

## REVIEW ARTICLE

# Sustainable changes in beauty market trends focused on the perspective of safety in the post-coronavirus disease-19 period

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**Abstract**

**Background:** In February 2020, WHO announced the outbreak of coronavirus disease-19 (COVID-19) in a global epidemic, and the COVID-19 vaccine has recently been developed and approved in many countries to release disease radio waves. Immediately distributed and used to control and control infections. During the COVID-19 pandemic, the world closed extensively in beauty and beauty services to control the spread of the virus.

**Objectives:** Therefore, this study for the first time that the perspective of safety in sustainable may be applied to the entire alteration of beauty industry market in the post-COVID-19 pandemic for literature review.

**Methods:** A Narrative Review is proposed as a new report and commentary on the sustainable change of beauty market trends centered on safety due to the COVID-19 pandemic in December 2020. It was written with reference to keywords such as "Covid Beauty Market," "Covid Sustainable," "Covid clean beauty," and "Safety beauty." This study was performed by searching on PubMed, Google Scholar, Scopus, and ResearchGate. A total of 383 papers were retrieved, of which 36 were successfully included in this study.

**Results:** Analysis of customers and markets in the beauty industry since COVID-19 was absolutely required at this time. Harmful and safe edible ingredients of clean beauty perspective should be compared and analyzed. In addition, importance of sustainability value from a clean beauty perspective should be considered.

**Conclusion:** There is an era in which the perspective of safety in sustainable may be applied to the entire beauty industry today. In addition, depending on the customer's perception change, beyond the ingredients, raw material procurement of products, manufacturing process, product experiments, etc. are part of clean beauty to minimize carbon emissions, water use, recycle product containers, and reduce waste.

**KEYWORDS**

Beauty market, Clean beauty, COVID-19, Safety, Sustainable

## 1 | INTRODUCTION

Rubin CB, Brod B (2019) said that modern society is a generation different from the industrialization that has continued over the past 100 years. He said that he thinks that the era of clean beauty,

which has emerged from several years ago, can be applied to the overall beauty industry. I think that clean beauty can have a greater impact on the overall beauty industry, not just one category.<sup>1</sup> In addition, the Environmental Working Group (2019) revealed that the content that dermatologists know and what consumers know and

spread through the "Clean Beauty Movement" is a little different.<sup>2</sup> Goop (2019) has sparked fears of consumers who have so far only wanted and persisted in safe and non-toxic skin care. Nonetheless, the U.S. Food and Drug Administration (FDA) wants these labels to be clean and natural. These are not retailers, bloggers, and dermatologists. Celebrities who started to define clean beauty themselves began to promote and advertise clean beauty. The clean beauty movement has re-think about hundreds of compounds, in this respect, we need clean or natural products and consumers want and need to make them safer.<sup>3</sup> Rubin CB, Brod BA. (2019) numerous researchers in the Clean Beauty Movement have expressed a problem with parabens over the potential for endocrine disruption, but studies conducted with rat and yeast cells have shown that parabens have tens of millions of times more impact than the endogenous hormone estradiol. The research results came out with a weaker confirmation.<sup>4</sup> Jennifer Abbasi (2019) found that exposure of certain chemical ingredients in products such as toothpaste and cosmetics may be the reason why some girls quickly reach puberty.<sup>5</sup> Also, Kim G Harley et al. (2019) have proven its relevance in a study on the relationship between phthalates, parabens, and phenols, which are commonly used and found in personal care products, during early puberty in boys and girls.<sup>6</sup> Rubin et al. (2019) the terms "clean beauty" and "natural skin care" are said to be more comprehensive and broader than what the US pharmacies actually define "clean" and "natural."<sup>7</sup> However, Karien J Rodriguez et al. (2020) indicated, recently, disposable baby wipes have been popularized and are used in a variety of ways, including skin for infants and toddlers and the premature babies. Although it is effective and widely used for cleansing, public interest in safety and tolerability is increasing, and stability issues continue to be raised. And various regulations are in place<sup>8</sup> In addition, the severe acute respiratory syndrome coronavirus disease-19 (COVID-19, SARS-CoV-2) epidemic was first reported in December 2019, is spreading worldwide at an unprecedented rate, and the World Health Organization (WHO) has declared a pandemic. COVID-19 still seriously paralyzes health and society worldwide.<sup>9</sup> The COVID-19 pandemic caused by severe respiratory syndrome coronavirus 2 (SARS-CoV-2) has been shown to have a fatal effect mainly on the epithelium of the airways. Therefore, this crisis management is receiving more attention. Although this requires a more systematic investigation, it has been found that some symptoms are very important over the minor COVID-19. In the study of the skin symptoms of COVID-19, it may be helpful in classifying the risk groups such as early diagnosis.<sup>10</sup> Additionally, COVID-19 can cause a variety of viruses. This is because they can naturally resist SARS-CoV-2 infection through their innate immune system, but a variety of mutant viruses can occur, requiring thorough preparation.<sup>11</sup>

