fair treatment are essential ethical responsibilities. These principles constitute the foundation of health research ethics and aim to ensure that research is conducted with respect for human dignity while maximizing potential benefits and minimizing risks (Ministry of Health of the Republic of Indonesia, 2021)

Research involving human subjects is considered ethically acceptable only when it is conducted using scientifically valid methods and complies with established ethical standards (Setyawan, 2013). Ethical research requires not only methodological rigor but also adherence to evolving moral principles that respond to scientific and societal developments. Researchers are therefore expected to uphold integrity, fairness, transparency, and respect for participants' privacy and confidentiality while ensuring that research outcomes contribute positively to society (Ministry of Health of the Republic of Indonesia, 2021). These ethical considerations are particularly important in studies involving direct human sensory evaluation, including organoleptic testing.

Organoleptic testing, also referred to as sensory evaluation, is a scientific method used to assess the sensory characteristics of food and beverages through human perception. The discipline has evolved through the standardization of evaluation procedures, objective assessment methods, and systematic statistical analysis, enabling reliable measurement of sensory attributes such as appearance, aroma, taste, texture, and overall acceptability (Zhao et al., 2011). Consequently, organoleptic testing has become an indispensable quality assessment tool in the food, beverage, pharmaceutical, and agricultural industries. Common sensory evaluation methods include rating scales, descriptive analysis, discrimination tests, and consumer acceptance tests (Gonçalves et al., 2014). Unlike instrumental analysis, organoleptic testing directly involves human participants as research instruments, making ethical considerations particularly significant. Besides protecting participants from physical or psychological harm, researchers must also consider food safety, potential allergic reactions, interactions with medications or other foods, and the physiological condition of panelists before conducting sensory evaluation.

Despite the widespread application of organoleptic testing, existing ethical guidelines primarily emphasize general principles such as informed consent, participant safety, confidentiality, and risk management. Relatively limited attention has been given to the ethical implications of using food products that must also comply with the religious beliefs of participants, particularly Muslim consumers. For Muslim panelists, ethical protection extends beyond conventional biomedical ethics to include assurance that the food or beverages being evaluated comply with Islamic dietary requirements. Consequently, integrating halal assurance into organoleptic research ethics represents an important yet underexplored dimension of participant protection.

In Indonesia, halal assurance is regulated through the Halal Product Process (*Proses Produk Halal* or PPH), which encompasses all stages of a product's life cycle, including the procurement of raw materials, processing, storage, packaging, distribution, marketing, and presentation. This comprehensive process aims to ensure that products consistently maintain their halal status throughout the supply chain. Accordingly, researchers conducting organoleptic testing should ensure that food and beverage samples provided to participants are not only scientifically appropriate but also safe and halal. Unsafe food products may endanger participants' health and compromise research integrity; therefore, food quality and safety must comply with established nutritional and regulatory standards. These requirements are stipulated in the Food Law (President of the Republic of Indonesia, 2012). Furthermore, Article 146 paragraph (2) of the Health Law states that: *"In addition to fulfilling the obligation to meet standards and/or requirements, food and drinks that are*

produced, processed, distributed and consumed must meet the provisions for guaranteeing halal products in accordance with the provisions of laws and regulations." (President of the Republic of Indonesia, 2023).

Within Islamic jurisprudence, the concept of *halal* extends beyond the permissibility of ingredients to encompass the entire production process, including sourcing, handling, processing, storage, and distribution. Products that are intrinsically permissible may lose their halal status if contamination occurs or if production processes violate Islamic legal principles. Consequently, halal assurance requires comprehensive traceability throughout the food supply chain. Moreover, the Qur'anic principle of *halalan tayyiban* emphasizes that food should not only be religiously permissible but also wholesome, safe, hygienic, nutritious, and beneficial to human health. Therefore, ethical responsibility in food-related research should incorporate both halal compliance and food safety as complementary dimensions of participant protection. Consuming halal and *tayyib* food is regarded as an important aspect of Muslim life because it supports physical well-being and spiritual responsibility (Nasution & Nasution, 2023).

