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The influence of scanning mobile apps on consumer
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Athénaïs Völcker

Abstract

Due to rising concerns about overconsumption, consumers are more aware of the negative impact of their purchase habits on the environment and on their health and are concerned about the ingredient lists of their every-products. In this context, a new type of information channel has recently emerged: scanning mobile apps. The user scans the product and then an algorithm generates a grade, assessing the quality and the hazardousness of the ingredient declaration; if the product is "bad", the app suggests some "better" alternative to replace the other with. The enthusiasm for these apps seems to rather be towards the food industry, while not much is said about cosmetics.

Our research focuses on cosmetics and was based on a quantitative study. The credibility of the scanning apps comparing to other information channels is analyzed. Furthermore, the impact of the disclosure of a "bad grade" on a consumer's favorite cosmetic product was studied through two parallel paired t-tests (one for skin care, another for makeup). The results showed that the main advantage of scanning apps as a source of information is their availability and that for both scenarios, brand equity was significantly affected by a "bad grade" from a scanning app when the product is the favorite cosmetic product of the consume.

The results of our study invite managers to be attentive to the influence these scanning apps can have on consumers and thus on their business. They need to quickly adapt their strategy while anticipating other stakeholders' moves regarding product transparency.

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1. INTRODUCTION

French consumers are more and more aware of the impact of their consumption habits on their health and the environment. Besides, they are concerned about the composition of their everyday products, and they struggle to decipher products' labels on their own. Hence the creation and the enthusiasm for scanning mobile apps that rate products and recommend better alternatives so that the consumer makes healthier choices in supermarkets. In 2019, more than 60% of French respondents read the information put on the product packaging, while 17% relied on a new habit: taking one's phone to use a food application and scanning the product in order to get information (see **Exhibit 1:**).

For example, Yuka is a mobile app that scans both food and personal care products to helps consumers understand the ingredients and evaluate their impact on their health (see **Exhibit 2**). When the consumer scans the product barcode, Yuka generates a "score based on different criteria that classifies products according to their health performance and compares them to one another" (Soutjis, 2019). The success of Yuka among the press and consumers is undeniable in France and has now spread to other European countries. Since its launch in 2017, over 21 million people have downloaded the app (see **Exhibit** 3). More than 140,000 French users daily use Yuka's services (see **Exhibit 4**). In 2018, Yuka was the most famous mobile food application in France (see **Exhibit 5**) but it is not the only app that helps consumers decipher the list of ingredients: there are also "Y'a quoi dedans?" (What's in it?), Scan Eat, Scan Up (see **Exhibit 6**)…

Another example is Open Food Facts. It was first a large database that collected nutritional information from about 374,000 products in 2018 (Delvallée, 2018), and then an Open Food Facts *app* was developed to generate the « Nutri-score» of the food product (i.e., the non-compulsory nutrition label selected by the French government in 2017 to be put on food packaging). It is a collaborative and independent project where every person who creates and fills a product information sheet does it for free.

When it comes to cosmetics (i.e., any products you apply to your body that are not drugs), there are also INCI Beauty, Cosmeticon, CosmEthics, Open Beauty Facts, Mireille app, and many other new apps to help consumers make the "right" (or, at least, the best available) choice. According to moijeune.fr, 25% of the respondents trusted Yuka's advice before buying a cosmetic product (see **Exhibit**

7). These apps usually warn consumers about the use of chemicals that can be endocrine disruptive, carcinogenic, allergenic, or irritant; they denounce greenwashing and make recommendations. For the purpose of the paper, we are going to focus on that type of apps that facilitates product comparison and increases information about cosmetics composition.

Generally speaking, these apps question the market and challenge companies to improve their products' ingredients list in order to « pass the bar code scan exam ». Today, no innovation in the French retail industry is launched without being scanned by one of these mobile applications. It also became a selling argument for some brands (see **Exhibit 8**). Besides, regarding the consumer, the success of these apps is said to entail a positive and healthier change in users' habits. Among the 230,000 users who responded to a study about the impact of Yuka in 2019, 83% of them said they bought fewer products, but of higher quality and 92% claimed they put back a product when they were rated "red" on the application (*Mesure d'impact - Comment Yuka Contribue à Changer Les Choses ?*, 2019).

It is important to note that all the ingredients present in cosmetic products are authorized by the regulations and validated by the European Scientific Committee on Consumer Safety (SCCS). Furthermore, some quality labels aim at guiding the customer to make sound and "green" choice but their influence on consumption does not seem to be that effective (Horne, 2009; Manzini et al., 2006; Pedersen & Neergaard, 2006). Yet, the concerns regarding controversial ingredients listed in the INCI (International Nomenclature Cosmetics Ingredients) of many cosmetics (Bilal et al., 2020; Bridges, 2002) and the need for transparency for the consumer (Shamburger, 2021) have been raised for years as well. Al-Haddad et al. (2020) underline the rising awareness towards a healthy life and green products that leads to "an exponential growth in consumers' consciousness of the risk of using synthetic chemicals." Consumers expect healthier cosmetics that would be environmentally friendly and gentle to the skin (Lin et al., 2018). According to IRI, in 2018, 31% of French were concerned about the quality and the composition of cosmetics, in 2019, they were 54 % (Belloir, 2020). And according to Statista Global Consumer Survey, 32% of French respondents judge the ingredients to choose their body care or cosmetics (see **Exhibit 9**).

Furthermore, even though the transformation of the cosmetics sector started later than the mutation of the food industry, according to IRI, it is faster. « IRI tried

to assess the importance of this transition by grouping organic products, aluminum-free deodorants, natural toothpaste, natural hair coloring, solid cosmetics, concentrated soap… » which represented 10.6 % of the sales revenue of the French cosmetics industry, compared to the less than 9% sales revenue of the food industry. (Belloir, 2020) (Own translation).

Therefore, if we draw a parallel with the food industry, studying the impact of these scanning mobile apps on cosmetics consumption would be a relevant addition to the literature. As the enthusiasm for these solutions on the French market is booming but is quite new, the literature is still limited in many aspects and constantly needs to be updated. Furthermore, most of the studies about this topic are not necessarily about one sector, however, without intending to do so and being quite vague about the products they deal with, they usually focus on the food industry and very little research investigates their impact on the consumption of cosmetics. The literature seems to focus rather on the problems of controversial chemicals substances in cosmetics (Bilal et al., 2020; Bridges, 2002; Chaubey et al., 2016; Ljubisic, 2004; Low, 2001; Lunny et al., 2017; Steinemann et al., 2011; Terhaer et al., 2010; Yazar et al., 2014) and not on the potential solution these apps provide by alerting the consumer as if their success was mainly about the change in consumers <u>food</u> habits and did not necessarily spill over other products that consumers buy in a retail store. The idea would be to assess whether the « power » of these apps is as strong for cosmetics as it is for food in France. In other words, one of the objectives of this paper would be to understand if the consumer takes into account the recommendations of the apps and makes better choices of <u>cosmetics</u> consumption in the end.

Therefore, in this research, we will investigate:
The influence of scanning mobile apps on consumer behavior regarding cosmetic products sold in retail stores in France.

Cosmetics include many types of products (shampoo and conditioner, hand soap, deodorant, lotions, makeup are all cosmetics), that are sold in different distribution channels depending on the geographic area. In order to be precise in our research, we chose to focus the problem on products sold in retail stores in the French market which excludes any cosmetic sold in pharmacies and drugstores, beauty franchise (e.g. Yves Rocher), or perfumeries but allows the research to focus

on the major distribution canal of beauty-hygiene products that is hypermarkets and supermarkets.

In addition, the choice of France is relevant as it is the first country where the Yuka app was launched and where the trend of this type of mobile apps started. In addition, the case of France is interesting as it is the second biggest market for cosmetics and personal care in Europe (see **Exhibit 10**).

2. LITERATURE REVIEW

2.1. The impact of mobile phones and apps on consumption

Urban and Sultan (2015) worked on the topic of « benevolent » mobile apps in the context of the digitalization of our society. They claim that « in recent times, perhaps no other consumer electronic device has impacted consumers as much as mobile phones. Mobile devices are everywhere. » (Urban & Sultan, 2015). More and more people have mobile phones or smartphones, and the trend is not expected to stop. The booming of smartphones led to the growing use of mobile apps. « The all-time cumulative total number of mobile app downloads stood at 37 billion at the end of 2011 » (Urban & Sultan, 2015). This phenomenon had a huge impact on the way we consume and on how companies interact with us as consumers. All the information we can find on the Internet is at our fingertips and companies have never been so close to their customers (Pitton, 2019).

However, instead of focusing their study on what they called « push » apps which « are designed to generate sales and promote special deals to customers », they worked on « benevolent » apps which « offer services that aren't directly tied to sales but are designed to help customers solve problems or make decisions. » (Urban & Sultan, 2015). The idea of these apps is to build trust between consumers and them and explicitly put consumers' needs before a company's own profits, and eventually increase consumers' preference for the company.

Firms need to build customer trust so that they form a long-term customer relationship, especially now that customers rely on the Internet for information and purchases (Bart et al., 2005). In their research, Urban and Sultan (2015) explained that consumer trust is built on the competence of the provider, the confidence she/he has in the company, and its benevolence.

Even though the scanning mobile apps we study are not part of a company that would provide an additional free service for consumers to build trust, the idea that apps can provide crucial information to consumers in order to make decisions in the framework of a trusted consumer relationship is relevant for the paper.

Indeed, many of these apps are free and live on donations. They are independent and rely on users' contributions to feed their database.

At first, Yuka used the Open Food Facts database, but it has now its own database so that it could "implement advanced systems for monitoring and verifying

each addition" (*How Was the Database Created ?*, 2019). Users or brands can notify Yuka that a product has changed and that its information needs to be updated (*How Is Product Information Updated ?*, 2019). The funding of Yuka is based on the paid version of their apps and the sales of their "Healthy eating guide" and their calendar of seasonal fruits and vegetables (*Independence of Yuka*, n.d.).

Similarly, INCI Beauty is an independent project that lives on donations of users and the revenues of their premium version of the app (*INCI Beauty - Analysez La Composition de Vos Cosmétiques*, n.d.).

These scanning mobile apps provide useful and clear information about the products' composition for consumers who would usually find it hard to apprehend it on their own; they constantly remind consumers the fact that they are independent and have no business interest with any firms; these apps are usually free. As no previous research has specifically worked on this topic, one of the objectives of this paper is to test whether consumers easily trust these scanning mobile apps and consider their analysis of the scanned products and the possible better alternatives they can advise.

2.2. Concerns about the composition of everyday products

2.2.1. Consumerist press alert consumers on their consumption

Even though the regulation regarding the ingredient list of retail products is very strict, especially in the European market, some operators carefully analyze products' composition and denounce companies that put consumers' health at risk. Indeed, consumerist magazines' (e.g., *60 Millions de Consommateurs*, *LSA*) purpose is to analyze the market, test products, and help consumers make their purchase consequently, independently from the mediation of market players. Performance testing conducted by this type of magazine does not necessarily end with the selection of the optimal product, but it is rather a:

> tension, between two ways of accomplishing rational choice from the consumerist standpoint: as a) the discovery of the best product or service ('given a series of criteria, there is an intrinsically best good that wins'), or as b) the identification of the plurality of possible answers to the consumers' needs and desires. The magazine articles therefore often propose contrasting approaches to the issue of choice. (Mallard, 2007)

Similarly, when grading a product, if it is considered poor quality in terms of ingredients, the app will provide a list of possible alternatives that would fit the

need of the consumer. For example, the alternative algorithm of INIC Beauty will suggest a product of the same category (e.g. switching a « bad » shower gel for men with a "better" shower gel for men), if possible in the same price range (e.g. suggesting a product that can be bought in the same store in a similar range) and with similar ingredients (e.g. replacing a « bad » vanilla and shea butter moisturizer with a face cream with the same major ingredients that ranks higher) (*Les algorithmes - INCI Beauty*, n.d.).

Obviously, compared to consumerist press, the advantage of the scanning mobile app is that you can test it directly on the products you planned to purchase when you are in the retail store.

However, the recommendations these magazines make are not only based on health issues, but they also test the quality and the efficacy of the product, they take into account the manufacturing and they usually focus on the quality-price ratio, whereas scanning mobile apps base their evaluations of the product on the ingredient list.

In a paper specifically about the Yuka app (and again, with no clear description of the industry area it is focused on), Soutjis (2019) argues that the relationship between the consumer and the market established by Yuka is less distant than the one established by traditional consumerist mediators, such as consumerist magazines. Compared to them, the main objective of the Yuka "start-up is not to develop a space where the market can be made visible and collectively debatable, but to create a small window where an individualized consumer can qualify the implications of her personal consumption choices" (Soutjis, 2019).

2.2.2. *The mixed results of eco-labels*

Morris (1997) defines a product certification symbol as "a mark which producers of certain goods may incorporate into their product label if they have been authorised to do so by the owner of the mark". The idea is to inform the consumer that the product has been certified by the specified organization for the specified purpose. In its analysis, Parkinson (1975) finds that seals and certifications significantly impact consumer decision-making and that respondents ranked "seals of approval" highest, above "friends", "salespersons", and "advertisements", for their "expertise" and "impartiality" and second-highest, behind "friends", on "trustworthiness".

Due to the rising concern about global warming, the consumer demand for clearer information on labeling to help them tell the difference between a sustainable product and a less sustainable alternative has encouraged firms to use "eco-labels". Eco-labeling is a way to promote "the cooperation of consumers, producers, retailers and state aimed at user and environment-friendly products" (Klaschka et al., 2007). By choosing eco-labeled products, customers can redefine the retail scenario and encourage firms to invest and produce goods with high environmental standards (Walley & Whitehead, 1994). Some of the arguments to support the use of eco-labels is that it can raise awareness towards consumers regarding environmental issues, and in the end, contribute to the protection of the environment; besides, as consumers do not spend a lot learning about the environmental footprint of every product they buy, an eco-label is supposed to give clear and recognizable information about the environmental impact of products (Morris, 1997).

After the United Nation conference for environment and development in Rio de Janeiro in 1992, the International Organization for Standardization (ISO) proposed eco-labels ISO 14024 which was "a voluntary, multiple-criteria-based third party activity which implies that independent private or national organisations develop transparent criteria and organize the award of the eco-label" (Klaschka et al., 2007). An eco-labeled product is the optimal alternative in terms of environmental impact in its product category. An eco-label is awarded independently from the firm and its criteria are public. Thus, it is supposed to encourage firms to improve their products and innovate in order to make environmental efforts (Klaschka et al., 2007), furthermore, it gives firms a competitive advantage (Porter & van der Linde, 1995). Governments are also urged to raise environmental standards (Gallastegui, 2002).

However, many authors question the influence of these eco-labels. They praise the intention, but they point out that it does not necessarily result in a concrete change in consumption.

First, the concept of "green" consumer tends to be presented as a simplified consumer stereotype while it is much more complex than expected (Gallastegui, 2002; Horne, 2009; Pedersen & Neergaard, 2006). "Green" consumers' positive attitudes towards green products are usually overestimated (Olson, 2013). In general and not only regarding eco-labels, "green" consumers do not have a

consistent shopping behavior: they may be aware and willing to buy eco-friendly products, but they also take into account other factors (e.g., price, habit, quality) that prevent them from following through with their ideas (Horne, 2009; Pedersen & Neergaard, 2006).

Hemmelskamp and Brockmann (1997) detail some personal and exogenous factors that can be detrimental to the relationship between environmental consciousness and consumer behavior.

- The first factor is *consumer satisfaction* as the needs and desires of the consumer may not be compatible with her/his environmental consciousness.

- On the one hand, the harmony between one's social *values* and green consciousness in a situation where one can earn prestige or recognition can lead to a consistent green behavior, but on the other hand, social values can also generate poor actions regarding the environment on the part of the consumer.

- *Identification* is another exogenous determinant of green purchasing behavior. Hemmelskamp & Brockmann (1997) explain that "the greater the extent to which environment-related product features are perceivable personally, the more likely environmentally conscious consumer behavior becomes". They underline that, during the life cycle of a product, a direct green reference to the production or the disposal stage result in a weak effect on consumer behavior.

- If green product characteristics have a low *personal utilitarian value*, the consumer might not be that inclined to make financial trade-offs.

- If the consumer strongly believes that her/his behavior can have an *effective* and positive impact on the environment, she/he will be more likely to act in keeping with her/his green principles.

- As many authors point out, *cost* is an important factor in the willingness to adopt a green product, due to the fact that there might be some additional costs related to the green characteristics of a product compared to a regular one. The consumer must then judge whether it is worth it. Hemmelskamp and Brockmann (1997) precise that price is not the only cost to consider: "transaction costs for information on environmentally compatible products, their

procurement, utilization and disposal are also involved in the assessment".

- *Availability* is the last factor to influence the relationship between environmental consciousness and consumer purchasing behavior. The more available eco-friendly products are in common retailers, the easier it gets for consumers to be consistent in their purchasing.

Second, eco-labeled products tend to blend into a large number of products and information that are tricky to apprehend for the consumer (Horne, 2009), especially since consumers' knowledge regarding eco-label is actually quite limited (Pedersen & Neergaard, 2006). Instead of enabling consumers to make environmentally sound purchases in little time, eco-labels can appear as an additional piece of information that is not easy to comprehend. For Parkinson (1975), there is a misinterpretation on the part of consumers regarding those types of certifications: he comes to the conclusion that consumers usually recognize the symbol of the label but do not know the true meaning of it.

