IV. BIG DATA APPLICATIONS FOR NEW FOOD PRODUCT DEVELOPMENT PROCESS

After extracting Big Data, the selected data can then be used in various stages of the new food product development process. The following table maps articles that discuss the use of Big Data for new food products development processes.

Table 3. Big Data Applications for New Food Product Development Process

Author(s) & year of publication	Aim(s)	Data Context	Source Data	Analysis Data Types/ Techniques
(Albertsen et al., 2020)	To comprehend consumer acceptance of innovative food products and identify the antecedent factors of perception related to innovation	Consumer acceptance	Online surveys from participants that were recruited from social network pages	Statistical analysis
(Caskey et al., 2021)	To explore consumer psycho sensory perceptions of non-endemic foods, the contemporary phenomenon of coffee's acceptance in Taiwan's tea-dominated market.	Consumer perceptions	NVivo database	Qualitative data analysis
(Chang, 2020)	To provide general rules for enterprises engaged in bubble water production and marketing for reference, and provides practical and theoretical guidance for Chinese enterprises to carry out and expand this industry	Consumer demand	-	-

(Dubé et al., 2018)	To discuss the structure, methods, and development of an artificial intelligence platform to support convergent innovation	Consumer opinions and sentiments	Some platforms (Twitter & Facebook)	Text & semantic analysis
(Eftimov et al., 2017)	To introduce a semi-automatic system for classifying and describing foods according to FoodEx2	Food attributes and compositi on	Food platform database	Machine learning and Natural language processing
(Eldesouk y et al., 2015)	To evaluate two projective techniques, word association, and completion techniques, to study consumers' expectations about food packaging.	Consumer sociodemo graphic and opinions	Online data collection from participants that were recruited from databases	Qualitative analysis
(Filieri, 2013)	To analyze the innovation outputs companies can achieve by involving customers at the "fuzzy front end" of the new product development (NPD) process.	Product ideas	Online consumer co-creation	Qualitative analysis
(Gan et al., 2017)	To identify the structure of online restaurant reviews and examine the influence of review attributes and sentiments on restaurant star ratings.	Consumer sentiment	Online restaurant review	Text mining and multidimensi onal sentiment analysis
(Gómez-corona et al., 2016)	To measure the experience of drinking craft and industrial beers.	New Product Developm ent	Online questionnaire from participants that were recruited from an online consumer panel	Statistical analysis

			company (www.cint.com)	
(Hietscho ld et al., 2017)	To measure the experience of drinking craft and industrial beers.	Consumer resistance and negative emotions	A crowdsourcing platform (Amazon Mechanical Turk)	Statistical analysis
(Horvat et al., 2019)	To provide insight into how specific negative emotions emerge when consumers are confronted with innovation, what consumer cognitions and behaviors result from specific negative emotions, and how consumers react to various communication strategies of companies.	Consumer data use in new product developme nt	Online questionnaire via the SurveyMonkey platform from participants that were recruited via LinkedIn	Statistical analysis
(Jagtap & Duong, 2019)	To understand the use of Big Data in new food product development.	Various data	Multiple sources	Data fusion and integration
(Jarschel et al., 2020)	To promote advanced production technologies in the food industry by set up an automated system for collecting and analyzing food data	Food data	Elasticsearch database	Multiple analysis
(Jitsoonth ronchaiku l et al., 2019)	To examine the use of Big Data in consumer behavior by focusing on the critical local marketing strategies of local modern trade businesses and stores, and how to respond	Transactio n data from six local modern trades in Phuket and Ratchaburi	-	Quantitative and qualitative analysis

	to customer needs and customer satisfaction.	provinces		
(Juntunen, 2020)	To examine consumer involvement as a part of the food innovation development process	Consumer opinion, insight, and evaluation.	Online platform to collaborate with consumers (Omenakori)	Qualitative and quantitative analysis
(Kemp, 2013)	To give an overview of consumer-driven innovation	Product concepts	Co-creation platform, web, Twitter	-
(Khan et al., 2017)	To investigate the food product innovation process of food manufacturing in the Asia-Pacific region (Singapore) regarding functional foods development	Demographics and NPD approaches	A database of Spring Singapore and FIRC and an online survey	Statistical analysis
(Kim et al., 2020)	To investigate the effect of formulation categories (parent brand and extension product) and research and development (R&D) cooperation types on electronic word-of-mouth (eWOM) volume for extension products	NFPD	Twitter, Instagram, and blog contents	Text mining
(Lagast, 2017)	To better understand consumers' food experience by looking at the wide field of measures and is the first to comprise both the explicit and the implicit responses.	Consumer preferences	Online emotional response through an online panel	Quantitative descriptive analysis
(Makatsoris et al., 2017)	To map and address the options available for integrating users in the product development decisions of future	Consumer preferences	Crowdsourcing	Data integration

