

Managerial strategies in developing healthy food product: integrating aspect of health and food science for competitive advantage

Grace Maria Fitricia^{1*}, Puspita Lianti Putri¹, Slamet¹, Faizal Rizky Yuttama¹, Alfizi¹

¹Department of Management, Social Science Faculty, Universitas Harapan Bangsa, Indonesia

Abstract. The rapid growth of the healthy food products market is one of main indicators of the changing trend in food and beverage industry. People nowadays aware and more selective about their health and healthy eating habit related to healthy life style. This global awareness make influence in their decision and preference of food and beverage consumptions, finally give impact in global market for healthy food products. The trend should become main focus of the food and beverage industry to make decisions about managerial strategies for the purpose of long term and competitiveness advantage. The purpose of this research is to develop an effective managerial strategy model to support the development of healthy food products regarding of the changing trend. The methods of this research using qualitative descriptive approach which examines from the articles, global data about trend and healthy food products market, and practitioners which have experiences in developing healthy food products. Results and discussions show that integration of food science and health in developing of healthy food products is a strategic step that must be taken by food companies which can be able to meet the demand of consumers to remain relevant in competitive market. Product innovation, cross-disciplinary collaboration, and marketing strategies that emphasize consumer education have also proven to provide a significant competitive advantage.

1 Background

Global awareness of health and healthy eating has increased significantly in recent years. This shift is being driven by the increasing prevalence of lifestyle-related diseases such as diabetes and heart disease, which is encouraging consumers to seek out foods that are not only tasty but also beneficial to their health [1]. The global trend shows that the demand of healthy food product increased especially since COVID-19 pandemic. According to Global Wellness Institute [2], healthy food product market grows 8% every year in line with the increasing public awareness of the importance of a healthy lifestyle. A report from the Nielsen Releases 2nd Annual Global Wellbeing Report (2019) [3] shows that more than 70% of consumers around the world now choose foods that are considered healthier and support an active lifestyle include those superfoods. COVID-19 pandemic affected the lifestyle of

* Corresponding author: gracemaria@uhb.ac.id

Indonesians. According to survey conducted by NielsenIQ and Grab with more than 13,000 respondents, 7 out of 10 Indonesians want to regularly consume healthy food [4]. Survey from 1729 Grab active users in Singapore also show that they consume healthy food at least once in every two or three days, and the option to consume the healthy food is for lunch [5].

The urgency of a sustainable and resilient food system is increasingly felt in a rapidly changing world. Recognizing this, Indonesia embarked on a transformative journey through the Sustainable, Inclusive, Healthy Food System Transformation in Indonesia (SHIFT) program. Starting from January 2021 to April 2022, this pioneering initiative aligns with the global momentum set by the UN Food System Summit in 2021, driving the national commitment to revolutionize the food system as articulated in Indonesia's Food Law and National Medium-Term Development Plan. At its core, SHIFT is not just about ensuring food security; it is about nurturing a system that balances nutritional needs with environmental sustainability and socio-economic well-being [6].

According to research by Annunziata and Vecchio [7], healthy food is one of the fastest growing sectors in the global food industry. Previous research supporting this has shown that people now want foods that not only provide nutrients but also have an effect on health, known as functional foods [8]. Consumers are increasingly paying attention to the nutritional composition and health effects of the foods they consume, so manufacturers are challenged to create products that meet these trends.

The rapid growth of the healthy food products market is one of the main indicators of this changing trend. According to Grand View Research in 2023 [9], the global market for healthy food products is expected to reach USD 1.5 trillion by 2027, with steady annual growth. This data highlights a huge opportunity for food companies to innovate and adapt their products to the growing market demand. In Indonesia, based on data from the Ministry of Industry [10], the food and beverage industry grow up to 7,78 % in 2019 compared to non-oil and gas industry at 4,34 % and national industry growth at 5,02 %. With an increasingly population that more conscious of health, developing effective strategies will be a great opportunity for the businesses. As described by Thompson and Moughan [11], the integration of food science and health is the key to creating products that are able to meet the demands of an increasingly selective market. An effective managerial strategy in managing these innovations can provide a competitive advantage for companies, especially in conditions of increasingly tight competition.

Despite this promising opportunity, the development of healthy food products faces various challenges. A study by Lukiewska [12] shows that many companies have difficulty integrating health aspects with product formulations that remain attractive to consumers. This suggests an urgent need for effective managerial strategies to deal with these challenges.

Innovation in food product development is one of the solutions to overcome these challenges. Kotler et al. [13] underline the importance of innovation in marketing strategies, including in the food industry. They argue that companies that can effectively innovate their products have a greater chance of success in a competitive market. The integration of food and health science in product development is crucial to ensure products are not only safe but also meet nutritional standards. Anandharamakrishnan and Parthasarathi [14] state that an in-depth understanding of food science principles can improve product quality and make them more suitable for consumers' health needs.