Furthermore, the credibility of eco-labels is challenged. Gallastegui (2002) lists different weaknesses of labeling systems, including the lack of objectivity in the choice of the criteria. Similarly, Rubik and Frankl (2005) state that "whereas criteria that are too strict may act as a barrier to adoption, so that the scheme will lack the visibility needed for marketing, criteria that are easy to meet might create mistrust among consumers and thus discredit the scheme ». For them, credibility and trust are crucial for an eco-label to serve its purpose, hence the importance of the independent position of the organization that delivers the label. In addition, Hemmelskamp and Brockmann (1997) point out the growing number of self-declared labels that are not state-controlled and that choose their own criteria, that harm the credibility of all eco-labels. Moreover, greenwashing can affect the credibility of eco-labels and prevent well-intentioned brands to promote environmentally friendly products (Pedersen & Neergaard, 2006).

Nevertheless, despite the fact that the concrete initiative of eco-labels does not seem up to the expectations, eco-labels still present some potential, if well executed (Manzini et al., 2006).

In a similar vein, scanning apps were created to help consumers spot the best product alternative in terms of green criteria within the large shelves of the store. They both had been born out of a growing awareness from consumers

regarding the impact of their consumption on their health and the environment. Eco-labels and scanning apps seem to share the same purpose (even though scanning apps put an emphasis on the health aspect of the product), but we can also assume that they share the same limits: "green" consumers may or may not follow the mobile applications' indications for some reasons, their criteria might be questioned… Another objective of this paper is to understand whether scanning apps can succeed where eco-labels have failed and if they represent a trustworthy and relevant source of information in the eyes of the consumer. In the literature, many authors worked on the difficulty for consumers to make healthy choices and to read labels, yet there is very little research that tried to understand how technology might help consumers use this information and how these apps might influence the consumer journey and his final choice (Pitton, 2019).

Thus, one of our research questions is about the credibility of these scanning apps, in comparison with other information channels such as consumerist magazines and eco-labels:

Compared to other information channels, are scanning apps a reliable source of information regarding cosmetics ingredient declaration?

2.2.3. Scanning mobile apps shake the industry

Greenwashing can be defined as "the intersection of two firm behaviors: poor environmental performance and positive communication about environmental performance." (Delmas & Burbano, 2011).

One of the purposes of Yuka is to unmask greenwashing practices and denounce « the undeserved 'health' discourses and the behind-the-scenes compromises proposed by manufacturers. » (Soutjis, 2019). As Soutjis (2019) states in his article, this type of apps can be considered as « counter-labeling devices » by giving an independent point of view of the INCI of manufacturers. Besides, it can be seen as well as a « counter-merchandizing device » (Soutjis, 2019). Indeed, products are not only offered on the shelves, strategically displayed by the retailers and the brands, they are also presented among the list alternatives suggested by Yuka.

Herman (2013) assesses the importance of information and communication in the long-term for companies, as digitalization transformed the cosmetic industry. Consumers have very easy access to information, which, on the one hand, « allows

a flow of promotional material and allows user interaction and feedback », but on the other hand, « provides an unfiltered forum for critics of the industry » (Herman, 2013). For example, on the INCI Beauty app, users can chat, share their experiences and opinions with other members of the community. The free flow of information regarding brands and products can be double-edged but is more likely to be an opportunity for the firm if it decides to follow the transformation of the market.

2.2.4. The difficulty to apprehend the INCI

In addition, in the literature, many pieces of research are about some ingredients that are authorized by the health authorities to be used in cosmetics but that are under debate such as silicones, paraben, aluminum (Bilal et al., 2020), fragrance (Bridges, 2002; Lunny et al., 2017; Steinemann et al., 2011). In their research on safety concerns about the purchase of cosmetics, Chaubey et al. (2016) underline the risks of some cosmetic products:

> Cosmetics can pose various short-term hazards, such as flammability (hairspray, deodorant, nail polish remover) or skin irritation (e.g. hair colors). Products contain a wide variety of ingredients, including many different dyes and fragrances. Some ingredients can cause allergic reactions or sensitivity in certain individuals. Others may cause cancer or other serious illness. (Chaubey et al., 2016).

According to them, the main protection for the consumer is to carefully read the label which contains the list of ingredients, that is the ingredient declaration. A descending order of predominance is used to write the list on the label: the most prominent ingredients are listed first but the precise concentration of the ingredients is not written.

However, « companies can hide specific ingredients from the list in two ways: identify them as a fragrance or flavoring […] or claim that their identity is a trade secret. » (Chaubey et al., 2016). Thus, some ingredients are listed under umbrella names and the consumer will never know what they include: "the bottom line is that you never know the exact composition of a cosmetic product or OTC drug– cosmetic product" (Baki & Alexander, 2015).

Furthermore, as previously pointed out, the INCI of a product can be tricky to understand.

First, it is a mixture of conventional scientific names, the chemical substances are written in English and the natural ingredients are written in Latin. The INCI names are "standard names used to indicate cosmetic ingredients on cosmetic product labels in a number of countries, including US, China, Japan and many countries in Europe" (Baki & Alexander, 2015). These are often different from the chemical names of ingredients.

Second, the consumer may not have the knowledge to recognize what the ingredient means and what is its impact on her/his health. That is why scanning mobile apps such as Yuka or INCI beauty decipher product composition in order to help consumers make well-reasoned decisions regarding cosmetics.

However, each app has its own algorithm in order to evaluate and recommend alternatives which can lead to very different results in some cases.

For example, for the Yuka app, each ingredient is assigned a risk level according to its potential/adverse health effects based on the latest scientific research. The score is based on the level of the highest-risk ingredient present in the product and the rest of the ingredients will determine precisely the score of the product (*Yuka - About Us - How Are Cosmetic Products Evaluated?*, n.d.).

INCI Beauty takes into account the presence and the level of dangerousness of a controversial ingredient, as well as the category of the product (e.g., shampoo), its texture (e.g., a spray can cause the inhalation of some volatile substances), the targeted consumers (e.g., children or pregnant women), the use of labels and certifications (e.g., an ECOCERT/COSMOS certification can guarantee the use of essential oils and not synthetic perfumes). Then, they apply the "progressive penalty", which is a way of progressively penalizing products without being too categorical and with a certain perspective, depending on other ingredients in the list. The grade is a mix of bonus/malus based on these elements (*Les algorithmes - INCI Beauty*, n.d.).

2.2.5. *Cosmetics: an industry in transition*

As they faced backlash about the composition of their products, cosmetic brands are improving their formulas to adapt to new consumer trends (Lee & Chen, 2019). However, in 2019, the beauty and hygiene sector continued to decline in both value and volume in French supermarkets and hypermarkets. Furthermore,

Covid-19 is strongly affecting the beauty market in France and around the world and is likely to penalize it significantly in 2020 (Belloir, 2020) (Own translation).

2.3. Scanning the product and consumer behavior

2.3.1. Concept of the customer journey

When using a scanning app, the consumer is at the end of the prepurchase phase, right before the crucial moment where she/he makes the final decision and purchases the selected product. Thus, it is important to dive into the concept of the customer journey in order to correctly "place" the moment where the app is used.

Lemon and Verhoef (2016) conceptualize customer experience through an iterative and dynamic customer's process, that is the customer journey, over time (see **Exhibit 11**). The customer journey can be divided into three steps: "prepurchase, purchase and postpurchase" (Lemon & Verhoef, 2016).

The prepurchase phase includes customer behaviors such as "need recognition, search, and consideration" (Lemon & Verhoef, 2016). In concrete terms, the consumer recognizes a need that can be solved thanks to the purchase of a product (or service). She/he searches for information about different brands in order to consider the possibilities that are available to her/him.

Then, there is the second phase, the purchase, which "covers all customer interactions with the brand and its environment during the purchase event itself"; it involves the choice, the ordering, and the payment of the product (Lemon & Verhoef, 2016). Finally, there is the postpurchase phase that covers "customer interactions with the brand and its environment following the actual purchase"; it involves the usage and consumption, the postpurchase engagement, and the service requests (Lemon & Verhoef, 2016).

Furthermore, Lemon and Verhoef (2016) identify four types of "customer experience touch points [along the customer journey]: brand-owned, partner-owned, customer-owned, and social/external/independent". These different touch points can "have direct and more indirect effects on purchase and other customer behaviors" (Lemon & Verhoef, 2016). The scanning apps belong to the last category: they are "third-party information sources" that can influence customers throughout the prepurchase phase of the customer journey.

2.3.2. Noncompulsive consumer behavior

Horváth and Birgelen (2015) worked on the influence brands can have on the behavior and purchase decisions of compulsive buyers and noncompulsive buyers. Within the larger framework of compulsive consumption, compulsive buying is a "chronic, repetitive purchasing that becomes a primary response to negative events or feelings"(O'Guinn & Faber, 1989). The results of Horváth and Birgelen (2015) provide us interesting insights about noncompulsive buyers, the category to which the users of scanning app more likely belong.

First, noncompulsive buyers are more interested in the "functional benefits (e.g. quality, workmanship, durability)" of branded products, compared to compulsive buyers who are more attached to the symbolic and the emotions that emanate from such products (Horváth & Birgelen, 2015). Functional benefits are defined as "the more intrinsic advantages of product or service consumption and usually correspond to the product-related attributes" whereas "symbolic benefits are the more extrinsic advantages" of the product (Keller, 1993). In the brand resonance model of Keller and Swaminathan (2020), the meaning of the brand is more about the "performance" and for noncompulsive buyers while it is about the "imagery" for compulsive buyers (see **Exhibit 12** and **Exhibit 13**).

Second, noncompulsive buyers are more attached to their favorite brands and tend to have a higher degree of brand trust than compulsive ones. The results also show that "compulsive buyers appeared to switch a lot among brands due to their variety-seeking nature" which prevents them from developing trust in brands (Horváth & Birgelen, 2015). Thus, we can assume that users of scanning apps whose favorite product obtains a good grade will be comforted in their choice of brand and their brand trust will be reinforced. However, finding out that their favorite product is "bad" according to a scanning app may not be a sufficient argument for them to adopt an alternative product.

2.4. The explicit success of scanning mobile apps regarding food

2.4.1. Scanning apps and the food industry in the press and the literature

Soutjis (2019, p.115) states that « as a mobile app, Yuka is part of the current trend of digitalization of consumption », based on Hagberg et al. (2016) and Cochoy et al.'s (2020) work. The consumer journey has evolved, and new technologies have impacted it. Consumers are hyper-connected and can easily search for information about products. Scanning mobile apps are at the center of these trends and are said

to revolutionize the industry by pushing big companies to improve their offer and provide healthier alternatives in order to stay competitive in the market. The number of users has kept increasing since 2017 with the launch of the most popular French scanning mobile app, Yuka, which first targeted the food industry.

When it comes to the impact of such apps on consumers and industrials, the press and the literature mainly focus on the food sector, even though 45% of users scan food as well as cosmetics, if we take the example of Yuka (*Mesure d'impact - Comment Yuka Contribue à Changer Les Choses ?*, 2019).

In their respective research, Pitton (2019) and Soutjis (2019) do not explicitly state that the scope of their research on Yuka is only limited to the food industry, but their main arguments are implicitly about food.

The French newspaper *Le Monde* ran « Nutri-Score and Yuka shake the food industry » (Girard, 2019) (Own translation) as a headline. But the success of Yuka goes beyond borders as the app is now available in several European countries, the United Kingdom, and North America (*App Alerts Shoppers to Unhealthy Products in Real-Time*, 2020). Forbes presents Yuka as the app that « Deciphers Food Labels So You Can See Just How Healthy They Are To Eat » (Sherriff, 2019). A Euronews article announced that « French supermarket chain Intermarché had said it will remove 140 food additives by the end of 2020, changing 900 food recipes in the process. » using Yuka (Chadwick, 2019).

Regarding food products transparency, Volpi and Roper (2020) could not fail to mention apps such as Open Food Facts, Yuka, and « Y'a quoi dedans? » (What's in it?).

2.4.2. *The complexity of consumer attitudes towards cosmetics*

What about cosmetics? Current literature provides scant insights on the relationships between the market of cosmetics and these scanning apps. The main objective of this paper is to fill this gap by asking consumers about their regular shopping habits when it comes to cosmetics and whether they use these apps and, if they do or at least are interested in using it, follow their recommendations.

Some difficulties that consumers can have in changing habits regarding cosmetics can be mentioned.

The real influence of these apps regarding cosmetics might face some hardships such as brand loyalty. First, as they aim to "improve" consumer habits,

achieving this goal might be difficult considering "green" consumers are not that consistent in their shopping habits (Horne, 2009; Pedersen & Neergaard, 2006) and that they might not be willing to adopt an alternative product. Second, within the cosmetic products, the impact of these recommendations on consumers' purchase decisions might be different depending on which type of product is scanned. Professor Tsuneyuki Abe (2017) worked on the "Psychology of Cosmetic Behavior" and designated skin care as a "*caring* cosmetic behavior to fill the role of a facilitator for the health of the body surface" while makeup (and fragrance) was described as an "*adorning* cosmetic behavior for self-presentation by adjusting appearance" in our daily life. We have special relationships with those cosmetics. Abe (2017) explains that both of them are closely linked to self-esteem and private self-consciousness, however, skin care has a relation to private self-consciousness whereas makeup is more related to public self-consciousness and social viewpoints. Indeed, skin care has a "*healing* [effect] to bring comfortable relaxation" whereas makeup acts the role of "*encouragement*, contributing to facilitation of a pro-social attitude" (Abe, 2017). The findings of Abe (2017) are illustrated in **Exhibit 14** and **Exhibit 15**. Giving the effect that the use of a cosmetic can have on us, being instructed by an app to switch from one's favorite cosmetic to an alternative product might not be well received by the consumer. Furthermore, considering our different connections to those products, the potential influence of those scanning apps might be different whether you scan a face cream (skin care) or a blush (makeup), for example. In regard to our research, testing the likelihood that consumers will follow recommendations depending on the type of cosmetics (skin care vs makeup) is relevant.

Thus, two other research propositions will guide the reflection:

- For two types of cosmetics, does a "bad grade" on a scanning app is enough for the consumer to give the "better" product a higher Consumer-based brand equity that encourages him to abandon his favorite cosmetic?

- And more precisely, does the willingness of the consumer to abandons his favorite cosmetics for a "better rated" one depends on the type of cosmetics he scans?

2.4.3. Scanning app and the concept of Brand equity

Brand equity is an important concept in the marketing literature and a strategic topic for marketers. It is relevant to analyze the impact of such scanning apps on the brand equity of cosmetics, and how it can specifically modify its subdimensions.

Similar to Sanfilippo's (2017) research, we base our analysis on Keller (1993) and Aaker's (1991) definitions of customer-based brand equity. Keller (1993) defines it "as the differential effect of brand knowledge on consumer response to the marketing of the brand". Aaker (1991) bases his definition of brand equity on four marketing dimensions: brand loyalty, brand awareness, perceived quality, and brand associations.

Regarding *brand loyalty* can be expressed through "buying frequency", meaning that the consumer buys the brand more frequently than other consumers, and/or "share of category requirements", that is "devoting a larger proportion of category purchases to the brand than to competitors" (Romaniuk & Nenycz-Thiel, 2013). Having her/his favorite product getting a bad grade regarding its ingredient declaration may a negative effect on the purchasing frequency of the product.

Brand awareness refers to "the likelihood that a brand name will come to mind and the ease with which it does so", it is a mix between brand recognition and brand recall performance (Keller, 1993). The role of brand awareness is important in the consumer decision making process as (1) it is crucial for marketers that the consumer considers the brand within the product category, (2) a minimum level of brand awareness can still affect consumer behavior, and (3) brand awareness affects consumer' decisions by impacting the creation and strength of brand associations in the brand image (Keller, 1993).

However, brand awareness will not be tested in the research paper as its analysis is not relevant since the respondent knows about her/his own favorite product.

Aaker (1991) defines *perceived quality* as "the customer's perception of the overall quality or superiority of a product or service with respect to its intended purpose, relative to alternatives". It is an "intangible, overall feeling about the brand". Depending on the personalities, needs, and preferences of the respondent, the perceived quality of a product that is denigrated by a scanning app is more or less likely to change.

Finally, Keller (1993) defines brand image as "perceptions about a brand as reflected by the brand associations held in consumer memory". *Brand associations* possess the meaning of the brand for the consumer (Keller, 1993). The strength, favorability, and uniqueness of a brand might be impacted by the suggestion of a "better" alternative from a scanning app.

To conclude, the conceptualization of brand equity allows us to test every aspect of a brand that the grade given by a scanning app can potentially impact.

Therefore, we create the model of the analysis that is shown in **Exhibit 16**. The type of cosmetics is the independent variable, and as a brand product, it is linked to the three dimensions of its consumer-based brand equity that we analyze. Brand loyalty, perceived quality, and brand associations are the dependent variables of the model. The moderator is the disclosure of a "bad grade" given by a scanning app as it can harm the strength of the relationship that connects the consumer to her/his favorite cosmetic product.

More precisely, we test the relative influence of the moderator, which is the bad results of a scanning app, over the brand equity of two types of cosmetics. Following the insights of Abe's (2017) work, we run two scenarios:

1) The favorite skin care product of a consumer that has a *caring* behavior and a *healing* effect

2) The favorite makeup product of a consumer that has an *adorning* behavior and provides *encouragement*

Therefore, the hypotheses are the following.

H1: Brand equity is significantly affected by a "bad grade" from a scanning app when the product is the favorite skin care product of the consumer.

