

# Creating a New Design for a Dual-Flavored Juice Product in KSA

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**Abstract**—The study provides an effective development of a new food product that targeting the Saudi Arabia market. The study highlights the importance of the food sector, which is driven by factors such as increasing population as well as rising incomes, and evolving consumer preferences. The research used the main attributes to develop and create a new food product focusing on providing new ideas for a product to the market. This study was applied to the KSA market by focusing on creating dual-flavored juice targeting children. The product has a unique design to enhance children to drink fresh juice with new aspects of drinking experience, in order to meet the demands for health conscious yet appealing options. The study contributes to Saudi Arabia's broader goals of economic variation and self-sufficiency in the food sector.

**Keywords**— Divider, Dual-Flavored Juice, Juice Container, New Product Development (NPD), Twin Bottle container.

## I. INTRODUCTION

The food industry sector enjoys the attention of all developed countries of the world because of the benefits it provides. which integrated with the agricultural sector and significant on a strategic level, food security, and its contribution to the self-sufficiency of countries. In fact, many recent studies suggest having more development in the agricultural sector to face the increasing demand for food year after year, where the existing yield improvement will not be sufficient as expected in 2050 [1]. When it comes to Saudi Arabia's economy, the food sector is a backbone of effective industry. In KSA, there is a continuous expansion in food production and that has gained from the country's expanding population, rising per capita income, supportive government policies, changing consumer preferences, and strong economic strategy. The expansion of the food sector is in line with the Kingdom's Vision 2030 to boost the economy by diversifying sources of income and reducing dependence on oil exports. Moreover, the increased expansion of the food sector came to meet the demands of individuals for high-quality, healthy and sustainable food products. Saudi Arabia's food processing sector has excellent prospects for rapid expansion in the coming years. Seafood, dates, and halal items have seen the greatest increases in demand among Saudi consumers. On the other hand, the export of these product supports the economy as well, where the demand for Halal food is increasing in developed countries which have less Muslim people. So, that opens a great opportunity to export to those countries [2].

Creating a food product contains many steps and begins with brainstorming of the existing products in the market. Then, develop a new one in order to meet the market needs. Once the idea is taking shape and developed, the necessary tools and raw materials are gathered to convert the idea from scratch into a physical food product. So, after completing experimentation and manufacturing to achieve the desired taste, the good texture, and appearance. The product can be tested on a random sample of people in order to assess its quality. This feedback will provide ground base for continuous development and highlight potential improvements that will boost customer

satisfaction and bringing brand loyalty as well. So, taking those steps will provide good results.

## II. RESEARCH OBJECTIVES

The main Objective of this study is to investigate the process plan of new food product in Saudi Arabia. The study will be dedicated to identifying the main attributes that impacting a new food product lunch in KSA.

## III. LITERATURE REVIEW

There are many studies and research that have been done in terms of planning and designing new food products. Reviewing previous studies is essential as it establishes a solid foundation for the food industry and creates a general picture for the target market. Offering valuable guidance that is made for attributes of the new food production. Overall, previous studies allow us to critically analyze various perspectives, creating good arguments that justify the need for the work and enhance its credibility.

### A. Models And Theories in New Food Product Development

According to Booz, Allen and Hamilton [3], the New Food Product Development (NPD) process consists of six steps (exploration, screening, business analysis, development, testing, and commercialization). They employ a business strategy that promotes using a product team to set and track quantifiable goals. The use of ongoing market research to get data on the product's acceptance during development is also emphasized. Other researchers Graf and Saguy [4] have worked in the food sector, where their theory decides to split a typical project into five parts (screening, feasibility, development, commercialization, and maintenance). They went ahead and divided them into many sections. They also consider the specific tasks and abilities needed for every project. This concept is thorough and presents food in an educational manner. To make the model more manageable, it could be beneficial to divide the five processes into a number of additional stages. According to Kotler and Armstrong [5], a new product should only contain original items or adjustments and enhancements to existing products that the company creates

via internal research. In addition to recognizing that the process has historically been carried out in an ordered manner, beginning with idea creation and concluding with the marketing of a product, they break down the new product development process into eight primary components (idea screening, concept development and testing, marketing strategy development, business analysis, product development, test marketing until commercialization).

