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INTRODUCTION

This research deals with the combination of two extremely important and topical issues in the FMCG food world: front-of-pack nutrition labels and the integration of digital technologies into the consumer shopping experience.

In doing so, one tool that is able to combine the two has been identified: the Yuka application. This app allows to scan products' barcodes and it gives a score out of 100 of the products' healthiness with the relative explanation and scientific evidence, following the Nutriscore guidelines. This tool has been chosen due to its high and continuous diffusion, featuring today a user base of more than 60 million users.

The purpose of this research is to provide a substantial theoretical and practical contribution by examining the product evaluation of the users after they engage with the app.

This thesis is structured in 4 chapters. The first three chapters deal about an accurate literature review and the exposure of real-time evidence that supports its practical relevance for marketing managers in this historical period. The last chapter is about the experimental study, with the analysis of the data and the related conclusions, theoretical contributions and practical implications.

To test the hypotheses and gather reliable yet representative data, a survey has been built on the online tool Qualtrics XM. Due to the nature of this 2x2 study, which sought to determine whether the impacts on customers' evaluations could have been potentially moderated by another variable, the survey includes four scenarios, and it has been distributed to a sample of Italian consumers in the month of May 2024.

The study's results and conclusions not only add to the body of literature on consumer behavior, health related topics, but they also provide professionals looking to improve the technology-enhanced shopping experience for FMCG with useful advice.

Finally, this thesis emphasizes the need for further studies in response to the changing digital ecosystem and customer expectations, setting the foundation for future investigation into the constant interaction between technology and consumers.

CHAPTER 1: UNDERSTANDING CONSUMER BEHAVIOR

Understanding consumer behavior has become in modern times a matter of extreme importance. Companies in fact try to devote more and more resources in order to have consumers' profiles that are always as accurate as possible. In this chapter we will dive into the literature of the art of consumer behavior, from its origins to the point in which we are today.

1.1 CONSUMER BEHAVIOR: ORIGIN AND EVOLUTION

The discipline of consumer behavior research and studies has its roots in motivational research from the 1940s and 1950s. In this timelapse mainly for-profit businesses used social sciences to analyze consumer behavior in order to gain insights. Since most of these studies were owned by them, they were not disclosed to the public. Prior to the 1960s, marketing was dealing with multiple topics, including some that now relate to other disciplines, but had some gaps on consumer behavior. However, this was covered by motivational research outside the academia, to explain why the consumer did some actions or took some choices (Fullerton, 2013).

Motivational research is a type of marketing research that attempts to explain why consumers behave as they do. Motivational research wants to identify and understand certain characteristics of consumers that they are not aware of. This is possible due to the fact that it believes there are hidden motivations that influence consumer behavior, and to better understand the target audience this type of research aims to discover these motivations that can be for instance cultural or social and apply them to a particular good or service (Thomas, 1998).

An important study that helps understanding the progress of the vision of consumer behavior is *Consumer Behavior: Yesterday, Today and Tomorrow* (Zaichowsky, 1991). In this mentioned study the author divides the time in decades and points out the following: from 1940s the main approach being used by marketers when analyzing consumers' purchasing decisions is the so called "economic man". This approach sees the consumer as a rational individual that has the primary objective of maximizing utility when approaching a purchase, so for example: (a) the lower the price of the product, the higher the sales; (b) the lower the price of substitute products, the lower their sales; (c) the lower the price of complementary products, the higher their sales; and (d) the higher

the promotional expenditures, the higher the sales. The main limitation of this approach is that consumers are assumed to be both perfectly rational and aware of every alternative available on the market, which is not the case. This approach, which is the most theoretical one, traced the path for the following ones.

The 1950s, as a reaction to the previous decade, is characterized by a vision of the consumer as an irrational, impulsive decision maker, which is just a passive individual vulnerable to external stimuli. This is also the time in which psychologists were involved in the study of the consumer; in particular, Pavlov and Freud were very important for this period. The first one developed a model that emphasizes the desirability of repetition in an advertising, while the second gave consumer behavior field the tool of in-depth interviews to discover the real and deep motives behind a purchase.

A study called "*Motivation Research from a research viewpoint*" (Politz, 1956) points how some of the first attempts to study consumer behavior at the time were just some statistical exercises passed as consumer research, with no hypotheses that had no real useful managerial application. Politz notes how the research was about finding the so-called "real motive" of why consumers bought a certain product, so that it could have been possible to increase sales of product X. What researchers at that time didn't consider is that there is not just a single or at least a single major reason that drives consumer behavior, indeed, any one specific piece of consumer behavior is the result of a multitude of psychological and mechanical causes. These causes have different and relative strengths that act on final behavior of the consumer, and uncovering these must lead to a prediction that serves as managerial insight.

The 1960s see the transition from the irrational consumer to the problem solver. This decade is characterized by informed purchasing, as several governments started making sure the consumer had access to information by making new laws, however this information was often not organized in ease resulting in being too complex and counterproductive.

The overriding conclusion of consumer research in the 1970s was that people can only attend to limited information at one point in time. The consumers' existing skills, habits, reflexes, values, and goals shape the way they search and use information to make their decisions. The 1970s told us that consumers' skills were limited, but at the same time the number of choices available to the consumer kept increasing (Zaichkowsky, 1991).

During the 80s there was a focus on business and conservatism, rather than the consumer. The average person saw a decrease in leisure time, because of the increase in the time spent at work, and this, joint with a higher choice available in the marketplace, brought to a low-involvement decision making, with limited cognitive effort from the consumer.
1990s witnessed the birth of collective decision making due to the shift cultural patterns and the decrease in purchasing power of the individual consumer. This phenomenon is being enhanced nowadays with technological means that enable a fast and easy connection between individuals.
Building on these observations, it is now essential for modern researchers and marketers to use an in-depth and comprehensive approach to analyzing consumer behavior. It is necessary to acknowledge that customer decisions are influenced by many kinds of psychological, social and cultural elements rather than a single motivator. A correct approach is the one that sees the fluid character of consumers' conduct, that is susceptible to continuous modifications, both from internal and external forces.
Furthermore, research is now able to sort through enormous datasets to find patterns and connections that may have previously been difficult to find because of the introduction of advanced analytical tools and technologies. This data-driven methodology, joint with all the possible integrations (behavioral economics, neuromarketing…) facilitates a more precise and complete understanding of consumer incentives, highlighting the smallest details that influence buying choices.

1.2 EVOLVING PERSPECTIVES: AN HISTORICAL REVIEW OF CONSUMER BEHAVIOR MODELS

The dynamic nature of consumer behavior, as we have seen in the previous chapter, comes from several ideas that have evolved throughout the time due to the progressive better understanding of every shade of it. This chapter aims to take the reader into an historic voyage, tracing a timeline to mention and explain the most important models of consumer behavior. This historical analysis helps to comprehend consumer behavior from an academic point of view and gives a holistic perspective of the subject to the reader.
According to Paz et al (2023), since the 1930s, theories have been considered, which could well be regarded as the first models, such as the one by Gabriel Tarde theorized in 1935: the Psychological Theory of the Underpinnings of Economic Behavior, in which

he supposed that the underpinnings of economic behavior are two psychological causes: desire and belief. This theory is very important as it is the first effective attempt in the 20th century to explain economy from different angles, however this model falls short because it only considers belief tangentially.

In 1951 George Katona theorized the so-called Psychological Analysis of Economic Behavior Model. According to Katona there are three variables: (a) economic stimuli, composed of the objective economic conditions prevailing such as value of money, unemployment rate or taxation rate; (b) behavioral responses, are the behaviors that manifest themselves through purchase, investment, saving and the use of goods and services; (c) psychological variables, that comprehend prior attitudes, the atmosphere referring to the individual's economic situation and modified attitudes, which are a the result of own behavior faced with economic stimuli. In this model Katona finds that psychological variables are a mediator between economic stimuli and economic responses. The main downside of this model is that it views mass consumption society as an open, dynamic system, and this was too disruptive for the period in which it belonged, as in that decade the consumer was seen as passive to external stimuli, invalidating the simplicity of the previous model.

The early 1960s were marked by the development of hierarchical models concerning the effects of advertising on purchasers. In 1965 Andreasen theorized the consumer behavioral model, which involves four states: internal stimulations, perception, and filtering, being prepared to change attitude and the feasible results. The information perceived by the consumer about a product is obtained via the 5 senses, and the potential consumer's first filter is his/her own perception of these messages, while the attitudes will function as a determining factor that allows or disallows the information to keep flowing. The model takes into account that every new information can have an effect on the consumer's attitudes and feelings. Some limitation about it relies in the fact that the variables are always weighted towards the attitude of the consumer, weakening other variables that could be just as influential.

A year later Nicosia proposed his consumer behavioral model, in which he describes a circular flow with more than one option of influences in which each component leads to the next one, where consumers act in an increasingly active way throughout the consumption process, gradually acquiring knowledge about the desired product.

In 1968 Engel, Kollat and Blackwell trace one of the most emblematic representations of consumer behavior. In their Consumer Behavior and Decision-Making Model the main features are the following: (a) information process consists of 5 stages: information explosion, attention, understanding, acceptance, and retention in the memory; (b) decision process: where the recognition of the problem forces the consumer to seek for more information, then he/she assesses the different options and finally there is the intention to purchase. The three authors identify two main groups of variables that they believe are connected to the decision-making process: environmental influences and individual influences.

This double-faced concept can be found again ten years later with Paul Albou and his Ternary and Graphical Previsional Model, that can be broken down in two: contextual bases, that determine the psychological aspects of economic behavior and are the context in which the individual acts, and psychological bases, made of conative, affective, and cognitive sectors.

In the 1980s, when great emphasis was put on important models that defined the future, Ajzen and Fishbein proposed the Theory of Reasoned Action Model, which enabled the user to consider certain factors that so far had only been considered in an isolated way. The authors explain how beliefs, attitudes and intentions determine consumer behavior. Midway through this decade, one main aim of consumer research was to predict the choices of an individual consumer or a group of consumers when a change affects the conditions that bear an influence on selection.

Gatignon & Robertson in 1985 developed a global model for the processes of innovation diffusion, under the assumption that the first people to adopt a new product are hoping to obtain some kind of benefit or improvement, which is associated with other works according to which the most innovative consumers are generally well informed (Feick et al, 1987) and make greater distinctions with regard to the information they need, considering that the marketing actions have an effect on how quickly adoption takes place (Paz et al, 2023). At the end of the decade, in 1989, Davis, Bagozzi and Warshaw, using the theory of reasoned action, explained the behavior of the individual when interacting with a new technology through the impact of external factors on an individual's attitudes and intentions. A year later, in the Theory of Trying Model, the same authors explained the behavioral patterns of individuals trying to reach a specific goal when there is a degree

of uncertainty regarding its attainment (Bagozzi et al, 1990). This was because the theory of reasoned action could not be applied in circumstances in which the decision maker finds barriers.

Midway through the 1990s, in 1995, Taylor and Todd proposed the Decomposed Theory of Planned Behavior, which applied the elements of an earlier theory (attitude, subjective standard and perceived control) to explain the adoption of new technologies.

In the new millennium Sweeney and Soutar in 2001 developed the PERVAL, Perceived Value Model, in order to account for the values that affect decision making in the choices of certain consumers, which has had a considerable effect on the measurement of the value as perceived by the consumer. Subsequently, Blackwell, Miniard & Engel (2002) in their Consumer Decision Process Model show depict schematically the activities that occur when decisions are taken, showing the effect of internal, external forces and their interaction on how consumers think, assess and act.

Four years later, in 2006, Kotler and Keller in their Purchase Behavior Model found that the marketing stimuli consist of the following variables: product, price, distribution and communication. Furthermore, other stimuli involved in the process are variables external to the purchaser: economic, technological, political and cultural. More recently, in 2015, Yangui and Hajtaieb developed the Consumer Behavioral Model when consumers were faced with a Total Depletion of a Food Product, aimed at explaining consumer behavior when they expect a food product will no longer be available. The findings show that expecting total depletion is influenced by word of mouth and the perceived variety of the product range.

Later, Di Virgilio and Antonelli proposed the Online Purchase Intention Theoretical Model (2018) that states the direct effect there is of customer intention behavior on their purchase intention, and when buying online this becomes even more obvious. To keep a light on the attention given to the online environment, which this work will focus on, in 2021 Vasilica-Maria, in the Consumer Online Purchase Intention Model, shows the indirect relationship that exists between the characteristics of the purchase channel, the perceived risks, consumer motivation, the perceived quality of the product and the social standard with online purchase intention through attitude to purchase online (Paz et al, 2023).

After this focus on a review of some of the most emblematic models on consumer behavior, the next paragraph will focus on the main external factors that shape consumer behavior.

1.3 EXTERNAL FACTORS SHAPING CONSUMER BEHAVIOR

In the fluid environment of consumer behavior, several external factors interact to shape people's decisions. These outside variables include the larger atmosphere that embraces customers, impacting their preferences, mindsets, and eventually, their buying choices. This paragraph aims to examine the main outside influences in order to comprehend how people's perceptions of the outside world influence how they behave in the marketplace, with a special eye on food-related environment, where individuals typically make between 200 and 300 decisions a day (Wansink and Sobal, 2007).

The first external factor that influences consumer choices in the marketplace is without any doubt the law. Legal influences in fact are something that have an impact on every single consumer acting in a determined marketplace. Several policies have been made on a global[1] but also national level[2] to encourage the adoption of a healthy diet and lifestyle, meaning the world is pushing in the same general direction.

Conventional approaches to a food disorder such as obesity (those policies based on the rational choice model) include price interventions, information or education efforts, or the banning of problem foods in various contexts. One of the primary arguments for a price-based approach is that prices helped to create the rise in obesity. This argument supposes that deepening income inequality throughout the 1980s and continuing to today (Subramanian and Kawachi, 2004) negatively impact the health of the overall population which, subsequently, resulted in an increase in overall obesity rates (Drewnowski and Darmon, 2005). Ranney and McNamara (2002) argue directly that calorie dense foods are less expensive. To correctly deal with health-related food issues, Mozaffarian et al. (2014) argue that a combination of subsidies and taxes should be implemented to target a healthier dietary choice.

There is another type of norm influencing consumers in their decision process: social norms (Melnyk et al, 2022). Defined as “rules and standards that are understood by

[1] https://iris.who.int/bitstream/handle/10665/43035/9241592222_eng.pdf?sequence=1
[2] https://www.gov.uk/government/publications/government-food-strategy/government-food-strategy

members of a group, and that guide and/or constrain social behavior without the force of laws" (Cialdini and Trost 1998), social norms influence various forms of everyday consumption, including food choices (Pliner and Mann 2004). Their impact on behavior stems from two evolutionary desires: (1) for social acceptance or affiliation and (2) for avoiding negative social outcomes such as social exclusion (Bellezza et al, 2013). What is interesting about social norms in the food environment is that eating often occurs in a social context and the food choices of others and the amounts that those around us eat have a powerful effect on our consumption decisions. There is evidence that we use information about the eating behavior of others as a guide as to what is the appropriate behavior in each context (Herman et al, 2003). Two possible reasons why people follow eating norms are that (1) following a norm enhances affiliation with a social group and being liked, and (2) following a norm results in eating that is correct (Deutsch and Gerard, 1955).