> *H1a: Brand loyalty is significantly affected by a "bad grade" from a scanning app when the product is the favorite skin care product of the consumer.*

> *H1b: Perceived quality is significantly affected by a "bad grade" from a scanning app when the product is the favorite skin care product of the consumer.*

> *H1c: Brand associations are significantly affected by a "bad grade" from a scanning app when the product is the favorite skin care product of the consumer.*

H2: Brand equity is significantly affected by a "bad grade" from a scanning app when the product is the favorite makeup product of the consumer.

    H2a: Brand loyalty is significantly affected by a "bad grade" from a scanning app when the product is the favorite makeup product of the consumer.

    H2b: Perceived quality is significantly affected by a "bad grade" from a scanning app when the product is the favorite makeup product of the consumer.

    H2c: Brand associations are significantly affected by a "bad grade" from a scanning app when the product is the favorite makeup product of the consumer.

To conclude, with this thesis, we try to assess the credibility of scanning apps and to evaluate the impact of a "bad grade" given by a scanning app on the brand equity of a consumer's favorite cosmetic, and to see the difference in this potential effect for the two chosen types of cosmetics.

3. METHODOLOGY

3.1. Research design

In order to answer these research questions, primary data is collected. A quantitative method is used to identify patterns and eventually make generalizations. This will help understand in-depth motivations for people's behavior or feelings (Adams et al., 2014).

Our quantitative research is an experimental design since it allows us to generate results from a sample and then generalize these findings. In our research, consumers' behaviors and relationships to a brand are analyzed between two time-points, that is before and after the disclosure of a "bad grade" generated by a scanning app. Through the survey, the attitudes of the consumers are converted to a quantitative form that can eventually be analyzed.

3.2. The questionnaire

The logic and the flow of the survey are shown in **Exhibit 17**. The entire survey is displayed in **Exhibit 18**.

At the beginning of the survey, it is highlighted that the answers are anonymous and that respondents must be honest in their answers and not answer what they might think is expected of them.

The first part of the questionnaire is about the personal information of respondents. Regarding the sampling, to obtain relevant results, the respondents must live in France since we focus our research on scanning apps available in France.

The second part is about a general analysis of the respondent regarding scanning apps. First, cosmetics and scanning apps are defined, then it is shortly explained that all ingredients are government-approved but that some parties are concerned about their use in cosmetics. The idea is not to influence the respondents but to make sure she/he has some basic knowledge about the context in which scanning apps have been developed. This part of the questionnaire raises questions about awareness, usage, usage frequency or interest in those apps.

The third part of the survey is about the credibility of scanning apps in the eyes of the respondents, compared to previously mentioned information channels, such as consumerist press and labels or certifications. Following the same reasoning

of Parkinson (1975), we compare the level of trustworthiness, expertise, and impartibility, adding the level availability, of five information channels: a friend, an ad, consumerist press, labels or certifications, and a scanning app. The idea is to assess whether scanning apps do provide an additional value in terms of product information, compared to other information channels whose limits were pointed out above.

The last part of the survey is about assessing the impact of a "bad grade" on a scanning app on a consumer's favorite cosmetic, in two scenarios. The first subpart is about the brand equity of a consumer's favorite product and is followed by the second subpart in which the consumer learns that his favorite product has a poor ingredient declaration according to a scanning app. The idea behind this is to generate two paired t-tests in order to test our hypotheses. We are in a before and after analysis in which each respondent is tested twice on the same variable (Ho, 2013). In order to perform these tests, we will need to delete these outliers in the data and then test the assumption normality of the difference of the means of before vs after the disclosure of the "bad grade" (Ho, 2013; Verma & Abdel-Salam, 2019).

This part is a situational experience. As our research is focused on the potential influence of scanning apps regarding the purchase of cosmetics, to be relevant, this part must be answered by consumers who use these apps, or who are at least interested in using them. Thus, consumers who do not use scanning apps for cosmetics and that are not at all interested or only a little bit interested in using these apps automatically skip to the end of the survey.

Furthermore, one questionnaire is about skin care, the other is about makeup. First, in order to assign the first survey to some respondents and the second to other respondents, we need to make sure that the respondent uses the favorite product in question. We can assume that all respondents use skin care, however, makeup is not likely to be used by everyone and there is no point in asking a respondent about his attitude towards his favorite makeup product if she/he does not use makeup at all. Thus, if the respondent uses makeup, she/he is randomly assigned to one of the two questionnaires while, if the respondent does not use makeup, she/he is automatically assigned to the questionnaire about skin care.

In the questionnaire, similar to Abe's (2017) work and using his terms, we assess the relationship that the respondent share with a skin care product or a makeup product, which are the independent variables.

The questions of the survey offer seven-point scale possible responses. A seven-point scale is a Likert scale that "provides independence to a participant to choose any response in a balanced and symmetric way in either directions" (Joshi et al., 2015). Compared to a five-point scale, "adjacent options are less radically different (or more gradually different) from each other" which can lead to an increasing "probability of meeting the objective reality of people" (Joshi et al., 2015).

For each scenario, we assess the brand loyalty, the perceived quality, and the brand associations of the favorite cosmetic of the respondent before and after the disclosure of the "bad grade" given to the said product. We do so by analyzing commonly used variables of brand loyalty, perceived quality, and brand associations. Regarding brand loyalty, we analyze the intention to repurchase and the willingness to pay a higher price. When it comes to perceived quality, we chose to assess the reliability and the healthiness of the cosmetic. And, regarding brand associations, we ask the respondents about the strength, the favorability, and the uniqueness of the brand of their favorite cosmetic. Additional variables could have been analyzed, but it was crucial to make sure that the survey would not take too long for respondents in order to have complete answers.

After telling the consumer her/his favorite product has a "bad" ingredient list according to a scanning app, the respondent is asked (1) whether she/he is willing to follow the recommendation of the app and switch to a "better" alternative, (2) whether changing of application of use can impact her/his willingness to switch, and (3) if the respondent is willing to pay a premium price for a "healthier" product according to a scanning app compared to her/his current favorite cosmetic.

3.3. Data collection

A survey is conducted on Qualtrics and we followed the recommendations of Adams et al. (2014) about the design of a survey. Then the results are analyzed using Qualtrics and the software IBM SPSS Statistics.

In order to have a decent sample size, the survey is sent online (through email, on social media (Facebook, Instagram, LinkedIn)) and is also conducted in person (in the streets, malls, and supermarkets).

The respondent can choose to answer the survey in French or English. Since this trend of scanning apps comes from France, we target French residents, thus the

survey is more likely to be answered in French. However, having the survey translated into English is mainly for us to share with our English-speaking readers the content of our survey in our master thesis.

All French residents reach the third part of the survey, but for the last part of the survey, the sampling is limited to users of cosmetics scanning apps and respondents who are interested in using them.

4. RESULTS

4.1. Data material

In total, regardless of the scenario, 185 answers were recorded. Only eight respondents did not live in France, so 177 persons were able to go through the rest of the survey. 80.23% of women, 19.21% of men, and 0.56% of people who checked "other" answered the survey. They were three major group ages: 49.78% of respondents were 18-25 years old, 23.16% were 46-60 years old and 16.95% were 26-35 years old. When it came to their profession, 76 respondents were students while 54 respondents were executive or had a higher intellectual profession.

88.30% of respondents knew about these types of apps and 65.50% used them. 33.92% used them for both food and cosmetics while 28.65% of respondents used these apps exclusively for food.

Among the 107 respondents who did not use these apps at all or only for food, 65.43% of them were more than interested to try these apps in order to check the ingredient declaration. The rest of them were asked about channel information credibility but were not part of the samples of the two paired t-tests. As previously written, since our purpose is to assess the potential influence of the use of these apps on consumption, the respondents of the paired t-tests need to be a minimum interested in using the app.

Regarding the actual users of scanning apps for cosmetics, most of them usually scanned cosmetics before buying them for the first time.

4.2. Data analysis

4.2.1. Credibility analysis of information channels

All respondents who lived in France were asked about the perceived credibility of informational channels, regardless of their positive or negative attitude about scanning apps.

In order to determine the relative credibility of scanning apps, friends, ads, labels, and consumerist magazines as informational channels concerning the purchase of cosmetics, the respondents were asked to rank these sources according to their trustworthiness, expertise, impartiality, and availability.

In terms of *trustworthiness*, similar to Parkinson's (1975) findings, "a friend" was rated highest with a mean of 1.84 followed by "a label or a

certification". "A scanning app" came third, closely followed by "a consumerist magazine". It is interesting to note that "an ad" was considerably ranked as the least trusted channel information. The results are shown in **Exhibit 19**.

The second credibility dimension was *expertise*. Again, similar to Parkinson's (1975) results, "a label or a certification" was rated as the most expert channel, neck and neck with the "consumerist magazine". Then, "a scanning app" was usually ranked as third. Unsurprisingly, "A friend" and "an add" were rated significantly lower. The results are shown in **Exhibit 20**.

Regarding the impartiality of these informational channels, the consumerist press was praised as the most impartial one. However, labels and scanning apps' results were quite close to it. Unsurprisingly, an ad was ranked as the least impartial information channel. The results are shown in **Exhibit 21**.

Finally, when the availability dimension is considered, "a scanning app" is ranked the highest, followed by "a friend". "A consumerist magazine" is strongly rated as a source of information that is not as easy to access as other sources. The results are shown in **Exhibit 22**.

Overall, our results are consistent with Parkinson's (1975) work. Since the communication of information from an ad is linked to the quest for profit of a firm and return on investment, it was expected that "ad" would perform poorly for most credibility dimensions compared to other information channels. The seriousness of the labels and consumerist press were praised by respondents, while the trust they put in relatives with whom they share a personal relationship and who can advise them on cosmetics products was very significant.

If we take a closer look at the performance of scanning apps, it is interesting to highlight that they were ranked below consumerist magazines and labels in terms of trustworthiness, expertise, and impartiality. Surprisingly, "label or certification" performed better than scanning apps on impartiality: regardless of the entity behind the label (whether they are state-controlled or self-declared labels), still, it is the company that *chooses* to add a label on the packaging, and one could have believed that respondents would have ranked the scanning apps before them, as, in this case, it is the consumers that *chose* to scan the product. But, given the results, respondents perceived labels as more impartial than scanning apps. However, as expected, the main interest of scanning apps compared to other information channels seems to be their availability. Having access to clear and simple information, right in our pockets, is an advantage for consumers.

The end of the survey is designed as two parallel paired t-tests, one about skin care, the other about makeup. As previously stated, only current users of these apps or respondents that would be relatively willing to use them for cosmetics were used as a sample for this analysis. In order to obtain relevant results, respondents were asked whether they used makeup or not so that they would be assigned to one questionnaire about a category of products they used (i.e., the non-makeup users were only directed to the skin care questionnaire while the makeup users were randomly assigned to the makeup questionnaire or the skin care questionnaire).

4.2.2. Normality tests

As previously mentioned, to perform our two paired t-tests, we need to assess the normality of the difference between the means of the Before and After variables. To do so, the skewness and kurtosis values of each dependent variable were computed for the two scenarios (see **Exhibit 23** for the skin care analysis and **Exhibit 24** for the makeup analysis). The skewness refers to distortion or asymmetry of our data, "the perfect normality of data arrives when skewness is "zero," which is practically rare." (Verma & Abdel-Salam, 2019). Kurtosis "depicts the normal density of data by the peakedness of normality curve" (Verma & Abdel-Salam, 2019).

As explained by Ho (2013), we use a simple diagnostic test for normality that is based on the skewness and kurtosis values. We compute the statistical *z* value for the skewness:

$$Z_{skewness} = \frac{skewness}{\sqrt{s.e.skewness}}$$

Similarly, the statistical *z* value for the kurtosis is:

$$Z_{kurtosis} = \frac{kurtosis}{\sqrt{s.e.kurtosis}}$$

"If the calculated z value exceeds the specified critical probability value, then the distribution is nonnormal" (Ho, 2013). In our case where the alpha level is at 0.05, a calculated *z* value exceeding ± 1.96 results in a rejection of the assumption of normality. After extracting the skewness and kurtosis values for each difference, we compare the statistical *z* value to the critical probability value. We conclude that the distribution of all variables does not depart significantly from normality. Thus, we are able to conduct a paired t-test using all variables for each scenario.

4.2.3. Specific scenario and paired t-tests

Respondents' attitude towards skin care and makeup products

Following Abe's (2017) work on mechanisms of cosmetic behavior effects as an emotion control device, we assess the caring, adorning, healing and encouraging behavior of cosmetics among our respondents. The results for skin care and makeup are respectively presented in **Exhibit 25** and **Exhibit 26**.

Skin care products performed better on "caring" and "healing" dimensions while makeup obtains better results for "adorning" and "encouraging" dimensions. However, skin care still obtains a mean above 4 for the "adorning" effect while the means of "caring" and "healing" for makeup were below 4.

Furthermore, respondents stated that they rather use skin care for themselves, while they use makeup for themselves and others, but they were more mitigated for makeup usage (mean = 4 ("for myself and others") and standard deviation = 1.56). Compared to their current favorite product, they were likely to pay a higher price for the "better" alternative.

Our results are aligned with Abe's (2017) findings that state that "both skin care and makeup have a close relation to both self-esteem and private self-consciousness". Skin care is rather used "for me", while makeup is also related to "public self-consciousness and social viewpoints" (Abe, 2017).

Respondents' reaction towards the alternative cosmetic

Apart from analyzing the impact of the disclosure of a "bad grade" on a cosmetic's brand equity, we also wanted to grasp respondents' attitudes towards the alternative product that she/he is advised to use instead. The results for skin care and makeup are respectively presented in **Exhibit 27** and **Exhibit 28**.

Respondents were slightly more enthusiastic to replace their favorite skin care product with a "better" one in terms of ingredient composition compared to makeup. However, for both cosmetics, their positive attitudes towards the alternative were moderated by the change of application use (mean = 4.28 for skin care vs mean = 4.08 for makeup).

Analysis of the impact of the disclosure of the "bad grade" for skin care products

The hypotheses we test are the following:

_H1$_0$: Brand equity is not significantly affected by a "bad grade" from a scanning app when the product is the favorite skin care product of the consumer._

H1$_A$: Brand equity is significantly affected by a "bad grade" from a scanning app when the product is the favorite skin care product of the consumer.

In this first scenario, skin care is the category of the favorite product of the respondent. We perform a paired t-test for seven dimensions of brand equity (i.e., intention to buy and intention to put a premium price on the said product for brand loyalty; reliability and healthiness for perceived quality; strength, favorability, and uniqueness for brand associations) (see **Exhibit 29**).

According to the SPSS extraction, all the items are significantly different before and after the respondent learned about the "bad grade" of her/his favorite skin care product: for all variables, sig (p-value) is null, hence it is below alpha. Consequently, *H1a$_0$*, *H1b$_0$*, and *H1c$_0$* are rejected, thus *H1$_0$* is rejected. It means that the variables associated with brand equity differ significantly once the "bad grade" is revealed to the respondent. Respondents significantly leverage their brand equity after learning that the ingredient declaration of their favorite skin care performed poorly on a scanning app.

Analysis of the impact of the disclosure of the "bad grade" for makeup products
The hypotheses we test are the following:

H2$_0$: Brand equity is not significantly affected by a "bad grade" from a scanning app when the product is the favorite skin care product of the consumer.

H2$_A$: Brand equity is significantly affected by a "bad grade" from a scanning app when the product is the favorite skin care product of the consumer.

In this second scenario, makeup is the category of the favorite product of the respondent. We perform a paired t-test for seven dimensions of brand equity (i.e., intention to buy and intention to put a premium price on the said product for brand loyalty; reliability, and healthiness for perceived quality strength, favorability, and uniqueness for brand associations) (see **Exhibit 30**).

According to the SPSS extraction, all the items are significantly different before and after the respondent learned about the "bad grade" of her/his favorite makeup product: for all variables, sig (p-value) is null, hence it is below alpha. Consequently, *H2a$_0$*, *H2b$_0$*, and *H2c$_0$* are rejected, thus *H2$_0$* is rejected. It means that the variables associated with brand equity differ significantly once the "bad grade" is revealed to the respondent. Respondents significantly leverage their brand equity

after learning that the ingredient declaration of their favorite makeup performed poorly on a scanning app.

5. DISCUSSION

5.1. General Discussion

The purpose of this paper was to unveil insights about the possible changes in consumer purchasing behavior due to the app's informative role and to provide some managerial suggestions that could be used to elaborate future marketing strategies for firms and the developers of the apps.

The information search is an important step in the consumer journey, it determines what would be the possible brands and products considered by the consumer in order to fulfill her/his needs. The issue of the complexity of ingredient lists regarding Fast-moving consumer goods, especially cosmetics, is not a new topic and some attempts have been taken in the past so that consumers would be more likely to make sound and reasoned choices. We mentioned consumerist magazines and the important and advanced analyses on everyday products they provide to readers, we also focused on the benefits but also the limits of eco-labels, especially linked to the inconsistency in ("green") consumers' behaviors and to their overall credibility.

The most recent solution when it comes to understanding what is in a product is mobile scanning apps. The general feedback on the impact they can have on the food industry is very positive, but as we pointed out, it is more tenuous regarding cosmetics. Thus, we tried to better understand consumers and users' behaviors towards these apps regarding cosmetics. In our analysis, we tried to grasp how scanning apps stood out from other informational channels. The performance of the scanning apps regarding the different dimensions of credibility was quite neutral. The only dimension where scanning apps outperformed other sources of information was availability.

Mobile phones have reshaped the way we live and consume. Nowadays, consumers are eager to obtain clear information simply and quickly, whenever and wherever they want. The ease of use and the availability of scanning apps are their main advantages.