Some NPD theorists, including Urban and Hauser[6], occasionally utilize food as an example to illustrate their points. As part of their broader organizational strategy, they advocate for a five-step NPD plan (opportunity identification, design, testing, introduction, and life-cycle management.). Their method could need to be adjusted based on a company's strengths and capacities. Also, MacFie [7] presents a seven-point approach (concept generation, concept screening, product development, product testing, packaging development including advertising material, first production run, and launch) that encourages the proactive use of computers for food development and access. Additionally, MacFie admits that his concept would need a significant amount of funding to be completely implemented. Fuller [8] describes six stages of growth (idea screening, screening of ideas Development, production, consumer trials, and test market.) and suggests a method similar to Graf and Saguy. He approaches things cautiously and understands what a food development program needs.

#### *B. Adapting Standard New Product Development (NPD) Models for The Food Industry*

The way of creating a new product brand as well as manufacturing it is called New Product Development (NPD). As is known, introducing a new product properly is the key to success for any company. Standard models have been used in industrial businesses that range from high technology to medium technology. Companies in the food industry use many routes while brainstorming added items. For instance, they often use the same name as "Stage-Gate" or "milestone-based models" which created by Cooper [9]. The term "stage-gate" refers to a method where the whole product development process starting from ideation to market launch is divided into distinct phases, each with assigned duties and deadlines. Each stage has gates that indicate Go/Kill or investment decision points. Manufacturing companies have embraced the strategy to push innovative product initiatives to the market. Normally, the stage-gate includes steps like concept scoping, business case creation, product testing and assessment, and product launch. On the other hand, there is a technique called "PD Process Unified Model" developed by Amado[10] which contains three phases, the initial phase called pre-development which involves analyzing the market, internal resources, new products, and corresponding business models. The second phase, called development, involves making and modifying prototypes. The post-development stage is the final stage and includes product introduction and market index

#### *C. Development of the food industry in Saudi Arabia and foreign investment*

The Arabian Gulf region, especially the Kingdom of Saudi Arabia, is considered a key area for investment and a fertile environment for production. With the Kingdom's orientation towards reducing dependence on sources of income from oil revenues and working to increase job opportunities for the population due to the increase in population. Foreign investors are now entitled to 100% ownership of projects, which provides wide and comfortable investment opportunities, as many investment regulations have been adjusted to suit modern ambitions. Even with this, the Kingdom maintains habits and traditions as a conservative country despite the developed and modern lifestyle. Islam and the Bedouin heritage are the two main pillars that shape Saudi culture. Foreign administrators conducting business in Saudi Arabia must be ready to make frequent trips to the country, demonstrate real concern for Saudi development goals and culture. [11]. However, the majority of Saudi Arabia's food and raw materials are still imported, despite the government's attempts to boost food production and reduce food imports. Approximately 80% of all consumable food goods are imported from 157 different nations worldwide[12]. It is necessary to import, transport, and distribute large amounts of food components over great distances throughout the nation [13]. So, there is a big chance for the foreign companies to invest in the food production section in KSA to meet the increasing demand for food.

#### *D. Consumer Behaviour and Organic Food Purchase Intentions in Saudi Arabia*

A study was conducted by [14] in KSA to determine whether there is a real relationship between trust issues and quality standards of organic foods and consumer purchase intentions and actual purchases. A study of 236 Saudi Arabian organic food consumers was conducted. Latent variables' convergent and discriminant validity were verified. To evaluate the relationships between them, partial least square modeling (PLS) was used. According to the findings, consumers' intentions to buy are positively impacted by subjective standards, trust, and utilitarian and hedonistic values. Additionally, they show how availability in the Saudi Arabian context moderates the link between customers' desire to buy and their actual behavior. The study advances our understanding of the connections between consumers' actual behavior in a developing market and perceived values, trust, subjective norms, availability, and aspirations to purchase organic food. The findings highlight key areas for further investigation and deepen our understanding of the buying habits of customers in the Saudi organic food sector. Value and originality the study is unique in examining the elements that affect Saudi Arabian consumers' intentions and actual purchase decisions about organic food. In a developing market, this is the first attempt to examine how availability influences the link between buy intention and actual purchasing behavior for organic food goods.