According to Tuzunkan and Ozen [15], managerial strategies that are adaptive and responsive to market changes and health trends are key to success in the food industry. Several studies support the importance of integration between food science and managerial strategies. Lukiewska [12] emphasized the importance of innovative approaches in the development of healthy food products, while refers to Food and Agriculture Organization (FAO) pointed out that the integration of health principles and food technology is key to creating safe and nutritious products [16]. Research by Ronteltap et al. [17] highlights the

need for a deep understanding of food science and nutrition in managerial decision-making. Proper management of resources, including the utilization of technology to increase the nutritional value of products without compromising quality, is an important factor in the success of companies in competitive markets. In addition, marketing strategies that emphasize consumer education on the health benefits of food products are also indispensable.

However, there is a research gap in the application of effective managerial strategies to integrate health and food science aspects. Most previous studies have focused on the development of food product innovation in general, without paying in-depth attention to the synergy between the two aspects. For example, Venkatesh and Chintagunta's [18] research focuses more on product innovation based on market trends, but less on how nutrition and health science aspects can be a major factor in such innovation. In fact, food products that are innovative and have added value in terms of health have the potential to increase consumer loyalty in the long term [19-22]. Health science focuses at nutrition aspect, disease prevention, and sustainable long-term health, in spite of food science emphasize in taste aspect, texture, fragrance, and product durability. Each of science, both health science and food science have contrary purpose [23].

Thus, there is a need to further examine how managerial strategies can effectively integrate and align health and food science aspects in the development of healthy food products. Previous research has shown the importance of product innovation and marketing strategies that support health trends by Grunert and Wills [24], but there is still a few research that has focused on how companies can implement comprehensive managerial strategies to achieve these goals. This creates a gap in the literature that serves as an important foundation for this research.

Responding to this phenomenon, this study aims to explore managerial strategies that food companies can implement in developing healthy products that suit the preferences of modern consumers. It will also examine how the integration of food and health sciences can enhance the competitiveness of companies in an increasingly competitive market. By exploring these aspects, the research is expected to make an important contribution to the literature related to innovation management in the food industry as well as provide practical guidance for industry players in facing dynamic market challenges.

Overall, this research will fill the research gap by developing a managerial strategy model that supports the development of healthy food products based on the integration of health and food science. The result of this study is not just relevant theoretically but also directly contribute for the sustainable development goals, especially to overcome health and nutrition problem in society and this study provide the guidance for comprehensive managerial strategies that can be implemented by food and beverages industry in producing healthy food product that meet market needs and consumer trends at the competitive market. It is hoped that the results of this research can provide added value for companies and consumers, and encourage more sustainable growth of the food industry in the future.

1.1 Research Objectives

- a. Exploring the role of innovation in the development of healthy food products and how the integration between food science and health can create a competitive advantage for food companies.
- b. Developing an effective managerial strategy model to support the development of healthy food products on product innovation management in the food sector.
- c. Analyzing how managerial strategies can be implemented in the development of healthy food products that integrate aspects of health and food science.
- d. Identifying the challenges faced by the company in developing healthy food products, and how managerial strategies can help overcome these challenges.

1.2 Research Benefits

1.2.1 Theoretical Benefits

- a. This research will contribute to the development of theory in the field of innovation management, especially related to healthy food product development strategies that integrate aspects of health and food science.
- b. This research will add to the scientific literature related to strategic management in the food industry, as well as providing a theoretical basis for further research on product innovation management in the food sector.

1.2.2 Practical Benefits

- a. Providing guidance for food companies in designing effective managerial strategies to develop healthy food products that meet market needs and modern consumer trends.
- b. Offering practical solutions for companies in facing the challenges of integrating health and food science aspects, so as to improve their competitiveness in a competitive market.

2 Literature Review

2.1 Concept of Healthy Food Products

Healthy food products are foods that are produced with the main purpose of providing health benefits to consumers. These products are often associated with natural ingredients, do not contain harmful chemicals, and pay attention to balanced nutritional values. Sudarsono [25] defines healthy food products as food that is safe for consumption, both in the short and long term, which has a balanced nutritional content such as carbohydrates, proteins, fats, and vitamins and minerals needed by the body. Healthy food products usually also focus on the use of organic raw materials and the reduction of chemical additives. According to Jati [26], this trend of healthy food product consumption is triggered by consumers' increasing awareness of the long-term health impacts of the food they consume.

2.2 Health as a Key Aspect of Food Consumption

In the modern era, consumers are increasingly aware of the importance of choosing food that is not only delicious but also beneficial for health. According to Winarno [27], the health aspect of food consumption is related to nutritional content, product hygiene, and its effect in reducing the risk of chronic diseases such as hypertension, diabetes, and obesity. Healthy food products supported by health benefit claims such as gluten-free, low-fat, or high-fiber, are becoming increasingly popular among consumers who pay attention to a healthy diet. Purnamasari and Putra [28] in their study showed that consumers, especially among the upper middle class, are increasingly paying attention to nutrition labels and food safety before deciding to buy a product.