	sustainable products they need.			
(Ozturk & Zeyrekce, 2019)	To create a new food in Marmara Region using flavor network analysis by evaluating the ingredient pairs based on the number of shared compounds	Ingredients data	Various source	Data mining
(Poetz & Schreier, 2012)	To present a real-world comparison of ideas generated by a firm's professionals with those generated by users in the course of an idea generation contest.	Product ideas	Crowdsourcing data	Statistical analysis
(Kumar et al., 2021)	To demonstrate how the global marketplace can be used for generating new texture concepts for snack foods.	Snack products data	Data Bank	Descriptive analysis
(Schemmann et al., 2016)	To understand the influence of ideator and idea-related characteristics on the likelihood of an idea being implemented in a long-term open idea call	Product ideas	Online idea crowdsourcing	Quantitative analyses
(Singh-Ackbarali & Maharaj, 2014)	To discuss the comprehensive and practical training that was delivered to students in a university classroom on how sensory evaluation can be used to determine the acceptability of food products.	Product acceptability	Online resources for taste identification	Descriptive analysis
(Tsimiklis	To design new food products that offer an	Information related	Blogs, questionnaires,	-

& Makatsoris, 2016)	integrated sensory experience of food and packaging, encompassing customization, healthy eating, and sustainability.	to yogurt product ideas	and websites	
(Zhang et al., 2019)	To expedite the development of new food products using a hybrid machine learning and mechanistic modeling approach	Sensorial ratings, and other data related to recipes	Databases and knowledge base	Machine learning and mechanistic model

New product development stages consist of identifying customer demands, developing product concepts, developing design, testing, and commercialization (Kazimierska & Grębosz-Krawczyk, 2017). According to Kotler (2000), the new product development process involves 8 stages, namely generating ideas, selecting good ideas, developing and testing product concepts, developing marketing strategies, analyzing business, developing products, market testing, as well as commercialization. In this chapter, the detailed discussion of Big Data Analytics applications in the food industry will be divided into five parts.

4.1. Generating Ideas & Screening

A study for generating ideas and screening was presented by Filieri (2013) in the use of co-creation consumer platforms to participate in providing ideas for implementing products that suit their wants and needs. Based on the category of product brand ideas (ideas for new products, new ingredients, and new recipes), promotional brands (product usage context, new ideas, and feelings related to the consumption process), product packaging (design, shape, size, and materials), corporate social and environmental responsibility, the implemented ideas were 9 such as a new line of wheatmeal biscuits, packaging ideas, and new ingredients for a type of snack (Filieri, 2013).

The use of Big Data for generating ideas has also been published by Schemmann et al. (2016) regarding the consideration of implementing ideas against data obtained through a crowdsourcing platform for beverage producers and sellers that are active internationally. Based on the collected data in the platform, there were 92,382 ideas which 1,456 had been reviewed by the company. The implemented ideas were 348, while the rejected ideas were 1,108 and the other 230 were currently under review. One of the implemented ideas was the idea that asks the company to introduce bite-sized pastries with new flavors. This idea received so many positive votes and was considered a potentially innovative product. It showed that the implemented ideas are more likely to come from valuable or innovative ideas from users who suggest only a few ideas and tend to be influenced by users' positive attention to other ideas (Schemmann et al., 2016). A study by Poetz & Schreier (2012) also explained crowdsourcing use in the idea generation stage of NPD. The study presented ideas generation contests and the difference of ideas generated by a firm's professionals and users through crowdsourcing. Based on the generating ideas, the collected ideas from professionals were 51, while users were 70 ideas. The rejected ideas in the evaluation ideas stage were 18 users' ideas. Between the total of 103 ideas, 22 were considered very new (6 were professional's and 16 were users'). 10 ideas qualified as top ideas based on consumer benefit (2 were professional's and 8 were users'). 79 ideas qualified as top ideas based on feasibility (42 were professional's and 37 were users'). The top ideas in at least two dimensions were 16 (3 were professional's and 13 were users'), while the top ideas in all three dimensions were 4 (1 was professional's and 3 were users'). The result proved that generating new ideas using performance from users through crowdsourcing is better than professional under certain terms (Poetz & Schreier, 2012).