Although ethical guidelines for research involving human participants are well established, there remains no comprehensive framework specifically addressing organoleptic testing that integrates conventional research ethics with halal assurance and food safety principles. Existing sensory evaluation protocols generally focus on methodological validity and participant safety while overlooking religious values that may influence participants' willingness, comfort, and confidence in research participation. This gap is particularly relevant in countries with large Muslim populations and in the expanding global halal food industry. Therefore, this literature review aims to develop a conceptual ethical framework for organoleptic testing that integrates research ethics, halal assurance, and food safety principles. The proposed framework is expected to provide practical guidance for researchers, ethics review committees, food laboratories, and the halal industry in conducting sensory evaluation studies that are scientifically rigorous, ethically responsible, and respectful of Muslim participants' religious values.

METHODS

This study employed a literature review using a normative legal approach to examine the ethical dimensions of organoleptic testing involving human participants, with particular emphasis on the integration of *halal* and *thayyib* principles. Relevant literature was systematically identified through electronic databases, including Google Scholar, SINTA, and Garuda, to retrieve both national and international peer-reviewed journal articles and conference proceedings published in open-access sources.

The literature search was conducted using combinations of the following keywords: *organoleptic testing*, *sensory evaluation*, *food testing*, *research ethics*, *human subjects research*, *halal*, *halal food*, and *thayyib*. Boolean operators (AND/OR) were applied to broaden and refine the search strategy. Additional references were identified through backward citation tracking of relevant publications.

The inclusion criteria comprised studies that discussed one or more of the following topics: (1) organoleptic or sensory testing involving human participants; (2) food acceptability and sensory evaluation; (3) research ethics in studies involving human subjects; (4) halal food assurance and certification; and (5) the concept of *thayyib* in relation to food safety and quality. Editorials, opinion articles, duplicate publications, and studies lacking relevance to the research objectives were excluded from the review.

The selected literature was analyzed using qualitative content analysis. Relevant information was extracted, compared, and synthesized to identify ethical principles,

regulatory provisions, and practical considerations related to organoleptic testing. The synthesis was subsequently used to develop a conceptual ethical framework integrating conventional research ethics with *halal* assurance and *thayyib* principles for sensory evaluation involving Muslim participants.

RESULT AND DISCUSSION

Conventional Ethical Principles in Organoleptic Testing

Organoleptic testing has become one of the most widely applied methods for evaluating the sensory quality of food and beverages before products are introduced to the market. This approach enables researchers and manufacturers to determine consumer acceptance, evaluate formulation changes, compare competing products, monitor quality consistency, and identify sensory characteristics that influence consumer preferences (Rochmawati, 2019). Unlike instrumental measurements, organoleptic testing relies on human perception as the primary measurement instrument. Consequently, the quality of the resulting data depends heavily on the competence, health condition, and ethical protection of the panelists participating in the evaluation.

The literature indicates that sensory evaluation has evolved into a standardized scientific discipline through the development of systematic testing procedures, statistical analysis, and internationally recognized panelist selection methods. According to the International Standard Organization (1993), the selection of panelists involves several stages, including recruitment, screening, training, and continuous supervision. These procedures are intended to ensure that panelists possess sufficient sensory sensitivity and can consistently distinguish differences in color, aroma, taste, texture, and other sensory attributes. Previous studies have also emphasized that descriptive panelists should undergo screening for taste sensitivity, color perception, and discrimination ability before participating in sensory evaluation (Anupama et al., 2018; Callejo et al., 2015).

Sensory evaluation encompasses both objective and subjective assessments. Objective evaluation is generally performed by trained panelists capable of identifying specific sensory attributes, whereas subjective evaluation reflects consumer perceptions and product acceptability (Kemp, SE; Hollowood, T; Hort, 2009). Therefore, sensory evaluation contributes not only to product quality control but also to product innovation, formulation optimization, and market competitiveness. Furthermore, the method provides valuable information regarding the relationship between sensory characteristics and instrumental measurements, consumer preferences, and purchasing behavior (Setyaningsih et al., 2010).