2.3 The Role of Food Science in Healthy Product Development

Food science is a very important discipline in the development of healthy food products, as it involves the study of the composition of food ingredients, processing, and technology used to maintain the quality of food products. Rahmawati [29] emphasizes the importance of innovation in food science to produce healthier products, especially in processing techniques that minimize the use of chemical preservatives and maximize the natural nutritional content of food ingredients. One important innovation is the use of cold processing technology or minimal processing, which aims to maintain the nutrients and natural flavors of food ingredients without using high temperatures that can damage nutritional content [19]. Research study held by Sufyan et al. [30] in some food and beverages businesses found that product innovation that produce healthy food and beverage products like gluten free, develop organic product line, including snack and beverages increase their market share especially the consumers with diet habit and attracting the segmentation of consumers who cares about their health. Sufyan et al. [30] also found that a company in food and beverage industry that collaborate with nutritionist to make sure that their developed products are not only tasty but also healthy can increase the consumers loyalty about the products' health brand image.

2.4 Managerial Strategies in Healthy Food Product Development

Managerial strategies are key to creating and maintaining competitive healthy food products in the market. Kotler and Keller [13] emphasize the importance of combining market analysis with product innovation in the food industry. In the context of healthy food products, managerial strategies include research and development (R&D) to create new products that meet consumer needs, value-added marketing, and efficient supply chain management to ensure products remain fresh and of high quality. Handoko [31] explains that effective managerial innovation in the food industry should involve cross-disciplinary collaboration, including nutritionists and food scientists, to create products that are not only commercially attractive but also provide tangible health benefits.

2.5 Managerial Strategies Implementation in Healthy Food Product Development

A company that has been succeed to implement this strategy that prioritized innovation and involved cross-disciplinary collaboration is Nestle, their food product called Garden Gourmet, plant-based product line. Nestle sees an opportunity to create healthier food products that are more nutritious and environmentally friendly to fulfill consumers awareness and need on health and sustainability. Nestle's innovation team combines knowledge of food technology, biotechnology and nutrition to create plant-based meat alternatives that are delicious, nutritious and more environmentally friendly. This product get positive response in Europe and North America market, increase significantly especially in the segmentation of vegetarian and flexitarian consumers. This product also helps to reduce carbon emissions and in line with Nestle's commitment to achieve net zero emissions in 2050. This Nestle's innovative innovation has got various award in sustainable and food product innovation category [32]. A marketing strategy that emphasizes consumer education about the health benefits of food product is also considered important by the food and beverage industry that produce healthy foods product. The managerial strategy implemented by Danone using digital campaign to give education about their product benefit for consumers' health, for example 'Air Sehat Aqua' campaign that promote the importance of proper hydration and good water quality through education content, social media and collaboration with health influencer and doctor that give the credible information. Others managerial strategies that

Danone has been implemented is education program in school and community through ‘*Tanggap Sehat*’ program, which consist of product demo and education session by nutritionists that give scientific explanation about the benefit of their product which are infant formula and baby food products, also education material distribution through brochure and nutritional guidance that can be easily understood by parents and teachers to help them decide better in choosing healthy food product for their children. Danone also use e-commerce platform like Shopee and Tokopedia to educate consumers about the benefit health of their product. They did partnerships with *Asosiasi Ahli Gizi Indonesia*/Indonesian’s Nutritionists Association (AAGI) and the Indonesia Ministry of Health to held seminars and workshops. The result of the implementation of these managerial strategies are as follows can increase consumers’ awareness about the importance of hydration and balanced nutrition, increase consumer’s trust and increase the sales [33].

2.6 Market Orientation and Product Innovation

Healthy food product innovation must be in line with market orientation, which is the company's ability to understand and respond to consumer needs and preferences. Narver and Slater [34] define market orientation as a business strategy in which companies proactively identify and fulfill consumer needs to create competitive advantage. In the healthy food industry, product innovations that focus on increasing nutritional value, using organic ingredients, and reducing sugar or fat content can provide strong competitiveness in the market. Tjiptono [35] adds that market needs-oriented innovation also involves product development based on consumer trends, such as the increasing demand for plant-based products or specific diets such as keto or vegan.

2.7 Integration of Health Science and Food Science in Product Development

Healthy food product development requires a multidisciplinary approach that integrates health science and food science. According to Setiawan [36], health science provides an understanding of how food affects human health, including the risk of chronic diseases and individual nutritional needs, while food science provides methods to process, preserve and enhance the nutritional value of food products. Collaboration between these two disciplines is essential in creating products that can promote health without compromising product quality and taste. Widodo [23] emphasized that collaboration between nutritionists and food scientists results in more holistic innovations, such as fortified food products designed to prevent specific nutrient deficiencies in certain population groups.

2.8 Consumer Behavior towards Healthy Food Products

Consumer behavior towards healthy food products has changed along with the increasing awareness of the importance of health. In the food and beverage industry, product diversification is an important strategy used to expand market share, which can be the introduction of new flavors, organic products, or products with certain health claims that match current consumer trends [37]. Putri [38] revealed that millennial and generation Z consumers prefer food products that are environmentally friendly and support a healthy lifestyle. This trend includes organic, low-sugar, gluten-free foods, as well as minimally processed products without preservatives or artificial colors. Prasetyo [39] adds that the increasing popularity of special diets, such as vegan or keto diets, is also driving demand for healthy food products tailored to specific nutritional needs.