4.2. Product Concept & Design Development

Consumer involvement through an online collaboration platform (Omenakori) in creating new products was examined by Juntunen (2020). First of all, lead users were recruited via an online platform to be involved in the new product

development process. Initially, consumer insights were analyzed to explore people's intention in consuming specific products. Then, diverse target groups' needs were identified by testing the product. During the development process, the products will be tested at certain times to deliver good quality products with good levels of acceptance. The result found out that consumer collaboration early in the process allows the company to analyze current and future consumer demands to develop product concepts. Contrariwise, quantitative research like sensory acceptability testing can evaluate the acceptance of the product concept and provide external insights and knowledge for the company to make the right decisions during the process (Juntunen, 2020).

Kemp (2013) also summarized a case study on consumer collaboration in PepsiCo's Mountain Dew® 'DEWmocracy™'. Mountain Dew® used the DEWmocracy ™ campaign to create new flavors of Mountain Dew® Voltage ™ through consumer participation in selecting product elements using online interactive games based on stories from 2007-2008. A year later, contributors were asked to select flavors, colors, names, packaging designs, and advertising for three variants, one of which was permanently named on Mountain Dew® through various platforms (web, voting in live web, Twitter, others). In June and July 2009, seven flavors and video cameras were sent to 50 DEW fans who were asked to try, discuss, and select the flavors from which the results were selected. The colors were selected through a live web event, and then members of the Flavor Nations picked nine new names, posted them on Twitter, and asked Dew fans to vote for their favorite names. Advertised over the Internet, tours, and events in the US and nearly two million votes were cast before the mid-June 2010 deadline. The final design of the Mountain Dew® White Out ™ product was introduced as a permanent member of the Mountain Dew® product range in October 2010. These collaborations can create long-term relationships with consumers, form a central user group to develop innovations together, create a high level of awareness and deliver new products that are widely wanted (Kemp, 2013).

Another open innovation framework for collaborative food product design and manufacturing is provided by Tsimiklis & Makatsoris (2016). Tsimiklis & Makatsoris (2016) proposed an open innovation with selected customer and partner data. The purpose was to design new food products that offer an integrated sensory experience of food and packaging, which includes customization, healthy eating, and sustainability. Better yogurt products with better packaging designs that increase sales and reduce costs were the results of the study. The open innovative approach using crowdsourcing has the advantage to find new market segments and recognize their needs, allow the production and the design of food products, and promote the reduction of energy consumption and resources due to the assure of the actual demand and the use of the product (Tsimiklis & Makatsoris, 2016). Meanwhile, Makatsoris et al. (2017) studied consumers' engagement in new product development. The result acknowledged that consumer demand information contributes to rapid, flexible, and successful new product development. Preference marketplace tools can identify consumer segments and demands in a rapid time for a new product development process that requires lower energy (Makatsoris et al., 2017). Hence, the producers can make products according to the wishes of the community in a short time, when needed, Therefore, they can help reduce the production of materials, resources, and waste because they do not produce a surplus of unwanted goods. This enhanced product customization can also enable new markets, where products can be made and tested on-demand, enabling more effective NPD.

Big Data can also be supported by other technologies in maximizing its use, like an automated system. A study of a semi-automatic system that aims to compare food consumption data from various sources and food consumption data that provides insight into the composition, processing, and marketing of food is provided by Eftimov et al. (2017). Standfood is used to classify and describe food according to FoodEx2. It consists of three parts involving machine learning, natural processing approaches, and probability theory to classify, describe, and define food. Standfood can be used to classify and describe food items according

to FoodEx2 and find missing FoodEx2 codes in the food composition database and food consumption data, so users can compare and combine them. This system will be useful for the industry to develop product concepts or designs such as comparing better materials or processes to use (Eftimov et al., 2017).