When choosing a product, of course another fundamental aspect are its attributes. Product attributes provide a basis both for marketers to differentiate and position existing products apart from those of their competitors and for the development of new products (Belch and Belch, 1995). Each attribute of a product can bring different value to different potential consumers, and product attributes and their ratings are of great interest to marketing researchers and practitioners because these are the very criteria that consumers use to assess products before making purchases, and marketers design their products and differentiate them from the competition based on attributes that are important to consumers. Today's consumers have more and more information on aspects such as those related to good farming practices, food safety during the production process, nutritional quality, or the convenience or ease with which the product could be prepared and consumed, and are thus more demanding when choosing the food they want to purchase. For instance, Robinson (2002) found that consumers supported sustainably produced food, although, paradoxically, they were not particularly likely to purchase it, however this will be deepened in the next chapter.

Evidence shows that there are several other factors influencing food choices, such as technology, often used to promote and encourage healthy food consumption (Chew et al, 2023). In a more general perspective, Faulds et al. (2018) identify three major areas in which consumers use of mobile technology can impact the retailing community: (1) they

argue that retailers must concentrate on influencing the whole consumer decision process rather than focusing merely on the decision outcome, this is because they can offer a more customer-centric shopping experience, (2) retailers must adopt the concepts contained in the following four pillars: consumer-retailer interconnectedness, consumer empowerment, proximity-based consumer engagement and web-based consumer engagement, (3) the use of mobile technology by consumers has magnified the importance of three areas: customer analytics, employee empowerment/engagement and omnichannel marketing. According to the authors, these three areas offer retailers the ability to directly and indirectly influence the consumer decision-making process, forming the basis to achieve and maintain a competitive advantage in the mobile shopping environment.

As highlighted by Blaylock et al. (1999), we cannot ignore the significant impact that economic conditions have on people's food decision-making when analyzing external variables that shape consumer behavior. Shortly, people match the foods they eat to their present financial circumstances, thus the status of the economy largely determines what ends up on our plates.

After giving an outline of the modern environment, the next paragraph deals with a profiling of the modern consumer, and different segmentation techniques based on multiple influences in a digital hyperconnected world.

1.4 THE MODERN DIGITAL CONSUMER

Today's marketing, also known as Marketing 5.0 (Kotler et al., 2021), by definition, is the application of human-mimicking technologies to create, communicate, deliver, and enhance value across the customer journey. One of the critical themes in Marketing 5.0 is what we call the next tech, which is a group of technologies that aim to emulate the capabilities of human marketers. It includes AI, NLP, sensors, robotics, augmented reality (AR), virtual reality (VR), IoT, and block-chain. A combination of these technologies is the enabler of Marketing 5.0.

Around this context, the modern consumer lives in a digital age, utilizing smartphones and continual connectivity to navigate an endless virtual marketplace. Consumers of today are mobile, have a high degree of digital connectivity, conduct all of their business online, and rely heavily on technology in their daily lives. Because they can buy whenever

and wherever they want and share their experiences instantly, they spend more money than traditional consumers. The typical consumer is egotistical, always looks for the best deal, and assumes that someone else will solve their issues. They also tend to hunt for additional things. For the digital customer, the whole value of a product is more significant than its price, even though it may not be the lowest. Digital consumers solve their own issues instead of waiting for others to do so; to them, "we" is more significant than "I," and they are connected to other customers' experiences, which make the product less significant than the experience (Kotler et al, 2017). The most important characteristics of these consumers are the following: (1) they are better at using digital media, since most of them are comfortable with this medium and have been using internet for many years at this point; (2) want everything at once, in a world where everything happens at a million miles per hour, consumers have grown used to getting their information on demand from multiple sources simultaneously. Their time is a precious asset, so they want information in a format that allows them to scan rapidly for relevance, not wasting time in examining the details. Having said so, marketers must adapt and present content in an optimized way; (3) want to control everything, since the web is not a passive medium anymore, users are in control more than ever. Modern digital marketing must be user centric, offering a real value proposition to the consumers in order to obtain positive results; (4) changeable, while brand or vendor loyalty is not completely eliminated, it is weakened by the openness and speed of the internet. This happens because consumers today have the ability to easily compare and contrast competing businesses, and for businesses developing a brand's trust remains a critical component of digital marketing. (5) talk to each other a lot to share their experiences and keep in touch, through peer reviews, blogs, social networks, online forums and communities they share their positive and negative experience. From a marketing point of view this is a double-edged sword, since it can bring rapid success but at the same time rapid decline (Ryan, 2016).

Digital consumers begin to gather details about the brand or product they are about to purchase, and they do it by using technology, in contrast to conventional consumers. In order to use and adopt technology, they are more inclined to alter their attitudes and views. As a result, unlike conventional consumers, information sources may change and be impacted by several circumstances. Their opinions of a good, service, or piece of

information are therefore influenced in many ways. When making decisions, people use technology and various product access levels and channels to evaluate items, make purchases, meet their wants, and foster loyalty.

Consumers who make purchases online and offline frequently go through similar steps in their processes. There are some distinctions amongst them, such as the instruments they employ throughout the purchase process, the variables influencing them, the ways in which they impact other people, or the kind of products that they purchase online.

They purchase goods using two distinct models: high-involvement and low-involvement, depending on the products. A high-involvement purchase is one that involves buying for example a car or other expensive item. While digital consumers with little engagement do not make much effort when buying a good or service, under this purchase model, digital consumers experience every step of the purchasing process in detail, from issue identification to information search, assessment, and decision-to-buy through to post-purchase. Low engagement describes how consumers interact with the products they buy on a regular basis (Chaffey & Smith, 2008). The purchasing stages, communication objectives and digital marketing techniques of digital consumers are examined in the following order: (1) unaware problem recognition, where consumers are not still fully aware of their needs and companies generate awareness. At this stage consumers find the undefined emergence of the desire for a product; (2) aware of product need, develop specification, where they become aware of their specific needs and begin to investigate which features of that product are advantageous and necessary. Digital tools play a very important role in this stage as consumers typically use search engines to conduct some research, so companies typically use search engine marketing and affiliate marketing to position features, benefits and brands in this stage; (3) supplier, information and pre-purchase search, when digital consumers begin to do some research devoted to buy something. Businesses at this stage typically try to understand how consumers are searching for the alternatives and their objective at this point is to lead generation from consumers; (4) alternatives evaluation and selection, when digital consumers identify a particular product to meet their needs and they usually analyze its benefits, comparing them to the ones offered by other brands. At this stage the reviews and ratings become some of the most helpful factors; (5) purchase decision, where, if consumers decide to buy based on the previous steps, then they will look for the some additional convenience

like the best warranty on the product, free delivery options, fast or customizable delivery and their preferred paying option; (6) post-purchase, evaluation and feedback, in this last stage digital consumers can participate in reviews and contribute to the comments made by others. Companies in this scenario can try to keep in touch with the consumer through e-mail marketing by sending surveys or special offers informing them about new products (Chaffey & Ellis-Chadwick, 2016).

In the literature we find different segmentations of digital consumers, one of the main contributions is given by Kotler et al. (2017) that identified three segments which are Youth, Women and Netizens. (1) First segment, called youth, has three main characteristics: Early adopters, trendsetters, and game changers. Youths are often the first to try a new product that has been developed and introduced to the market because they're not afraid to try, they are early adopters. They are so good at following the trends. They act quickly when any product becomes a trend, so they are trendsetters. They react very quickly to the recent changes in the world, that's why they're also called game-changers. (2) Women, the second segment, have three main characteristics: Information collectors, holistic shoppers, and household managers. Women do a lot of research for purchasing behavior, they get the opinions of anyone around them before buying a product/service. Therefore, they are information collectors. They look at not only the value of the products they buy for themselves, but also the value for the whole family, so they are holistic shoppers. They are managers and approvers of household matters and are important to investment and financial services, which is why they are called household managers. (3) Netizens are called social connectors, expressive evangelists, and content contributors. They are very likely to interact with others, very social. Expressive evangelists' group, which does not fully disclose their identity, can be very aggressive in explaining their views. They are responsible citizens and contribute to the improvement of the Internet, enthusiastically creating new content (Yuruk-Kayapinar, 2020).

Another way in which in the literature digital consumers have been segmented is by considering their values and attitudes. Since these tend to be more stable than other characteristics, segmenting customers based on their values can help address the issue of the dynamic nature of online behavior. Additionally, values can be seen as a clear and useful method of integrating offline and online segments. This can be achieved by comparing the values of the two groups and creating relationships based on these shared

values. However, they do not conflict with motivation; rather, they complement the multifaceted view of the consumer profile.

Values over the years have received a huge attention from marketers because they define what matters for consumers in life and as just stated, because they last long.

A study conducted by Campbell et al. (2014) found several consumer segments based on their attitude when interacting with online advertisement: (1) passives, social network marketing fails to drive their brand engagement, purchase intentions or word-of-mouth referrals. In this study the segment, which was more likely to be done by males, had a high entertainment motivation and a low convenience motivation; (2) talkers, they have strong rating on behavioral outcomes of brand engagement and word-of-mouth as a result to social media exposure; (3) hesitants, they are characterized by low level in information motivation, and most likely to be made by older males. They do not care to engage with responding to brands via social networks; (4) actives, they have the highest levels on behavioral outcomes, in fact interaction plays a crucial role for their offline purchase decision making. These consumers have a high level of information motivation, shopping enjoyment and convenience. Demographically, they are likely to be younger and females; (5) averse, they display extremely low levels of behavioral outcomes, meaning they are not influenced at all by social network marketing. These consumers desire convenience, but it comes from other sources. Demographically, they are mostly made by people between 25 and 34 years of age.

Stephen, A. T. (2016) in "The role of digital and social media marketing in consumer behavior" identifies five themes related to consumers and their behavior in a digital environment: (1) consumer digital culture, a kind of research that considers the digital landscape in which consumers are operating. A crucial aspect about this topic is for sure understanding how consumers' identities and self-concepts incorporate in the digital environment. The author mentions a work by Belk R. W. (2013) in which is an important contribution to the theory, as it considers the possibility for consumers to have multiple selves due to their possession of multiple online personas; (2) responses to digital advertising, that considers how different consumers respond to several aspects of digital ads, with a special attention to personalization and the way to do so, so by collecting and processing consumers' personal data. Multiple articles consider behavioral responses to digital ads on several sides, for example different authors study how to overcome

psychological reactance due to the personalization of ad targeting online. Negative reactions on to retargeting are found, but this has been mitigated when consumers' preferences are refined, and when consumers perceive to be in more control of their personal information, the ads are more positively received; (3) effects of digital environments on consumer behavior. This is a quite recent topic in the literature, where we find two different ways of thinking the consequences: as environment-integral, where digital environments influence behavior inside of those environments, or as environment-incidental, where digital environments influence behavior in other not related environments. The behavior can be shaped from different types of influences, such as reviews and opinions wrote by other online users or by their actions. Wilcox & Stephen (2013) discussed the environment-incidental response related to the usage of Facebook and the effect it had on a person's self-control. What they found out and that is relevant to this study is that when people are exposed to closer friends on Facebook, they exhibited lower self-control in choices related healthy behaviors, proving the effect that the digital environment has in this particular kind of situation on the consumer; (4) mobile environments, that throughout the years has become a matter of growing importance for the increase in their usage. A study conducted by Brasel and Gips (2014), suggests for example how in an online shopping setting, touching products on the screen, using a mobile device such as an iPhone or an iPad, impacts online shopping behavior by enhancing the endowment effect. This happens because instead of clicking with a mouse, touching the product directly on a screen can increase the feeling of psychological ownership and endowment. And the effect is stronger for products high haptic importance (so where touching or feeling is important to give an evaluation of the product). (5) online word of mouth, a theme that has been analyzed across different dimensions and from different perspectives. This type of analyses mainly focused on the type of language used and their effect on consumer attitudes and behavior. What differs word of mouth in a digital environment from the one made in person is that, differently than you might probably think, consumers are less inclined to transmit word of mouth in a social media and online environment due to a higher perceived social risk (Eisingerich et al., 2015).

Following a thorough examination of consumer behavior as a whole and a careful characterization of the modern customer, we will intentionally reflect on the vast landscape of the food industry. Chapter 2 navigates the currents and developing patterns

that define the modern food landscape, maintaining a special attention to the digital environment and the role it assumes in this context.

CHAPTER 2: THE MODERN FOOD CONSUMER

After exploring consumers and their characteristics and behaviors in the modern environment, we make a closer step related to a crucial aspect of this research: the food industry. In this analysis we will move on four dimensions that enclose the essence of modern culinary choices and go into detail for each one of them in the following four paragraphs.

2.1 HEALTHINESS AND NUTRITION

When approaching food decisions, consumers value a good mix of both experience and credence characteristics (Mai and Hoffman, 2015). In this second dimension we find a feature that is gradually acquiring a higher importance in consumer minds, with a significant impact on food-related buying decisions, which is the perceived healthiness of the products they are buying (Pinto et al., 2020). The need to investigate the perceived healthiness of food and its impact on the industry for a study like that requires qualitative research techniques that are used to acknowledge consumers' values, motivations and buying behavior.

In contemporary consumer markets, the demand for products which have a positive influence on health brought to several trends. A representative example is found in nutraceutical products, a category of products such as functional foods or dietary supplements that provide medical or health benefits, including the prevention and treatment of diseases (Kalra, 2003). The term comes from the fusion of "nutrition" and "pharmaceutical" and was coined by Dr. Stephen Defelice in 1989. In this context, perceived healthiness has a significant impact on the way people buy nutraceuticals. Customers embrace nutraceuticals and choose to pay more for them based on their perceptions of their health-promoting qualities (Urala and Lahteenmaki, 2004).

Along with these trends, governments are adapting their guidelines and norms. For example, in the U.S., the Food and Drug Administration recently announced an update on the legal definition of healthy[3]. According to the proposal, companies are allowed to label a product as "healthy" if it includes a sizable portion of food from at least one of the dietary recommendations' suggested food categories or subgroups (such as dairy, fruit, or vegetable). They also must follow certain dietary guidelines, such those for added sugars,

[3] https://www.washingtonpost.com/business/2022/09/28/white-house-conference-food-labels-healthy/

saturated fat, and salt. The purpose of the labels is to make it easier for customers to read nutrition labels and make wiser decisions when they shop at the grocery store. According to the FDA, the proposed regulation would bring the meaning of the "healthy" claim into line with the most recent findings in nutrition research, the Nutrition Facts label, and the Dietary Guidelines for Americans.

In the literature we find several studies that investigate every shape of perceived healthiness of food and its impact on every aspect of the consumption process. Most of them do not take perceive healthiness as a unique construct, in fact in a study conducted by Lusk (2019), the author considers the healthy dimension using some precursors to the healthiness association towards food, such as animal origin, environmentally friendly production, home-cooking, nutritional aspects (diet and/ or light products), level of processing (natural vs transformed foods) and preservation and freshness. Ditlevsen et al. (2019) have also found out that perceived healthiness of food is influenced by three main factors: (1) nutritional value, for which the qualifying factor for healthiness is whether the food has good nutritional values; (2) pleasure, that takes into account the sensory quality of food products and (3) purity, that means whether the products are free of contamination or not.