#### *E. Evaluating The Review Processes of The Saudi Food and Drug Authority*

A study conducted by Hashan [15] compares the Saudi Food and Drug Authority's (SFDA) examined the regulatory review procedure and best review practice of regulatory agencies in

Australia, Canada, and Singapore and provides prospects for the SFDA to become a regional center of excellence. The SFDA responded to a questionnaire, which included information on the organization, important milestones, review deadlines, and effective review methods, about the procedures and practices of health Canada, Singapore's health sciences authority, and the Therapeutic Goods Administration in Australia, comparable information was gathered during (2014/2015) by using the same standard questionnaire. These bodies enjoy excellent and high evaluation as they conduct many studies and analyses on a regular basis. They work to raise the level of transparency and monitor reports to make continuous improvements to provide the best care for beneficiaries. However, of the four agencies, only the SFDA demands a Certificate of Pharmaceutical Product (CPP) at the time of the submission and pricing negotiations before final product approval. To support the SFDA in achieving its goal of becoming a Regional Centre of Excellence. It is recommended that the agency must investigate a risk stratification approach to choose files for verification, or full reviews other than the CPP.

#### IV. RESEARCH METHODOLOGY

The methodology of the research used the main attributes to develop and create a new food product focusing on providing new ideas of a product to the market. Therefore, the new food product developed in the research was based on a set of essential attributes that align with market needs and consumer preferences, like, quality, taste, nutritional value, sustainability, cost-effectiveness, and consumer appeal. Each of them affects the product's potential success in the market.

##### *The General Attributes for Designing the Product*

The product manufacturing process requires many steps and main stations to bring a concept to market. Starting from the idea of the product into the production phase and distribution. Moreover, the profit-making process requires serious and elaborate work in order to achieve satisfactory results. However, the food industry has many attributes and factors that affect the food product. Like, the consumer gender, age, level of education, food-related advertising, package design, food product nutritional quality and price. All of those have a direct effect on food products in the market [16]. Moreover, sensory quality characteristics impact on food acceptance, which most people look for, especially if it's related to the food product due to health concerns[17]. Furthermore, the food product packaging design attracts consumer's attention with modern appealing elements, intelligent colors [18]. For this reason, a flow chart was made screening the general features that must be considered and the general idea of manufacturing the product, the mechanism that must be followed, the engineering requirements, whether the machines that must be used, the production lines, and the feasibility and development control departments. The next figure (1), illustrates the general vision of designing a new food product

#### V. RESULTS & DISCUSSION

##### A. Defining Product Specifications and Features

Defining the product's features and its specifications is an important factor in any industry, especially if it is related to human health. The Saudi market is highly competitive which you have to introduce your product with something unique that will attract the customers.