More than simply evaluating a cosmetic ingredient declaration, these scanning apps also suggest to users some alternatives that can replace their current "bad" product. Thus, these apps can potentially change the potential outcome of the consumer's purchase journey. In our research, we evaluated the impact a "bad

grade" on a cosmetic ingredient list could have on a consumer's favorite cosmetic brand equity. More precisely, we used brand loyalty, perceived quality, and brand associations as dimensions to analyze brand equity.

Following Abe's (2017) views on cosmetic behavior effects, we offered two possible scenarios: one where the favorite cosmetic is a skin care product (i.e., a *caring* cosmetic with a *healing* effect) and another where the favorite cosmetic is a makeup product (i.e., an *adorning* product that *encourages*). The idea was to check whether the type of cosmetics (and the type of relationships we share with them) would influence the likelihood that consumers would follow the scanning app's recommendations. For both scenarios, the results showed that the disclosure of a "bad grade" significantly impacted the brand equity of the favorite cosmetic, and respondents were relatively disposed to adopt an alternative. As *H1* and *H2* were both (completely) supported by our data analysis, no differentiation regarding the scale of the impact between the two types of products was withdrawn from the data.

However, it still validates the fact that scanning apps can change consumers' perceptions about the product, especially about products and brands they love and usually use, which may result in the end in the abandonment of the said favorite product. And this is specifically what "scares" big firms and urges them to adapt their offer and consider scanning apps algorithms in their innovation process. But for now, according to analysis in line with our findings, users of these scanning apps seem to rather scan food products than cosmetics products. This could explain why today there is less talk about change in cosmetic consumer habits than in the food industry, due to scanning apps.

5.2. Managerial implications

Through the hypotheses we initially drew from literature and understanding of the recent context in which scanning apps were developed and the results we collected and analyzed, our research has enabled us to find out managerial implications and contributions.

Regarding the developers of the apps

When it comes to the credibility of scanning apps as information channels, developers of such apps should keep insisting that they are completely independent of firms and reassure consumers about their expertise in order to attract more users.

Besides, when advising "better" alternative products to consumers through the app, a change skin application or classic directions of use might slightly reduce the chance that the consumer will pick and purchase this particular alternative. Thus, in order to actually provoke a change, the alternative better have the same application use than the scanned product.

Regarding managers

Even though these apps are quite recent, marketers have quickly considered them in the management of their brands by "cleaning" the ingredient lists of their current offer or by innovating in order to provide cosmetics with "clean" formulation. However, not all companies have embraced this path.

If we assume that this trend will last and increase over time, not improving the formulation of a product can become costly for the brand. The firm can lose sales over a "better" cosmetic from the competition, especially if the consumer scans the product once and definitely remove it from her/his consideration set, without checking whether its score has improved or not since its last scan. Besides, we can assume that cleaning the formulation of a product may not only result in higher R&D costs but also in additional advertisement costs in order to make sure that the consumers are aware of this positive change and can consider buying the product again. However, modifying the ingredients of a cosmetic according to a scanning app algorithm must not entail poorer ease of use for the consumer, or harm its performance or overall quality for the brand to stay competitive and convince the consumer to purchase it.

Furthermore, retailers must also adapt their strategy to scanning apps. They need to make sure to enrich their cosmetics offer enough in order to provide "good" products (according to scanning apps) to shoppers but also so that consumers could find and purchase in-store the alternative product suggested by the app, and thus not lose potential sales.

Apart from the "ingredient list" aspect, firms should anticipate the next moves of scanning apps and adapt their product accordingly, especially regarding the transparency topic. For example, in February 2021, Yuka launched an "éco-score" to assess the environmental impact of products (Haverland, 2021). The algorithm takes into account criteria such as the recyclability of the packaging, water usage, carbon footprint, deforestation, mode of transportation in order to give users information about the qualities and the defaults of the product.

5.3. Limitations and Future Research

Some limitations regarding our research are likely to arise from our methodology and quantitative study.

As mentioned by Pedersen and Neergaard (2006) in their work, the feedback from respondents can be biased : "behavioural experiences affect and are affected by the individual's values, attitudes and basic assumptions through learning. However, it is uncertain to what extent behavioural experiences are interpreted correctly". In our case, the respondents might be convinced that, for example, they would be likely to use the better alternative instead of their actual favorite product, although their true behavior may not reflect their "green" values.

Furthermore, as our survey should not be too time-consuming so that the more respondents complete 100% of the survey, some additional tracks could have been missing and should be investigated in future research regarding our topic. In the future, researchers could consider the perceived performance of eco-friendly products (i.e., their smell, their texture) and their impact on the willingness of consumers to adopt such products, compared to their current standard cosmetics. Similarly, assuming that "green" and "clean" products are quality products and that it is reflected in the price, future research could study the impact of the premiumization of the suggested alternatives on consumers' likelihood to modify their purchase behavior and actually consistently purchase more expensive green products.

In addition, in order to go further than in our study, future research could also consider the possibility that a "bad grade" assigned by a scanning app on consumers' favorite brand might lead them to question or even abandon the app rather than the brand they have loved and used for years.

Considering that the topic of scanning apps is still quite new and that technology constantly evolves, future research could make sure to keep the subject up to date and perform more in-depth studies, based on our findings, and use a qualitative method to complete our work.

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7. APPENDIX

Exhibit 1: How do you get information on a food product? *
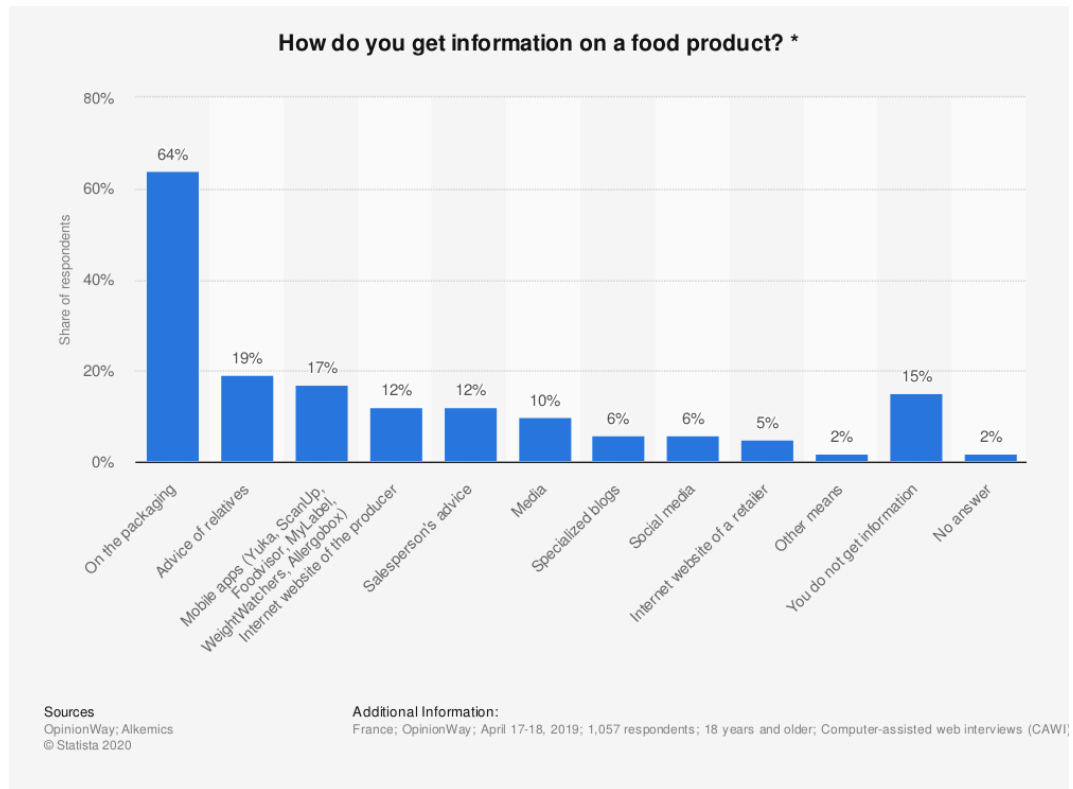
Source: OpinionWay & Alkemics (May 24, 2019), in *Statista*

**Exhibit 2: Results after scanning a product on Yuka**

The app generates the global grade of the product (between 100 and 75, the product is "excellent", from 75 to 50 it is "good", "mediocre" for 50 to 25 and "bad" below 25), classifies the controversial ingredients depending on their degree of hazardousness and suggests multiple alternatives that obtain a better grade with the Yuka algorithm.

Exhibit 3: Number of Yuka users (in million) in the world in March 2021

La success story de Yuka

Nombre total d'utilisateurs de l'application Yuka, en millions

Disponibilité *

* en date de mars 2021.
Sources : Yuka, rapports média
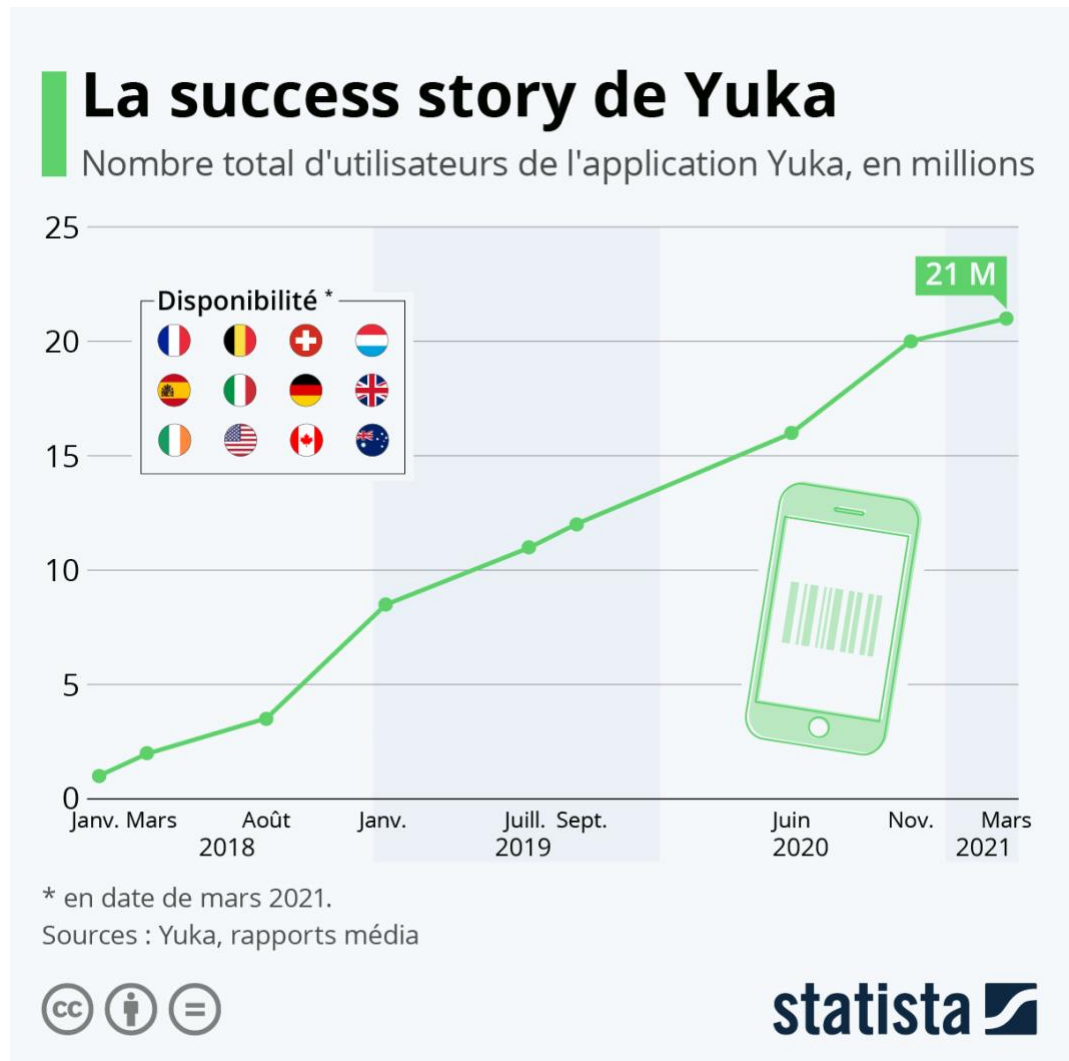
statista

Source: « Yuka's success story », Gaudiaut, T. (April 26, 2021), in *Statista*

Exhibit 4: Daily active users (DAU) of leading iPhone health and fitness apps in France during April 2021 (in 1,000s)
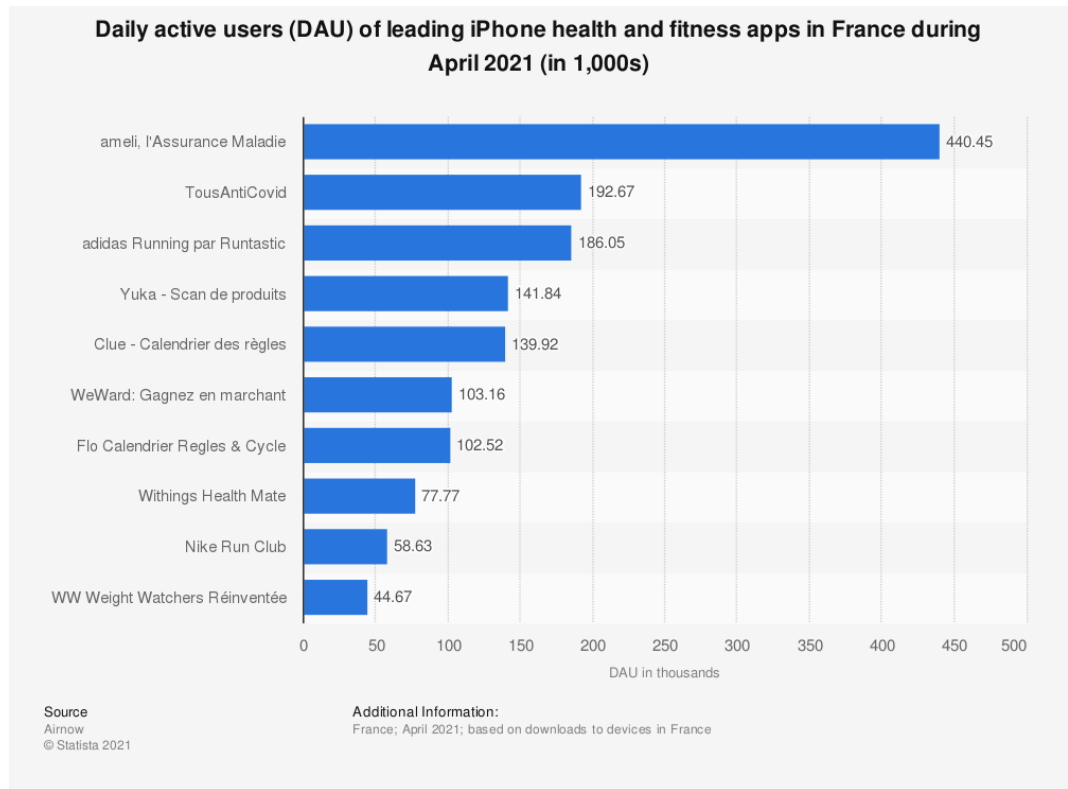
Source: Airnow (May 12, 2021), in *Statista*

Exhibit 5: Ranking of the best-known mobile food applications by French users in 2018

Ranking of the best known mobile food applications by French users in 2018
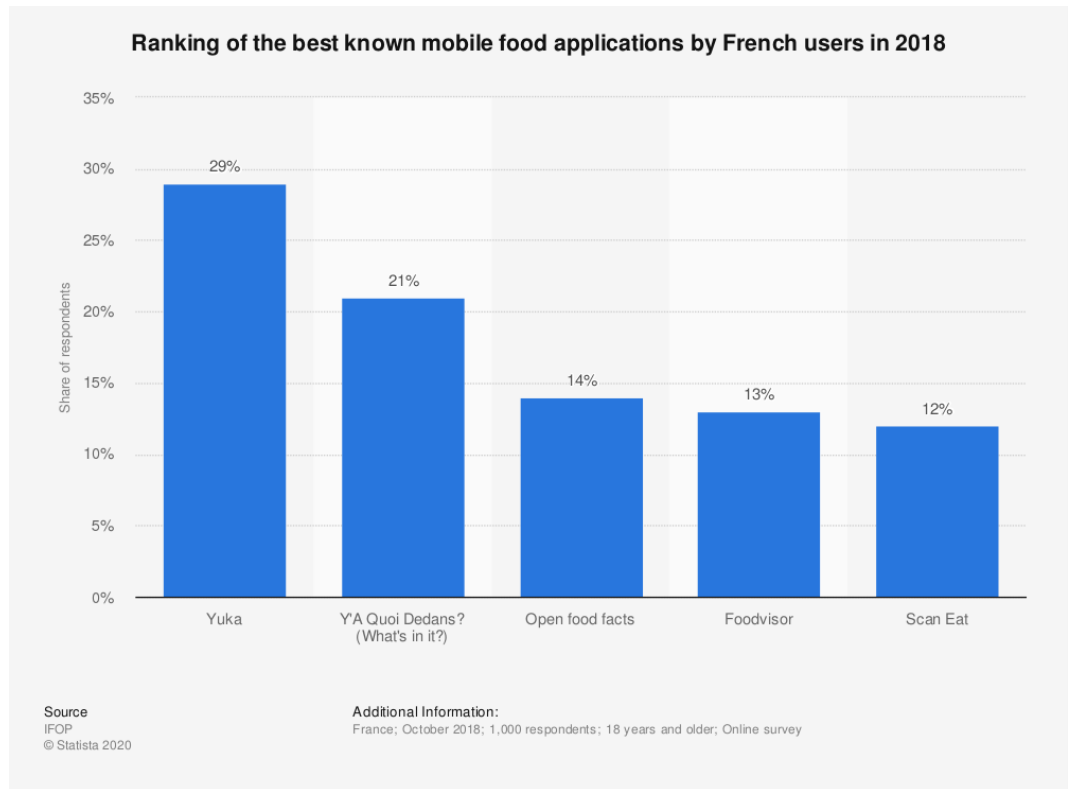
Source: IFOP (November 8, 2018), in *Statista*

Exhibit 6: Les petits plus de chaque appli (Each app's own specificity; own translation)

Yuka Quand vous scannez un article mal noté, l'appli vous soumet un équivalent « meilleur pour la santé », choisi « en toute indépendance ».	**Scan Up** Propose la notation Siga (niveau de transformation) et engage ses utilisateurs à voter pour « cocréer les bons produits » en partenariat avec les marques.	**Y'a Quoi Dedans ?** Avec les 12 filtres de l'appli de Super U, on peut écarter des substances controversées (colorants…), privilégier le bio ou l'origine France.	**Open Food Facts** Utilise l'échelle Nova, qui note les produits de 1 (peu ou pas transformés) à 4 (ultratransformés), ces derniers étant jugés à risque.	**Scan Eat** Permet de sélectionner des labels de qualité (bio, origine, équitable, MSC, label Rouge…) et d'exclure neuf allergènes et les additifs.