Therefore, this study comprehensively and systematically investigates the trends in the clean beauty market from the perspective of consumers in the post-COVID-19 era. It is hoped that this study will be used as a marketing material for the beauty and cosmetics industry in the future from the perspective of clean beauty of consumers

that have changed since COVID-19. This review paper is a literature review, and the method is a narrative review, which uses a method of reviewing and introducing all existing published studies on the subject.

## 2 | MATERIALS AND METHODS

A Narrative Review is proposed as a new report and commentary on the sustainable change of beauty market trends centered on safety due to the COVID-19 pandemic in December 2020. It was written with reference to keywords such as "Covid Beauty Market," "Covid Sustainable," "Covid clean beauty", and "Safety beauty." This study was performed by searching on PubMed, Google Scholar and Scopus, ResearchGate. A total of 383 papers were retrieved, of which 38 were successfully included in this study. As a result, the importance of harmful and harmful ingredients, safe and edible natural ingredients, and sustainability value from the perspective of sustainable safety and customer and market analysis of the beauty industry after Corona 19 was analyzed and presented in four tables.

## 3 | RESULTS

### 3.1 | Analysis of customers and markets in the beauty industry since COVID-19

COVID-19 SARS-CoV-2 is a big event around the world. During the COVID-19 pandemic, Australia was forced to shut down beauty and beauty services to control the spread of the virus. This may be a reason for safety concerns: COVID-19 restrictions could have been avoided from the pressure on appearance due to the use of masks, but with prolonged wearing of masks, appearance-oriented behaviors began to emerge. From the COVID-19 pandemic, depression and psychological behavior began to emerge. There are also issues regarding health. This requires interest in appearance or a more understanding of the long-term effects.<sup>12</sup> Most businesses have worked from home, and when ordered to work from home, health anxiety, financial anxiety, and loneliness increase. In addition, the impact of COVID-19 on daily life was related to health anxiety, financial anxiety, and social support, but loneliness and negative associations are also emerging, which requires research. It emphasizes the importance of social connections and multifaceted issues to do so.<sup>13</sup> For these reasons, the 2019 COVID-19 pandemic is very destructive and sudden changes have the potential to cause serious mental health problems. For the impact of the COVID-19 pandemic on mental health and quality of life, we underscore the importance of having an effective social system for leading a healthy and beautiful life.<sup>14</sup> Table 1 summarizes the beauty industry customers and market analysis after COVID-19.