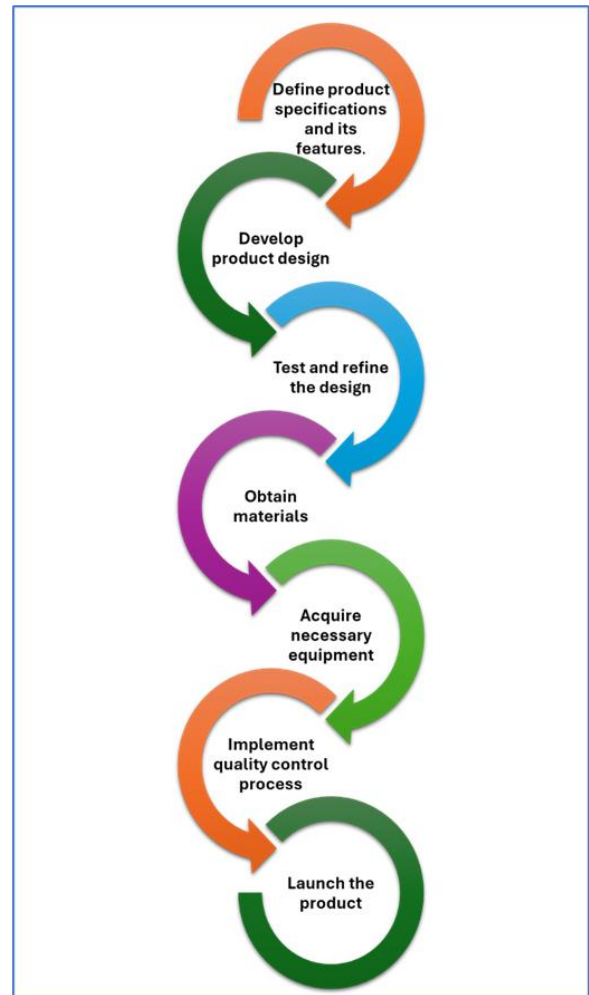


Fig 1: The General Attributes for Designing the Product

However, the characteristics of the product have taste experiment, health benefits as well as the approval from the General Authority for food and drug (SADF) administration. So, to satisfy the health and safety criteria for people and meet the standards for product quality, SFDA has been working with The Saudi Standards, Metrology, and Quality Organization (SASO) and other relevant ministries since 2011 to write a unified Saudi food law. This law was created by updating the country's inspection procedures and implementing global standards to meet World Trade Organization (WTO) membership requirements, including the Technical Barriers to Trade (TBT) Agreement and the Sanitary and Phytosanitary (SPS) Agreement. The Saudi food legislation outlines the duties and activities of the SFDA, the national agency charged with managing, regulating, and supervising all facets of food safety across the food supply chain. Therefore, by applying all of those regulations, the product features and specifications are strict and critical in KSA [13].



### B. Nutritional Content and Ingredients

In order to appeal to customers in the Saudi market who are concerned about their health. The juice product should be made from natural components and a minimum quantity of sugars needs to be added. Additionally, the product should include necessary vitamins and elements, making it a superior choice to standpoint in terms of nutritional value. It is essential that the juice product's components come from reliable sources meet the laws of consumption of food in the KSA. Usually, it is necessary to focus on the external appearance of the product. which has a great impact on the consumer in purchasing. By adding attractive graphics with colorful appearance will catch the consumer's attention. In addition to using modern and strange names, especially if the target group is children. Despite this marketing momentum, these drinks contain small amounts of juice. These include pure juice, fresh-squeezed, chilled and ready-to-serve, not from concentration, fresh frozen, juice blend, nectar, puree, nectar base, 4-juice drink, juice beverage, fruit + Ade, juice extract, fruit punch, juice cocktail, and natural flavored[19]. Consumer trust is an important factor, because the consumer in Saudi Arabia gives a high priority for health, safety, and quality. This enhances their well-being and justifies the high costs for organic products. Therefore, confidence in organic certification and labeling impacts purchase decisions among the customers in KSA. Where organic products link the gap between intention and actual purchasing behavior, highlighting the need for accessible distribution to meet consumer demand for natural and health-conscious options in Saudi Arabia [14].

### C. Identifying Desired Juice Flavors

Bringing a new food product to KSA and making it attractive to the customers, especially when we talk about juice beverages. However, combining two flavors is challenging, because it is necessary to identify compatible flavor combinations that customers prefer. So, conducting market research will help to identify the gap between the customer preferences and existing products. Which provides the opportunity to bring a competitive product to the market. Moreover, analysis of ingredient accessibility and expenditure as well as exploration of different flavor mixes will provide a general vision about the favorite flavor in the market. If we look in Saudi market, there are many different types of flavors are available and popular in the market depend on many factors like, geographical region, season, and occasions. There are some of the popular flavors in KSA include Apple, raspberry, strawberry, lemon, orange, guava, apricot, pineapple, grape, pomegranate and more money.