Yuka	Scan Up	What's in it?	Open Food Facts	Scan Eat
When you scan a poorly rated product, the app gives you a "healthier" alternative, independently selected.	Gives you the Siga rating (level of processing) and encourages its users to vote to "cocreate good products" in partnership with the brands.	With the 12 filters of the Super U app, you can put aside controversial substances (coloring…), favor organic products, or the "Made in France" claim.	Uses the Nova level, which rates products from 1 (little or not processed) to 4 (ultra-processed, the latter being considered risky for your health.	Enables you to select quality labels (organic, fair trade, Marine Steward Council certification, the French "Red label" certification…) and to set aside nine allergens and all additives.

Source: Verbaere (2020)

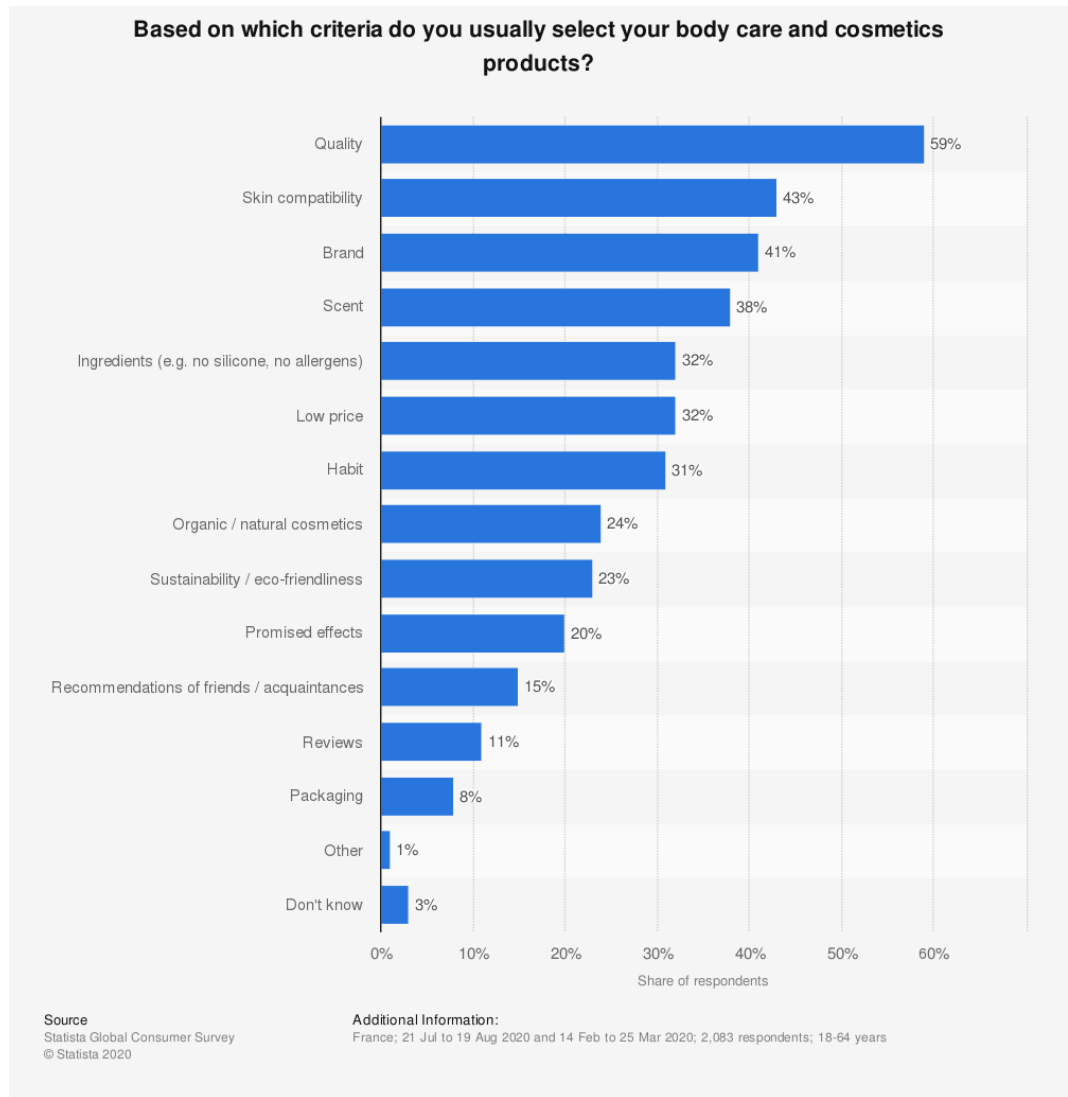**Exhibit 7: Before buying cosmetics (cream, makeup, aftershave, etc...) what advice do you trust the most?***
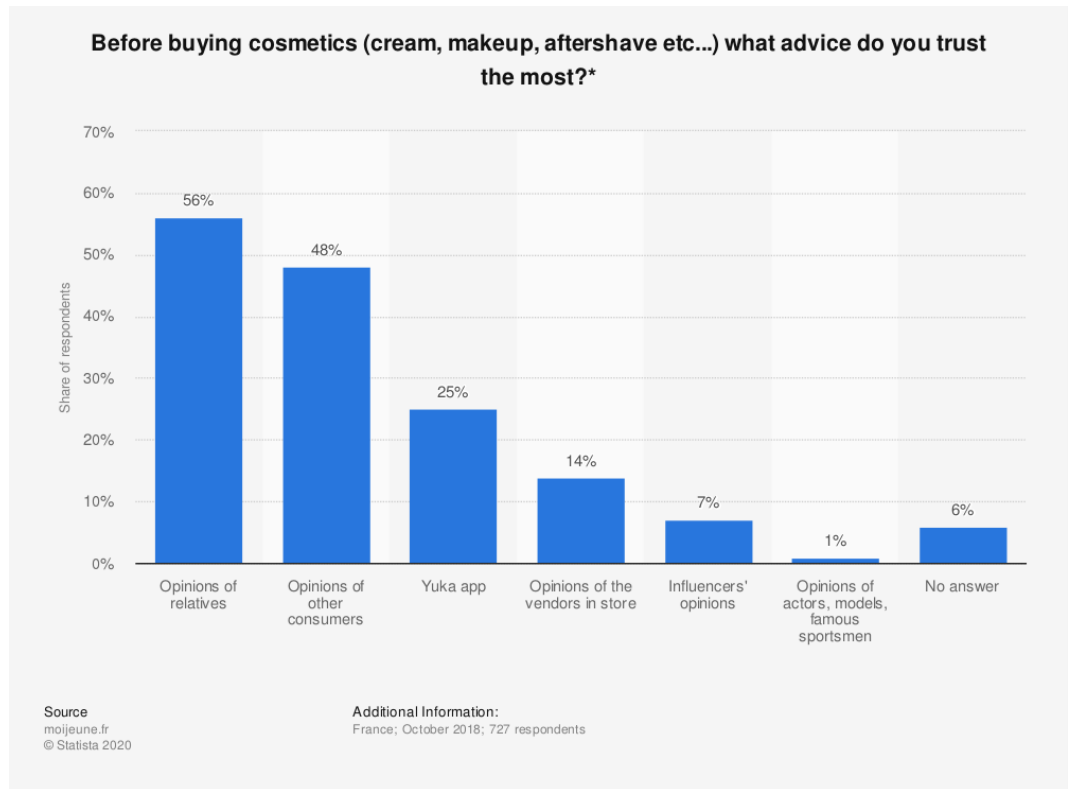
Source: moijeune.fr (October 29, 2018), in *Statista*

Exhibit 8: The use of a Yuka score in an Instagram advertising post

Source: Sponsored Instagram post from the 900.care brand

*"Plus, it has a 93/100 grade on the Yuka app" (own translation)*

Exhibit 9: Based on which criteria do you usually select your body care and cosmetics products?

Based on which criteria do you usually select your body care and cosmetics products?

Criteria	Share
Quality	59%
Skin compatibility	43%
Brand	41%
Scent	38%
Ingredients (e.g. no silicone, no allergens)	32%
Low price	32%
Habit	31%
Organic / natural cosmetics	24%
Sustainability / eco-friendliness	23%
Promised effects	20%
Recommendations of friends / acquaintances	15%
Reviews	11%
Packaging	8%
Other	1%
Don't know	3%

Share of respondents

Source
Statista Global Consumer Survey
© Statista 2020

Additional Information:
France; 21 Jul to 19 Aug 2020 and 14 Feb to 25 Mar 2020; 2,083 respondents; 18-64 years

Source: Statista Global Consumer Survey (November 19, 2020), in *Statista*
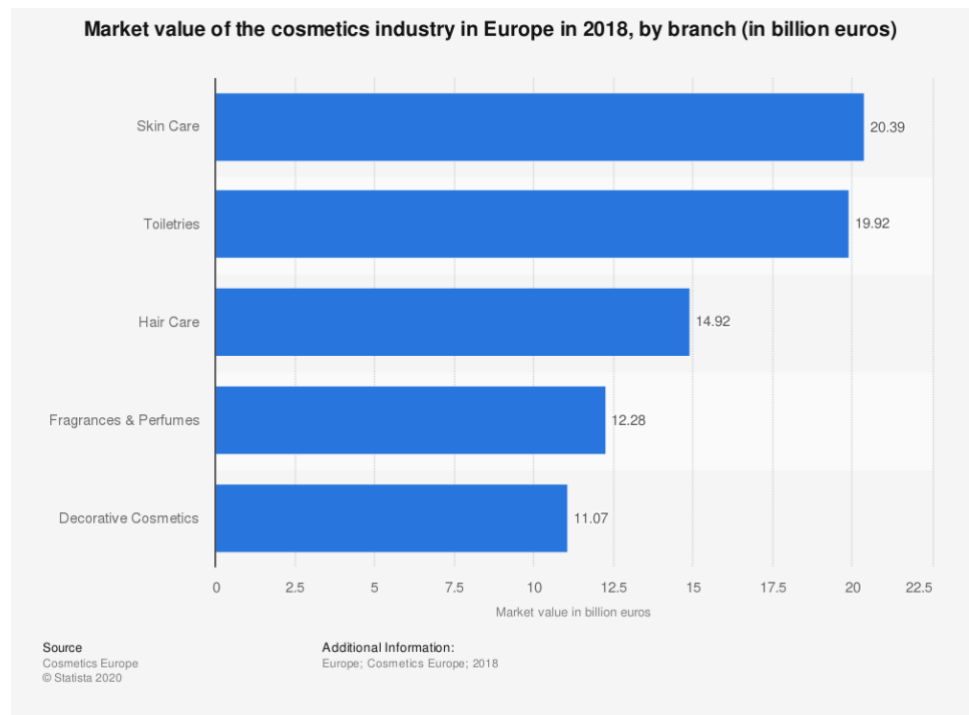
Exhibit 10: Analysis of the French market within Europe regarding cosmetics

Figure 1: Consumption value of cosmetics and personal care in Europe in 2019, by country* (in million euros)
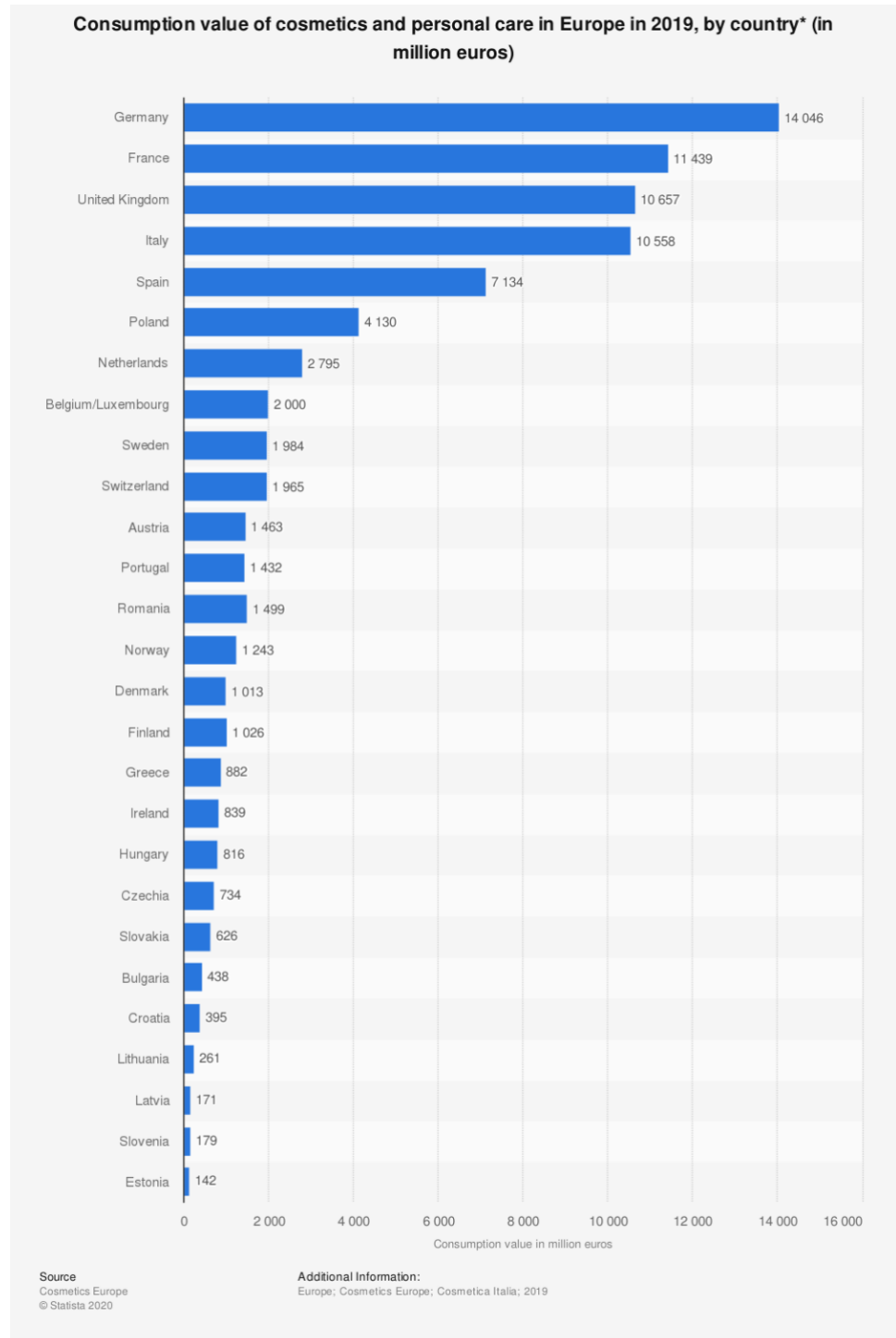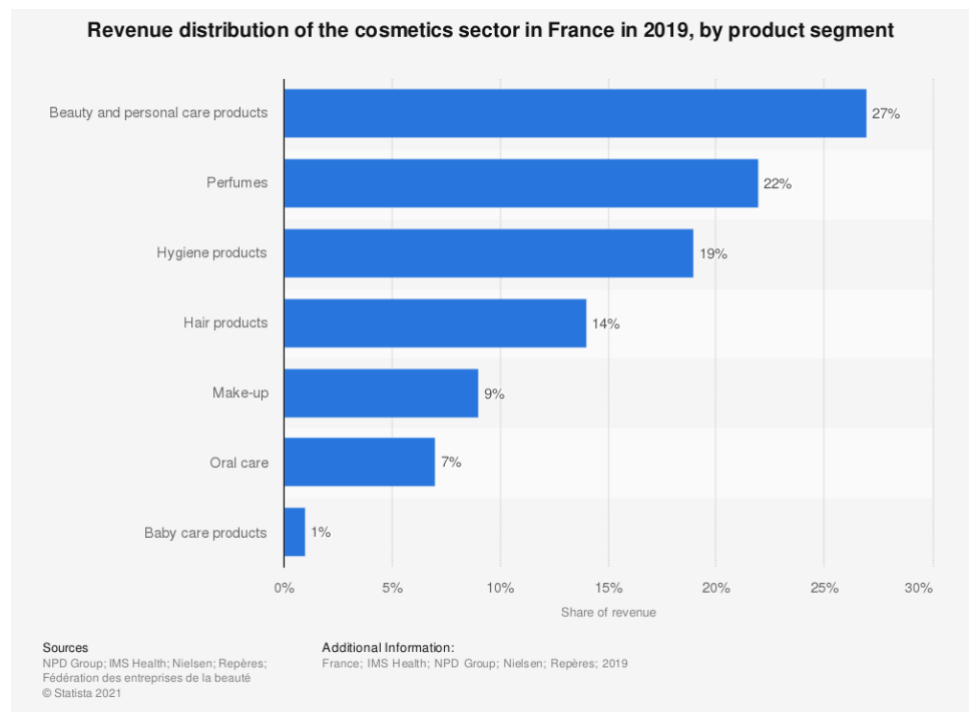