These are just some of the numerous attempts to study the influences on perceived healthiness, and they can differ from one place to another due to the culture and the raw materials found in each location, in fact a report from the European Food Safety Authority[4] suggests that around 46% of consumers, when deciding to buy a food product, are influenced by the geographical origin. This was demonstrated by Cavallo and Piqueras-Fiszman (2017) that compared the differences between Italian and Dutch consumers according to perceived healthiness of olive oil and of course some differences were observed. The two groups were both highly influenced by Italian origin of the product when having to rate the perceived healthiness, but for example one was negatively influenced by hot taste while the other was not influenced by it. Moreover, a darker glass bottle had a negative effect on the perceived healthiness of the examined product, with some exceptions: it had a positive influence on Italian consumers and on those for whom the origin of the product is important.

[4] https://www.efsa.europa.eu/sites/default/files/2022-09/EB97.2-food-safety-in-the-EU_report.pdf

Healthiness and diet component plays an important role in influencing consumers' perception about a product. It has been in fact demonstrated that perceptions about healthiness or "fatteningness" of foods may bias estimations of caloric content of foods (Carels et al., 2007) and at the same time, when showed to the actual caloric intake of healthy and unhealthy foods, consumers underestimate the calories found in healthy alternatives and at the same time they overestimate the amount inside of the unhealthy food alternative. Another widely spread bias among food consumers is the so called "halo effect", with regard to the healthiness of a product. As the name implies, the concept of "health halo effects" was developed from "halo effects," an error in thinking that occurs when an entity's positive perception based on one positive attribute impacts the assessment of other unimportant traits (Nisbett and Wilson, 1977). Similar to this, "health halo effects "are a particular kind of halo effect whereby consumers believe a food to be healthy based on "the type of food, its health or nutrition claims, its brand, packaging, price, promotion, and distribution" (Wansink and Chandon, 2014). These deceptive health halos lead consumers to view the food's nutritional value and overall health in an unduly positive light. The main issue with this perceptual bias is that it typically causes people to underestimate their caloric intake, which can subsequently result in unintentional excess in eating.

After analyzing the main factors that structure the perceived healthiness of a food product, we move to another perspective, to analyze if and how perceived healthiness influences buying behavior. Several studies on willingness to pay for healthy food products have been conducted across the world, and a relevant example is the one by Liu et al. (2021) where customers' purchasing decisions seem to be significantly influenced by their perceived health, especially when it comes to food and environmentally friendly items. The authors show that consumers' views toward sustainable consumption and their decisions to buy organic food may be positively influenced by perceived healthiness and health value, particularly in trying times like the COVID-19 pandemic. As Nguyen et al. (2019) illustrated, the perceived healthiness of products can also influence consumers' intentions regarding green purchases, and this can be explained with the theory of planned behavior framework, which was mentioned in the previous chapter.

Someone may think that the health dimension only has an influence on organic food products, but research conducted by Rimal and Fletcher (2000) shows how consumers'

attitudes towards in-shell peanuts, a product which is not normally meant to have beneficial properties, were influenced by health-related attributes, although taste emerged as the main determining factor when deciding on the purchase.

Moreover, in subjects other than the one under investigation, perceived healthiness has also been demonstrated to impact consumer purchasing behavior. One such area is the clothing industry where, as demonstrated by Davis and Dabas, (2021), young consumers' decisions to buy organic clothing are heavily influenced by perceived health benefits.

However, healthiness is just the first dimension that this chapter wants to investigate. The other significant aspect is about nutrition. Ernst (1995), for instance, identified four categories of product characteristics regarding meat quality: (1) characteristics indicating the nutritional value, such as protein, fat, and carbohydrate content; (2) characteristics indicating the processing quality, such as pH-value and water binding capacity; (3) characteristics indicating the hygienic-toxicological quality, such as contaminants and additives; (4) characteristics indicating the sensory quality, such as texture, flavor, odor and appearance. The first point of these findings, the nutritional value, is the one on which we will focus. Research by Hwang and Lorenzen (2008) shows that the amount of nutritional information, not focusing on the content of it, significantly influences consumers' attitudes towards healthy food. When focusing on the content of the information on the nutritional content of a product, instead, Burton et al. (1999) discovered that it also has a significant influence on consumers' attitudes towards food goods. Some countries decided to enclose this information and the minimum nutritional values for a product by placing a logo on those products that respect the requirements, and Vyth et al. (2010) found that also placing a front-pack nutrition logo significantly influences consumers' motives in their food purchase (Hati et al., 2021).

Overall, perceived healthiness and nutritional content of products plays a highly significant role in shaping consumers' purchase intentions and behaviors, as it interacts with various other factors such as attitudes, perceptions of risk or value, and in the food industry, especially for organic products, this effect is fundamental in driving consumers in their purchasing process.

2.2 SENSORIAL HEDONISM

Over time, the academic view of consumption has evolved and moved from an emphasis on the rational process that happens in consumers' minds to a focus on buying needs that were apparently irrational to the typical models (Howard and Sheth, 1969). In this context, Sensorial Hedonism is a phenomenon that emerges in the food environment, when individuals adopt a more pleasurable approach to eating instead of the only utilitarian one. This aspect of the experience of the food consumer celebrates the diversity of flavors, textures, or colors of the food. Since eating is more than just consuming meals, Sensorial Hedonism deals with the emotions connected to the whole process of nutrition. Western world, in its not so recent history, shifted the attention on the consumption of food from availability and scarcity to pleasure (Holbrook and Hirschman, 1982), and this is often shaped by the contextualized consumption practices in which it all happens (Bardhi et al., 2010).

A significant contribution about this topic has been made by Yann Cornil and Pierre Chandon (2016a). In their research, the authors point how research on eating behavior assumes that pleasure must be sacrificed for the sake of good health. In contrast with this point of view, research shows how a focus on sensory pleasure can make people happier and, as a consequence, willing to spend more for a smaller amount of food, resulting in an improved health. When choosing between a small or large food portion, without taking into account price, consumers are influenced by at least three expectations: (1) Will it satiate their hunger? (2) How will it affect their health and weight? and (3) How pleasurable will it be? Hunger tends to lead people to choose larger portion sizes (Herman and Polivy, 1983). It has been shown via research that people's food choices are influenced by their expectations of sensory pleasure (Raghunathan et al., 2006). However, its impact on portion size choice—that is, the decision between different portions of the same meal—is less clear. The physiology of eating supports precisely the opposite of what most food commercials, particularly those for fast-food restaurants, suggest: eating more food will make you happier (Harris et al., 2010).

With each additional bite, sensory pleasure decreases and maximizes during the first few mouthfuls. This phenomenon, known as "sensory-specific satiation," affects both adults and young children and is obviously different from hunger satiation.

The epicurean view sustains that the greatest pleasure comes from moderation, and this has been investigated by research. It is not a case that portion sizes and obesity rates are lower in cultures that strongly value the aesthetics and cultural dimension of eating, like France or Japan (Rozin, 2005). For example, Wansink et al., (2007) observed that, in these Epicurean pleasure-oriented cultures, people pay less attention to external signs of satiation (such as stopping to eat when the plate is empty or when the television program is finished). One of the reasons why Epicurean eating pleasure can lead to portion size moderation is that it leads to more mindful food decisions, and it improves awareness of sensory-specific satiation. Because of sensory-specific satiation, there is no "accumulation" of pleasure with each bite (Cornil and Chandon, 2016b).

Governments, having acknowledged these considerations, have advocated portion size limits to curb food related diseases like obesity. These portion size limits and health appeals (e.g. food labeling) are designed to encourage people to trade off the expected enjoyment of hedonic foods against the health benefits (Raghunathan et al., 2006). When going to a restaurant, consumers not only want a good meal, but they seek also a satisfying overall experience (Canny, 2014), and restaurants have the ability to provide them with this experience with the creation of good-looking dishes, design furniture in the place, lighting, music and more.

Sensorial food hedonism and its evolution over time has seen an exponential growth, mainly due to the rapid diffusion of smartphones and social media, especially Instagram, where users post food photos online with hashtags i.e. #food #foodporn etc. (Antoniadis et al., 2020). This phenomenon is very common in tourism, where a lot of tourists look online for the best deals, but more specifically for pictures of the restaurant's dishes when deciding where to eat, and, at the same time they post their order to let others know where they dined and what type of local food they had (Liu et al., 2013). The frequency of posting food photo has been found to be significantly related to self-identities and motivations and, according to Zhu et al. (2019), food is a means of expression that supports a customer's cultural, social, and emotional expression. At the same time, food is becoming increasingly popular not only in digital media like Instagram or YouTube, but also in traditional forms like cooking books and TV, that bring up every sort of show about it, and are becoming a socio-cultural phenomenon all around the world (Petit et al., 2016). A good explanatory reason for this rapid diffusion of food as a cultural

phenomenon is that food photography is a cross-cultural universal way of communicating, in fact food is an obvious human necessity and this makes it a relatable and understandable vehicle (Woolley and Fishbach, 2017). For instance, people from everywhere might feel nostalgic in relation to specific food seen in picture online when living away from their childhood country or area, while, according to Ibrahim, (2015) people from other cultures can understand and relate to the individual posting about the nostalgic meal experience, even if they may not have any specific memories associated with the same cuisine. The author argues that people create a dichotomy between the public and private spheres by sharing photos of their ordinary meals in public. This hybrid setting that combines public and private spaces promotes cultural exchange.

This wave of food hedonism in the online context brought consumers to manipulate photos withy image filters. To study the effect of image filters on consumer engagement (which has been measured as likes, comments and favorite pins), Flickr engineers analyzed 4.6 million images on the platform and, overall, they found out food photos had an approximately 30% higher engagement-likelihood with respect to non-food images, and filter-edited images have turned out to be 16% more likely to be seen, compared to raw ones (Bakhshi et al., 2019).

On one hand, food photography can make dining experiences more enjoyable. On the other hand, the intention behind the camera may have an impact on the experience itself. According to Barasch et al. (2018), shooting pictures with the only intention of sharing them online might make an experience less enjoyable than taking pictures for your own use. This impact is mediated by increased concerns about one's appearance. People's participation and enjoyment of the eating experience are thus reduced as a result of the self-presentational worries, which also increase anxiety and direct attention away from the experience and onto the self. But why do people share pictures of hedonic food on social media? Research shows that food and diet are also expressions of identity, therefore it can fulfill the need to express oneself as a healthy person and, consequently, reduce the need for actual healthy eating (Yun and Silk, 2011).

Nowadays, sensorial hedonism is integrated into the foundation of cultural expressions in the society, beyond the simple act of eating. Its continuous evolution has made it a universal language that connects people and celebrates beauty, unifying the physical and digital food ecosystem.

2.3 CONVENIENCE FOOD

One general trend that emerges when we investigate the many aspects of the contemporary food environment is the widespread presence and impact of convenience food. Brunner et al. (2010) define convenience food as "those products that help consumers minimalize time as well as physical and mental effort required for food preparation, consumption and clean-up", the attention is not only put on time and physical efforts, but also on cognitive worries (i.e. what are we eating today?). This chapter explores this phenomenon in cooking and recognizes it as an essential variable influencing modern eating habits. Convenience food emerges not just as a product but also as a cultural reaction to the demands of the modern lifestyle in a world where time is an essential resource. Here, we examine this movement and its rapid rise in our eating practices.

Some scholars highlight two main moments in the history of convenience food when giving a brief overview of the category: the 1954 American TV dinner and the introduction of microwave ovens in the late 1980s (Jabs and Devine, 2006). Others, on the other hand, travel even further back in time and discuss pubs in the eighteenth century, street food in the Middle Ages, and charitable kitchens in the nineteenth century (Dixon et al., 2006). Although both of these types belong to a broad definition of convenience foods, they do not align with the majority of their hypothesized meanings, either from todays or the past: convenience foods are often associated with home cooking. The mention of microwave ovens and TV meals suggests that the house is important (Scholliers, 2015). Nowadays, especially in more economically developed countries, it has become a cultural habit. According to statistical data[5], the global Convenience Food segment has experienced significant growth in recent years, with the COVID-19 pandemic leading to increased consumer spending. This segment is expected to maintain the continued robust and resilient growth in retail sales over the next couple of years. When it comes to this segment's drivers, according to the report, economic growth and increased disposable income play a significant role in consumption as they enable consumers to purchase more convenience food products. Additionally, urbanization and lifestyle changes, such as long working hours, are also factors that drive demand.

[5] https://www.statista.com/outlook/cmo/food/convenience-food/worldwide#analyst-opinion

In the academic literature instead, there are several studies that identified the main drivers of consumption for convenience food. A relevant example is the one conducted by Brunner et al. (2010), in which the authors discuss on different points of view about consumption drivers, taking in consideration for example lifestyle, for which 20 different factors were identified, among them we find the ageing population, the female participation in labor force with longer working hours or the overall societal decline in cooking skills. Another dimension which has been studied in the literature is sensory attributes, in particular taste, which in several studies, as the one conducted by Wang et al. (2015), appeared to be the most relevant characteristic for consumers when deciding which product to buy for this category of goods. Food safety is another important variable to consider when dealing with the influences on the buying decisions of these goods, in fact consumers expect that national and international regulatory institutions and food processing companies take actively part in ensuring the best standard in terms of safety for convenience foods. This involves chemical, microbiological and technological issues as well as the place of origin of the product (Behrens et al., 2010).

It is important to mention that the present variables have been studied taking in consideration More Economically Developed Countries, which is the same environment on which this research will focus, and for the emerging economies things could change due to a mix of different factors such as traditions, food habits, social structure or ethical values. This brings us to another major influence on buying decisions for convenience food, which are socio-demographic trends that, in emerging economies have recently been indicating a major change. This involves more educated and entrepreneur youth population that increased the percentage of their monthly income spent on food because they lack time to cook, have a multiple income family and overall adopt a dynamic lifestyle (Imtiyaz et al., 2021). Societies are progressing over time, allowing women to pursue an education and to have more fair career opportunities, and Szabo (2011) in particular, links the increase in female labor force participation and women's longer working hours outside the house to the increased demand for convenience food items. The author comes to the conclusion that using pre-prepared (convenience) food was a useful strategy for managing meal preparation given women's increasingly busy work schedules. This of course is taking place at different levels in different countries, and we find a positive general correlation between the degree of advancement in that sense of a

society and the scale of consumption of convenience food. This "demographic segmentation" can be done for another category of people for which convenience food plays an important role, which are the elderly, although it can be sometimes a divisive subject. Nakano and Washizu (2020) in fact note that there are several studies for which convenience food may improve eating habits and prevent malnutrition in the elderly. A well-crafted, already prepared meal will help elderly people who lack physical strength for cooking and that usually have biases in food preferences. A country, among the most economically developed ones which has a huge percentage of elderly people is Japan[6] (29%). For Japan, assisting home cooks in making well-balanced meals has become a major societal issue, and the government recently decided to plan the introduction of a smart food system that involves the usage of smartphones to provide the elderly with knowledge about eating habits and assist them in using convenience foods. On the other hand, Brunner et al. (2010) argue that age is a predictor of consumption for convenience food, in fact the higher the age, the less convenience food is consumed. This is hypothesized to be because of the more time available for cooking.