TABLE 1 Analysis of customers and markets in the beauty industry since COVID-19

NO	Journal name	Author	Title	Discussion	References
1	<i>Int J Eat Disord</i>	Pikoos TD, Buzwell S, Sharp G, Rossell SL N <i>et al.</i> (2020)	The COVID-19 pandemic: Psychological and behavioral responses to the shutdown of the beauty industry.	While COVID-19 restrictions may have provided a break from societal appearance pressure for those with low dysmorphic concern, appearance-focused behaviors persisted in individuals with high dysmorphic concern.	12
2	<i>Psychiatry Res</i>	Tull MT, Edmonds KA, Scamaldo KM, Richmond JR, Rose JP, Gratz KL <i>et al.</i> (2020)	Psychological Outcomes Associated with Stay-at-Home Orders and the Perceived Impact of COVID-19 on Daily Life.	Emphasizes the importance of social connections to mitigate the negative psychological consequences of the COVID-19 pandemic.	13
3	<i>Saudi J Med Med Sci</i>	Alyami M, de Albuquerque JV, Krägeloh CU, Alyami H, Henning MA <i>et al.</i> (2020)	Effects of Fear of COVID-19 on Mental Well-Being and Quality of Life among Saudi Adults: A Path Analysis.	Emphasizes the importance of having effective social systems in place to minimize the impact of the COVID-19 pandemic on mental well-being and quality of life.	14

### 3.2 | Harmful ingredients from the viewpoint of sustainable safety

In many countries, mask wear has increased due to the COVID-19 epidemic and other reasons. Nevertheless, women do not stop wearing basic makeup and color makeup to maintain their beauty.<sup>15</sup> Previously, the trend of the beauty market paid attention to “adding” ingredients, but after COVID-19, it was converted to “free from,” which is a new feature of the beauty market. As customers change their perception, sourcing of raw materials for products, manufacturing processes, and product experiments beyond ingredients have become a new important part of Clean Beauty, from carbon emission, minimization of water use, recycling of product containers, and reduction of waste. Many of the ingredients that have been criticized for their safety are changing accordingly, as companies try to “greenwash” their products to make their products more attractive to consumers who want clean beauty products. So, in July 2018, Whole Foods have released an updated list of ingredients that are not allowed. These ingredients list more than 400 ingredients based on criteria that are not suitable for premium body care lines.<sup>16</sup> Now it inspires fear in consumers who want to use products made with ingredients that are safe and non-toxic, that is, consumers who focus on clean skin care. Monitoring of heavy metals, especially allergen metals, has a great influence on consumers’ purchasing behavior as cosmetics use increases and population allergy cases increase. In addition, to evaluate the safety of cosmetics, the safety of metals was evaluated. There is a study that cosmetic contact dermatitis may be due to the content of allergen metals in the product.<sup>17</sup> Metals occur naturally in rocks, soil, and water that remain in the environment. Because of this, the metal remains in the process for the manufacture of pigments and other various raw materials used primarily in the cosmetic industry. Therefore, many people have natural contact with metals that have trace contaminants in cosmetics they use every day. This is an undeniable reality: the metals in the cosmetics we use can come into direct contact with the skin, breathe, and be absorbed in various forms and uses. Also, the metals contained in cosmetics can cause local skin problems, but they can also cause problems to the whole body after being absorbed or ingested naturally through the skin. Nevertheless, cosmetic companies are not obligated to report on non-metallic impurities contained in these kinds of metals. Consumers do not have a way to check for these issues; many consumers understand that they are made with ingredients that are suitable for the purpose or intent of the cosmetic product. This is because we know that prohibited toxic substances or hidden impurities are prohibited.<sup>18</sup> It is summarized in Table 2 of hazardous and hazardous ingredients from the perspective of sustainable safety.