The study by Zhang et al. (2019) also presented a hybrid machine learning with a mechanistic modeling approach for food product design using data from databases. Initially, the preferred sensorial characteristics of chocolate chip cookies were identified. Afterward, the recipe was formulated based on databases. Baked cookies were measured using machine learning and mechanistic. Machine learning was applied to predict the sensorial rating, while the mechanistic model was run to determine the food characteristics (fat content, chocolate content, brownness index, crumbliness, and crispness index). Training data of machine learning contained 446-462 samples data (consisting of composition, baking temperature and time, and average sensorial rating) taken from recipe-sharing sites. Last, a genetic algorithm was applied to reveal the optimal solution. The final optimal design was taken from cookies with the highest sensorial rating (92.8 for the reduced-fat and 93.3 for the mashed banana flavored). The optimal result for reduced-fat chocolate chip cookies was when baked at 195°C for 12.5 min, while for mashed banana flavored chocolate chip cookies was when it contained 6.5% of banana, baked at 175°C for 9.5 min (Zhang et al., 2019). A different research method was published by Horvat et al. (2019) regarding the use of consumer data for product development based on online questionnaire results. Participants recruited via Linkedin were asked to fulfill an online questionnaire via SurveyMonkey platform. A total of 113 respondents completed the questionnaire about new product development and product life cycles. It was found out that there are three main data categories used for new product development, namely direct consumer engagement data, food trends, and environmental factors. At least 85% of the respondents used all those types of data in new product development. The three types of data are most often used in the

identification and product design stages, while the product testing stage uses more types of consumer engagement data (Horvat et al., 2019).

A study by Kumar et al. (2021) demonstrated the use of a global marketplace for generating new texture concepts for snack foods. Data of snacks from Seoul, Busan, and Kyoto, including product name, description, and size, manufacturer, photo, composition, and packaging, were generated to form a data bank. The data bank was used to help identify, catalog, and generate knowledge about the packaging, ingredients, and nutrition of other snacks. New texture concepts were developed using references from the tested product. Texture and flavor from tested products were mapped using projective mapping. PM categorized products using texture and flavor evaluation. Mapping of tested products is used to analyze their food positioning in the market. By knowing the existing food positioning in the market, new opportunities and new products segmentations can be explored. Sensory science tools can be used to develop new product concepts by identifying new market opportunities (Kumar et al., 2021). Contrarily methodology and case were explained by Ozturk & Zeyrekce (2019) in creating new recipe innovations using flavor network analysis. Flavor network analysis is the process to analyze the pairs of ingredients by the content of general flavor compounds. The study recommended that the highly preferred alternative dishes for the Marmara region can be composed using a variety of ingredients that contain high flavor compounds. The interest of culinary scientists and chefs can increase in using the information on flavor network science and sensory acceptance of dishes to make innovative recipes. Food industries can also apply that method for the new food product development process (Ozturk & Zeyrekce, 2019).

4.3. Marketing Strategies Development

Big Data also can be useful for marketing strategies. Big Data marketing is one of YuanQi Forest marketing strategies (Chang, 2020). YuanQi Forest is a beverage company that has a large market share in Chinese for its competitive products. YuanQi Forest marketing strategies are product strategy, channel strategy, and

Big Data Marketing. Big Data helps the company to understand industry data more frequently and is time-saving. Accordingly, the company can develop the market of the innovative product first, followed by an accurate and strong grasp of promotion and distribution chances (Chang, 2020). Dubé et al. (2018) also explored the use of Big Data for marketing strategies in the product development process. A total of 359 seed words were collected through different social platforms. Semantic analysis was carried out to predict future market trends as well as support product development and marketing strategies. The results demonstrated the positive and negative drivers of demands for convergent innovation in food and convey insights to consider creating convergence pathways between food belief systems, motives, and goals that lead to sustainable individual healthy dietary behavior from all of these perspectives, biological, psychological, cultural, economic, or environmental. Geographic analysis of consumer data can also provide geographic information on the effects of food and food cues on food preference and suggests possible detailed diversification of consumer insights for better-targeted food convergent innovations (Dubé et al., 2018).

Each consumer has different behaviors that can be studied and categorized for consideration in corporate decision-making. Data regarding consumer behavior can be obtained broadly from Big Data analysis. Analysis of consumer purchasing behavior data can increase customer satisfaction and competitive advantage in business (Jitsoonthronchaikul et al., 2019). Big Data can also be used as a tool to predict future models of consumer behavior. Consumer behavior is based on consumer transaction data originating from six modern local markets in Ratchaburi and Phuket provinces. From this data, it is determined the types of consumers, the products to be purchased, the causes of their purchases, and the comparison between consumer behavior in the two provinces. Based on the survey results, it can be seen that consumer lifestyle and activities are related to purchasing behavior. Marketing factors also have a significant effect on consumer decision making such as product quality, product arrangement, dimensions, prices, promotions. Based on the various research results, the company can

consider an effective strategy so that the product can compete and excel in the market (Jitsoonthronchaikul et al., 2019). Consumer preferences for food packaging are studied in qualitative research by Eldesouky et al. (2015). Consumers were recruited through databases and were asked to fill an online survey via e-mail. Using this methodology, a large number of people and data can be generated rapidly for research at a lower cost. There are various aspects related to cheese packaging that influence consumers' purchase decisions. It is known that consumers are interested in food safety and some packaging characteristics like easiness to open and close, resealability, package size, and packaging material (Eldesouky et al., 2015).