Other than fulfilling the need of reducing time and cognitive effort in the kitchen and being associated with an improved society, convenience food has its downsides. First of all, Contini et al. (2018) argue how some people that buy these types of goods fear negative judgement from close friends and family, due to the risk of being perceived as lazy and not health conscious. Moreover, as pointed out by Nakano and Washizu (2020), this phenomenon is a real danger for the environment due to disposable packaging that contains small portions of food. Another study by Xin et al. (2021) shows how among 11 studies that reported the association between convenience store access in the neighborhood and weight-related behaviors, findings were rather consistent: Nine reported a positive association, two reported no significant association, and none reported a negative association. For girls and children living in low-income neighborhoods, convenience store access was positively associated with unhealthy eating behaviors (i.e. eating/snacking out and consumption of fast food, sugar-sweetened beverage, and delivered/take-out foods). In conclusion, convenience food consumption is shaped by an intricate combination of factors. This chapter emphasizes convenience food's role as a

[6] https://www.statista.com/statistics/264729/countries-with-the-largest-percentage-of-total-population-over-65-years

cultural phenomenon and a reaction to the challenging demands of modern lifestyle. Finding a balance between the advantages and disadvantages of this gastronomic journey will be crucial to determining how our eating habits will develop in the future and how they will affect emerging societies and the environment.

2.4 ETHICAL CHOICES AND SOCIAL RESPONSIBILITY

Giving a look at "Ethical Choices and Social Responsibility" is a way to learn about a prominent aspect of contemporary food choices. This chapter explores the ethical factors that influence modern dietary choices and the evolving nature of social responsibility in the food sector in a time when people are becoming more conscious of the consequences of their actions. This chapter will help us understand the connections between individual decisions and wider societal and environmental effects, highlighting the exciting possibilities of ethical decision-making in the food industry.

Making sure that both production and consumption become sustainable is one of the goals in the UN Agenda 2030[7] for a sustainable societal evolution, as it is widely recognized that the whole food supply chain has a huge role in today's environmental impact.

On one side, producers are trying to shift to increasingly sustainable practices, redefining their supply chains, while on the other side consumers adopt a more sustainable lifestyle and try to do their part in reducing human impact. In this process, governments push and regulate a fair shift to these types to practices.

According to Wang and Dai (2018), the Food Supply Chain may be made more sustainable by maintaining food safety—especially good food quality—using technology, increasing resource efficiency, educating staff members, and having a better understanding of what customers want. For example, for optimal consumer satisfaction, stored harvested foods should be distributed and retailed; yet, due to inadequate FSC, about 30% of food yearly is lost or wasted globally. For this reason, there is a strong need for effective strategies aimed at reducing waste and improving efficiency.

From producers' side, the adoption of sustainable agriculture practices can encounter some barriers, also considering the intention-behavior gap that exists in this sense. According to Rodriguez et al. (2009) some of these barriers are: (1) economic, such as the cost of the higher costs of these equipment and materials, the uncertain profits, the

[7] https://unric.org/it/agenda-2030/

increased risk, loss of productivity, labor supply, at-risk economic situations, and farm program policies. Both when perceived and real, risk is always a barrier to adoption of sustainable agricultural practices among farmers, the main risk feared is the one that shifting to sustainable practices may reduce performance, however Caswell et al. (2001) demonstrates how the adoption of sustainable agriculture practices significantly diminishes the use of products such as pesticides and fertilizers, and this resulted in no economic underperforming, instead sometimes it resulted in overperforming. Farmers could view environmentally friendly practices badly if they are considered to increase labor demand, as labor is sometimes a costly or limited resource in the agricultural chain. They may not have the extra time or energy to perform the extra work personally since they are aware of their own limitations. Added labor expenses might have an impact on profitability (Schneeberger et al., 2002); (2) personal characteristics, in fact farmers themselves may differ based on age, attitudes and beliefs. In particular, the study mentions a frequent belief which is the "resistance to change" (with the most frequent barrier to adoption resulting in the initial cost of changing practices, that includes both the cost of new machinery and the cost of changing management style); (3) social infrastructure, meaning the social context in which producers find themselves, made by peers and family, shapes the common practices and accepted norms about agricultural practices. In this context, sustainability may be seen as a new practice in the well-established mechanism of farming, and farmers often decide by what the social group to which they belong considers as socially and culturally acceptable.

Around this context, the legislators play an important role of facilitating and supporting farmers to adopt sustainable techniques. In Europe, the Common Agricultural Policy[8], an ever-evolving policy that periodically adapts its intervention, supports that farmers should operate in a sustainable and ecologically responsible manner while staying economical. The substantial role that the public sector plays for our farmers is justified by the risks in business and the environmental effect of farming. The following measures are carried out by the CAP: (1) market measures, to deal with difficult market conditions, such as a sudden drop in demand due to a health scare or a fall in prices as a result of a temporary surplus on the market; (2) income support through direct payments, which ensures income stability and remunerates farmers for environmentally friendly farming and

[8] https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-glance_en

providing public services not normally paid for by the markets, such as taking care of the countryside; (3) rural development measures with programs to address the specific needs and challenges facing rural areas.

In this landscape consumers are becoming increasingly ethical and socially responsible, in fact numerous academic works have attempted to examine the factors that drive consumer interest for sustainable food. Regarding the literature specifically on organic consumers, many studies indicate that there may be a direct correlation between the level of organic consumption and sustainability issues, which includes social, environmental, and economic concerns. There is a growing body of literature suggesting that societal worries about the environment are one factor driving rising demand for organic food (Lee and Yun, 2015). In this regard, Hjelmar (2011) distinguished between two types of organic consumers: "reflective" consumers, who typically purchase organic products based on consideration of sustainability issues, and "automatic" consumers, who purchase organic products pragmatically and pay attention mostly to prices and availability. Over time, green consumers gained an increasing relevance, in fact several are the attempts of segmenting among them. A significant contribution is given by Verain et al. (2012) that groups sixteen articles that deal with sustainability and food. The author categorizes the variables used in these articles to segment consumers in three levels of abstraction: (1) personality characteristics, (2) food-related lifestyles; (3) behavior. All of the three levels were useful in differentiating consumer segments regarding sustainability. In addition, the importance of price and health differed across the segments. This is useful to understand that segmentation studies should include variables on all levels of abstraction to get a complete picture of existing sustainable consumer segments, so marketers should be aware that segmenting just on socio-demographic characteristics is not enough.

Consumers have several reasons beyond their food selection behaviors. The eco-friendliness of a food product, however, not so long ago did not seem to be one of the main influences on their choices (Tobler et al., 2011). The theory of Planned Behavior, seen in the previous chapter, says that intentions control actions and thus are the key elements in predicting and explaining individual behavior. This means that to analyze behavior we should look way back to predictors of it, such as attitudes, subjective norms or the individual's beliefs. In the literature, however, we find a misalignment between the declared intentions and actual behavior, and this situation is known as the "intention-

behavior gap", which has been recognized in various research in the area of consumerism, such as sustainable consumption, ethical consumption, recycling behaviors and public procurement tenders. The body of research demonstrates how views about organic food purchases are influenced by both egoistic and altruistic motives. Therefore, consciousness about health and the environment are likely to have an impact on organic consumers for both altruistic and egoistic reasons. While concerns about animal welfare and the environment, for example, benefit society as a whole (altruistic), concerns about health imply advantages for the individual or family (egoistic) (Testa et al., 2019). Health consciousness can be regarded as the degree to which health concerns are integrated into individual daily activities. Several studies have provided evidence of a positive relationship between health beliefs and attitude towards buying organic food, demonstrating that the more concerned consumers are about their health, the stronger their intention to purchase organic products (Nuttavuthisit, and Thøgersen, 2017). On the same stream, knowledge has been identified as an important variable in influencing consumer decision making on the purchasing of organic products. Customers identify the key characteristics of organic farming, such as being natural, raw, and less processed than conventional products, and have a basic concept of what organic means. On the other hand, they don't seem to be aware of the costs associated with organic production, inspection procedures, or farming methods.

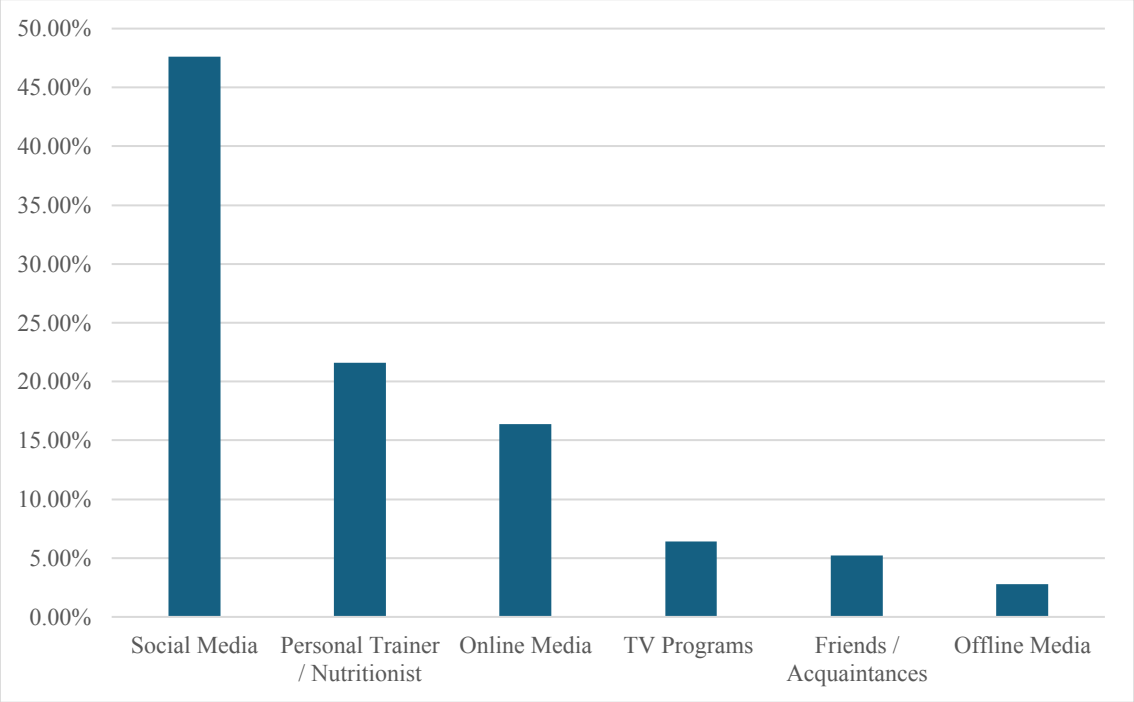
Consumer attitudes about organic goods have been the primary focus of research on the impact of knowledge in predicting organic purchase behavior (Teng and Wang, 2015). This study shows that views regarding organic food have been positively affected by a higher degree of awareness and understanding about it.

In conclusion, a review of the ethical considerations regarding decision-making and social responsibility in the food sector provides insights into contemporary eating patterns and the best approach to adopt. The complex relationship between personal choices and larger social and environmental effects is seen in a variety of contexts, including sustainable agriculture and consumer perceptions of organic products. In order to develop a food system that puts social responsibility and ethical concerns first as we progress towards a more sustainable future, it is critical to comprehend these processes.

CHAPTER 3: EMPOWERED CONSUMERS: TOOLS FOR AWARE CHOICES

This chapter discusses what is going on around the phenomenon of consumers becoming increasingly able to make informed food and nutrition decisions. Consumers have access to a variety of tools and services that offer useful information on the nutritional value and overall health of the foods they eat. This chapter explores several ways that customers could be taught about this, from conventional labeling and packaging to digital platforms and mobile applications. Through this analysis we may get a better understanding of how informed consumers make decisions about their diets that prioritize their health and well-being in the world of food options. Moreover, this paragraph offers tangible insights about the practical relevance of this research.

When thinking about what can involve and link the great majority of people nowadays, we immediately think of social media, due to its ease in accessing and usage. According to a survey[9] conducted among European respondents, 47.6% of European consumers use social media as their main source of information for a serious topic like health, underlining how easy and accessible it is to get informed, and how smartphones and technology play a fundamental role in this whole process.

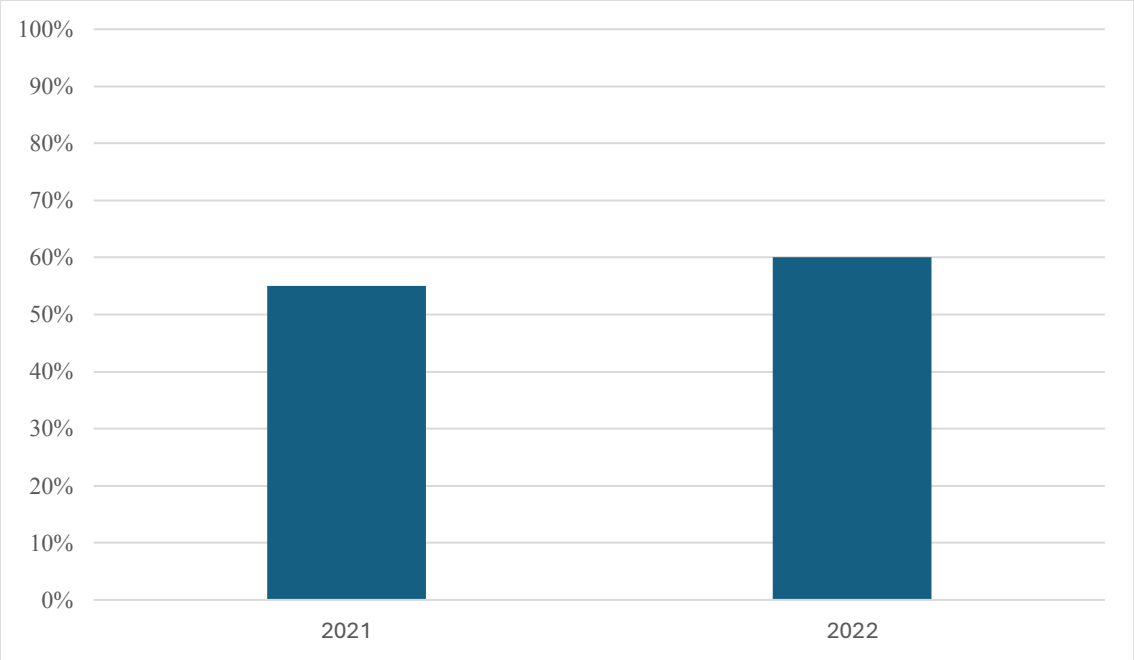


Graph 1: Distribution of the main source of health information according to respondents in Europe in 2022.

[9] https://www.statista.com/statistics/1346593/main-source-of-health-information-in-europe/

3.1 TRANSPARENCY AS AN ASSET

Consumers are becoming more selective and cautious about the products they buy, and this is supported by several studies. For example, the graph below shows the share of consumers who believed that trustworthiness and transparency were the most important traits of a brand worldwide[10].



Graph 2: Share of consumers who believed that trustworthiness and transparency were the most important traits of a brand worldwide in 2021 and 2022.