### 3.3 | Safe and edible natural ingredients from a clean beauty perspective

Consumers today want safe and edible natural ingredients. Most oral and topical supplements are based on or contain many plant ingredients. Many of them have a long history of using traditional or

TABLE 2 Harmful ingredients from the viewpoint of sustainable safety

NO	Journal name	Author	Title	Discussion	References
1	<i>Environ Res</i>	Shomar B, Rashkeev SN <i>et al.</i> (2021)	A comprehensive risk assessment of toxic elements in international brands of face foundation powders.	The health risk assessment associated with women's regular use of face foundation is dynamic with the new product.	15
2	<i>J Cosmet Sci</i>	Sipahi H, Charehsaz M, Güngör Z, Erdem O, Soykut B, Akay C, Aydın A <i>et al.</i> (2015)	Risk assessment of allergen metals in cosmetic products.	Contact dermatitis caused by cosmetics is most likely due to a metal allergen in the product.	17
3	<i>Regul Toxicol Pharmacol</i>	Bocca B, Pino A, Alimonti A, Forte G <i>et al.</i> (2014)	Toxic metals contained in cosmetics: a status report.	This is because it is banned as a deliberate ingredient in cosmetics, has draft restrictions as a potential impurity in cosmetics, and is known to be toxic.	18

folk medicine, and there is consumer belief in it. Some of the available products derived from vegetable ingredients have dermatological benefits. It is well documented so that many people know and understand its efficacy.<sup>19</sup> Recently, due to the issue of immunity, consumption of probiotics to be eaten and probiotics to be applied continues. The biological functions of probiotics, which act as immunity to the skin, and their actions, when applied to the skin, can not only improve the skin's properties against bacteria, but also suppress or eliminate inflammation. The same result was also proved in clinical studies to determine the effect of substances extracted and isolated from lactic acid bacteria on chemical stimulation, skin microbes, skin barrier improvement due to acne, and reduction of erythema (red spots). As a result, lactic acid bacteria extract is effective in reducing skin erythema, restoring skin barriers, and reducing skin microbes, resulting in good results by reducing the size of acne lesions and erythema by 5%.<sup>20</sup> In addition, probiotics acting on the skin play an important role in skin diseases and skin problems including blemishes and blemishes due to anti-inflammatory activity, antioxidant activity, UV protection, and inhibition of tyrosinase activity.<sup>21</sup> In addition, a lot of research has already been done on the relationship of the skin to the vitamins to be eaten. The process that occurs in the flesh of cut fruit has a form similar as the process of making melanin in human skin cells. The skin has been shown to be able to differentiate itself by making the difference and the benefits of formulations containing azelaic acid, a primarily known skin whitening ingredient, to minimize dullness and pigmentation in various areas.<sup>22</sup> The natural ingredients we are familiar with are mainly used in a variety of ways to improve various cosmetic problems such as fine lines, deep wrinkles, tone, and textures. These ingredients found in nature primarily have excellent antioxidant and anti-inflammatory properties. Some, such as mushroom extract, have a regenerative function that accelerates skin transformation. The skin molecules that provide structure and elasticity to the skin can be newly restored. In addition, natural plants such as green tea protect the skin from light damage from UV-induced DNA damage. It is said that the cosmetic benefits of mushrooms are related to their ability to improve the appearance of the skin. The healing effect of the wheat complex on damaged hair is also covered.<sup>23</sup> Photoaging due to light is a major concern for dermatology. Many of the dermatologists due to photoaging have a desire to use natural ingredients as treatments. Mushroom, Fever Pew, Green Tea, Licorice, Olive Oil, Soybean, and Coffee Berry have special properties in antioxidants, and studies have shown that they play an important role in the treatment and prevention of skin photoaging. Recently, selected basic science and clinical studies examining the main principle of action, structure, and efficacy of these ingredients are being discussed.<sup>24</sup> These natural ingredients have traditionally been used continuously for thousands of years. It is known that creams, lotions, and other medicines for healing through treatment through traditional medicine and various cultures are formulated and processed for therapeutic purposes and applied and used in a specific form suitable for this purpose. Clinical and laboratory studies over the past 20 years have identified the benefits of a variety of natural ingredients for skin care. As a result, these various

natural ingredients and compounds are developed and used in various ways for use in anti-aging effects as well as skin diseases today. Ingredients such as colloidal oatmeal and aloe vera are also known to be beneficial in treating psoriasis and atopic dermatitis, respectively. It has also been shown to inhibit the occurrence of inflammation. Green tea and niacinamide have also been shown to be effective in lowering acne and rosacea. Licorice, green tea, arbutin, soybean, acai berry, turmeric, and pomegranate are the most effective and helpful plants and compounds in terms of hyperpigmentation and antioxidant function.<sup>25</sup> Table 3 summarizes safe and edible natural ingredients from the point of view of clean beauty.