Source: Cosmetics Europe (June 25, 2020), in *Statista*

Figure 2: Market value of the cosmetics industry in Europe in 2018, by branch (in billion euros)


Source: Cosmetics Europe (June 1, 2019), in *Statista*

**Figure 3: Revenue distribution of the cosmetics sector in France in 2019, by product segment**

Source: NPD Group; IMS Health; Nielsen; Repères; Fédération des entreprises de la beauté (December 18, 2019), in *Statista*

Figure 4: Sales volume of hygiene articles sold in supermarkets and hypermarkets in France from April 2020 to April 2021, by type of product (in million units)
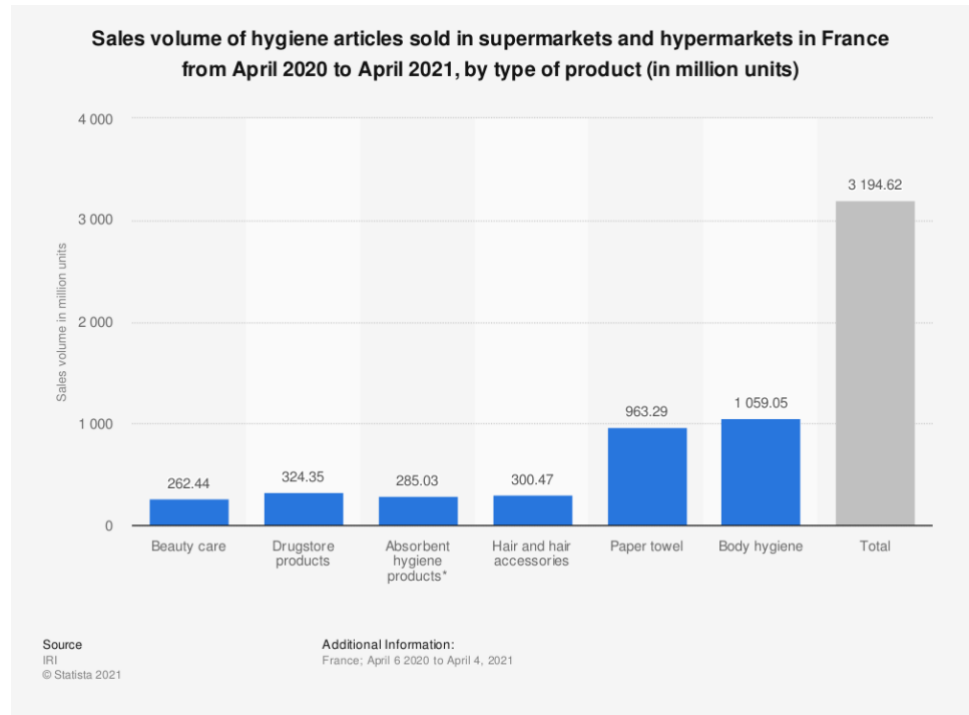
Source: IRI (April 21, 2021), in *Statista*

Figure 5: **Sales value of hygiene articles sold in supermarkets and hypermarkets in France from April 2020 to April 2021, by type of product (in million euros)**
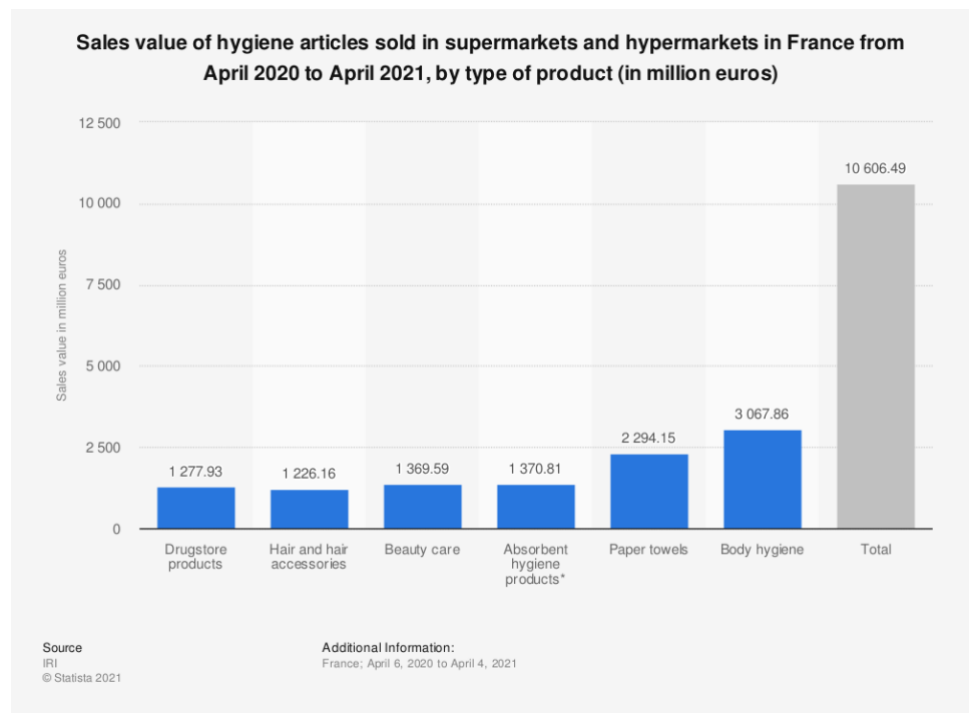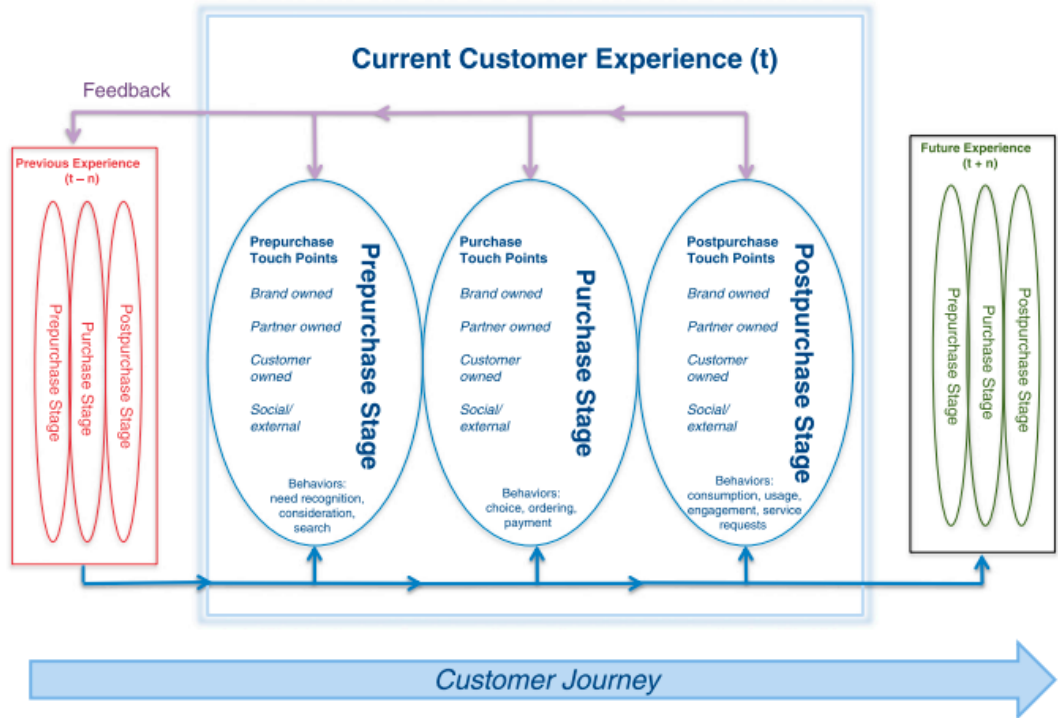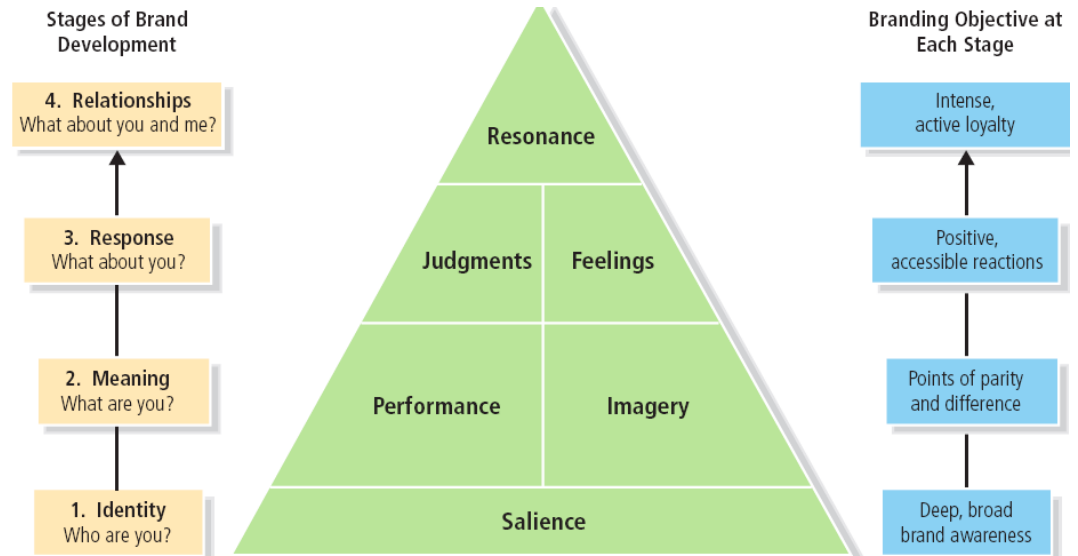

Source: IRI (April 21, 2021), in *Statista*

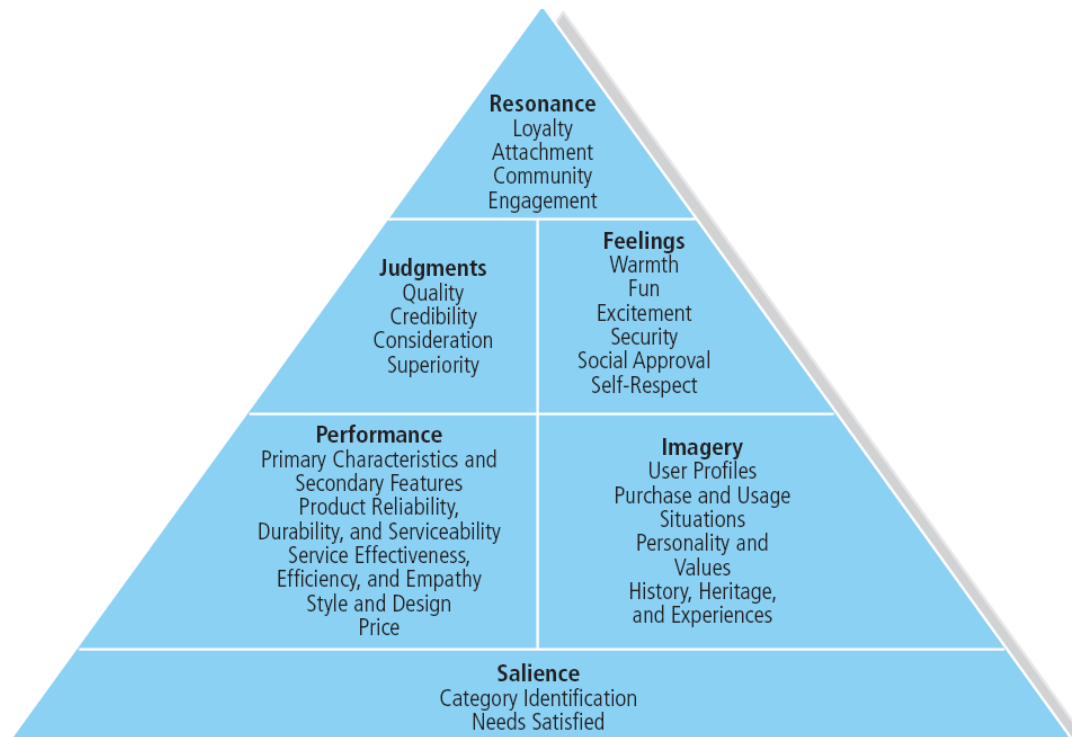**Exhibit 11: Process Model for Customer Journey and Experience**

Source: Lemon & Verhoef (2016)

Exhibit 12: Customer-Based Brand Equity: The Brand Resonance Model

Stages of Brand Development

4. Relationships
What about you and me?

3. Response
What about you?

2. Meaning
What are you?

1. Identity
Who are you?

Resonance

Judgments   Feelings

Performance   Imagery

Salience

Branding Objective at Each Stage

Intense, active loyalty

Positive, accessible reactions

Points of parity and difference

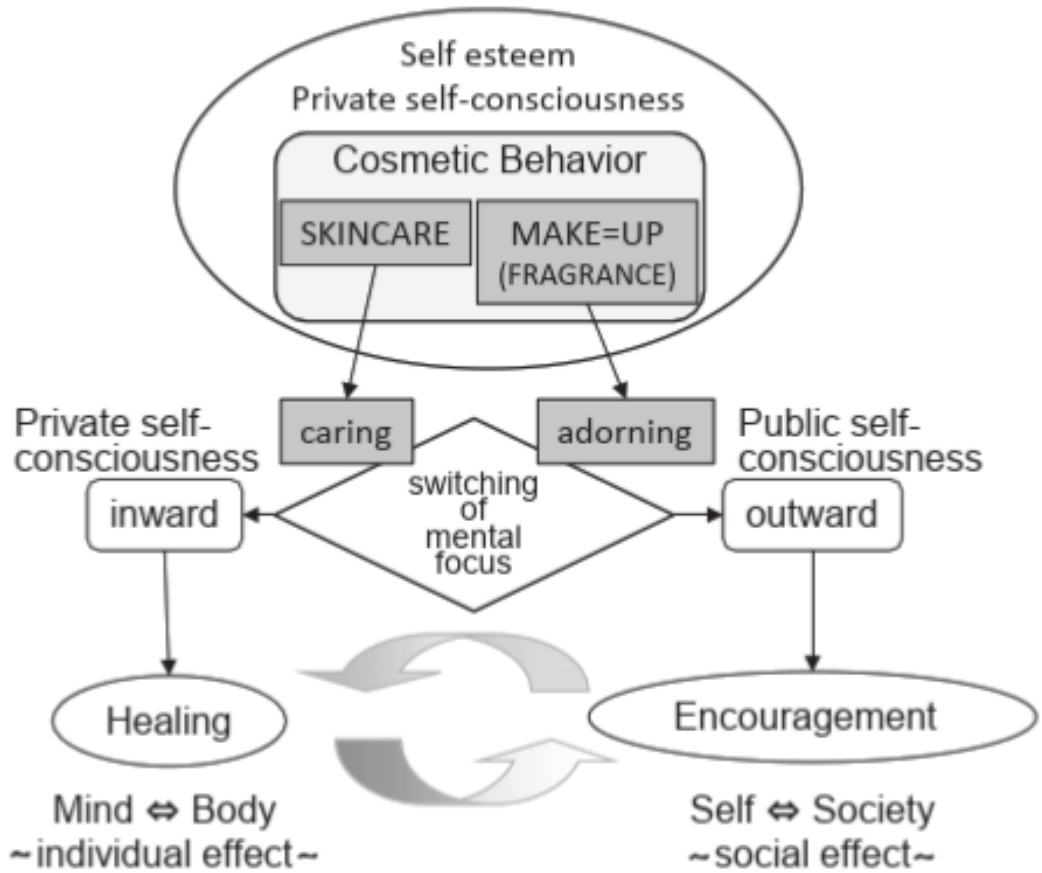Deep, broad brand awareness

Source: Keller & Swaminathan (2020)

Exhibit 13: Subdimensions of Brand Building Blocks

Source: Keller & Swaminathan (2020)

Exhibit 14: Mechanisms of cosmetic behavior effects as an emotion control device.

Source: Abe (2017); Sakamoto, K., Lochhead, R., Maibach, H., & Yamashita, Y. (Eds.). (2017)

Exhibit 15: Conceptual story of the emotion-controlling effect of cosmetic behavior along a day.