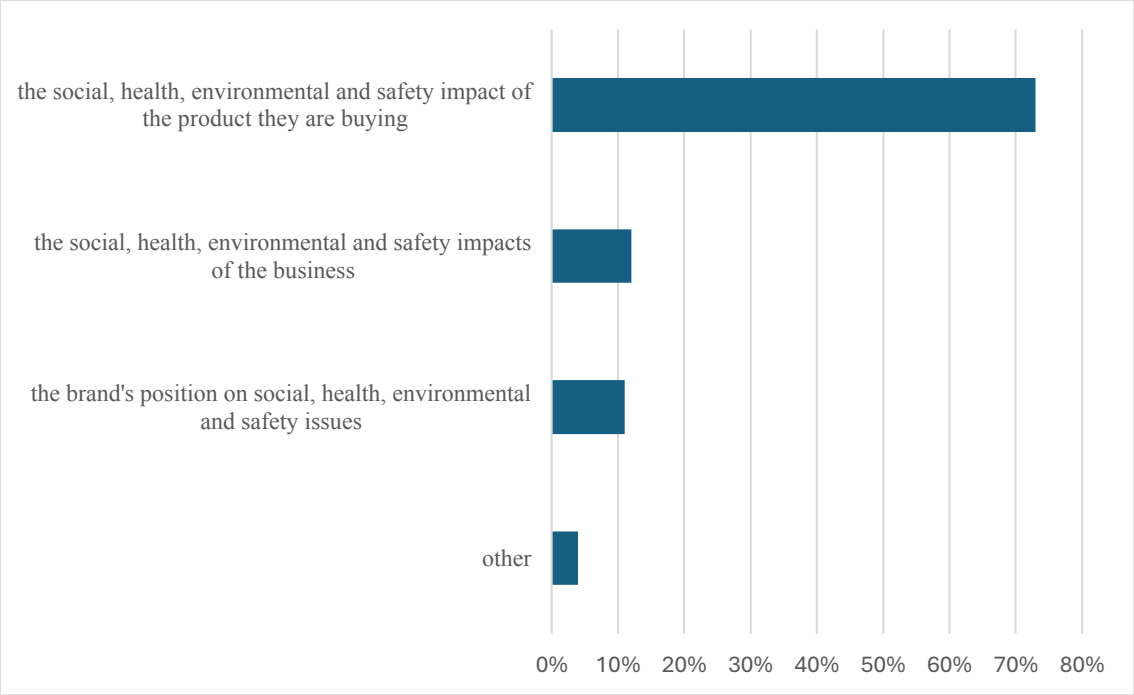
Furthermore, according to the Edelman Trust Barometer[11], 81% of respondents list "I must be able to trust the brand to do what is right" as a major buying criterion in 2019, and the majority of respondents think businesses employ marketing techniques just to increase sales. Companies need to communicate their knowledge of what is happening in the supply chain both internally and externally in order to maintain transparency.

The fact that more customers are requesting it is one reason it has grown in significance. For example, according to Kraft et al. (2018), customers may be prepared to spend 2% to 10% extra for items from firms that give better openness in their supply chain. Based on this research, buyers were interested in discovering how products are treated by suppliers as well as the seller's initiatives to enhance labor standards. This increasingly aware consumers seek for details on product materials and ingredients, product origins, and

[10] https://www.statista.com/statistics/1332294/trustworthiness-transparency-in-marketing/
[11] https://www.edelman.com/sites/g/files/aatuss191/files/2019-02/2019_Edelman_Trust_Barometer_Global_Report.pdf

production conditions across all sectors. As these demands have increased, so has the reputational risk for companies from media and NGO campaigns. Over the last decade, numerous scandals have inflicted considerable damage on the reputations of companies (Bateman and Bonanni, 2019). Diving into the food industry, a recently published NielsenIQ and Food Industry Association research[12] states that two-thirds of consumers who purchase food would move from an average brand to one that offers more detailed product information. Nutrition and ingredient information continue to be top concerns for a growing percentage of consumers (66%) when it comes to food transparency. However, the majority of respondents (80%) claimed that other factors, such as information about allergens, certifications, and values-based information, influenced their purchase decisions.

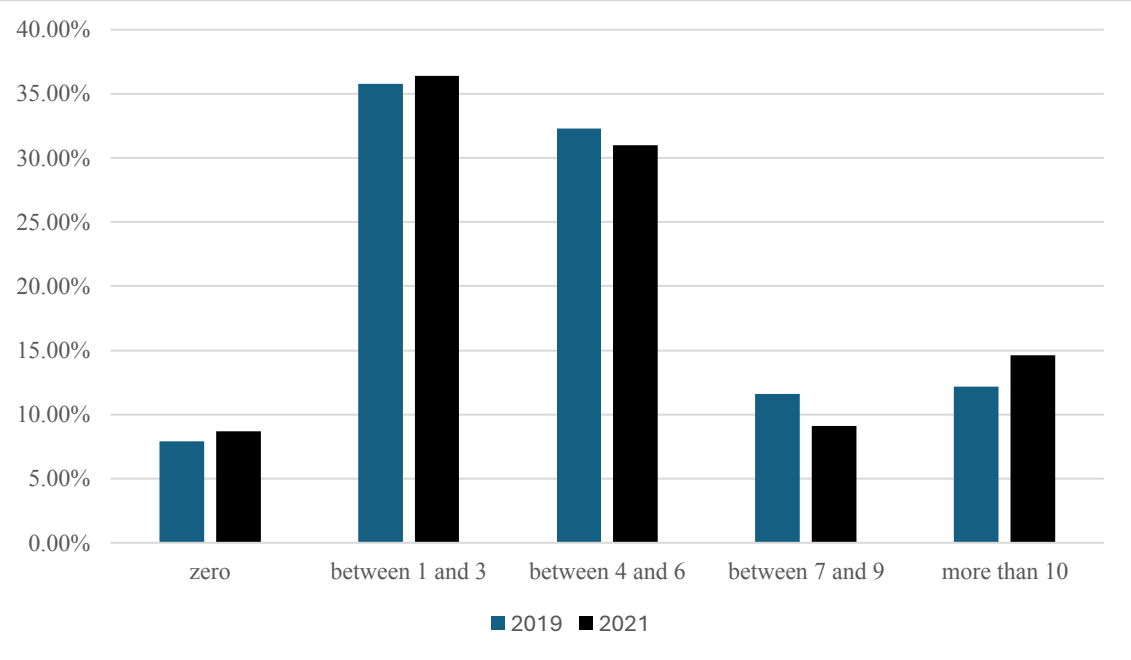
More than in other industries, consumers value the characteristics of the specific product they are buying over the company seen as a whole. Research conducted on a global scale in 2018 shows how the social, health, environmental and safety impact of the product they are buying is valued at first place by 73% of global consumers[13].



Graph 3: Most important transparency issues to consumers according to corporations worldwide as of July 2018.

[12] https://www.fmi.org/forms/store/ProductFormPublic/transparency-evolving-omnichannel-world
[13] https://www.statista.com/statistics/1028709/global-consumer-interest-in-transparency-according-to-corps/

Consumers can choose to gain information through different methods, and one of the most largely developed is through online reviews. Several studies such as the one by Chen et al. (2022) show the significant impact that this particular source of information has on consumers. Data in the graph below[14] shows how 9 consumers out of 10 look for reviews before making a purchase, moreover 14,6% of consumers in 2021 claimed that they looked at more than 10 reviews, and this data has been growing since 2019, in which the same percentage was 12,2%.



Graph 4: reviews read before deciding to purchase.

According to the Politecnico di Milano "multichannel observatory", promoted by Politecnico school of management and NielsenIQ, more than one third of consumers use online technologies just to get informed on the products. Moreover, in 2019 digital technologies had a significant role in consumers shopping journey in 83% of the Italian population over 14 years of age, the so-called "multichannel consumers". This data gives a deep relevance to this research, demonstrating how consumers are not only ready, but significantly involve a mix of different channels in the modern shopping experience. From the results of the study, it emerged how even the most loyal physical shoppers involve digital channels as a point of contact with brands[15].

[14] https://www.statista.com/statistics/1020836/share-of-shoppers-reading-reviews-before-purchase/
[15] https://www.som.polimi.it/multicanalita-oggi-spazio-integrato-customer-journey-differenziati/#collapse_1907

3.2 FRONT OF PACK LABELS

Front of pack nutrition labels represent one of the most common ways in which consumers get informed on the product they are willing to buy, directly from the shelf. Up to the 1960s there was little information on food labels to identify the nutrient content of the food, however with the increase in the number of processed food available, during the 1970s there has been a general development towards this highly spread system for identifying the nutritional qualities of food (Boon et al., 2010). Nowadays there are numerous FOPNL schemes with very disparate levels of information, color, and complexity.

Some systems, known as "reductive schemes", are color-coded or monochromatic, while some are entirely numerical and repeat parts of the nutrition declaration. Other schemes include summary scoring schemes that are dualistic recommendation logos or scored ratings.

Front of pack nutritional labels have gained a vast attention from the academic literature in recent years. A report by the European commission, written by Nohlen et al. (2022) provides a large update of the evidence. Overall, research indicates that consumers value FOPNL because they perceive them as a simple and immediate source of nutritional information that helps them make more informed choices and gives them a sense of empowerment. Evidence shows that consumers support both the more comprehensive back-of-pack (BOP) nutrition labels and FOPNL. Monochrome and non-directive FOPNL don't seem to be as popular as colored and directive ones. It is important to acknowledge that the self-reported preferences of customers may not always align with their actual understanding and usage of the different FOPNL. Instead of focusing only on influencing consumers' purchases of healthy or unhealthy products, FOPNL schemes like (Multiple) Traffic Lights, Health Star Rating, and Nutri-Score appear to be more effective at enhancing the overall healthiness of options. This is because they combine an increase in the number of healthy products with a decrease in the number of unhealthy products, in fact there is evidence indicating a potential beneficial impact of FOPNL on the reformulation of foods and drinks to create a more nutritious food supply and to improve their nutritional value, with particular regard to nutrients like sodium and sugars. Although informing consumers is the primary goal of food labeling systems, there is real-

world evidence that well-designed front-of-package nutrition information can help encourage healthier choices (Cawley et al., 2015). This evidence is for sure of great interest to policy makers to promote a healthier lifestyle among the population, but not only. If nutrition labels for sure encourage consumers to choose healthier options, this can result in companies adopting healthier ingredients, demonstrating how FOPNL actually involves all the stakeholders that are found in the supply chain.

There are several types of front of pack nutrition labels, and Roberto et al. (2021) designed the table below, useful to understand the main ones.

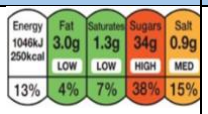
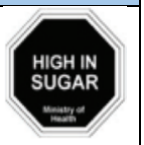
	Guideline daily amount	Traffic light	Nutri-score	Health star rating	High in
symbol					
Summary indicator or nutrient specific	Nutrient-specific	Nutrient-specific	Summary	Summary	Nutrient-specific
information provision	Non-Interpretive	Interpretive	Interpretive	Interpretive	Interpretive
Nutrient thresholds for label display	No threshold	No threshold	No threshold	No threshold	Threshold

Table 1: dimensions of front-of-package nutrition labels and common labeling systems.

As suggested by the European Public Health Association[16], it is evident that the adoption of a unified FOPNL plan for the entire EU has substantial support. There are at least four major advantages that can result from this: (1) From the perspective of the customer: carefully designed FOPNL might help in informing customers on the nutritional content of the food they buy and eat. The core of the EU's consumer and health protection policies involves informing consumers, giving them the power to make empowered choices. It is

[16] https://eupha.org/repository/advocacy/2023/EUPHA%20Statement%20on%20FoPNL%20FINAL.pdf

consistent with the European Union's established belief that encouraging free trade while encouraging people to make better decisions involves regulation on food labeling (European Commission, 2007). Effectively designed FOPNL can provide easy-to-see and easy-to-understand information on the front of food packaging thus supporting healthier food choices; (2) From the perspective of manufacturers and other economic operators, a harmonized FOPNL scheme will level the playing field, increase legal certainty and reduce labelling costs. At present, there are seven national schemes recommended across 14 Member States. There are further schemes designed by industry but not officially endorsed by a Member State. While some manufacturers have adopted FOPNL, many have not, whilst others are using multiple different schemes; (3) From the perspective of Member States, a mandatory, EU-wide scheme will contribute to policies intended to reduce the prevalence of obesity and diet-related diseases. Currently, EU rules prohibit the adoption of effective national FOPNL schemes which are interpretive, and they do not encourage the adoption of FOPNL schemes which are easy-to-use. Moreover, and very importantly, Member States cannot make FOPNL mandatory; (4) From the European Union's point of view, a unified FOPNL system will support the internal market's proper administration in line with the EU's mandate to guarantee a high standard of consumer and health protection in all of its policies. Additionally, it will make it easier for all of its members to follow through on their worldwide commitments to promote better food ecosystems and avoid diseases associated with diet.

Front of pack nutrition labels are a tool meant to give the consumer an accurate overview of a product’s nutritional content in a limited time frame. This ambivalent nature presents several pros and cons; the main pros about this measure are found in the fact that it gives consumers a way to compare in a fast way several alternatives, promoting healthy choices and spreading awareness on nutrition. Moreover, it encourages companies to adopt healthier formulations for their products for better ratings, advantaging consumers. Some cons about this tool may be the expertise that consumers need to have to read the label in an accurate way, to not mislead it meaning, or the bias that it can create in consumers that assume a product to be healthier than another without considering the full nutritional profile.

Right now, among the different options, Nutriscore is the most popular across Europe, with France, Belgium, Germany, Luxembourg, the Netherlands, Spain and Switzerland

that embraced its adoption[17]. In the process of diffusion and regulation of this scheme through the whole European Union, Italy is playing a central role due to the fact that the actual prime minister Giorgia Meloni, since 2021, is trying to battle the adoption of this measure because on one hand it penalizes lots of well-known “made in Italy” products, like for example Grana Padano and Prosciutto di Parma, while on the other hand it gives higher ratings to products that are not commonly considered healthy. The nutritional score is calculated with the following formula: Component N - Component P. Component N considers the nutritional elements whose consumption should be limited (calories, saturated fatty acids, simple sugars, and sodium) per 100 g of product, while Component P considers nutritional components whose consumption should be higher (fiber, protein, fruits, vegetables, legumes, nuts, rapeseed, walnut, and olive oil). Furthermore, the nutritional score has correcting processes for some specific meal categories. According to a great slice of Italian politicians, this tool can bias consumers when shopping for food, bringing them to prefer imported products to Italian ones, so that the actual government in charge defines it “misleading”. Evidence about the influence of such a tool to empower consumers on their buying behavior is supported from Nohlen et al. (2022), which found out that simpler, evaluative, color-coded labels are easier to understand than more complex, reductive monochrome labels. The five-color logo not only has "the potential to guide consumers" toward better diets, but also to "stimulate food reformulation and innovation".

While Italian government is opposing a resistance on this matter towards their European colleagues, they proposed a different formula which is the so-called “NutrInform Battery”, which will be seen in the next paragraph.

3.3 ALTERNATIVE OFFICIAL SOURCES: NUTRINFORM BATTERY

Italy (Ministry of Health, Economic Development, Agricultural Food and Forestry Policies, Istituto Superiore di Sanità and Council for Research in Agriculture and Analysis of Agricultural Economics) has developed the scheme called NutrInform Battery, which allows to represent graphically on the label, the percentage intake of energy and nutrients compared to the recommended portion of consumption of the food.

[17] https://www.eurofins.de/food-analysis/other-services/nutri-score/#:~:text=The%20Nutri%2DScore%20is%20currently,(keyword%3A%20multilingual%20labelling)

The "NutrInform Battery" FOPNL system uses data and graphics to show how many calories, fats, saturated fats, sugars, and salt are in a portion of the product and how much of that amount is consumed in reference to the daily requirement (which is equal to 2000 reference kcal) as defined by Regulation (EU) No. 1169/2011. It varies from other FOP labeling systems because its foundation is the goal of educating customers, free from any type of pressure, so they may make decisions that will help them create a daily diet that is nutritionally balanced.