### 3.4 | Importance of sustainability value from a clean beauty perspective

According to the consumer's choice, living organisms through nature have been well adapted over time. Accordingly, various survival studies have been conducted. In that respect, Moorea Lagoon's shallow water has a microbial mat called "co para" in the Polynesian word. It is rich in film-forming exopolysaccharides (EPS) that are secreted by microorganisms within the biofilm. This is a kind of survival strategy to protect yourself from this changing environmental stress. A manufacturing process has been developed to obtain EPS that is beneficial to the skin using blue biotechnology. The active ingredient (EPS-229) protects against urban pollution in a complex society including free radicals, heavy metals, hydrocarbons, and PM 2.5 (particulate matter less than 2.5  $\mu\text{m}$ ).<sup>26</sup> We humans are also a part of the earth, and if we cannot harmonize with the environment in this earth, sustainable growth will be difficult. Therefore, consumer interest in this and new problems of governments in each country will arise, and systematic preparations for the trend must be continued. Will be. The word "ESG" is frequently encountered in various news recently. ESG refers to the increasing interest in natural conditions or social situations that directly or indirectly affect living organisms and all types of human groups that live in common life, and these are a movement related to the increasing size and power of the organism. It will change to a different direction or state. With the creation of regulations that cost carbon emissions, the framework of border recognition that fundamentally defines the opinions and thinking of people in various major industries is being transformed. Environmental Working Group (EWG)'s safe skin, that is, a collection of organically combined and stored data that is jointly needed, scores thousands of products based on the estimated toxicity of the ingredients.<sup>1</sup> The EWG Safe Skin Database calls attention to consumer exposure to chemical sunscreen ingredients.<sup>27</sup> It turns out that EWG can create clean beauty; there are many ways to assess risk, and it is not just data driven. EWG also has research results that show that consumers have benefited from participating in an affiliate program that receives a certain percentage of sales when consumers make purchases through various online sites through web sites. As such, various studies on EWG are being conducted. It is reality. Meanwhile, CIR (Cosmetic Ingredient Review) is a major

TABLE 3 Safe and edible natural ingredients from a clean beauty perspective

NO	Journal name	Author	Title	Discussion	References
1	<i>Dermatol Ther</i>	Baumann LS. (2007)	Less-known botanical cosmeceuticals.	Several products derived from plant sources are touted for dermatological benefits.	19
2	<i>J Cosmet Sci</i>	Muizzuddin N, Maher W, Sullivan M, Schmittger S, Mammone T et al. (2012).	Physiological effect of a probiotic on skin.	Nutritional products containing prebiotics and/or probiotics have a positive effect on the skin by regulating the immune system and providing a therapeutic effect for atopic diseases.	20
3	<i>J Cosmet Dermatol</i>	Piyavatin P, Chaichalotornkul S, Nararatwanchai T, Bumrungrert A, Saitwichai T et al. (2021).	Synbiotics supplement is effective for Melasma improvement.	Oral synbiotics supplementation for 12 weeks improved the severity of melasma score.	21
4	<i>J Drugs Dermatol</i>	Bowe WP, Pugliese S et al. (2014).	Cosmetic benefits of natural ingredients.	Mushrooms, feverfew, green tea, licorice, olive oil, soy, and coffee berry have been shown to have antioxidant properties and may play a role in the treatment and prevention of photoaging.	24
5	<i>J Drugs Dermatol</i>	Fowler JF Jr, Woolery-Lloyd H, Waldorf H, Saini R et al. (2012)	Innovations in natural ingredients and their use in skin care.	For combating acne and rosacea, green tea, niacinamide, and feverfew are considered efficacious.	25