### D. Container Size and The Available Types of Material

There are several sizes of Tetra Pak cartons ranging from small cartons that hold between 80 and 200 milliliters and bigger cartons that hold between 250 and 1 liters. The majority of the materials used in Tetra Pak's kids' product carton packaging are renewable resources, such paperboard derived from forests that are properly managed. To further insulate the boxes from light, air, and moisture, thin coatings of metal and plastic are applied to them. Tetra Pak also includes entertaining

and captivating artwork on several of its product containers. Tetra Pak provides pouch packaging for kid-friendly items in addition to cartons. The plastic and aluminum laminated layers that make up the pouches come in a range of sizes and forms. [20]

### E. Develop Product Design

#### • Juice Container & Divider

The juice container has two flavors separated by a divider which prevents them from mixing together until the customer decides that, where the divider ensures that the flavors remain distinct and do not mix until the user decides to combine them. This design allows the customer to choose between combining the juice or drinking each one separately. The idea behind the product is that the flavors are not mixed until the consumer decides whether to combine them or not, giving a unique experience that is both interactive and tasting, so whether they prefer to drink each flavor separately or create their own unique blend, the container with the divided compartments offers versatility and enhances the enjoyment of the juice product.

#### • Twin Bottle Container

Two main bodies of the container will hold both flavors which separated with large cap in the middle of them in order to ensure that both flavors do not mix together until the user allows them with proper sealing.

#### • Caps

- Two small caps are at the top of the body's container.
- One large cap separated the containers which sealed perfectly on both sides.

#### • Mixing Process

Adding simple twisting on both sides of the container will release the sealing label in both sides of the container and make the two flavors mix together with little shaking.

#### • Visible Indicators

The container has a clear material in order to let the user see the mixing process well and the levels of each juice.

#### • Safety Attributes

The sealing systems between both sides of the container are reliable to avoid leakage and the twist mechanism should have a secure lock to prevent any accidental mixing.

#### • Size Factor

Both chambers include 250ml, with total volume of 500 liters with rectangular shapes, which will be easy to hold and make the twist mechanism.

#### • SOLIDWORKS drawings

A sketch model has been made in figure (2) in order to visualize the idea of making a container with two chambers and the mixing process. SolidWorks' features allowed for a precise and realistic simulation of the suggested bottle design

### F. Test The Container and Divider for Durability, Functionality of It, And Easiness of Use

To test the effectiveness of the design, it may be necessary to use a dropping test, impact test as well as stress test and see the results and how the design can handle that during the tests. On the other hand, making the examination of the stability of the design will help to check if the container can accommodate the desired portion sizes. However, the simplicity of the

opening mechanisms, and the mixing of the two flavors will emphasize the significance of user design and ensure continuous user experience.

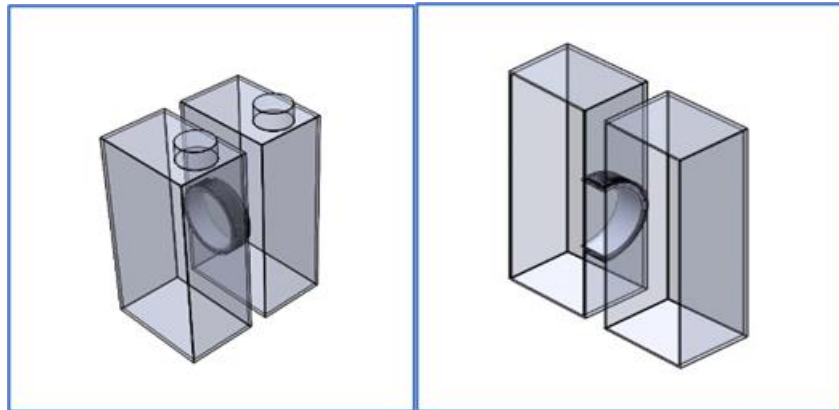


Fig 2: Dual-flavored juice bottle

#### G. Use Feedback from User Testing to Modify the Design as Needed

Taking advantage of consumer experiences is the best way to achieve success in sales by taking advantage of their comments and opinions about the product and what are the necessary additions to improve product quality. Therefore, the direct link between the consumer and the product creates broad horizons of continuous development and works to extend the product life cycle in the market in light of intense competition.