The foundation of this system is a set of fundamental ideals, including: (1) providing consumers with information about food's nutritional value in an understandable, transparent, and clear style; (2) basing its recommendations on the concept of portion, which is more helpful to consumers in creating their own daily diets than on evaluations expressed for 100 g / 100 ml of product as used in other systems; (3) being based on rigorous and proven scientific evidence, from the perspective of both the nutritional role and a proper understanding by the consumer; (4) reach a full compliance with article 35 of European Union Regulation 1169/2011 (Food Information to Consumer), and also being, as much as possible, respectful of the nutritional reference intakes; (5) not being an obstacle to the free trade of goods between EU member states; (6) being both objective and non-discriminatory towards any food.

The battery icon, an internationally recognizable symbol, is utilized in the NutrInform Battery FOPNL case to quickly indicate the main nutrients and energy level of any portion of the food compared to the daily RIs. Following a “Guideline Daily Amount” based approach, customers easily understand how much that quantity of food adds to the RI of energy and nutrients which have an important impact on health thanks to this visual representation. In order to help customers maintain a balanced, diverse, and healthful diet, the signal is provided by the perception of "full" versus "empty," and when combined with the idea of volume, it enables the message to be presented not only at the time of purchase but also when the food is put on display in the fridge or eaten at home. The concept of replenishment versus emptiness still available for other foods, empowers consumers to choose and eat foods considering the overall diet. Consumers can easily develop their daily diet balancing the food products they choose, provided that they do not exceed the replenishment of the battery for each nutrient (Mazzù et al, 2021a).

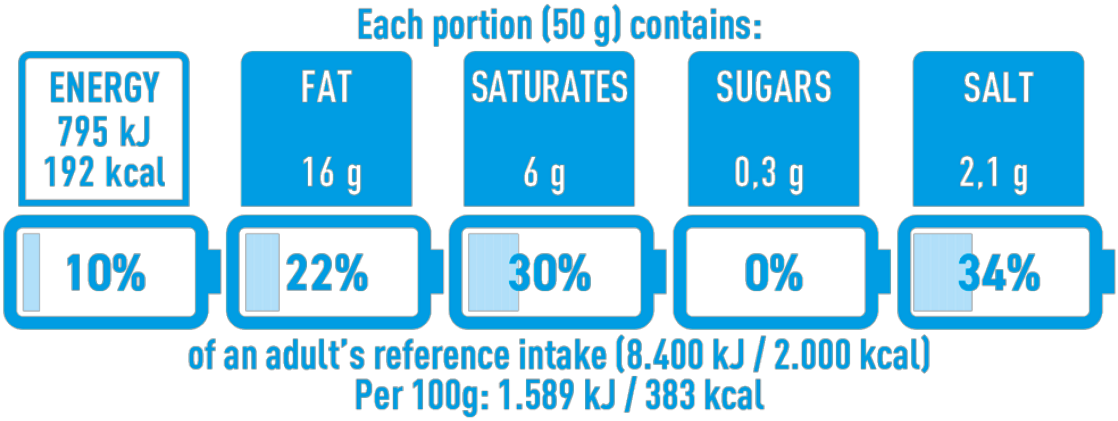


Figure 1: NutrInform Battery FOPNL

In order to pursue nutritional well-being, consumer must, regardless of the particular dietary and cultural model, be informed and empowered to choose a suitable and healthful eating pattern for themselves and others. The consumer here becomes an active subject who can decide on the meals that will best meet their nutritional demands rather than just a passive one whose decision is influenced by a judgment (color-letter). The French Nutri score system, which has already been implemented by various European nations, and the NutrInform Battery have been compared through experimental study[18].

The comparison, by Mazzù et al. (2021b), regarding subjective comprehension and liking, suggests how NutrInform Battery emerged as more effective than Nutri-Score in allowing consumers understand information in a relevant way. It appeared to be understood in a clear way across the various countries, showing limited impact of socio-cultural differences among countries and outweighing potential familiarity of consumers with Nutri-Score in selected countries where the FOPL label is already part of consumers' daily experience. Moreover, except for France where Nutri-Score presented a higher mean, yet not significant, than NutrInform Battery in terms of liking, NutrInform Battery emerged as the preferred label on subjective understanding within and across each country examined. These results are of great interest for policy makers, which final goal is to empower consumers using the least misleading tool they can think of.

Recently, the Italian government launched the NutrInform app for mobile devices which aim is to help consumers follow a healthy and balanced diet, through the help of two main tools: (1) NutrInform battery label on each food item: the nutritional information for every food product is presented on this label in an easy-to-read manner, along with the

[18] https://www.salute.gov.it/imgs/C_17_pagineAree_5509_5_file.pdf

recommended serving size as recommended by experts. To view the nutritional information (calories, salt, sugar, and fat) of any packaged product, all you have to do is take a picture of the barcode on the back of the item. You may use the NutrInform Battery to find out how each product's portion affects your regular diet. And because eating the right amounts of each item is crucial for optimal nutrition (which, as we saw, is one of the main reasons for its development), NutrInform Battery also tells you how much of each food, based on its kind, should be ingested. Of course, you have the option to adjust the number if you decide to eat more or less than the suggested amount. The NutrInform Battery label will provide you with accurate information about the quantity you have chosen, giving you a tool to help you keep track of the calories and nutrients that are actually absorbed; (2) Your Daily Diet Battery, located on the app's home screen. This tool will be updated with the data gathered from each meal you consume through the app. As the Daily Diet Battery provides detailed information on energy and nutrients (fat, sugar, and salt) the amount of which should be moderate, it can help you diversify your diet and prevent abuses. This information is recommended by the World Health Organization. Indeed, when a nutrient's Daily Diet Battery is almost full, you will know that it's best for you to stay free of that nutrient for the rest of the day and instead focus on consuming meals of a different kind until the battery is fully charged. The suggested values for calories, salt, sugar and fat represent the reference intakes for an average adult, suggested by the European Food Security Agency (EFSA).

To ease consumers in the usage, the app features also nutritional data for more than 300 recipes of dishes that are popularly consumed in Italy, avoiding for the consumer to add manually the single ingredients used for the recipe[19].

With the introduction of the NutrInform app, the Italian government has made incredible advances in the areas of nutritional knowledge and aware food selection. NutrInform was created with the specific goal of offering controlled and correct nutritional information and aims to operate as a reliable resource for anybody looking for guidance on following healthy eating practices. As an official governmental program, the app carefully sticks to official dietary standards and is a reliable resource for anybody trying to make informed food decisions.

[19] https://www.nutrinformbattery.it/it/app

But NutrInform is not the only app in the evolving world of nutrition and wellness. In fact, there are already existing and independently developed applications with larger databases and intuitive user interfaces, like Yuka, that will be one of the determinants in this research and will be seen in the next chapter.

3.4 YUKA APP

As per Yuka official definition on the app store[20], it is a free mobile app that allows you to scan the barcodes of food and personal care products and instantly see their impact on your health. A rating and detailed information helps you understanding the analysis of each product. When a product has a negative impact on your health, Yuka also recommends similar but healthier alternative products. Yuka is a 100% independent project: product reviews and recommendations of healthier alternatives are done in an objective way, and no brand or manufacturer can influence them in one way or another. Furthermore, there is no in-app advertising, and scores and recommendations are obtained independently, with absolutely no influence from outside brands or manufacturers. The official website of the app publishes in fact the annual revenue breakdown and the balance sheet[21], where it is transparently evident how the majority of the revenues come from the premium version (which comes with a number of additional features, such as a search bar, offline mode, and custom alerts notifying users of the presence of palm oil, gluten, or lactose), and a smaller part comes from the "healthy eating guide", a book in which you can find the ideal plate for every one of the 4 daily meals, advice on how to better choose your food as well as 36 healthy recipes, and from the "calendar of seasonal fruits and vegetables", a physical calendar that associates to the right period the right fruits and vegetables which come in that season.

To totally grasp the functioning of Yuka mobile application we must understand its evaluation criteria, which is made public on their official website[22]. The food products scores are based on three criteria: (1) nutritional quality, accounting for 60% of the score. The calculation is based on Nutriscore, and the score is transformed in order to avoid threshold effects that could lead to significant rating differences between two products with similar nutritional values and to prevent a product with a Nutriscore of D or E from

[20] https://apps.apple.com/us/app/yuka-food-cosmetic-scanner/id1092799236
[21] https://yuka.io/en/independence/
[22] https://help.yuka.io/l/en/article/ijzgfvi1jq

having a Yuka score higher than 49/100; (2) the presence of additives, accounting for 30% of the score. Benchmarks are based on the latest scientific research, taking into account the recommendations of the EFSA and the IARC, in addition to several independent studies. Every additive is assigned a risk level based on various existing studies: risk-free (green dot), limited risk (yellow dot), moderate risk (orange dot), hazardous (red dot). If an additive which considered to be hazardous is present, the maximum score for the product is set at 49/100. In this case this criterion represents more than 30% of the score; (3) the organic dimension, accounting for 10% of the score. This is a bonus granted to products considered organic, i.e. those with an official national or international organic label. They avoid chemical pesticides which can pose a health risk, are high in antioxidants, and reduce the risk of developing diseases[23].

The choice for this study to feature Yuka as a tool to analyze consumers responses, rather than other available tools, such as the NutrInform app, comes from several reasons: (1) a huge user base, with more than 50 million users, demonstrating a high coverage and a huge potential impact of influence that the app can have on a large scale, (2) an average score of 4,7 out of 5 for three hundred thousand reviews, which demonstrates the great user experience and high trust from the users, (3) the fact that, as previously seen in the chapter, digital technologies have a significant role in consumers shopping journey in 83% of the Italian population over 14 years of age, the so-called "multichannel consumers". This demonstrates how consumers are not only ready, but already involve a mix of different channels in the modern shopping experience, (4) the contents of an official report, found on the Yuka official website[24]. This report shows the results of a research conducted among a sample of 229005 French people that regularly use the app. In particular, it shows that 94% of the sample claims that they stopped buying certain products after starting to use Yuka, in fact 92% of the total puts back products when they are rated red on the applications, highlighting how for that sample the app makes a significant influence during the consumption process. However, the influence of the app does not stick uniquely to consumers, in fact 90% of the sample believe that Yuka can influence brands and manufacturers to market better products. And this belief is actually already a reality, as supported by several declarations made by professionals working in

[23] https://help.yuka.io/l/en/article/whdil9afoj
[24] https://yuka.io/en/social-impact/

fast moving consumer goods multinationals. Sophie Creusot Jayet, Director of Communications and External Relations from Unilever France, said: “we have developed new products to meet the needs and expectations of consumers that are highly aligned with Yuka’s evaluation criteria”, like the range of organic sorbets from Carte d’Or, containing fewer ingredients and less than two additives to be rated at a higher level from the app. Sylvie Willemin, the Nutrition Director from Nestlé, told: “Yuka, which uses the Nutriscore program to which we are committed, is pushing us to speed up improvements to our products, simplifying our ingredient lists and build out our organic and plant lines”. Buitoni, a brand owned by Nestlé, in fact reduced the sodium content in their “Fraich’Up pizza” products. Thierry Cotillard, who is the president of Intermarché, a brand of commercial supermarkets and grocery stores found in France and other European nations, contributed to this study with the following words: “Yuka is a fundamental trend, so it is essential for us at Intermarché, as producers and traders, to be proactive in order to have the highest possible scores for our products. That’s why we are going to reformulate 900 of our recipes by removing 142 additives”.

It is important to mention that the call for manufacturer feedback was public and open to any company that wanted to speak about Yuka’s impact on its products, and no manufacturer was paid to contribute a testimonial to the study, aligning with Yuka’s 100% independency.

With smartphones working as their constant partners as they navigate through the lanes of grocery stores, the Yuka app appears to be both an educational tool and a possible source of chaos. Let’s take a look at the pros and cons that a tool like that is able to offer. On one hand, the pros are found in: (1) transparency, giving consumers access to information on the nutrient content and overall health of food items, enabling them to make healthier purchases; (2) user friendliness, in fact users just need to scan a barcode to receive simple and easy to read information about the product in a very short timeframe; (3) health promotion, motivating users to choose healthier options and develop better eating habits but, at the same time, have an influence on the manufacturers that reformulate their products with a health conscious approach. On the other hand, the cons about Yuka are: (1) Nutriscore based evaluation, carrying all the cons that the Nutriscore brings, like the potential power to influence the consumer rather than simply being an informative instrument; (2) a limited database, not being able to include the

products that do not provide a barcode on their package, such as fresh ones; (3) potential eating disorders, in fact keeping track of whatever you buy can be a healthy habit and help in preventing obesity, but there is a risk to develop eating disorders.

Despite its large usage, the app presents a main limitation which is the fact that, when calculating the score with the method explained above, it does not consider the amount of each ingredient or additive, sticking only to if it is present or not, and this is one of the arguments that its critics mostly use when critiquing.

Although some people present skepticism towards this tool, this study aims to consider it due to its diffused presence and the large potential influence it can have on consumers and the demonstrated impact it is already making on the industry. The next chapter will deal about the experimental study.

CHAPTER 4: EXPERIMENTAL RESEARCH

4.1 RESEARCH INTRODUCTION AND GAP

The topic of packaging into the marketing literature, with specific reference to Front of Pack Nutrition Labels, has been and still is widely discussed and very valuable. Several are the papers, as we saw in the previous chapters, that analyze their influence on every aspect of the consumer purchasing step.

As discussed in chapter 3, digital integration into everyday life brings to a change in how consumers interact with products and brands, in every step of the purchasing funnel. Yuka app is the tool that integrates on the largest scale the influence that the ratio behind the Nutriscore is able to have on consumers and the technological integration.

As of now, no existing study puts the consumer in front of this tool to test its influence on his behavior. This study wants to test if these evaluations have an influence on three main dependent variables: purchase intention, attitude towards the product and willingness to pay. The choice of these variables was made because they can be considered among the most important ones related to purchasing behavior.

Since there is no study in the literature that considers Yuka interfaces as an independent variable when studying consumer purchasing behaviors, to find evidence in the literature about the relation of this IV with the DVs, Nutriscore evaluations have been considered.

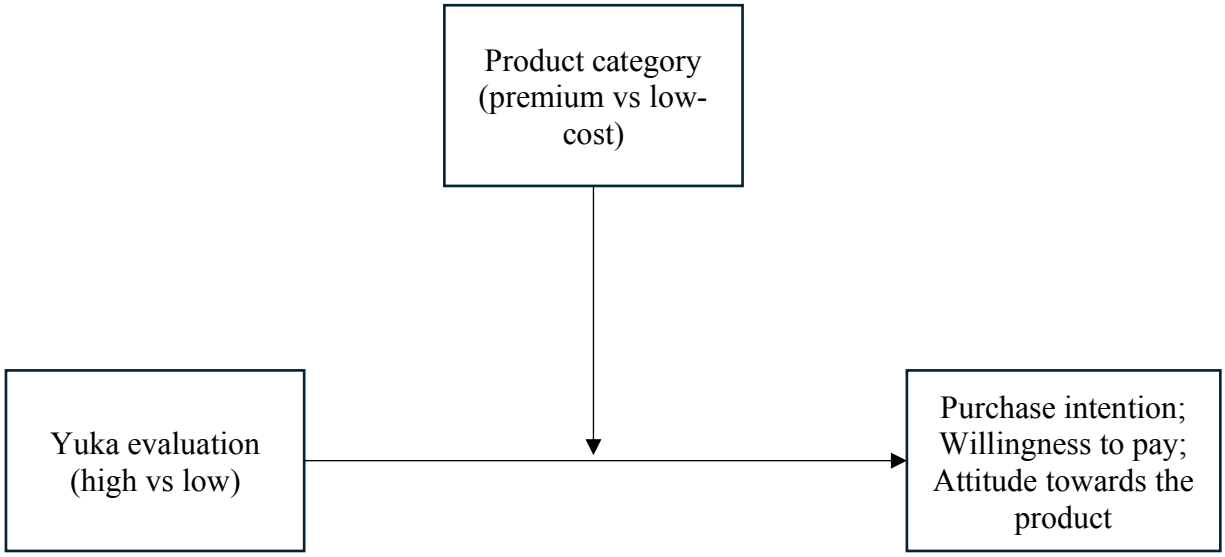
According to the present literature (De Temmerman et al. (2021); Berry et al. (2017)) in fact Nutriscore's presence and grading are both able to have a significant influence on purchasing decisions, and this is explained due to the mediating effect of perceived healthiness of the product. Evaluative tools located on the product, like the Nutriscore, however do not limit their influence just to the intention of the consumer, but they are able to make consumers be willing to pay higher prices, if the products receive green ratings (Jürkenbeck, K., 2023). Research has shown that Nutriscore significantly influences consumers' attitudes towards products. According to Hoteit et al. (2022), consumers tend to exhibit a more favorable attitude when Nutriscore is present.