TABLE 4 Importance of sustainability value from a clean beauty perspective

NO	Journal name	Author	Title	Discussion	References
1	<i>J Cosmet Sci</i>	Borel M, Lamarque E, Loing E et al. (2017)	Unique natural exopolysaccharides for biomimetic protective effect against urban pollution.	As a biomimetic shield at the surface of the skin, EPS-229 provides an immediate multiprotective action that efficiently fights the harmful effects of urban pollution and smog.	26
2	<i>Curr Opin Allergy Clin Immunol</i>	Deza G, Giménez-Arnau AM et al. (2017)	Allergic contact dermatitis in preservatives: current standing and future options.	While the prevalence of contact allergy to parabens has remained stable over the past few decades, iodopropynyl butylcarbamate is a new allergen with increasing prevalence.	27
3	<i>Int J Nanomedicine</i>	Ganesan P, Choi DK et al. (2020)	Current application of phytocompound-based nanocosmeceuticals for beauty and skin therapy.	The use of botanical compounds in a variety of cosmeceutical products, nano-delivery technologies used to deliver botanical compounds to a variety of cosmeceuticals, and various nano-sized botanical compounds used in the development of novel nanocosmeceuticals to enhance skin-based treatments are widely used.	34

technology composed of experts in various fields such as dermatology and toxicology. CIR's claims are confirmed by new scientific evidence available to the reader. As a result of such studies, they proved that propylene glycol, parabens, sulfates, and many other ingredients proven in the Clean Beauty Movement are non-toxic and non-carcinogenic.<sup>28</sup> Table 4 summarizes the importance of sustainability values from the point of view of clean beauty.

## 4 | DISCUSSIONS

Hygiene and cleanliness are becoming more important than anything else due to a lifestyle that values health and immunity after COVID-19, and as masks are used day by day, more people complain of skin problems, and the need for skin soothing and moisturizing products is emerging. When the weather gets hot, the skin inside the mask is itchy or tingling, along with a clear blister like millet. Cosmetics companies have successively introduced soothing products that soothe the skin. There were also various types of toners, powders, creams, cleansers, and mists. Beauty home care products that emphasized that they are good cosmetics for skin irritated by the heat received new attention. With the spread of "good consumption" among the younger generation, vegan cosmetics suitable for the era of writing environment have emerged as a new area. Products advocating a clean beauty brand that considered skin health and the environment were also launched one after another, forming a meaningful flow. Consumers and some scientists also want to mention the accessibility to detailed information on the key ingredients of these products, such as cosmetic ingredients, safety, and stability.<sup>29</sup> Heavy metal contamination in cosmetics is an important situation. It was carried out to assess the concentration of heavy metals (HM) in various cosmetic brands with a particular focus on health risk assessment in heavy metal assessment and health risk assessment studies in cosmetics. Five heavy metals, including Cd, Cr, Fe, Ni, and Pb, were quantified in precise amounts in a variety of product lotions, foundations, whitening creams, lipsticks, hair dyes, and sunscreen creams using atomic absorption spectroscopy. Therefore, to maintain human safety, social welfare, and order, we conducted research by monitoring and observation, especially regarding the incorporation of microbial impurities or foreign substances into HM. The LCR value was higher than the allowable limit of all cosmetics except lipstick. Regular use of these products poses a serious threat to human health, especially skin cancer after prolonged exposure. The findings of this study therefore indicated that to ensure human safety and security, continuous monitoring of cosmetics, especially with regard to HM contamination, should be adopted.<sup>30</sup> Recently, it has been scientifically tested for the use of certain plant ingredients, and then it is talking about the necessary functions in clinical and bench studies. Related discoveries regarding the principle of the proposed biological action or structure have been turned into clinical practice. Plant compounds that have emerged for skin and cosmetic applications include olive oil, chamomile, colloidal oatmeal, oat kernel extract, fever pew, acai berry, coffee berry, curcumin, green tea,