#### H. Implement the Quality Control Process

Carrying out regular inspections and many effective tests in order to deliver a product that meet specifications as well as analyzing data to identify trends, issues, and areas for improvement.

#### I. Launch the Product

Marketing and promotional strategies are important factors in attracting customers by choosing the right time for launching the product on the market.

#### J. Monitor Product Performance

Study the life cycle of the product frequently in order to maintain as much as possible in the market as well as response quickly to any fluctuation that might happen in the market with an effective backup plan.

#### The New Food Product and Its Effectiveness in Promoting Children's Drinking of Natural Juices

The idea of creating a new food product must have many factors, especially the nutritional content, especially since the target group is children. This is done by ensuring the health and safety of the product and its content of vitamins and minerals will help to build the child's body. In return, it is necessary to pay attention to the taste and the extent to which children accept it. The shape of the package and the colors that are used are an attractive and very important factor, especially for children, by using bright colors and innovative drawings that help attract children to the product. In addition to the above, it must be considered that the product does not contain any allergens or

any potentially dangerous impurities. In addition, packaging reduces the risk of suffocation or any other harm by using environmentally friendly packaging materials and obtaining ingredients from sustainable sources. Attractive packaging is effective marketing since it can attract children's attention and motivate them to try it. It is important to remember that the product should also be secure and not harmful, not including tiny pieces that might be eaten or provide a choking danger. While attractive packaging can help promote a product to kids, it's important to put safety first when creating packaging for any product. The packaging of the product will be made of harmless and transparent plastic at the same time, so the kids can see the color of the juice. In the meantime, there is a separator between the two flavors, so the child will press on the packaging from both sides in order to mix them together and allow them to see the mixing process which will be something enjoyable for the kids.

The idea of introducing an innovative idea in the Saudi market as a juice that contains two separate flavors, allowing the child to drink each one separately or enjoy the process of mixing them and getting another taste, is a fun way to enjoy fresh juice and creates the idea of their love for fresh drinks, as this idea will provide a unique and innovative solution to provide drinks that are fun, healthy and natural at the same time. This idea will encourage parents to replace sugary drinks that contain less nutritional value with a product that provides a healthy and fun alternative at the same time. Children will enjoy mixing the juice and watching the mixing process due to the blending of juice colors, which provides a creative and innovative idea at the same time. This idea will contribute Saudi Arabia in promoting children's health and reducing sugary drinks which contain uncomplete nutritional value as well as it contributes to spreading the culture among companies in choosing healthier alternatives and supporting national initiatives to encourage a better lifestyle.

#### VI. CONCLUSION

This study aimed to make a productive analysis of creating a new design of dual-flavored juice product in KSA with a

unique idea. The study effectively highlights the process of developing a new dual flavored juice with a new mechanism of drinking. Which contains two separate flavors, allowing the child to drink each one separately or enjoy the process of mixing them and getting another taste. The outcomes of this study will open the eyes to new aspects of presenting creative ideas in order to enhance the existing products in a good way. So, for future study, it will be interesting to transfer the idea dual flavor into real product. Which allows customers to buy it if it is available in front of them in the markets.