4.4. Product Development

Big Data adoption for product development has been presented by Jagtap & Duong (2019). The study discussed a case study related to Big Data analysis to support the lemonade company's new product development. The aim of the company is to integrate sustainability during the product development phase. The new product was developed focused on five main aspects: quality, environmental impacts, performance, cost, and social impacts. The company used Big Data to extract certain information for the product development process. First, seven brands of top priority lemonade beverages were selected by their sugar level and one was eliminated. Then, the product price was explored and one product with a price higher than £1 was eliminated. Consumer feedback from the company's product review platforms was collected and extracted to evaluate the product quality. Two products were eliminated because their acceptance level is below 70%. For product performance, the type of artificial sweeteners that are used was identified and compared to production facilities and the strategy of the company case. Last, a global warming potential report was followed to know the environmental impacts from the lemonade beverage production. The annual cost for NPD decreased to £592,223 from £889,623 because of using Big Data. The consumed time was also shortened to 27 from 30 weeks. These showed that Big Data can be used to shorten the product development time and the launch of a

product. To add more, the weakness of the product can be recognized and addressed earlier so the product development process can save huge costs in launching new products (Jagtap & Duong, 2019).

In addition to consumer data, Big Data analysis can also function to see consumer preferences and can also be used for decision-making considerations. This statement can be seen in a study by Gan et al. (2017) which discusses the analysis of online restaurant reviews to see the factors that influence consumer judgment on reflections of their experiences and attitudes towards factors that affect restaurants. Consumer opinions about food, service, atmosphere, price, and context affect restaurant evaluations such as total star ratings in online restaurant reviews (Gan et al., 2017). This fifth attribute can reduce restaurants to be able to improve their products and services so as to increase their competitive advantage. On the other hand, a study conducted by Kim et al. (2020) used a cumulative number of online reviews for products from Twitter, Instagram, and blog contents and analyzed them using text mining. It is shown that changing the formulation of the product categories through vertical collaboration is the most effective way to diffuse eWOM to expand the product. The results of this study provide new insights about new product development and product extension differentiation by providing information on which formulation changes are effective in stimulating consumer interest (Kim et al., 2020).

A different study by Jarschel et al. (2020) also explained Big Data analysis technologies. An automated system was arranged to promote analyzing food data was set up to develop manufacturing automation in the food industry by gathering and analyzing food data. A number of test objects, a green apple, a red apple, a clementine, and a tomato, were measured by laser triangulation. A laser triangulation system was used to measure three dimensions and chromatic composition of various types of food in a near-real-time. First, the food objects were measured and the data was stored as CSV files. Then, logstash tool transformed CSV files to be data that can be loaded and transferred to

Elasticsearch cluster. The recorded food data is clustered into many data using Elasticsearch cluster based on its criteria (dimensional values: length, width, height; RGB color: red, green, blue). Finally, the data in the Elasticsearch cluster can be visualized using Kibana browser-based analysis tool. Based on the visualization, the corresponding relations and anomalies of data can be revealed by machine learning analysis using Kibana. Laser triangulation has high stability, high repeatability, low cost, but if the objects are beyond the threshold, the laser can lose tracking and be blurred. Therefore, the settings can be adjusted such as the size, light, and speed settings. Another application of laser triangular can be implemented to analyze the fat content of fish by measuring the length between the meat fibers of fish fillets. This study indicates that laser triangulation can help the food industry to control food production over time and identify mixed objects by recording and observing the data of food objects in near-real-time. The collection, monitoring, and evaluation of food data will have a profound impact on how producers will meet growing customer demands in the future (Jarschel et al., 2020).