2.9 Challenges in Healthy Food Product Development

While there is a growing demand for healthy food products, their development is faced with various challenges. Suharyanto [40] notes that organic and natural raw materials often come at a higher price, which impacts production costs. In addition, there are challenges in ensuring that such products meet increasingly stringent health and food safety standards. Arifin [41] states that stricter regulations from international and local health agencies, such as the Food and Drug Administration in Indonesia (BPOM), can slow down the innovation process, as companies must ensure that their products comply with all relevant food safety standards.

2.10 Business Models in the Healthy Food Industry

An adaptive and innovative business model is required to compete in the healthy food industry. Osterwalder and Pigneur [42] introduced the concept of the business model canvas, which underlines the importance of value creation, especially in terms of developing products that can meet consumer demand for healthy food. Hermawan [43] emphasized that in the healthy food industry, collaboration with modern retailers and digital distribution is key to reaching more consumers, especially through e-commerce platforms and digital marketing that focus on health and sustainability values.

2.11 Integration of Managerial Strategy and Technology in Healthy Food

In the face of increasing competition, technology-oriented managerial strategies can help develop healthy food products. Wibowo [44] explains that technologies such as blockchain can be used to trace the supply chain, ensuring transparency and food safety. In addition, the use of smart packaging technology that can provide nutritional information directly to consumers through QR codes is also a managerial innovation that has great potential in increasing consumer confidence in healthy food products.

3 Research Methods

The research method used was a qualitative method with a descriptive approach. This method was chosen because it is suitable for understanding complex phenomena related to managerial strategies and the integration of food and health sciences in the development of healthy food products. The flowchart here (Fig. 1) describes the research process.

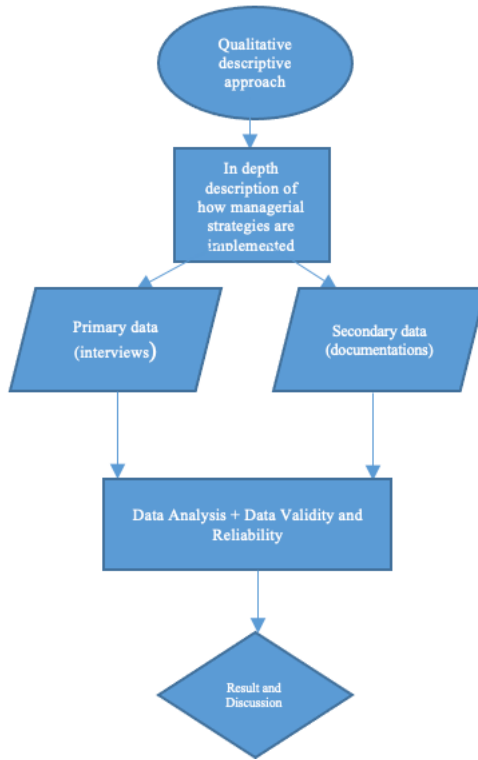


Fig. 1. Research Process

3.1 Research Approach

This research uses a qualitative-descriptive approach. This approach aims to provide an in-depth description of how managerial strategies are implemented in the development of healthy food products with a focus on the integration of food and health sciences. The descriptive approach is used to analyze current conditions as well as how managerial strategies and product innovation are implemented by food companies.

3.2 Data Source

This research uses two types of data, namely primary data and secondary data:

3.2.1 Primary Data

Primary data was collected through in-depth interviews with managers, food experts, nutritionists, and food industry players who are directly involved in the development of healthy food products. This information will explore how managerial strategies are applied in food product innovation and how companies overcome challenges in integrating health and food science.

3.2.2 Secondary Data

Secondary data is obtained from related literature, scientific journals, company annual reports, research articles, food industry reports, and market data from credible sources such

as Grand View Research [9], Nielsen Global Health and Wellness Report [3], FAO (2022), Indonesia Ministry of Industry [10], United Nation in Indonesia about SHIFT Publication [6]. This data was used to support the analysis and provide context to the primary findings.

3.3 Data Collection Technique

3.3.1 Interviews

Semi-structured interviews will be conducted with food industry players (managers, food experts, and nutritionists) who have experience in developing healthy food products. The interviews will dig deeper into the challenges, strategies and innovations undertaken in the integration of health and food science aspects. The interview questions will be structured based on the research focus and will be tailored to the respondents.

3.3.2 Documentation

Data collection from relevant secondary sources, such as scientific articles, industry reports, and previous case studies related to healthy food product development.

3.4 Sampling Technique

The purposive sampling method will be used in this study, where the selection of respondents is carried out deliberately based on certain criteria. Respondent criteria include:

- a. Managers or decision makers who are directly involved in the development of healthy food products in food companies.
- b. Food and nutrition experts who have knowledge and experience in the integration of health and food science.
- c. Companies that are active in the healthy food industry and innovate products that prioritize health aspects.