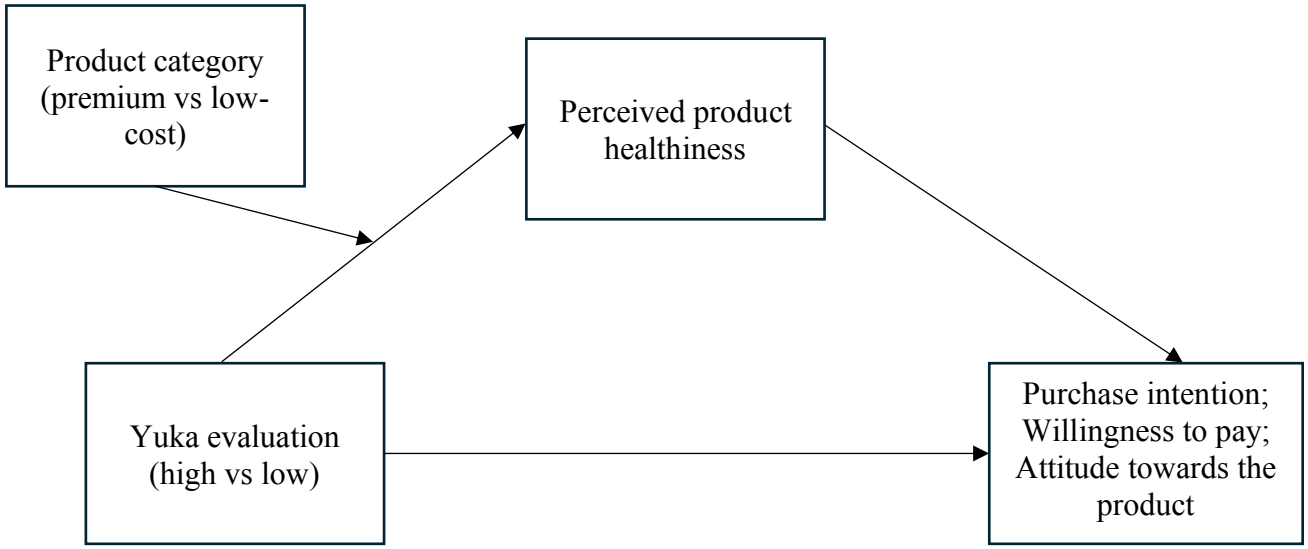
Building on these considerations, the aim of this study is to test whether Yuka app evaluations are able to influence consumer behavior and, more in particular, if there is a potential moderator for this effect. The moderator chosen to be tested in this case is the product category, a dichotomous variable that in this study can be "low-cost" or

"premium" for the stimuli, to observe if for different levels of "premiumness" the effect can be amplified or not. Moreover, the present study aims to conduct the study in the Italian market, where FOPNLs are a highly debated topic, and therefore to get access to rapid and understandable data consumers must rely on an independent mobile application like the one taken into consideration.
The definition of the gap and the aim of the study, gives us the possibility to define the research question for this experiment:

"Are Yuka evaluations able to influence purchasing behavior for food products? And is this influence moderated by the category to which the product belongs?
Finally, does perceived product healthiness help in explaining the relation between Yuka evaluations and purchasing behavior?"

This research question brings to the development of the following variables, and the related conceptual models, that will be repeated for each of the dependent variables:





IV: Yuka evaluation

DV1: Purchase intention

DV2: Willingness to pay

DV3: Attitude towards the product

M: Perceived product healthiness

W: Product category

This conceptualization comprehends several hypotheses due to the relation between the different variables.

H1: "Yuka evaluations and product category have an interaction to determine consumers' evaluations. Specifically, when the product belongs to a premium category, this effect is higher than when it belongs to a low-cost category".

H2: "Perceived product healthiness mediates the relationship between product category (premium vs. low-cost) and Yuka evaluation (high vs. low) on consumers' evaluations, bringing to a moderated mediation".

4.2 METHODOLOGICAL APPROACH

The present experimental study consists of several conclusive causal between-subjects 2x2 research designs. The results of the experiment are represented by responses to a questionnaire obtained through an independently administered survey conducted in Italy during the month of May 2024 using the online platform Qualtrics XM. Survey

participants were selected by adopting a non-probability sampling methodology. Specifically, it was decided to use a convenience method, thereby taking advantage of both the ease and speed of accessing and selecting elements of the target population. In fact, this technique involves no economic cost and is advantageous, both in terms of a high speed of data collection and a high response rate.

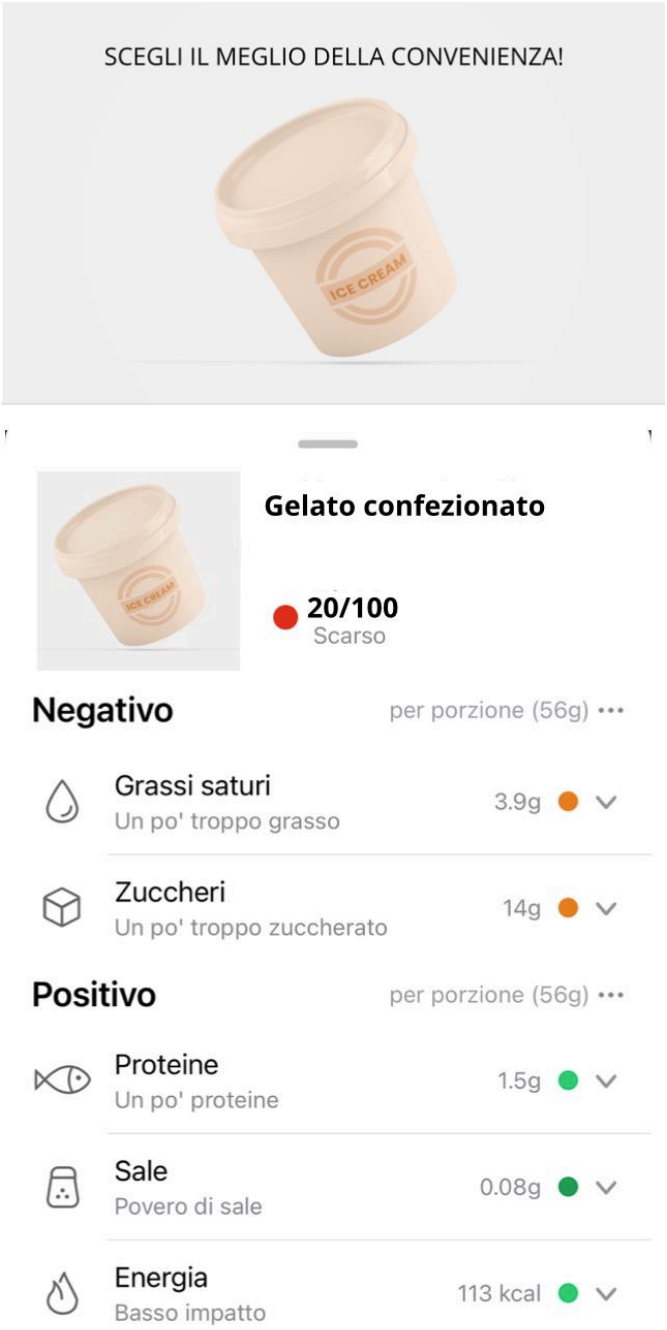
Considering the target sample, it was decided to include respondents of all demographic ages, collecting data from both female and male individuals, as demographic variables were not expected to influence the results of the experimental research in a statistically significant way.

The survey was distributed to 180 individuals, of whom 163 respondents fully participated in the experimental study, answering fully and completely all the questions within the questionnaire. The remaining 17 incomplete responses were first selected and later discarded from the data set, during the data cleaning procedure. Respondents were contacted through anonymous links generated by the Qualtrics XM online platform and sent through instant messaging applications and social media networks as main distribution channels (WhatsApp, Instagram, Facebook), but also face-to-face, providing the respondents with a tablet to answer the questions. The sample of the target population reached by the survey included mainly undergraduate and newly hired college students located in different cities in Italy. Therefore, following this assumption, the average age of the respondents was 24.99 years, although the age range ranged from a minimum of 19 years to a maximum of 59 years. Regarding the gender of the respondents, the prevailing gender of the sample was female, represented by 57.1 percent (93/163), while the male gender was characterized by 39.3 percent (64/163). The remaining 3.7% (6/163) of respondents preferred not to identify with a specific gender.

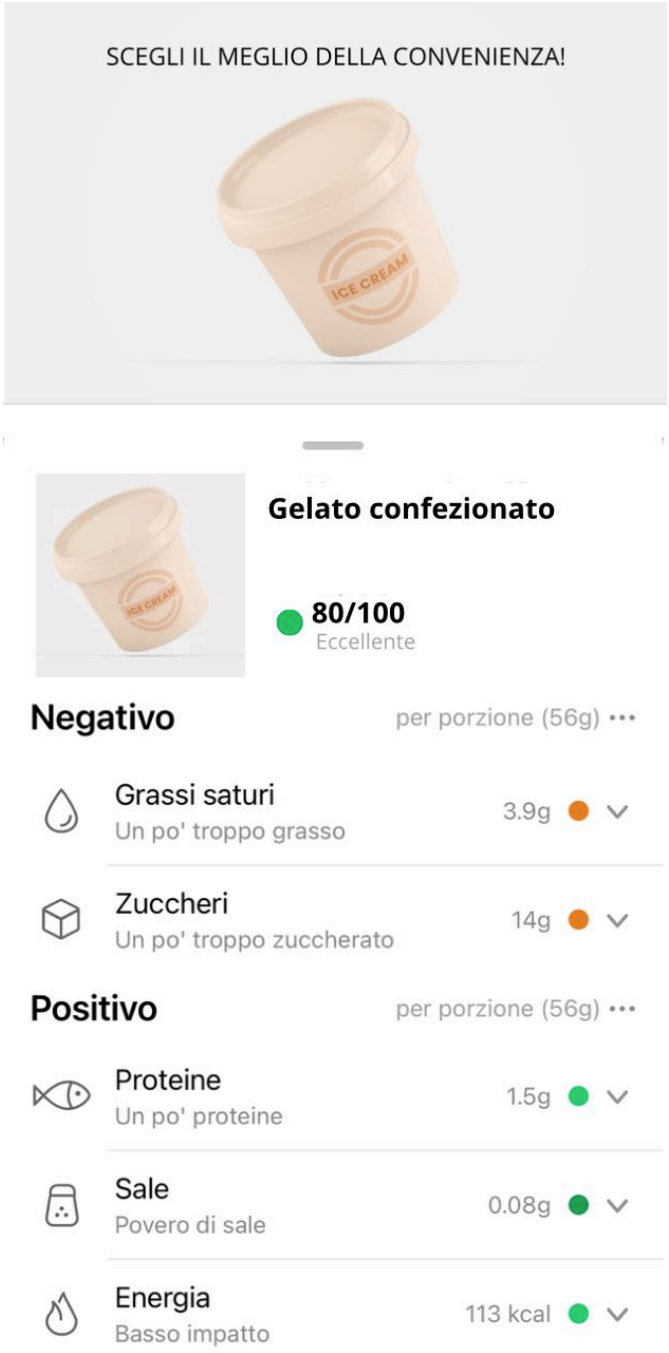
To conduct the experimental study, it was necessary to develop a questionnaire consisting of 28 questions, including 2 questions about demographic characteristics.

To manipulate the independent variable (Yuka Evaluation: high vs. low) and the moderator variable (Product Category: premium vs. low-cost), it was essential to make 4 visual stimuli, each one different from the other.

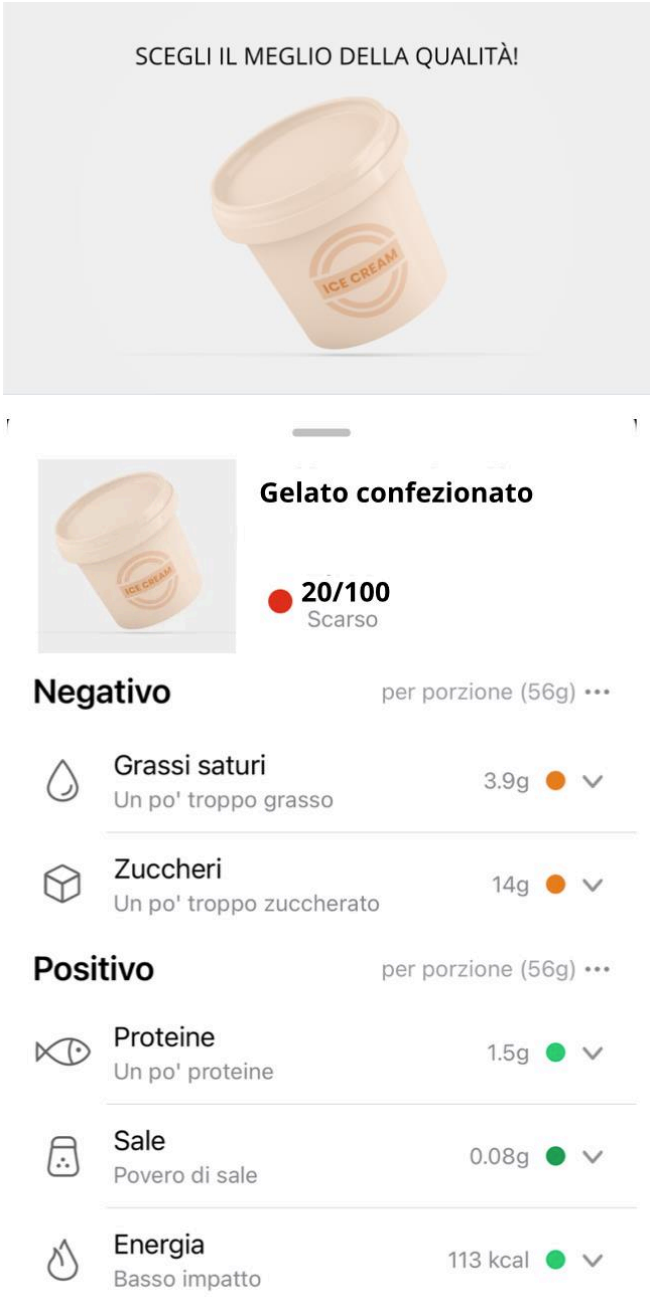
The first scenario consists of an image of a food product, a small jar of ice cream, characterized by discount store-level distribution (to be attributed to low-cost quality) and a Yuka evaluation of 20/100 (low). This condition has been labeled as (0;0).