Source: Abe (2017); Sakamoto, K., Lochhead, R., Maibach, H., & Yamashita, Y. (Eds.). (2017)

Exhibit 16: Model for the study
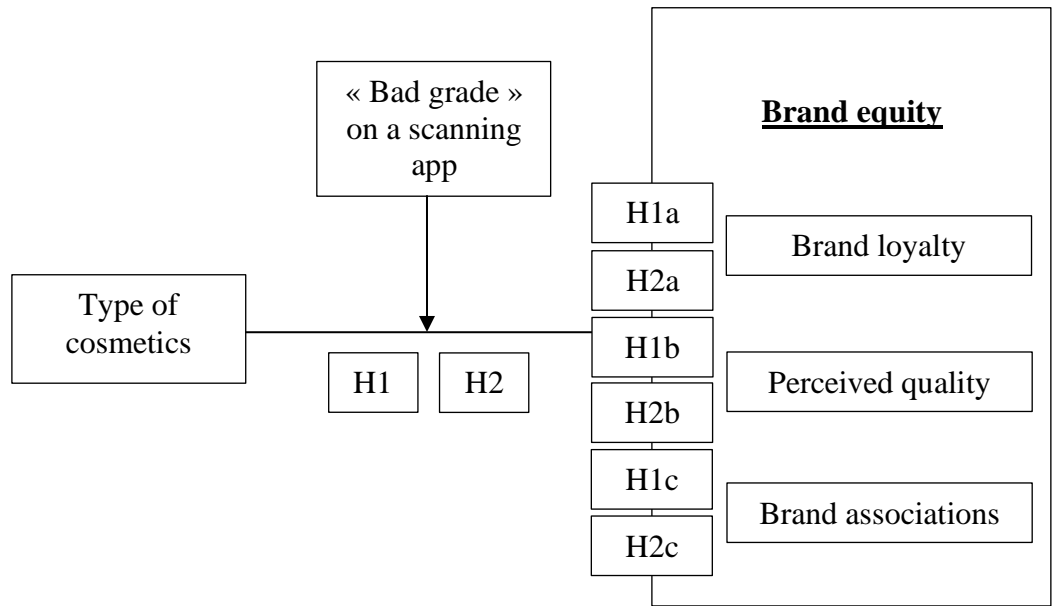
Exhibit 17: Survey flow

Standard: Introduction (2 Questions)

Branch: New Branch

    If

        If Do you live in France? No Is Selected

        EndSurvey:

Standard: Information (3 Questions)

Standard: General analysis (6 Questions)

Standard: Credibility (4 Questions)

Branch: New Branch

    If

        If How likely would you be interested in using a scanning app to check the composition of your cosmetics?... A little bit interested Is Selected

        Or How likely would you be interested in using a scanning app to check the composition of your cosmetics? Not interested at all Is Selected

        EndSurvey:

Standard: Distribution of surveys (1 Question)

BlockRandomizer: 1 - Evenly Present Elements

    Branch: New Branch

        If

            If Do you use makeup? Yes Is Selected

        BlockRandomizer: 1 - Evenly Present Elements

            Block: Skin care (11 Questions)

            Block: Makeup (11 Questions)

    Branch: New Branch

        If

            If Do you use makeup? No Is Selected

        Block: Skin care (11 Questions)

Exhibit 18: Survey questions

This survey is conducted as part of my double degree with BI Norwegian Business and EDHEC. The analysis of the results will be used to elaborate my thesis **about the influence of scanning applications** (e.g., Yuka, INCI Beauty, Cosmeticon, CosmEthics, Open Beauty Facts, Mireille...) **on the purchasing habits of hygiene-beauty products**.

The answers are collected anonymously. There are no "right" or "wrong" answers, just answer honestly and say what comes to your mind first.

Thank you for your participation,

Athénaïs Völcker

Do you live in France?

◯ Yes

◯ No

You are:

◯ A man

◯ A woman

◯ Other

How old are you?

○ Less than 18 years old

○ 18-25 years old

○ 26-35 years old

○ 36-45 years old

○ 46-60 years old

○ More than 60 years old

What do you do for a living?

○ Student

○ Farmer

○ Craftsman, merchant, and entrepreuner

○ Executive and higher intellectual profession

○ Intermediary profession

○ Employee

○ Worker

○ Retired

○ Unemployed

End of Block: Information

Start of Block: General analysis

A **cosmetic product** is any product that we apply on our body that is not a drug.

In the context of our study, we define **scanning applications** as mobile applications that generate, thanks to an algorithm, a score of the product's composition after scanning its barcode (e.g., Yuka, INCI Beauty, Cosmeticon, Open Beauty Facts, Mireille...). If the scanned product does not sufficiently meet the rating criteria, the application suggests alternative products that are better "rated".

NB: all ingredients present in cosmetics in Europe are *approved* **by the European Commission's Scientific Committee on Consumer Safety**. However, some ingredients (e.g. silicones, parabens, aluminum) are controversial because they

might present health risks (e.g., allergen, irritant, carcinogen, endocrine disruptor).

✳

I have read the text above :

▼ No ... Yes

Page Break

Were you aware of this type of scanning applications?

○ Yes

○ No

Do you use this type of applications?

○ Yes, for both food and cosmetics products

○ Yes, but only for food

○ Yes, but only for cosmetics

○ No

How likely would you be interested in using a scanning app to check the composition of your cosmetics?

○ Very interested

○ Interested

○ More or less interested

○ A little bit interested

○ Not interested at all

When you go grocery shopping at the supermarket, how often do you scan cosmetics?

○ I ALWAYS scan cosmetics before un use them for the first time

○ I USUALLY scan cosmetics before un use them for the first time

○ I RARELY scan cosmetics before un use them for the first time

End of Block: General analysis

Start of Block: Credibility

Rank this channel information by their level of **trustworthiness** when you buy a cosmetic (from 1 (the most trustworthy source) to 5 (the less trustworthy source)):

_____ A friend

_____ An ad

_____ A label or a certification (e.g., Ecocert)

_____ A scanning app

_____ A consumerist magazine (e.g.,60 Millions de consommateurs, LSA)

Rank this channel information by their level of **expertise** when you buy a cosmetic (from 1 (the most serious source) to 5 (the less serious source)):

_____ A friend

_____ An ad

_____ A label or a certification (e.g., Ecocert)

_____ A scanning app

_____ A consumerist magazine (e.g., 60 Millions de consommateurs, LSA)

Rank this channel information by their level of **impartiality** when you buy a cosmetic (from 1 (the most impartial source) to 5 (the less impartial source)):

_____ A friend

_____ An ad

_____ A label or a certification (e.g.: Ecocert)

_____ A scanning app

_____ A consumerist magazine (e.g., 60 Millions de consommateurs, LSA)

Rank this channel information by their level of **availability** when you buy a cosmetic (from 1 (the most available source) to 5 (the less available source)):

_____ A friend

_____ An ad

_____ A label or a certification (e.g.: Ecocert)

_____ A scanning app

_____ A consumerist magazine (e.g., 60 Millions de consommateurs, LSA)

End of Block: Credibility

Start of Block: Distribution of surveys

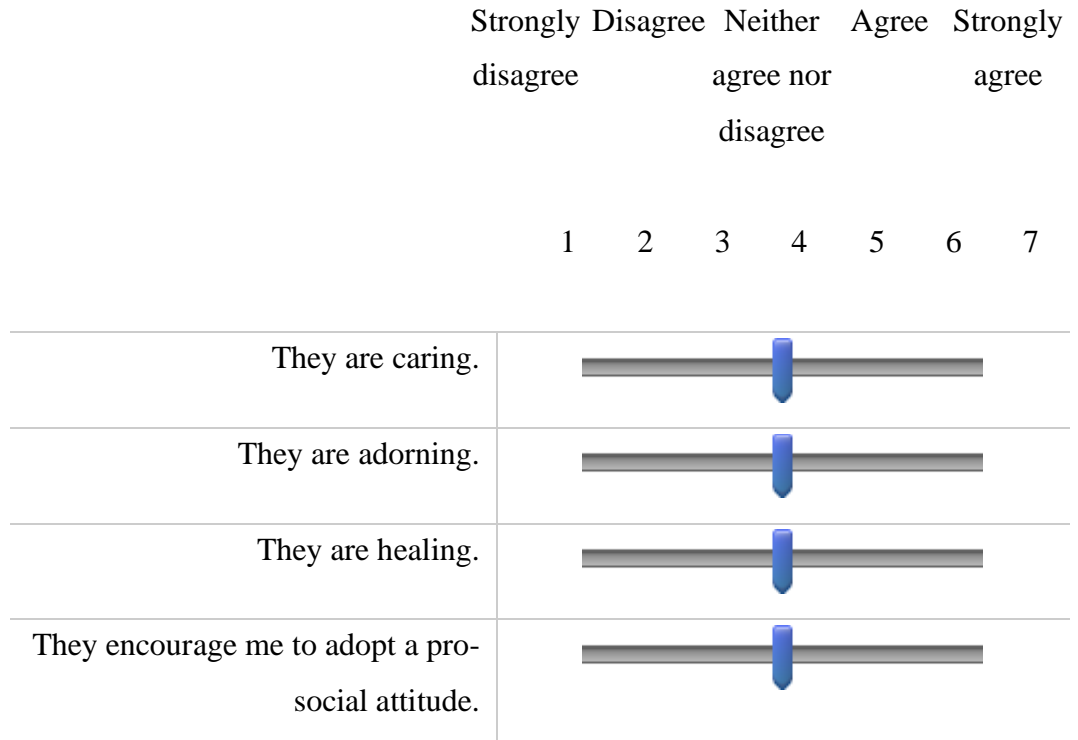Do you use makeup?

○ Yes

○ No

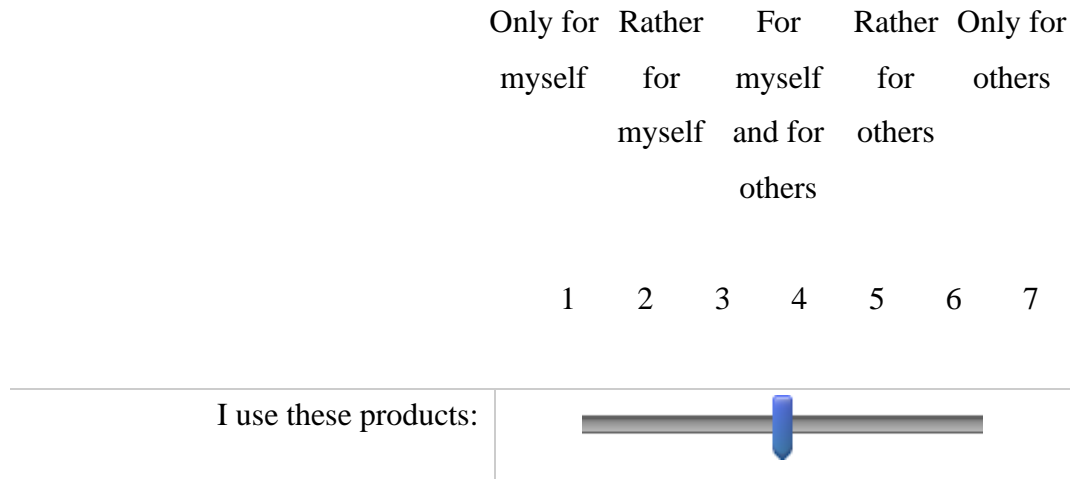**End of Block: Distribution of surveys**

Start of Block: Skin care

Picture yourself in a supermarket, you are in the cosmetics aisle of the store, and you are about to purchase your **favorite** skin care. Keep this specific product in mind.

Overall, what do you think of skin care products?

	Strongly disagree	Disagree	Neither agree nor disagree		Agree	Strongly agree
	1	2	3	4	5	6	7

They are caring.	
They are adorning.	
They are healing.	
They encourage me to adopt a pro-social attitude.	

Overall, what do you think of skin care products?

	Only for myself	Rather for myself	For myself and for others	Rather for others	Only for others
	1	2	3	4	5	6	7

I use these products:	

How would you qualify the image that you have about your favorite skin care brand?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
	1	2	3 4	5 6	7
Strong					
Favorable					
Unique					

Perceived quality: Regarding your favorite skin care product:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
	1	2	3 4	5 6	7
The product is of good quality/reliable.					
The product is healthy for me.					

Product loyalty: Regarding your favorite skin care product:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
	1	2	3	4	5	6	7
I would consider buying this product several times.							
I would be willing to pay a higher price for this product over others.							

Page Break

Before buying your product, you use a scanning app to judge the ingredient declaration of your favorite skin care product and learn that it is poorly rated. The app suggests you switch to an alternative product.

To what extent do you agree with the following statements:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
	1	2	3	4	5	6	7

I am willing to replace my favorite product with a skin care product that has a "higher grade" on a scanning app.	
I am willing to change skin application to adopt a "better rated" product (ex: replace a body cream with a pump with a solid body butter).	
I would be willing to pay a higher price for this "better" product over my favorite one.	

How would you qualify the image that you have about your favorite skin care brand, now that you know it is "poorly rated"?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree

	1	2	3	4	5	6	7
Strong							
Favorable							
Unique							

Perceived quality: Regarding your favorite skin care product, now that you know it is "poorly rated":

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree

	1	2	3	4	5	6	7
The product is of good quality/reliable.							
The product is healthy for me.							

Product loyalty: Regarding your favorite skin care product, now that you know it is "poorly rated":

	Strongly disagree	Disagree	Neither agree nor disagree	Disagree	Strongly agree
	1	2	3	4	5	6	7

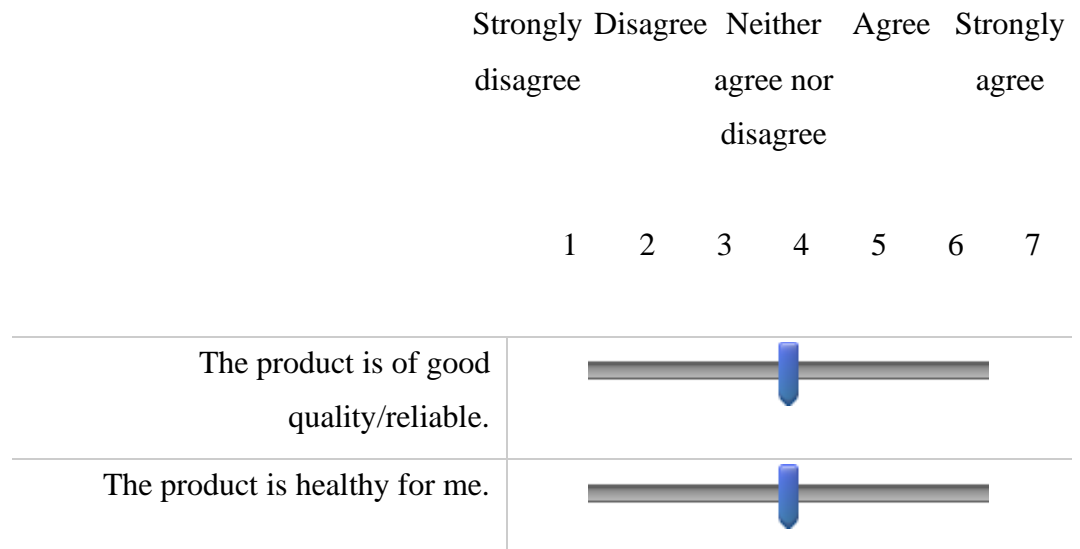|	
I would consider buying this product several times.	
I would be willing to pay a higher price for this product over others.	

End of Block: Skin care

Start of Block: Makeup

Picture yourself in a supermarket, you are in the cosmetics aisle of the store, and you are about to purchase your **favorite** makeup. Keep this specific product in mind.

Overall, what do you think of makeup products?

	Strongly disagree	Disagree	Neither agree nor disagree	Disagree	Strongly agree

	1	2	3	4	5	6	7
They are caring.							
They are adorning.							
They are healing.							
They encourage me to adopt a pro-social attitude.							

Page Break

Overall, what do you think of makeup products?

	Only for myself	Rather for myself	For myself and for others	Rather for others	Only for others

	1	2	3	4	5	6	7
I use these products							

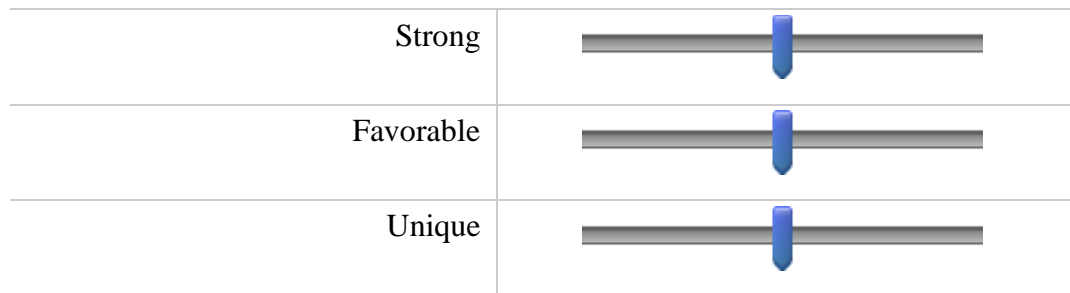How would you qualify the image that you have about your favorite makeup brand?