The number of respondents interviewed will be adjusted to data saturation, which is when the information obtained from the interview is considered sufficient to answer the research questions and there is no significant new data.

3.5 Data Analysis Technique

The data collected will be analyzed using thematic analysis to identify key themes related to managerial strategies and innovation in the development of healthy food products. The steps in data analysis are as follows:

- a. Data Collection: Collecting and organizing data from interviews and documentation sources.
- b. Data Reduction: Selecting data which relevant to the research focus, compiling categories, and formulating key themes that emerged from interviews and documentation.
- c. Data Presentation: Organizing the reduced data in descriptive form to provide a comprehensive picture of how managerial strategies are implemented in the context of food and health science integration.
- d. Conclusion Drawing: Interpreting the data based on the identified themes to draw conclusions about the most effective managerial strategies in developing healthy food products.

3.6 Data Validity and Reliability

To ensure the validity and reliability of the data, this research will use the triangulation method, namely:

a. Data Source Triangulation

Using various data sources (interviews, documentation, literature) to ensure consistency and accuracy of findings.

b. Triangulation of Methods

Utilizing various data collection techniques (interviews and documentation) to enrich understanding and get a deeper understanding of the phenomenon under study.

4 Results and Discussion

In this study, the results of interviews and thematic analysis provided an in-depth understanding of the application of managerial strategies in the development of healthy food products. Data from in-depth interviews with food company managers, nutrition experts, as well as analysis of scientific literature revealed several important themes related to the integration of health and food science aspects in healthy food product innovation. The following are details of the results and discussion of this research:

4.1 Managerial Understanding of Healthy Food Product Trends

The results show that the majority of food companies that focus on developing healthy products have a deep understanding of the trends of consumers who are increasingly concerned about health. Managers realize the importance of keeping abreast of global trends related to healthy lifestyles, which are driven by an increasing awareness of the risks of diseases resulting from unhealthy lifestyles, such as obesity and cardiovascular disease.

In line with research conducted by Annunziata and Vecchio [7], food companies are currently required to create products with the right nutritional composition, without compromising on taste quality. The study found that companies that can combine health aspects and taste enjoyment will more easily gain a place in consumers' hearts.

During the interviews, some managers stated that they often conduct market surveys to understand consumer preferences and make adjustments to their products to suit these trends. This strategy contributes to the development of products that are more in line with the expectations of modern consumers, who are not only looking for delicious food, but also those that are beneficial to their health.

Product innovation that supports that statement which have been implemented such as functional foods. Functional foods that can be defined as foods and food components with benefit beyond basic nutrition [21]. The functional foods like phyto-based yoghurt can be an alternative solution and more affordable. One of the phyto material that could potentially be used in making yoghurt is sweet corn and mung beans, which contain high nutritional quality, balanced content of amino acids, and high digestibility [21]. The combination of these two food raw materials can complete protein content that could not be found in each of food raw material. The combination of some food raw materials can complete the amino acids content and other nutrients. This sweet corn-mung bean milk can be enhanced in functional value by adding additional treatment in the form of lactic acid bacteria (BAL), which can give probiotic benefit. The content of amino acid which is contained in sweet corn mung bean yoghurt will be beneficial for preventing diseases. These combinations of food raw materials will give added value for the food and beverage products and can be the alternative solution to provide more affordable functional foods that support healthy but tasty food which become the preference of modern consumers.

The other food and beverage product innovation strategies that were proven to increase the product sales are the health drink products with natural drink materials and without added sugar, gluten free food product that increase market share in consumers' segmentation with special dietary needs, reduction of sugar content product that increase consumers' loyalty and brand image as the healthy food product manufacturer [30].

4.2 Integration of Food and Health Sciences in Product Innovation

One of the key findings of this study is the importance of integration between food science and health in the process of developing healthy food products. The food and nutrition experts interviewed stated that a deep understanding of food science is very important in creating food products that are safe and have optimal nutritional value.

A study by Thompson and Moughan [11] supports these findings by emphasizing the importance of innovation in combining modern food technology with health principles. The food companies involved in the study, for example, used modern technologies such as food fortification (the addition of vitamins and minerals) to increase the nutritional value of products without sacrificing taste and texture. This allows them to create products with better health benefits, without reducing their appeal to consumers. The increasing of consumer awareness of health is driving companies to reduce sugar content and add more nutrients in their products. One of the companies in the study collaborated with nutritionists to ensure that the products developed were not only tasty but also healthy. By collaborating with nutritionist is proven to enhance the consumers' trust regarding the claim of the product health based on the study conducted by Sufyan et al [30].

Experts also mentioned that further research related to the use of natural ingredients in the formulation of healthy food products continues to be developed. For example, the use of natural ingredients such as chia seeds and quinoa that are rich in fiber and protein is growing in popularity, as they have significant health benefits [45].

