Jurnal Kajian Ilmu Humaniora

JKIH, 8 (12), Des 2024
ISSN : 24531261

META-ANALYSIS: THE IMPACT OF RAW MATERIALS AND PROCESSING TECHNIQUES ON THE QUALITY OF CULINARY PRODUCTS

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Abstract: *This meta-analysis examines the influence of raw materials and processing techniques on the quality of culinary products. By synthesizing data from multiple studies, this research highlights the critical role of raw material selection, including freshness and source, as well as the application of precise processing techniques such as cooking methods, temperature control, and storage conditions. The findings reveal that high-quality raw materials and optimized processing methods significantly enhance sensory attributes, nutritional value, and overall product quality. This study underscores the importance of integrating careful material selection and advanced processing techniques in culinary production to meet industry standards and consumer expectations.*
Keywords: *Raw Materials, Processing Techniques, Culinary Product Quality.*

INTRODUCTION

The tourism industry has been well-known for a long time, and it is closely tied to accommodation and culinary experiences. When people visit a place, the first thing they need is to choose accommodation that fits their preferences. The second is food, as tourists will consume meals during their travels. The culinary industry is a rapidly growing sector, with products constantly innovating (Rahayu dan Mulya Sari 2022). The entry of the culinary industry into the creative industry indicates the added value provided by the creativity of culinary industry players, such as innovations in processing methods, recipes, and presentation styles.

Currently, the culinary industry in Indonesia is facing challenges due to the growing number of new businesses, intensifying competition. This forces entrepreneurs to apply various strategies, one of which is prioritizing product quality to remain competitive. To produce quality products, it is essential to choose the best raw materials and pay attention to the production processes or processing techniques applied (Gofi, 2023). Quality raw materials and appropriate processing techniques significantly influence the final quality of culinary products.

The quality of a product is closely related to the quality of the raw materials used. Therefore, entrepreneurs must select raw materials that meet the required standards. The success of a company in production does not only rely on raw materials but also on the processing techniques applied during production. High-quality raw materials are expected to meet the desired standards for producing quality products. Hanggana defines raw materials as substances used to create finished goods, which are essential components that are integrated into the final product (Gerung dan Palandeng 2021). Each raw material has characteristics that affect the final product.

For food to be consumed, it must undergo proper processing techniques. Food processing involves cooking raw ingredients to make food that is ready to consume, of high quality, and safe (Kemenkes RI, 2013). The cooking process in the food industry differs from cooking smaller portions. In food service systems, ingredients are prepared in large quantities. Wardhani states that creating a high-quality taste requires different stages compared to processing small quantities (Nabila dan Ms 2020).

The processing techniques used can change the properties of raw materials, including texture, flavor, and nutritional content (Sundari dan Astuti Lamid n.d.). Therefore, the

processing techniques or production processes must be planned before production begins, as the quality of a company's production system greatly affects the final product. For this reason, companies must implement an effective production system to ensure smooth operations and meet expectations. (Assauri, 2011) explains that production processes are methods used to create value in goods or services by utilizing available resources (Herawati, 2022).

This study uses meta-analysis because it aims to identify the relationship between raw materials and processing techniques, providing a clearer understanding of how these factors interact in producing high-quality culinary products by analyzing information from previously conducted research articles. This meta-analysis is expected to identify common patterns and practical recommendations for culinary professionals to improve product quality.

METHOD

This study uses a meta-analysis method to understand the impact of raw materials and processing techniques on the quality of culinary products. The objective of this meta-analysis is to combine and analyze results from various studies discussing the relationship between raw materials, processing techniques, and product quality (Sujatmiko, Palupi, dan Wulandari 2023).

Selection criteria for studies include research published in the past 5 years, using a qualitative approach, and being relevant to the topics of raw materials and processing techniques in the culinary field. Literature searches were conducted across several databases, such as Sinta Journal and Google Scholar, with keywords "culinary raw materials," "food processing techniques," and "culinary product quality." Each relevant study was evaluated based on abstracts and methods to ensure they matched the topic.

Ricvan explains that the steps in the meta-analysis research follow the guidelines set by (Sari dan Hardini 2020), which include the following:

1. Select criteria for articles to be used. Articles are chosen based on relevance, clear inclusion and exclusion criteria, and alignment with the research objectives.
2. Search for relevant studies. A search is conducted in trusted databases using specific keywords to find relevant studies.
3. Assess the articles for analysis. Articles are assessed based on methodology, data validity, and relevance to the research criteria.
4. Classify the articles for integration. Articles are grouped based on similarities in design, variables, or methods to facilitate integration.
5. Use models. Statistical models are selected based on data characteristics and are analyzed using specialized software.