#### REFERENCES

- [1] B. Bajželj et al., 'Importance of food-demand management for climate mitigation', *Nature Climate Change* 2014 4:10, vol. 4, no. 10, pp. 924–929, Aug. 2014, doi: 10.1038/nclimate2353.
- [2] R. Nurrachmi, 'Munich Personal RePEc Archive The Global Development of Halal Food Industry: A Survey The Global Development of Halal Food Industry: A Survey', vol. 11, no. 1, p. 2017, 2017.
- [3] Booz., Allen, and Hamilton, *Management of New Products*. 1965.
- [4] E. Graf and S. I. Saguy, *Food Product Development from Concept to the Market Place*. London: Chapman and Hall, 1991.
- [5] P. Kotler and G. Armstrong, *Principles of Marketing*, 5th ed. Englewood Cliffs, NJ.: Prentice-Hall, 1991.
- [6] G. Urban and J. Hauser, *Design and Marketing of New Products*, 2nd ed. Englewood Cliffs, NJ.: Prentice-Hall, 1993.
- [7] H. MacFie, 'Computer Assisted Product Development', *World of Ingredients*, 1994.
- [8] W. G. Fuller, *New Food Product Development from Concept to the Market Place*. Boca Raton, FL.: , CRC Press, 1994.
- [9] R. G. Cooper, 'The new product process: A decision guide for management', *Journal of Marketing Management*, vol. 3, no. 3, pp. 238–255, Jan. 1988, doi: 10.1080/0267257X.1988.9964044.
- [10] R. F. Amado, A. Iacono, D. C. Amaral, and H. Rozenfeld, 'Investigação do processo de desenvolvimento do produto de uma média empresa de base tecnológica e definição do seu nível de maturidade segundo Modelo Unificado de Referência', *Anais*, 2006, Accessed: Nov. 10, 2024. [Online]. Available: <https://repositorio.usp.br/item/002429027>
- [11] G. Rice, 'Doing business in Saudi Arabia', *Thunderbird International Business Review*, vol. 46, no. 1, pp. 59–84, Jan. 2004, doi: 10.1002/tie.10106.
- [12] W. S. Alrobaish, P. Vlerick, P. A. Luning, and L. Jacxsens, 'Food safety governance in Saudi Arabia: Challenges in control of imported food', *J Food Sci*, vol. 86, no. 1, pp. 16–30, Jan. 2021, doi: 10.1111/1750-3841.15552.
- [13] D. Al-Kandari and D. J. Jukes, 'A situation analysis of the food control systems in Arab Gulf Cooperation Council (GCC) countries', *Food Control*, vol. 20, no. 12, pp. 1112–1118, Dec. 2009, doi: 10.1016/J.FOODCONT.2009.02.012.
- [14] A. A. Mohammed, 'What motivates consumers to purchase organic food in an emerging market? An empirical study from Saudi Arabia', *British Food Journal*, vol. 123, no. 5, pp. 1758–1775, 2020, doi: 10.1108/BFJ-07-2020-0599.
- [15] H. Hashan, I. Aljuffali, P. Patel, and S. Walker, 'The Saudi Arabia Food and Drug Authority: An Evaluation of the Registration Process and Good Review Practices in Saudi Arabia in Comparison with Australia, Canada and Singapore', *Pharmaceut Med*, vol. 30, no. 1, pp. 37–47, Feb. 2016, doi: 10.1007/s40290-015-0124-4.
- [16] G. Koutsimanis, K. Getter, B. Behe, J. Harte, and E. Almenar, 'Influences of packaging attributes on consumer purchase decisions for fresh produce', *Appetite*, vol. 59, no. 2, pp. 270–280, Oct. 2012, doi: 10.1016/J.APPET.2012.05.012.
- [17] E. P. Köster and J. Mojet, 'From mood to food and from food to mood: A psychological perspective on the measurement of food-related emotions in consumer research', *Food Research International*, vol. 76, no. P2, pp. 180–191, Oct. 2015, doi: 10.1016/J.FOODRES.2015.04.006.
- [18] I. Kowalczyk, 'YOUNG PURCHASERS OF FOOD', *Acta Sci Pol Technol Aliment*, vol. 6, no. 1, pp. 95–105, Mar. 2007.
- [19] G. Floor, 'Pre-Feasibility Study Small and Medium Enterprise Development Authority Government of Pakistan [www.smeda.org.pk](http://www.smeda.org.pk) HEAD OFFICE 4 th Floor, Building No 3 Aiwani-e-Iqbal Complex, Egerton Road Lahore', 2016. [Online]. Available: [www.smeda.org.pk](http://www.smeda.org.pk)
- [20] A. Jernberg and S. Svensson, 'Improved Parts Packaging A case study performed at Tetra Pak Technical Service AB', 2006.