4.3 Challenges in Developing Healthy Food Products

Although there are great opportunities in the market for healthy food products, this study finds several challenges faced by food companies in the development of these products. According to the managers interviewed, the biggest challenge is finding a balance between a healthy product composition and consumer taste preferences. Some companies have difficulty creating healthy products without sacrificing flavor, which can have an impact on consumer loyalty.

Lukiewska [12] stated that many companies are experiencing similar challenges in trying to integrate health aspects into food products that remain attractive to consumers. Therefore, an effective managerial strategy is to manage product innovations that not only fulfill health standards but also maintain the taste desired by consumers.

4.4 Managerial Strategies in Developing Healthy Food Products

The interviewed managers revealed that product innovation and cross-disciplinary collaboration are the keys to success in the developing of healthy food products. Some companies leverage synergies between marketing, research and development (R&D), and nutrition departments to produce products that match market trends.

According to Kotler et al. [13], successful innovation in the food industry requires support from all elements of the organization. A marketing strategy that emphasizes consumer education about the health benefits of food products is also considered important by the company. The managers explained that they use a variety of communication channels to

convey this information, including social media, product packaging, and wellness campaigns. Thus, an effective communication strategy can increase consumer awareness of the importance of consuming healthy food.

The research of Ronteltap et al. [17] also highlights the importance of a managerial approach that is responsive to health trends. The managers of the companies interviewed confirmed that they continue to monitor the latest health trends and make strategic adjustments based on information obtained from market surveys and data analysis.

4.5 The Impact of Managerial Strategies toward Company Competitiveness

The results of this study show that companies that successfully integrate good managerial strategies with innovation in healthy food products have higher competitiveness in the market. Interviewed managers' report that adaptive managerial strategies and a focus on product innovation give them a significant competitive advantage, especially in an increasingly competitive market. In line with Day [46] emphasized that companies that understand consumer behavior and market trends can develop more effective strategies. Tuzunkan and Ozen [15] also emphasized that companies that are able to innovate in terms of healthy food products, as well as responsive to market trends, tend to be more successful in maintaining and expanding their market share. Thus, managerial ability in managing healthy food product innovation is one of the main factors for the company's success in the long term.

4.6 Discussion

Based on the results of this study, the integration of food science and health in developing of healthy food products is a strategic step that must be taken by food companies to remain relevant in a competitive market. These results are in line with a study conducted by Grunert and Wills [24], which stated that innovations that prioritize health aspects have great potential to increase consumer loyalty and strengthen the company's position in the market. Innovative food products that have added value in terms of health have the potential to increase consumer loyalty in the long term, according to Hartanto and Sugiharto [47]. As well as the research held by Maulana [48] found that companies that actively monitor trends and adjust their products, such as reduced sugar content and added nutrients, are more successful in meeting consumer expectations and increasing customer satisfaction. This support research study by Sufyan et al [30], the company that launch healthy drink with natural ingredients and without added sugar experienced 25 % sales increase in the first six months, likewise company that develop organic product line, include snack and drinks can attract the consumers who care about health and experienced sales increase in their organic product until 30 %. Their study also found that the food and beverage company which reduce their sugar content in their food and beverage product, add more nutrients in the products experienced consumers loyalty and their brand image as healthy food manufacturers.

This result of this study also related to Resource Based View Theory, which describe a company can achieve competitive advantage by relying on resources so that it can direct the company to be sustainably continuously [49]. Resources have two types, namely intangible and Tangible resources include machinery, medical devices, land, buildings, and so on [49]. While intangible resources such as expertise, perception, culture, and so on [50]. This study also supported SHIFT program, healthy and inclusive sustainable food system transformation in Indonesia to achieve success in this innovation and sustainability [6]. The managerial strategies that support cross-disciplinary collaboration, the use of modern food technology, and an adaptive approach to changing market trends is needed. These success factors engaging tangible and intangible resources. The study also emphasizes the importance of

educating consumers about the health benefits of food products, which can be part of a comprehensive marketing strategy.

4.7 Research Limitations

This research has several limitations, including:

- a. This study only involved a few food companies and nutritionists, so the generalization of the results may be limited to the context of the study. A broader study with a more diverse sample can provide a more comprehensive understanding.
- b. This study focuses on healthy food products and the integration of health and food science aspects, but does not discuss in detail other external factors such as government policies, food regulations, and economic changes that can also affect product development.
- c. The qualitative approach used in this study provides in-depth insights, but does not provide a broader quantitative picture. Further research with quantitative methods can help validate these findings and measure the impact of managerial strategies on company performance. Future Research can explore quantitative approaches of how the models have been implemented and give significant impact especially in health food industries.

5 Conclusions and Suggestions

5.1 Conclusions

This study concludes that the integration of health and food science aspects in the development of healthy food products plays an important role in creating strong competitiveness in the market. The results show that managerial strategies that are adaptive, innovative, and able to respond to consumer health trends are key factors in the success of food companies. Companies that are successful in managing healthy food product innovations tend to be more responsive to changing consumer preferences who are increasingly concerned about health.