4.5. Market Testing

The use of online resources for taste identification to determine the acceptance of innovative product development is presented by Singh-Ackbarali & Maharaj (2014). Food science and technology students were assigned to develop innovative products from local ingredients. They trained taste identification and related skills online before they created samples for the sensory evaluation test and developed the evaluation questions. Students were required to use certain sensory tests (difference, descriptive, and affective) methods and certain panelist types. The sensory test was divided into three stages. The first stage was designed to discover product characteristics (appearance, aroma, taste, sweetness, and mouth-feel/texture), consumer opinions, improvement ideas of the product, and to identify consumer's preference of apples, bananas, and carrots flavors. The second stage was designed to identify the most and least liked characteristics of the product and to identify the fruits and vegetables used in the product that they

liked and disliked. The final stage was designed to identify the attitudes of panelists toward the modified product. The result from the sensory evaluation showed that 55% of panelists would eat the modified nutritious, delicious, and fun drink, ABC punch, very often, 59% of panelists would eat the modified of the healthy granola bar snack from TCL's Fruity Nutritional Bar, 80% of panelists would eat Corn Flakes N'Kandied Fruit Koconut Ice Cream with modified flavor, and 85% of panelists would eat the modified T-Style Patty very often. The study showed that sensory analysis is a powerful tool and can be used with chemical analysis to discover more insights (Singh-Ackbarali & Maharaj, 2014).

Different acceptability studies were conducted by Albertsen et al. (2020) using data from online surveys. Participants were recruited through selected social network pages. Data were analyzed with statistical methods and a framework about acceptance of innovative foods was developed, such as perceptions related to innovation and acceptance process. The acceptance process consists of five phases: assessment, attitude, action, use, and acceptance of performance. The five main important factors that predict people's perceptions of innovative products are relative advantage, naturalness, novelty, trust in regulations, and inconvenience (Albertsen et al., 2020). A similar method was also applied by Khan et al. (2017) which discussed consumer acceptance/ preferences/ perception related to food innovation. The respondents are companies whose data was accessed from Spring Singapore and FIRC database. A total of 54 companies were involved in the survey. The survey data analyzed indicated that the traditional NPD approach dominates Singapore's food manufacturing industry. NPD with better resources and capabilities are needed with the help of advanced technology to achieve a sustainable competitive advantage in the global market (Khan et al., 2017).

Besides consumer acceptance, preference, or perception, consumers' experiences can also be used for NPD. Consumers' experiences in drinking beer were measured and analyzed to drive new product development by Gómez-corona et al.

(2016). The result indicates that sensory, affective, and cognitive dimensions can be taken to be analyzed for better understanding. Even though the product has the same acceptance, sensory, cognitive, and affective experiences can be different. That information can be developed with the same preferences with salient dimensions, according to the advantages desired to position the product in the market (Gómez-corona et al., 2016). In addition to consumer experiences and opinions, Hietschold et al. (2017) studied consumer resistance and negative emotions to better understand and respond to negative emotions related to product innovation. This study used a crowdsourcing platform (Amazon Mechanical Turk/ mTurk) to measure participants' emotions (attitudes towards functional products, purchase intentions, coping behaviors, negative word of mouth, and complaints). The result found out that advertisement of company perspective and information can reduce participants' negative emotions. Advertising information is most effective to reduce anger, while advertising company perspective is most effective to reduce fear. Advertising happiness can dampen the emotion of fear, but not anger. The company's communication strategy is effective to reduce consumers' negative emotions towards products (Hietschold et al., 2017).

The same method was also used by Lagast (2017) who studied sensory preference and emotional measurements of food products. All participants were recruited from SensoLab volunteers database for sensory tests. The participants' emotional responses to dark chocolate samples and behavior tendencies (approach and withdrawal behavior) of solutions and drinks were measured using neurophysiological measures. Dark chocolates have high levels of consumer acceptance, while solutions and drinks have various sensory responses, from strongly liked to strongly disliked. This methodology serves to determine the acceptability of food products. The combination of the application of different disciplines will drive innovation in food companies (Lagast, 2017). A different form of sensory evaluation can be performed as well. A psycho-sensory was applied by Caskey et al. (2021) to analyze consumer perceptions of coffee acceptance in a market dominated by Taiwanese tea. Participants were sought

through online forum posts, word of mouth, Facebook, and e-mails with Zaltman Metaphor Elicitation Technique. Data were collected through interviews, surveys, home visits, and focus groups of participants, and all input back into the NVivo database and linked to themes and concepts. Coffee that was considered foreign two decades ago has become popular and has become essential for millions of Taiwanese. A brief escape from hectic life can influence coffee into what it is today. Psychosensory research is excellent for eliciting subjective feelings and providing valuable insights. Insights have benefits in numerous contexts, such as food development (target market segment), food services, and improvement of the endemic food industry in response to increased competition for nonendemic foods (Caskey et al., 2021).