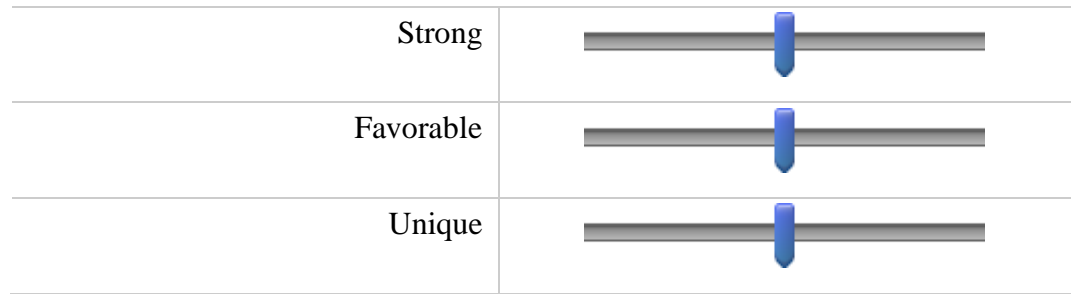|	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree

	1	2	3	4	5	6	7
Strong							
Favorable							
Unique							

Perceived quality: Regarding your favorite makeup product:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree		
	1	2	3	4	5	6	7
The product is of good quality/reliable.				●			
The product is healthy for me.				●			

Product loyalty: Regarding your favorite makeup product:

	Strongly disagree	Disagree	Neither agree nor disagree	Disagree	Strongly agree		
	1	2	3	4	5	6	7
I would consider buying this product several times.				●			
I would be willing to pay a higher price for this product over others.				●			

Page Break

Before buying your product, you use a scanning app to judge the ingredient declaration of your favorite makeup product and learn that it is poorly rated. The app suggests you switch to an alternative product.

To what extent do you agree with the following statements:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree		Strongly agree
	1	2	3	4	5	6	7

I am willing to replace my favorite product with a makeup product that has a "higher grade" on a scanning app.	
I am willing to change of direction of application to adopt a "better rated" product (ex: replace lipstick stick with a lipstick that is applied with the finger).	
I would be willing to pay a higher price for this "better" product over my favorite one.	

How would you qualify the image that you have about your favorite makeup brand, now that you know it is "poorly rated"?

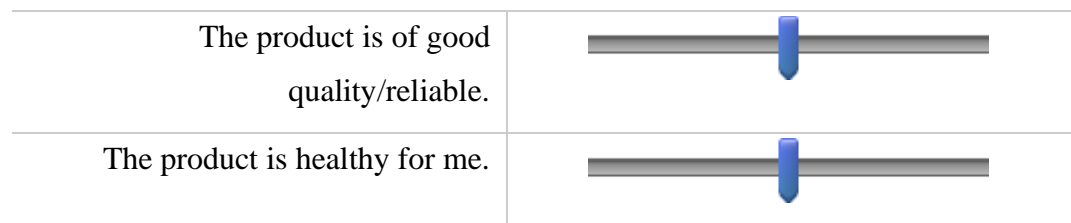|	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
	1	2	3	4	5	6	7
Strong							
Favorable							
Unique							

Perceived quality: Regarding your favorite makeup product, now that you know it is "poorly rated":

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
	1	2	3	4	5	6	7
The product is of good quality/reliable.							
The product is healthy for me.							

Product loyalty: Regarding your favorite makeup product, now that you know it is "poorly rated":

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
	1	2	3	4	5	6	7

I would consider buying this product several times.	
I would be willing to pay a higher price for this product over others.	

End of Block: Makeup

Exhibit 19: Credibility analysis of information channels – Trustworthiness

#	Field	Mean ▼	Std Deviation	Variance
1	A friend	1.84	1.09	1.19
3	A label or a certification (e.g., Ecocert)	2.73	1.16	1.34
4	A scanning app	2.89	1.05	1.11
5	A consumerist magazine (e.g.,60 Millions de consommateurs, LSA)	2.91	1.25	1.56
2	An ad	4.64	0.83	0.68

Exhibit 20: Credibility analysis of information channels - Expertise

#	Field	Mean ▼	Std Deviation	Variance
3	A label or a certification (e.g., Ecocert)	2.11	1.03	1.07
5	A consumerist magazine (e.g., 60 Millions de consommateurs, LSA)	2.17	1.31	1.73
4	A scanning app	2.88	0.89	0.80
1	A friend	3.45	1.40	1.95
2	An ad	4.40	0.89	0.79

Exhibit 21: Credibility analysis of information channels - Impartiality

#	Field	Mean ▼	Std Deviation	Variance
5	A consumerist magazine (e.g., 60 Millions de consommateurs, LSA)	2.21	1.25	1.57
3	A label or a certification (e.g.: Ecocert)	2.39	1.11	1.24
4	A scanning app	2.48	0.97	0.94
1	A friend	3.29	1.21	1.47
2	An ad	4.63	0.89	0.80

Exhibit 22: Credibility analysis of information channels - Availability

#	Field	Mean ▼	Std Deviation	Variance
4	A scanning app	2.30	1.29	1.66
1	A friend	2.49	1.27	1.61
3	A label or a certification (e.g.: Ecocert)	2.73	1.19	1.42
2	An ad	3.01	1.18	1.38
5	A consumerist magazine (e.g., 60 Millions de consommateurs, LSA)	4.47	0.97	0.95

Exhibit 23: Normality test for Skin care

Statistics

	DifferenceStrenghtSkinCare	DifferenceFavorabilitySkinCare	DifferenceUniquenessSkinCare	DifferenceReliabilitySkinCare	DifferencehealthySkinCare	DifferenceIntentionSkinCare	DifferencePremiumSkinCare
Skewness	-0,123	-1,012	-0,077	0,005	-0,169	-0,1	-1,034
Std. Error of Skewness	0,293	0,293	0,299	0,295	0,309	0,299	0,309
If z(skewness) < 1.96 (alpha=0.05), the distribution of this variable does not depart significantly from normality.	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
Kurtosis	-0,05	1,261	-0,591	-0,887	-0,71	-0,717	0,883
Std. Error of Kurtosis	0,578	0,578	0,59	0,582	0,608	0,59	0,608
If z(kurtosis) < 1.96 (alpha=0.05), the distribution of this variable does not depart - significantly from normality.	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE

Exhibit 24: Normality test for Makeup

Statistics

	DifferenceStrenghtMakeup	DifferenceFavMakeup	DifferenceUniqMakeup	DifferenceReliabilityMakeup	DifferenceHealthyMakeup	DifferenceIntentionMakeup	DifferencePremiumMakeup
Skewness	0,365	-0,454	-0,189	-0,074	0,41	0,235	-0,337
Std. Error of Skewness	0,347	0,347	0,347	0,34	0,34	0,343	0,357
If z(skewness) < 1.96 (alpha=0.05), the distribution of this variable does not depart significantly from normality.	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
Kurtosis	-0,254	-0,24	-0,596	-0,585	0,371	-0,91	-0,959
Std. Error of Kurtosis	0,681	0,681	0,681	0,668	0,668	0,674	0,702
If z(kurtosis) < 1.96 (alpha=0.05), the distribution of this variable does not depart significantly from normality.	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE

Exhibit 25: Respondents' perceptions of skin care products

Overall, what do you think of skin care products?

Field	Mean	Std Deviation	Variance
They are caring.	5.77	1.15	1.32
They are adorning.	4.90	1.21	1.45
They are healing.	5.50	1.24	1.54
They encourage me to adopt a pro-social attitude.	3.16	1.21	1.47

Overall, what do you think of skin care products?

Field	Mean	Std Deviation	Variance
I use these products:	2.94	1.34	1.79

Exhibit 26: Respondents' perceptions of makeup products

Overall, what do you think of makeup products?

Field	Mean	Std Deviation	Variance
They are caring.	3.98	1.53	2.33
They are adorning.	6.25	0.94	0.88
They are healing.	3.30	1.54	2.37
They encourage me to adopt a pro-social attitude.	5.13	1.54	2.37

Overall, what do you think of makeup products?

Field	Mean	Std Deviation	Variance
I use these products	4.00	1.56	2.45

Exhibit 27: Respondents' reaction towards the alternative skin care product

To what extent do you agree with the following statements:

Field	Mean	Std Deviation	Variance
I am willing to replace my favourite product for a skin care product that has a "higher grade" on a scanning app.	5.44	1.26	1.60
I am willing to change of skin application to adopt a "better rated" product (ex: replace a body cream with a pump by a solid body butter).	4.28	1.55	2.41
I would be willing to pay a higher price for this "better" product over my favorite one.	5.01	1.46	2.13

Exhibit 28: Respondents' reaction towards the alternative makeup product

To what extent do you agree with the following statements:

Field	Mean	Std Deviation	Variance
I am willing to replace my favourite product for a makeup product that has a "higher grade" on a scanning app.	5.25	1.34	1.80
I am willing to change of direction of application to adopt a "better rated" product (ex: replace lipstick stick to a lipstick that is applied with the finger).	4.08	1.58	2.50
I would be willing to pay a higher price for this "better" product over my favorite one.	5.08	1.44	2.07

Exhibit 29: Paired t-test for Skin Care

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	StrenghtSkinCareBefore *How would you qualify the image that you have about your favorite skin care brand? - Strong*	5,2419	62	1,06641	,13543
	StrenghtSkinCareAfter *How would you qualify the image that you have about your favorite skin care brand, now that you know it is "poorly rated" ? - Strong*	4,2742	62	1,08898	,13830
Pair 2	FavorabilitySkinCareBefore *How would you qualify the image that you have about your favorite skin care brand? - Favorable*	5,7121	66	1,01928	,12546
	FavorabilitySkinCareAfter *How would you qualify the image that you have about your favorite skin care brand, now that you know it is "poorly rated"? - Favorable*	3,7273	66	1,01596	,12506
Pair 3	UniquenessSkinCareBefore *How would you qualify the image that you have about your favorite skin care brand? - Unique*	4,3966	58	1,00768	,13232

	UniquenessSkinCareAfter *How would you qualify the image that you have about your favorite skin care brand, now that you know it is "poorly rated" ? - Unique*	3,2759	58	,98752	,12967
Pair 4	ReliabilitySkinCareBefore *Perceived quality: Regarding your favorite skin care product: - The product is of good quality/reliable.*	5,7424	66	,98153	,12082
	ReliabilitySkinCareAfter *Perceived quality: Regarding your favorite skin care product, now that you know it is "poorly rated": - The product is of good quality/reliable.*	4,0303	66	1,32398	,16297
Pair 5	HealthySkinCareBefore *Perceived quality: Regarding your favorite skin care product: - The product is healthy for me.*	5,2679	56	1,16761	,15603
	HealthySkinCareAfter *Perceived quality: Regarding your favorite skin care product, now that you know it is "poorly rated": - The product is healthy for me.*	2,5893	56	1,55828	,20823

Pair 6	IntentiontobuySkinCareBefore *Product loyalty: Regarding your favorite skin care product: - I would consider buying this product several times.*	5,8305	59	1,01968	,13275
	IntentiontobuySkinCareAfter *Product loyalty: Regarding your favorite skin care product, now that you know it is "poorly rated": - I would consider buying this product several times.*	3,4407	59	1,08709	,14153
Pair 7	PremiumpriceSkinCareBefore *Product loyalty: Regarding your favorite skin care product: - I would be willing to pay a higher price for this product over others.*	4,7667	60	1,48856	,19217
	PremiumPriceSkinCareAfter *Product loyalty: Regarding your favorite skin care product, now that you know it is "poorly rated": - I would be willing to pay a higher price for this product over others.*	2,8833	60	1,72805	,22309

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	StrenghtSkinCareBefore & StrenghtSkinCareAfter	62	,168	,192

		N	Correlation	Sig.
Pair 2	FavorabilitySkinCareBefore & FavorabilitySkinCareAfter	66	-,077	,539
Pair 3	UniquenessSkinCareBefore & UniquenessSkinCareAfter	58	,047	,727
Pair 4	ReliabilitySkinCareBefore & ReliabilitySkinCareAfter	66	,219	,077
Pair 5	HealthySkinCareBefore & HealthySkinCareAfter	56	,181	,181
Pair 6	IntentiontobuySkinCareBefore & IntentiontobuySkinCareAfter	59	,006	,962
Pair 7	PremiumpriceSkinCareBefore & PremiumPriceSkinCareAfter	60	-,294	,023

Paired Samples Test

| | | Paired Differences | | | | | | | |
| | | | | | 95% Confidence Interval of the Difference | | | | Sig. (2-tailed) |
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	
Pair 1	StrenghtSkinCareBefore - StrenghtSkinCareAfter	,96774	1,39046	,17659	,61463	1,32085	5,480	61	,000
Pair 2	FavorabilitySkinCareBefore - FavorabilitySkinCareAfter	1,98485	1,49350	,18384	1,61770	2,35200	10,797	65	,000
Pair 3	UniquenessSkinCareBefore - UniquenessSkinCareAfter	1,12069	1,37748	,18087	,75850	1,48288	6,196	57	,000

		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig.
Pair 4	ReliabilitySkinCareBefore - ReliabilitySkinCareAfter	1,71212	1,46513	,18035	1,35195	2,07230	9,494	65	,000
Pair 5	HealthySkinCareBefore - HealthySkinCareAfter	2,67857	1,76951	,23646	2,20469	3,15245	11,328	55	,000
Pair 6	IntentiontobuySkinCareBefore - IntentiontobuySkinCareAfter	2,38983	1,48576	,19343	2,00264	2,77702	12,355	58	,000
Pair 7	PremiumpriceSkinCareBefore - PremiumPriceSkinCareAfter	1,88333	2,59133	,33454	1,21392	2,55274	5,630	59	,000
Pair 4	ReliabilitySkinCareBefore - ReliabilitySkinCareAfter								

Exhibit 30: Paired t-test for Makeup

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	StrenghtMakeupBefore *How would you qualify the image that you have about your favorite makeup brand? - Strong*	5,5909	44	,94790	,14290
	StrenghtMakeupAfter *How would you qualify the image that you have about your favorite makeup brand, now that you know it is "poorly rated" ? - Strong*	4,3864	44	1,10424	,16647
Pair 2	FavorabilityMakeupBefore *How would you qualify the image that you have about your favorite makeup brand? - Favorable*	5,7826	46	,91683	,13518
	FavorabilityMakeupAfter *How would you qualify the image that you have about your favorite makeup brand, now that you know it is "poorly rated" ? - Favorable*	3,7391	46	1,20064	,17703
Pair 3	UniquenessMakeupBefore *How would you qualify the image that you have about your favorite makeup brand? - Unique*	4,7660	47	1,37070	,19994

	UniquenessMakeupAfter *How would you qualify the image that you have about your favorite makeup brand, now that you know it is "poorly rated" ? - Unique*	3,1064	47	1,40239	,20456
Pair 4	ReliabilityMakeupBefore *Perceived quality: Regarding your favorite makeup product: - The product is of good quality/reliable.*	5,8163	49	,83350	,11907
	ReliabilityMakeupAfter *Perceived quality: Regarding your favorite makeup product, now that you know it is "poorly rated": - The product is of good quality/reliable.*	4,0816	49	1,32030	,18861
Pair 5	HealthyMakeupBefore *Perceived quality: Regarding your favorite makeup product: - The product is healthy for me.*	3,7907	43	1,45665	,22214
	HealthyMakeupAfter *Perceived quality: Regarding your favorite makeup product, now that you know it is "poorly rated": - The product is healthy for me.*	1,5116	43	1,07730	,16429

Pair 6	IntentiontobuyMakeupBefore *Product loyalty: Regarding your favorite makeup product: - I would consider buying this product several times.*	6,2292	48	,72169	,10417
	IntentiontobuyMakeupAfter *Product loyalty: Regarding your favorite makeup product, now that you know it is "poorly rated": - I would consider buying this product several times.*	3,7500	48	1,61772	,23350
Pair 7	PremiumpriceMakeupBefore *Product loyalty: Regarding your favorite makeup product: - I would be willing to pay a higher price for this product over others.*	5,6364	44	1,22172	,18418
	PremiumpriceMakeupAfter *Product loyalty: Regarding your favorite makeup product, now that you know it is "poorly rated": - I would be willing to pay a higher price for this product over others.*	2,8182	44	1,93226	,29130

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	StrenghtMakeupBefore & StrenghtMakeupAfter	44	,488	,001

Pair 2	FavorabilityMakeupBefore & FavorabilityMakeupAfter	46	-,012	,935
Pair 3	UniquenessMakeupBefore & UniquenessMakeupAfter	47	,138	,356
Pair 4	ReliabilityMakeupBefore & ReliabilityMakeupAfter	49	-,138	,346
Pair 5	HealthyMakeupBefore & HealthyMakeupAfter	43	,510	,000
Pair 6	IntentiontobuyMakeupBefore & IntentiontobuyMakeupAfter	48	,032	,830
Pair 7	PremiumpriceMakeupBefore & PremiumpriceMakeupAfter	44	,030	,844

Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	StrenghtMakeupBefore - StrenghtMakeupAfter	1,20455	1,04725	,15788	,88615	1,52294	7,630	43	,000
Pair 2	FavorabilityMakeupBefore - FavorabilityMakeupAfter	2,04348	1,51960	,22405	1,59221	2,49474	9,121	45	,000
Pair 3	UniquenessMakeupBefore - UniquenessMakeupAfter	1,65957	1,82109	,26563	1,12488	2,19427	6,248	46	,000

Pair 4	ReliabilityMakeupBefore - ReliabilityMakeupAfter	1,73469	1,65549	,23650	1,25918	2,21021	7,335	48	,000
Pair 5	HealthyMakeupBefore - HealthyMakeupAfter	2,27907	1,29699	,19779	1,87992	2,67822	11,523	42	,000
Pair 6	IntentiontobuyMakeupBefore - IntentiontobuyMakeupAfter	2,47917	1,75025	,25263	1,97095	2,98739	9,814	47	,000
Pair 7	PremiumpriceMakeupBefore - PremiumpriceMakeupAfter	2,81818	2,25443	,33987	2,13277	3,50359	8,292	43	,000
Pair 4	ReliabilityMakeupBefore - ReliabilityMakeupAfter	1,73469	1,65549	,23650	1,25918	2,21021	7,335	48	,000