A deep understanding of nutrition and food technology goes a long way in creating products that are not only healthy but also appealing to consumers. Product innovation, cross-disciplinary collaboration, and marketing strategies that emphasize consumer education have also proven to provide a significant competitive advantage.

Despite the challenges of combining health aspects with consumer taste preferences, companies that can properly manage innovation are likely to succeed in maintaining consumer loyalty in the long term.

5.2 Suggestions

The future model from this research that can be explored more described below in Figure 2.

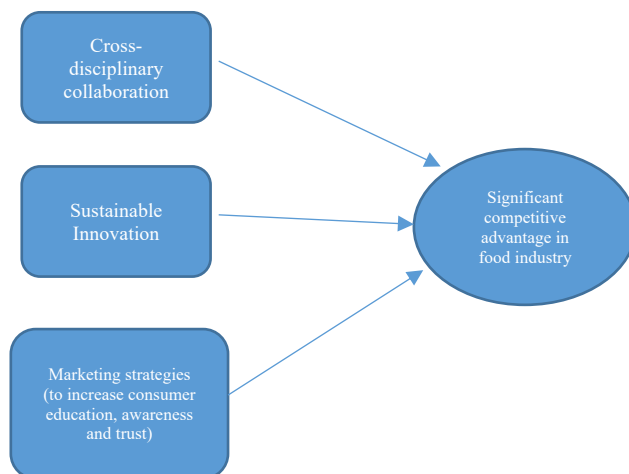


Fig. 2. The conceptual model

Based on the results of the research, suggestions that can be given are:

- a. Increased Cross-Disciplinary Collaboration: Food companies should continue to encourage collaboration between marketing, research and development departments, and nutrition experts to create products that not only meet market trends but also have optimal health benefits.
- b. Sustainable Innovation: Companies need to continue to innovate in the development of healthy food products by utilizing modern food technology and the latest research on ingredients that provide added health value. Food fortification, the use of natural ingredients, and product formulation adjustments must be continuously developed to meet the dynamic needs of consumers.
- c. Increased Consumer Education: Marketing strategies that emphasize education about the health benefits of food products must be further improved. This will help increase consumer awareness and loyalty towards healthier products.
- d. Adapting to Changing Trends: Managers need to keep an eye on evolving lifestyle and health trends, as well as use consumer survey data to make better decisions in the development of healthy food products in the future.

Reference

1. WHO, Healthy diet. (2024)
2. Global Wellness Institute, 2024 Global Wellness Economy Monitor. (Accessed Dec. 04, 2024)
3. Nielsen, Nielsen releases 2nd annual global well-being report. (Accessed Dec. 04, 2024)
4. D. Mariska, Pandemic changes our appetite and healthy food will rise again, TheIndonesia.id. (Accessed Dec. 04, 2024)
5. M. N. Yunita, Tren makanan sehat dan kebutuhan informasi gizi di kemasan, Tirto.id. (Accessed Dec. 04, 2024)
6. UN Indonesia, Lembar Fakta SHIFT : Transformasi sistem pangan yang sehat dan inklusif berkelanjutan di indonesia. (2024)
7. A. Annunziata, R. Vecchio, Consumer perception of functional foods: A conjoint analysis with probiotics. *Food Qual. Prefer.* **28**, 348–355 (2013)
8. J. R. Amelia, S. Ma'arif, Y. Arkeman, Yoghurt susu jagung manis kacang hijau sebagai strategi inovasi produk alternatif pangan fungsional. *J. Teknik Industri* **4**, 3 (2016)