Because human participants function as the primary measurement instrument, organoleptic testing must comply with ethical principles comparable to those applied in biomedical and behavioral research. The reviewed literature consistently demonstrates that ethical considerations extend beyond obtaining valid sensory data and include protecting participants' rights, health, safety, and dignity throughout the research process. Before participating in sensory evaluation, panelists should meet predetermined eligibility criteria, including being physically healthy, not suffering from food allergies relevant to the tested products, not being color-blind, not being excessively hungry or full, and being willing to participate voluntarily. In addition, informed consent should be obtained before the evaluation begins, ensuring that participants understand the objectives, procedures, potential risks, expected benefits, and their rights during the study. The literature synthesis further indicates that conventional organoleptic research ethics consist of several interrelated components. These include the identification of researchers and research institutions to establish accountability and scientific credibility; clear identification and selection of qualified panelists; comprehensive informed consent; transparency regarding

research objectives and procedures; confidentiality of personal and research data; participant compensation where appropriate; protection of participants' right to withdraw without consequences; and systematic documentation of research activities. Together, these ethical components establish a framework that promotes participant autonomy, minimizes research risks, and enhances the credibility and reproducibility of sensory evaluation studies.

Despite the comprehensive nature of these ethical principles, the literature also reveals an important limitation. Existing ethical guidelines primarily focus on participant autonomy, confidentiality, informed consent, and physical safety. Ethical protection is generally discussed from the perspective of research governance and participant welfare, whereas relatively little attention is devoted to the religious and cultural values that may influence participants' willingness and comfort in food-related research. Consequently, conventional organoleptic research ethics remain insufficient for studies involving Muslim participants, whose dietary decisions are strongly influenced by halal requirements in addition to conventional food safety considerations. This observation forms the basis for extending existing ethical principles by incorporating halal and *thayyib* concepts into organoleptic research ethics.

Integrating *Halal* and *Thayyib* Principles into Organoleptic Research Ethics

The synthesis of the reviewed literature demonstrates that conventional research ethics alone are insufficient to address the specific ethical requirements of organoleptic studies involving Muslim participants. Existing ethical frameworks generally emphasize participant autonomy, informed consent, confidentiality, and physical safety. Although these principles are indispensable, they do not explicitly consider religious values that may influence participants' willingness to consume food products during sensory evaluation. Consequently, integrating the principles of *halal* and *thayyib* into organoleptic research ethics provides a broader ethical perspective that respects both participants' physical well-being and their religious beliefs.

The concept of *halal* in organoleptic research extends beyond the permissibility of the final product. Rather, it encompasses the entire production chain, including the selection of raw materials, processing methods, storage, packaging, transportation, and product presentation. Therefore, ethical responsibility in organoleptic testing requires researchers to ensure that food samples originate from halal-certified ingredients, are processed without contamination from non-halal substances, and maintain halal integrity throughout the production process. For Muslim panelists, these requirements are not merely product attributes but constitute an essential component of ethical protection because consuming non-halal products may conflict with their religious obligations. Thus, halal assurance should be regarded as an extension of the ethical principle of respect for persons by acknowledging participants' religious identity and beliefs.

In addition to halal compliance, the literature consistently emphasizes the importance of the concept of *thayyib*, which refers to food that is wholesome, safe, hygienic, nutritious, and suitable for human consumption. Accordingly, ethical organoleptic testing should incorporate food safety considerations alongside halal assurance. Researchers should ensure that food samples do not contain hazardous substances, excessive food additives, toxic compounds, carcinogenic materials, or ingredients that may trigger allergic reactions among participants. Before testing begins, researchers should identify potential allergens, communicate these risks transparently to panelists, and exclude individuals with relevant medical conditions whenever necessary. Such measures not only minimize health risks but also reinforce the ethical obligation to protect participants from preventable harm.

The reviewed literature further highlights that food safety cannot be separated from hygienic production practices. Organoleptic samples should therefore be produced following appropriate hygiene and sanitation standards throughout the manufacturing process. Clean production facilities, sanitized equipment, proper food handling practices, and adherence to Good Manufacturing Practices (GMP) are essential to prevent microbiological contamination and preserve product quality during sensory evaluation. Compliance with these standards enhances both participant safety and the scientific validity of sensory testing because product quality is evaluated under controlled and standardized conditions.

Another important dimension identified in the literature is regulatory compliance. Products used in organoleptic research should possess the appropriate legal authorization, including food registration issued by the relevant authorities, such as P-IRT or BPOM, depending on product classification. Regulatory approval demonstrates that food products have satisfied minimum food safety requirements and undergone quality control procedures prior to human consumption. Consequently, legal compliance complements halal assurance by providing an additional layer of protection for research participants while strengthening the credibility of organoleptic studies.