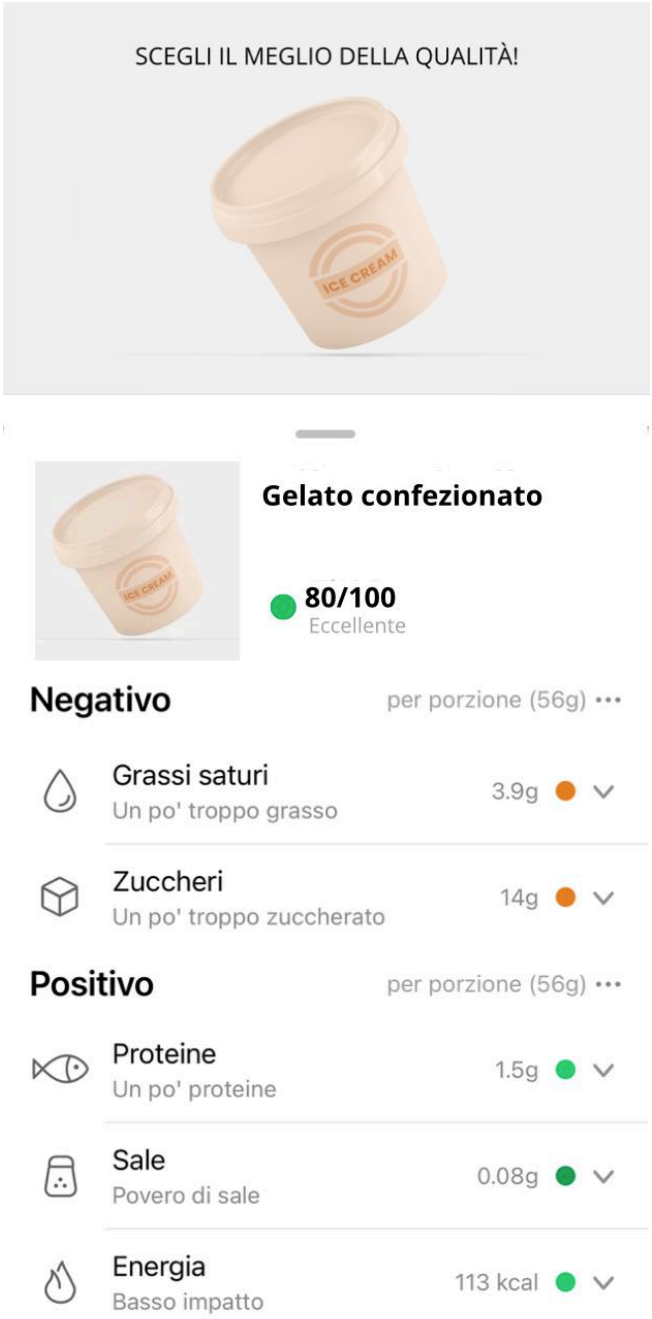
The second scenario consists of an image of a food product, a small jar of ice cream, characterized by discount store-level distribution (to be attributed to low-cost quality) and a Yuka evaluation of 80/100 (high). This condition has been labeled as (1;0).



The third scenario turns out to consist of an image of a food product, a small jar of ice cream, characterized by distribution at the premium supermarket level (to be attributed to premium quality) and a Yuka evaluation of 20/100 (low). This condition has been labeled as (0;1).



The fourth scenario results in an image of a food product, a small jar of ice cream, characterized by distribution at the premium supermarket level (to be attributed to premium quality) and a Yuka evaluation of 80/100 (high). This condition has been labeled as (1;1).



The stimuli are written in Italian language due to the target that the survey aimed to reach. The survey is divided into 4 main parts. A first part with a brief introduction was placed at the beginning of the questionnaire with an explanation of the academic purpose of the experimental research attached. Also, after including the university's credentials, complete and total compliance with privacy regulations regarding the anonymity policy about data collection and management was ensured.

The second part of the survey consists of four randomized blocks each composed of two separate scenarios. Specifically, the randomization process was essential within the

structure of the questionnaire so that a uniform number of exposures to all visual stimuli could be achieved. In addition, to avoid potential cognitive bias and possible conditioning related to brand sentiment, the first scenario in each of the 4 blocks is represented by 2 scenarios. The first features the mockup of a generic ice cream product without any brand recall, and a textual description to emphasize the moderation effect. The second scenario depicts Yuka's given evaluation of the product seen in the first scenario via an application mockup. All visual conditions were realized using the Canva tool.

The third part of the survey was introduced to respondents after they were subjected to one of four possible combinations of the scenarios. Specifically, this block of the questionnaire consists of 26 questions: the first 3 concerning the first dependent variable (Purchase Intention), 1 question concerning the second dependent variable (Willingness to Pay), and 3 more concerning the third dependent variable (Attitude Towards the Product); 1 question concerning the first mediating variable (Perceived Product Quality), 3 more concerning the second mediating variable (Perceived Product Sustainability), and 3 more concerning the third mediating variable (Perceived Product Healthiness); 5 concerning a first control variable (Health Consciousness), an additional 3 concerning the manipulation check of the moderator (Product Category) and the independent variable (Yuka Evaluation), 1 attention check to verify the validity of respondents' answers based on their level of concentration found during questionnaire completion, and the last 3 concerning consumers' buying habits. All questions that involved scales used likert scales based on 7 rating points.

The first scale, related to DV purchase intention, was derived from the scale prevalidated by Dodds, W. B., Monroe, K. B., & Grewal, D. (1991). Effects of price, brand, and store information on buyers' product evaluations. *Journal of marketing research*, *28*(3), 307-319.)

The second scale, related to DV willingness to pay, was made independently using only one item that included a text box.

The third scale, related to DV attitude towards the product, was derived from the scale prevalidated by Keaveney, S. M., Herrmann, A., Befurt, R., & Landwehr, J. R. (2012). The eyes have it: How a car's face influences consumer categorization and evaluation of product line extensions. *Psychology & Marketing*, *29*(1), 36-51.

The fourth scale, relating to MED perceived quality, was conducted independently using only one item.

The fifth scale, relating to MED perceived product healthiness, was derived from the scale prevalidated by Provencher, V., Polivy, J., & Herman, C. P. (2009). Perceived healthiness of food. If it's healthy, you can eat more!. *Appetite*, *52*(2), 340-344.

The sixth scale, relating to MED perceived sustainability, was derived from the scale prevalidated by Gershoff, A. D., & Frels, J. K. (2015). What makes it green? The role of centrality of green attributes in evaluations of the greenness of products. *Journal of Marketing*, *79*(1), 97-110.

The seventh scale, related to CV health consciousness, is derived from the scale prevalidated by Gould, Stephen J. (1988). "Consumer Attitudes Toward Health and Health Care: A Differential Perspective." *Journal of Consumer Affairs, 22,* 96-118.

All scales were readjusted according to the needs of the experimental research.

Finally, the fourth and final part of the questionnaire features the block devoted to demographic questions, in which respondents were asked to specify gender and age.

4.3 RESULTS OF THE EXPERIMENT

The data collected through the survey generated on Qualtrics XM were exported to SPSS statistical software for analysis.

To make sure all the scales involved were valid, a reliability test was conducted in order to verify the level of reliability of the scales considered. In particular, the Cronbach alpha value of all constructs was observed, making sure that it was above 60 percent.

Regarding the mediator variable, perceived product healthiness, a value of 0.947 was recorded. Moving on to the dependent variables, regarding the scale related to the first dependent variable, purchase intention, a value of 0.925 was found, while regarding the third dependent variable, attitude towards the product, a value of 0.920 emerged. Therefore, all scales turned out to be reliable.

After conducting reliability tests, the main hypotheses of the different conceptual models were examined so that their statistical significance, and thus, relative success, could be confirmed or rejected.

H1:

To test the statistical significance of the first hypothesis (H1), a moderation analysis has been conducted, through the Process Model 1 by Andrew Hayes for SPSS. The analysis has been repeated for each one of the dependent variables. The output of the analysis, which considers as a dependent variable Yuka Evaluation (high vs low), as an independent Purchase Intention and as a moderator Product Category (premium vs low-cost) is the following:

	coeff	se	t	p	LLCI	ULCI
constant	3,1368	,2042	15,3608	,0000	2,7334	3,5401
IV	1,6929	,2790	6,0677	,0000	1,1419	2,2439
MOD	-,2719	,2927	-,9290	,3543	-,8499	,3061
Int_1	,8073	,4006	2,0151	,0456	,0161	1,5986

Table 2: moderation on purchase intention output

The results show a significant interaction, confirming Product Category as a moderator between the IV and the first DV, and consequently accepting the H1 for Purchase Intention as a DV. In particular, the table for conditional effects of the focal predictor at values of the moderators is the following:

MOD	Effect	se	t	p	LLCI	ULCI
,0000	1,6929	,2790	6,0677	,0000	1,1419	2,2439
1,0000	2,5002	,2875	8,6954	,0000	1,9323	3,0681

Table 3: effects of the moderator on purchase intention

Specifically, for both the scenarios Yuka Evaluations have a direct effect on Purchase Intention, but for premium products the Effect size (2,5002) is higher than the one for low-cost products (1,6929), suggesting an intensity moderation, due to the sign concordance of the values.

The same analysis has been conducted for Willingness to pay as a dependent variable.

The output of the analysis, which considers as a dependent variable Yuka Evaluation (high vs low), as an independent Willingness to Pay and as a moderator Product Category (premium vs low-cost) is the following:

	coeff	se	t	p	LLCI	ULCI
constant	3,1590	,1882	16,7824	,0000	2,7872	3,5307
IV	1,1299	,2572	4,3936	,0000	,6220	1,6378
MOD	,1924	,2698	,7131	,4768	-,3404	,7252
Int_1	,8283	,3693	2,2428	,0263	,0989	1,5576

Table 4: moderation on willingness to pay output

The results show a significant interaction, confirming Product Category as a moderator between the IV and the second DV, and consequently accepting the H1 for Willingness to Pay as a DV. In particular, the table for conditional effects of the focal predictor at values of the moderators is the following:

MOD	Effect	se	t	p	LLCI	ULCI
,0000	1,1299	,2572	4,3936	,0000	,6220	1,6378
1,0000	1,9582	,2650	7,3882	,0000	1,4347	2,4816

Table 5: effects of the moderator on willingness to pay

Specifically, for both the scenarios Yuka Evaluations have a direct effect on Willingness to Pay, but for premium products the Effect size (1,9582) is higher than the one for low-cost products (1,1299), suggesting an intensity moderation, due to the sign concordance of the values.

The same analysis has been repeated for Attitude Towards the Product as a dependent variable, but no significant interaction was found (p-value = ,0535) suggesting that product category is not a moderator between Yuka Evaluation and Attitude Towards the Product. For this reason, H1 for Attitude Towards the Product as a dependent variable has been rejected.

The table for the conditional effects of the focal predictor at values of the moderator suggests, however, that there is a significant positive direct effect between the IV (Yuka Evaluation) and Attitude Towards the Product.

H2:

To test the significance of the second hypothesis (H2), a moderated mediation analysis was conducted through the application of model 7 of the SPSS extension, Process Macro version 4.2, to test the mediating effect caused by the mediator Perceived Product Healthiness against the relationship between the independent variable (Yuka Evaluation: high vs. low) and the dependent variable Purchase Intention. The results of the analysis gave the following output:

	coeff	se	t	p	LLCI	ULCI
constant	2,4444	,1944	12,5747	,0000	2,0605	2,8284
IV	2,2741	,2656	8,5623	,0000	1,7495	2,7986
MOD	-,0030	,2786	-,0108	,9914	-,5532	,5472
Int_1	,4273	,3814	1,1205	,2642	-,3259	1,1806

Table 6: moderated mediation output

The p-value of ,2642 suggests that the interaction is not significant, and therefore H2 is rejected. Although this value suggests that the interaction is not significant, the direction is coherent with the expectancies. The analysis has been repeated for each of the dependent variables, but it turned out to be not significant for all of them, showing that Perceived product healthiness does not mediate the relationship between Yuka evaluation (high vs. low) and product category (premium vs. low-cost) on consumers' evaluations.

4.4 CONCLUSION, LIMITATIONS AND FUTURE RESEARCH

This study has proved that Yuka evaluations significantly influence purchase intention, willingness to pay, and attitude towards the product. Specifically, the product category (premium vs low-cost) acts as a moderator in the relationship between Yuka evaluation (high vs low) and both purchase intention and willingness to pay. However, when testing a model of moderated mediation that included perceived product healthiness as a mediator between the independent variable (Yuka evaluation) and the dependent variables (purchase intention, willingness to pay, and attitude towards the product), no significant mediation effects were found.

The findings of this study contribute to the present body of literature on consumer behavior and digital health technologies in various ways. First, it contributes to our

understanding of how digital health applications like Yuka affect consumer decision-making processes. Through the identification of the moderating function of product category, this study offers insights into the circumstances in which Yuka evaluations have varying degrees of influence. This adds to the body of research on how consumer behavior is shaped by the relationship between external assessments and product features. The study also looks at the non-significant effect of perceived product healthiness as a mediator, indicating that Yuka ratings may have an impact on purchase-related outcomes due to other reasons.

These results provide useful information on how to incorporate Yuka assessments into marketing and product management strategies. Understanding that Yuka's impact differs by product category, businesses should adjust their marketing strategies appropriately. When it comes to premium items, showcasing positive Yuka ratings might successfully increase purchase intentions and support higher costs. On the other hand, resolving poor Yuka assessments for inexpensive items by open communication or product changes through R&D like some companies are already doing, can contribute to reducing the negative effects on consumer perceptions and willingness to pay. By using an integrated strategy, businesses may strategically position themselves based on consumer health app ratings, which might lead to an increase in customer trust and market dominance.

Regardless of its contributions, this study has some limitations. The findings' ability to be adopted extensively may be impacted by the sample's reduced size. Furthermore, the study used self-reported data, which is vulnerable to errors including memory bias and social desirability. Even after adjusting for a few variables, the experimental design might not fully represent the complexity of real-world purchase situations, when several variables simultaneously affect consumers' judgments. In addition, the moderated mediation model's lack of significance raises the possibility that there are additional, unresearched mediators that may be involved in the connection between Yuka ratings and customer behavior. For these reasons future research might overcome these limitations by applying real-world purchase data to verify the results and more representative and diverse sample sizes. Further investigation into mediators, including app trust or perceived product safety, can show a more complete knowledge of the mechanisms involved. Additionally, investigating temporal impacts may help understand how continuous exposure to Yuka ratings affects consumers' long-term brand loyalty and

behavior. To find out if the results demonstrated are constant across different consumer markets, more research might look at the influence of Yuka ratings in diverse cultural contexts.

In conclusion, this study reveals the significant impact that Yuka ratings have on consumer behavior, with product category acting as a crucial moderator. The results provide important theoretical and managerial insights, paving the way for improved and profitable marketing strategies in the age of digital health tools, even while perceived product healthiness did not mediate these associations.

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