9. Consumer Goods, Healthy Foods Market Size, Share : Industry Report, 2030. (2024)
10. Kemenperin RI, Industri makanan dan minuman siap jalani tatanan new normal. (2024)
11. A. K. Thompson, P. J. Moughan, Innovation in the foods industry: Functional foods. *Innovation* **10**, 61–73 (2008)
12. K. Łukiewska, Barriers to the innovation of the food industry in the European Union member countries. *Zeszyty Naukowe UPH seria Administracja i Zarządzanie* **49**, 23–33 (2020)
13. P. Kotler, K. L. Keller, M. Brady, M. Goodman, T. Hansen, *Marketing management 3rd edition* (Pearson Higher Ed., New York, 2016)
14. C. Anandharamakrishnan, S. Parthasarathi, *Food Nanotechnology* (CRC Press, 2019)
15. A. Tuzunkan, S. Ozen, Strategic management in the food industry: A resource-based view. *J. Strategic Management* **11**, 102–115 (2022)
16. S. K. Khanna, Global perspectives on food insecurity, nutritional knowledge, and community health and well-being. *Ecol. Food Nutr.* **60**, 137–139 (2021)
17. A. Ronteltap, J. C. M. van Trijp, R. J. Renes, Consumer acceptance of nutrigenomics-based personalised nutrition. *British J. Nutr.* **101**, 132–144 (2008)
18. S. Venkatesh, P. Chintagunta, Health and wellness foods: Emerging trends and managerial implications. *J. Bus. Res.* **106**, 76–85 (2019)
19. A. Hartono, *Inovasi Pangan: Membangun produk pangan sehat di era modern* (Pustaka Media, Surabaya, 2019)
20. V. Dwisakti, A. Santoso, S. Hartono, Analisis strategi harga dan inovasi produk terhadap keunggulan bersaing usaha sayuran hidroponik di Kabupaten Ponorogo. *JIM: J. Ilmiah Mahasiswa Pendidikan Sejarah* **8**, 2552–2560 (2023)
21. J. R. Amelia, S. Ma'arif, Y. Arkeman, Yoghurt susu jagung manis kacang hijau sebagai strategi inovasi produk alternatif pangan fungsional. *J. Teknik Industri* **4**, 3 (2016)
22. A. Pangestu, R. R. Al Hakim, H. A. Hidayah, et al., An android-based start-up app for self-agriculture and food. *IOP Conf. Ser. Earth Environ. Sci.* **1133**, 012070 (2023)
23. T. Widodo, *Kolaborasi ilmuwan gizi dan pangan dalam inovasi produk sehat* (UMM Press, Malang, 2019)
24. K. G. Grunert, J. M. Wills, A review of European research on consumer response to nutrition information on food labels. *J. Public Health* **15**, 385–399 (2007)
25. S. Sudarsono, *Pangan sehat: perspektif gizi dan kesehatan* (Alfabeta, Bandung, 2020)
26. S. Jati, *Clean label movement dalam pengembangan pangan sehat* (Cendekia Global Mandiri, Makassar, 2019)
27. F. G. Winarno, *Ilmu pangan: teknologi dan kesehatan* (Gramedia Pustaka Utama, Jakarta, 2021)
28. D. Purnamasari, R. Putra, *Analisis preferensi konsumen terhadap produk pangan sehat di Indonesia* (Mitra Wacana Media, Bogor, 2018)
29. Rahmawati, *Teknologi pangan sehat untuk industri makanan masa kini* (Gramedia Pustaka Utama, Jakarta, 2017)
30. Sufyan, Maimun, R. Maulana, Product development strategies in marketing management: The case of the food and beverage industry. *J. Penelitian Progresif* **3**, 27–38 (2024)
31. T. H. Handoko, *Manajemen: dasar-dasar konsep dan strategi* (BPFE, Yogyakarta, 2018)
32. Nestle, *Inovasi dan renovasi produk secara berkesinambungan*. (2024)

33. Danone, Responsible company practices. (2024)
34. J. C. Narver, S. F. Slater, The effect of a market orientation on business profitability. *J. Mark.* **54**, 20–35 (1990)
35. F. Tjiptono, Strategi pemasaran (Penerbit Andi, Yogyakarta, 2019)
36. Setiawan, Integrasi kesehatan dan teknologi pangan dalam pengembangan produk sehat (Universitas Brawijaya Press, Malang, 2020)
37. B. E. Kahn, The shopping revolution (Wharton Digital Press, Philadelphia, 2018)
38. A. Putri, Tren konsumsi pangan sehat di kalangan milenial dan generasi Z (Graha Ilmu, Yogyakarta, 2021)
39. A. Prasetyo, Tren konsumen dan pengembangan produk pangan berbasis tanaman (Alfabeta, Bandung, 2022)
40. B. Suharyanto, Tantangan pengembangan industri pangan sehat (Penerbit Andi, Yogyakarta, 2020)
41. T. Arifin, Regulasi pangan sehat dan implikasinya terhadap Industri (Pustaka Utama, Jakarta, 2019)
42. A. Osterwalder, Y. Pigneur, Business model generation: a handbook for visionaries, game changers, and challengers (Wiley, New York, 2013)
43. H. Hermawan, Digital business model dalam industri pangan sehat (Mizan Pustaka, Bandung, 2021)
44. H. Wibowo, Teknologi blockchain dan keamanan rantai pasok pangan (Pustaka Sejahtera, Jakarta, 2022)
45. J. Z. K. Khattak, et al., Concept of halal food and biotechnology. *Advance J. Food Sci. Technol.* **3**, 385–389 (2011)
46. G. S. Day, The capabilities of market-driven organizations. *J. Mark.* **58**, 37–52 (1994)
47. B. Hartanto, T. Sugiharto, Strategi inovasi dalam pengembangan produk pangan sehat di Indonesia. *J. Manajemen Inovasi* **11**, 234–245 (2022)
48. R. Maulana, Product development strategies in marketing management: the case of the food and beverage industry. *J. Penelitian Progresif* **3**, 27–38 (2024)
49. J. Barney, Firm resources and sustained competitive advantage. *J. Manage.* **17**, 99–120 (1991)
50. J. J. Ferreira, S. Garrido Azevedo, R. Fernández Ortiz, Contribution of resource-based view and entrepreneurial orientation on small firm growth. *Cuadernos de Gestión* **11**, 95–116 (2011)