The integration of *halal* and *thayyib* principles therefore transforms conventional organoleptic research ethics into a more comprehensive ethical framework. Rather than focusing exclusively on participant autonomy and informed consent, this integrated approach recognizes that ethical responsibility also includes safeguarding participants' religious values, ensuring food safety, maintaining product quality, and complying with applicable food regulations. Such integration is particularly important in countries with large Muslim populations and within the rapidly growing global halal food industry, where consumer confidence depends not only on scientific quality but also on religious assurance. Overall, the findings indicate that ethical organoleptic testing should be viewed through three complementary dimensions: protection of participant rights, protection of participant health, and protection of participants' religious values. The combination of these dimensions establishes a holistic ethical approach capable of enhancing participant trust, improving research integrity, and supporting the production of reliable sensory evaluation data for halal food research.

Proposed Ethical Framework for *Halal* Organoleptic Testing

The literature reviewed in this study indicates that ethical requirements for organoleptic testing extend beyond conventional research ethics and food safety considerations. Based on the synthesis of previous studies, ethical implementation of organoleptic research should integrate three complementary dimensions: (1) protection of research participants, (2) protection of food safety and product quality, and (3) protection of religious values through *halal* and *thayyib* assurance. The integration of these dimensions forms a comprehensive ethical framework for sensory evaluation involving Muslim participants.

The first dimension concerns the ethical protection of research participants. The literature consistently emphasizes that ethical organoleptic testing begins with transparent communication regarding the objectives, procedures, and expected outcomes of the study. Researchers should clearly explain the research protocol before sensory evaluation is conducted, allowing participants to understand the purpose of the study and make an informed decision regarding their participation. Comprehensive documentation of the research process also contributes to transparency and scientific accountability. Furthermore, participants should be provided with opportunities to ask questions before signing the informed consent document, ensuring that participation remains voluntary throughout the study.

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Another important component is participant autonomy. Organoleptic panelists should retain the right to withdraw from the study at any stage without experiencing any disadvantage or coercion. Respecting participants' decisions demonstrates adherence to the ethical principle of autonomy and contributes to creating a research environment based on mutual trust. In addition, confidentiality of both personal information and research data must be maintained through appropriate data management procedures, restricted access to research records, and secure documentation systems. These measures protect participants' privacy while improving the credibility and integrity of sensory evaluation research.

The second dimension relates to product safety and production quality. Organoleptic testing requires food products that have been manufactured following appropriate food safety standards. The reviewed literature indicates that researchers should ensure hygienic production environments, proper sanitation practices, Good Manufacturing Practices (GMP), and compliance with applicable food regulations before products are presented to panelists. Safe processing methods reduce microbiological contamination and ensure that sensory responses reflect product quality rather than defects arising from poor manufacturing practices. Likewise, researchers should verify that products do not contain hazardous ingredients, excessive food additives, toxic substances, carcinogenic compounds, or undeclared allergens that may endanger participants' health.

The third dimension, which distinguishes the proposed framework from conventional organoleptic research ethics, is the incorporation of *halal* and *thayyib* principles. The literature demonstrates that Muslim participants require assurance not only that food products are physically safe but also that they comply with Islamic dietary requirements. Consequently, ethical organoleptic testing should verify the halal status of ingredients, ensure that production processes are free from non-halal contamination, and encourage the use of products that possess valid halal certification whenever applicable. Integrating halal assurance into sensory evaluation reflects respect for participants' religious beliefs and strengthens trust between researchers and participants.

The concept of *thayyib* further complements halal assurance by emphasizing food wholesomeness, nutritional quality, hygiene, and safety. Consequently, ethical responsibility in organoleptic research encompasses both religious compliance and scientific quality assurance. The findings suggest that halal and *thayyib* should not be viewed as independent concepts but as mutually reinforcing principles that contribute to participant protection, product quality, and research integrity. This integrated perspective broadens conventional ethical standards by recognizing that participant welfare includes physical, psychological, and spiritual dimensions.