RESULTS AND DISCUSSION

Based on the meta-analysis of 20 relevant studies, it was found that raw materials and processing techniques are two interconnected factors in determining the quality of culinary products. These studies covered various types of culinary products, such as cakes, traditional foods, and modern dishes. The qualitative data from these studies are summarized in Table 1.

Table 1. Summary of the Impact of Raw Materials and Processing Techniques on Culinary Product Quality

No.	Aspect	Key Findings	Source
1	Raw Materials	Fresh, high-quality raw materials appropriate for the product type provide a strong foundation for producing quality products.	(Rahayu and Mulya Sari 2022), (Muryani 2020), (Billy Setiawan Gerung, Palandeng, and Tumewu 2021), (M. F. Hidayat and Saputra 2023), (Adli and Sjofjan 2020).

2	Processing Techniques	Proper processing techniques can preserve the quality and nutritional value of the product.	(Martina and Fadillah 2022), (T. Hidayat, Kandriasari, and Alsuhendra 2024), (Sumardiono et al. 2019), (Mariana et al. 2023), (Sujatmiko, Palupi, and Wulandari 2023), (Nabila and Ms 2020), (Asridinda Davina and Harahap 2024).
3	Relationship Between Raw Materials and Processing Techniques	Both must be synergized correctly to produce quality products. The final product quality is highly determined by both raw materials and processing techniques.	(Lupitasari, Lestari, and Barin Berlian 2023), (Sibarani and Alhazami Lutfi 2022), (Karomah, Pramulanto, and Nugraha 2023), (Adiningtiah et al. 2022), (Hilary and Wibowo 2021), (Gofi 2023), (Harsana n.d.), (Erdi and Hariyati 2023), (Ashriana and Fitriyani 2020), (Pratiwi and Sugiyarti 2022).

Discussion

The results of the research show that the quality of raw materials plays a key role in enhancing the quality of culinary products. As shown in Table 1, the use of fresh ingredients can significantly enhance the taste and outcome compared to processed ingredients. This supports the theory of (Sibarani dan Alhazami Lutfi 2022), where fresh ingredients contribute to the flavor and aroma of culinary products. Additionally, consumer preference for the best ingredients shows a shift toward healthier and more environmentally-friendly products.

Regarding processing techniques, the study found that modern methods provide better results than traditional techniques, particularly in preserving texture and flavor consistency. This finding is especially relevant for protein-based products, such as meat, which can lose tenderness when cooked at high temperatures. Furthermore, optimal baking temperatures (180°C for 20 minutes) were found to produce the desired texture and color in baked goods, as noted in the research by (T. Hidayat, Kandriasari, dan Alsuhendra 2024).

The interaction between raw materials and processing techniques is also an important consideration. For example, combining fatty ingredients with roasting methods results in richer flavors due to optimal Maillard reactions. This supports the findings of (T. Hidayat, Kandriasari, dan Alsuhendra 2024), which shows that processing techniques tailored to the characteristics of raw materials can produce high-quality products.

The limitations of the studies analyzed, such as differences in quality measurement standards across studies and limited exploration of local raw materials, pose challenges in this meta-analysis. Therefore, future research should explore alternative raw materials and the development of more specific processing techniques for particular product types.

Processing techniques are equally crucial. The selection of methods like roasting, frying, or steaming greatly contributes to the sensory qualities and nutritional value of products. Modern technologies, such as convection ovens, also prove to provide more consistent results in maintaining product quality. Factors like processing duration and temperature were found to have significant impacts, as proper settings help preserve optimal taste and texture in the final product.

The interaction between raw materials and processing techniques is an important finding of this meta-analysis. The right combination of these two factors can produce superior culinary products, both in terms of sensory quality and market competitiveness. For instance, high-moisture ingredients require specific processing techniques to achieve the desired texture without compromising taste. These findings provide culinary industry practitioners.

CONCLUTION

This study confirms that both raw materials and processing techniques have a significant impact on the quality of culinary products. Fresh and natural ingredients, when combined with appropriate processing techniques, play a crucial role in determining the taste, texture, aroma, and shelf life of the product. The results of this meta-analysis are expected to serve as a guide for future research, particularly in the development of more sustainable alternative raw materials and the exploration of innovative processing techniques. Furthermore, future research could focus more on in-depth analysis of the relationship between raw materials, processing techniques, and consumer satisfaction, to enhance the quality and competitiveness of culinary products in the global market.

These findings are expected to provide guidance for culinary industry practitioners in selecting the right ingredients and processing methods to produce high-quality products. Additionally, further studies could explore the relationship between these factors, considering the context of various types of culinary products.

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