pomegranate, licorice, paper mulberry, arbutin, and soybeans. Most of these botanical gardens offer rapid biological properties that require additional *in vitro* and *in vivo* investigations to adequately educate people with skin diseases or us for over-the-counter products based on these ingredients.<sup>31</sup> In addition to standardized treatments in the United States, treatments used by patients, dietary or folk remedies, and herbal remedies (CAM) are preferred and used by consumers. In this area of health care, oral and topical herbal supplements are the most frequently used alternatives. It has become one of the therapies. Most herbal supplements are based on or contain the main ingredients of several plants with a long history in traditional or folk medicine. Some of the many plant-based ingredients on the market today are believed to be beneficial for dermatology. The focus is on one of the plant compounds with a long tradition in Asian medicine, including curcumin, ginkgo, ginseng, silymarin, soybean, and tea tree oils, which have a long tradition in Asian medicine. Application. Arnica, bromelain, chamomile, pomegranate, caffeine, green tea, licorice, and resveratrol also have these benefits.<sup>32</sup> Herbal medicines are loved by consumers as an alternative to existing synthetic medicines and are sought by patients for treatment of chronic skin diseases and cosmetic treatments. Production and distribution of plant extract extensive studies on the principle of action, structure, safety, physiological stability, and optimal dosage have been overlooked because they are used without special restrictions. One of the main pathways for polyphenols as a natural supplement is to suppress oxidative stress. As a defense principle or structure of the body characteristics that cause some diseases, supplements according to this can be used as an important prevention and treatment strategy, which can function to remove oxidative stress.<sup>33</sup> Phytochemical compounds have been used a lot since the past. This has shown the potential for cosmetic applications, including sunscreen, moisturizing and anti-aging, and skin-based therapies as a major function for cosmeceuticals. The main concerns of the use of botanical cosmeceuticals are the low penetration and high compound instability of various cosmetics for the delivery of compounds based on cosmetics, and it is consistently confirmed whether it is possible for skin therapy. Various studies have been conducted to overcome these shortcomings. Nano-sized delivery technology is currently being used in cosmetics sector and in products for continuous and improved delivery of plant-derived biologically active compounds, and its efficacy has also been proven. In the future, there is a need for an evolution of cosmetics used for the use of plant compounds in various cosmeceutical products and for delivery of plant compounds to various cosmeceuticals. There is a need for a variety of studies on nano-delivery technology, the development of new nano-cosmetics for improving skin-based treatments.<sup>34</sup> PG derived from renewable resources makes a more realistic platform for sustainable sustainability can be provided. More active efforts will be needed to develop new ingredients with advanced performance in new cosmetic applications.<sup>35</sup>

Therefore, it can be said that the environment changed after COVID-19 is returning the shock of the past industrialization era to

mankind. A theme that appears in all industries amidst this change of mankind has been discussed for a long time, but it is the problem of the future environment in which our human beings are not properly improved and preserved.<sup>36</sup>

## 5 | CONCLUSIONS

There is an era in which the perspective of safety in sustainable may be applied to the entire beauty industry today. In addition, depending on the customer's perception change, beyond the ingredients, raw material procurement of products, manufacturing process, product experiments, etc. are part of clean beauty to minimize carbon emissions, water use, recycle product containers, and reduce waste.

### CONFLICT OF INTEREST

The authors of this manuscript do not have any conflicts of interest to disclose.

### ETHICAL STATEMENT

The conducted literature review did not require the agreement of the bioethics committee.

### AUTHOR CONTRIBUTIONS

Jinkyung Lee and Ki Han Kwon involved in conception or design of the work, interpretation, drafted the article, and critically revised of the article. All authors finally approved the version to be published.

### DATA AVAILABILITY STATEMENT

The findings of this study are available from the corresponding author upon reasonable request.

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