Based on the synthesis of the literature, the proposed ethical framework consists of four interconnected domains: research governance, participant protection, product assurance, and research implementation. Research governance includes researcher identity, institutional accountability, and research documentation. Participant protection includes panelist selection, informed consent, confidentiality, compensation, and the right to withdraw. Product assurance incorporates halal certification, food safety, allergen management, hygiene and sanitation, GMP implementation, and compliance with national food regulations. Finally, research implementation includes transparent explanation of research objectives, standardized sensory procedures, complete documentation, and supporting research appendices. Together, these four domains establish a holistic ethical framework capable of supporting scientifically rigorous, legally compliant, and religiously respectful organoleptic research involving Muslim participants.

The proposed framework also demonstrates that integrating *halal* and *thayyib* principles does not replace conventional research ethics; rather, it strengthens existing

ethical standards by incorporating religious considerations into participant protection. Consequently, this framework contributes to the development of more inclusive ethical guidelines for sensory evaluation and provides a practical reference for researchers, ethics review committees, food laboratories, and the halal industry.

Discussion and Implications

Theoretical Contribution to Research Ethics in Sensory Evaluation

This study extends the understanding of research ethics in food sensory evaluation involving human participants. Although sensory evaluation is often categorized as *minimal risk research*, it involves ethical considerations due to direct interaction between food products, human bodies, consumer preferences, and potential health risks. The findings demonstrate that ethical principles such as *respect for persons, beneficence,* and *justice* should also be applied in sensory studies through informed consent, participant protection, and fair panelist selection. Thus, ethical evaluation in sensory research should address not only data validity but also the rights, safety, and well-being of participants.

Contribution to Food Science and Sensory Evaluation

This study contributes to food science by highlighting that the quality of sensory evaluation is determined not only by methodological aspects but also by ethical compliance. Previous studies have primarily focused on sensory methods, panelist characteristics, and consumer acceptance, while participant protection and risk management have received less attention. Integrating ethical procedures, including health screening, allergen identification, product transparency, hygiene standards, and informed consent, can improve research credibility and strengthen the *ethical validity* of sensory evaluation.

Contribution to Halal Science

This research expands the concept of halal from merely ensuring halal status toward a broader framework of *halal and thayyib*. While halal studies commonly emphasize ingredients, production processes, certification, and supply chains, this study highlights that sensory evaluation is also an important component of the halal ecosystem. The application of ethical principles ensures that halal food research considers not only product compliance but also safety, quality, and human welfare. Therefore, research ethics should become an integral dimension of halal assurance systems.

Practical Implications for Ethics Committees, Laboratories, and Halal Food Industries

This study provides practical implications for several stakeholders. For ethics committees, it emphasizes the need for specific guidelines for food research involving human participants, including risk assessment, informed consent, allergen management, and participant protection. For laboratories, ethical considerations should be incorporated into sensory testing SOPs through researcher training, sample safety management, hygiene control, and adverse event documentation. For halal food industries, ethical sensory evaluation can enhance product credibility, consumer trust, and market acceptance.

Limitations and Future Research Directions

This study has several limitations. As a literature review, its findings depend on the availability and quality of previous studies. Future research should involve empirical investigations with researchers, ethics committees, laboratories, and food industries to validate the proposed principles. Further studies may also compare international ethical regulations and develop an *ethical framework for halal sensory evaluation* integrating research ethics, food safety standards, and halal-thayyib principles through approaches such as Delphi studies, expert validation, and implementation trials.

Overall, future research should promote a paradigm in which halal sensory evaluation is viewed not only as a tool for measuring consumer preferences but also as an ethical scientific process that prioritizes safety, responsibility, and human protection.

CONCLUSION.

Organoleptic research should integrate the concepts of *Halal* and *Thayyib* to establish a framework that combines sensory quality assessment with Islamic ethical principles. The implementation of these concepts ensures that research outcomes not only fulfill organoleptic quality parameters, including color, aroma, texture, and taste, but also comply with religious and ethical standards. Such integration can enhance the trust and confidence of Muslim panelists in participating in sensory evaluation activities. Furthermore, the application of the *Thayyib* concept strengthens the ethical dimension of organoleptic research by emphasizing product safety, hygiene, and the protection of panelists' health throughout the sensory testing process. Therefore, the principles of *Halal* and *Thayyib* should be consistently applied at every stage of research, including material selection, storage, production processes, and product presentation. Through this approach, organoleptic research can produce reliable sensory data while ensuring compliance with research ethics and safeguarding the safety and well-being of Muslim panelists in food and beverage evaluations.

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