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Greener Horizons: A Comprehensive Overview on Green Cosmetics Movements

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Abstract: ***The evolution of cosmetics, from ancient rituals to contemporary innovations, reflects humanity's ongoing pursuit of beauty and self - care. This review explores the history, classification, and regulatory frameworks of cosmetics, with a focus on the rise of green and herbal alternatives. Growing environmental awareness and consumer demand for safer, sustainable products have driven a shift toward eco - friendly formulations, cruelty - free practices, and organic ingredients. Green cosmetics use naturally derived components and emphasize sustainability, health, and ethical sourcing. Technological advances such as green chemistry and improved extraction methods have further enabled this transformation. Despite rapid market growth, challenges like greenwashing, limited shelf life, and production costs remain. This article also analyzes current market trends, consumer behavior, and the impact of celebrity endorsements and social media in shaping the green cosmetics movement. By integrating science, sustainability, and ethical values, green cosmetics offer a viable path forward for the industry, promoting responsible beauty that benefits both consumers and the planet.***

Keywords: Green Cosmetics, Herbal Products, Sustainable Beauty, Cosmeceuticals, Eco - friendly Formulations, Cosmetic Regulations

Abbreviations

- BCE: Before Common Era or Before Current Era or Before Christian Era
- CE: Common (or Current) Era
- BB: Beauty Balm or Blemish Balm
- BC: Before Christ
- D&C Act: The Drugs and Cosmetics Act, 1940
- US: United States
- FDA: Food and Drug Administration
- pH: Power of Hydrogen/ potential of hydrogen
- USD: United States Dollar
- USDA: U. S. Department of Agriculture
- CO_2: Carbon Dioxide
- MAE: Microwave Assisted Extraction
- ECOCERT: Ecological Certification
- COSMOS: Cosmetic Organic and Natural Standard

1. Introduction

The history of cosmetics and beauty products is as old as civilization and human evolution. In both the physical and social realms of life, every human being strives to be their best, including their fiancé's attraction. As a result, using makeup has become commonplace for people of various ages and geographical locations. [1]

A wild individual with few material belongings, who depends on hunting and fishing for their daily food, may also affix feathers to his hair, decorate his body with murals, and arrange his hair in fanciful ways because it brings him joy, elevates him in the eyes of other creatures, and holds magical meaning for him. This mindset has existed in India from ancient times, and there is a wealth of recorded evidence supporting the advancement of beauty aids and cosmetics. [2]

1.1. Cosmetics

The use of cosmetics dates back thousands of years, with various civilizations contributing to their development for aesthetic, cultural, and medicinal purposes.

Ancient Civilizations (4000 BCE – 500 CE):
In **Egypt**, cosmetics served both beautification and protective purposes, with ingredients like malachite, kohl, and beeswax used for eye makeup and skin care. **Mesopotamians** used rose and myrrh scents, bone powder, and crushed gemstones for face and lip color. In **Greece and Rome**, natural substances such as olive oil, herbs, and crushed mulberries were used in skin, hair, and theatrical cosmetics. **China**, **Japan**, and **India** developed distinctive traditions, including rice powder, vermilion, herbal skincare, kajal, and henna, with strong ties to Ayurvedic and cultural practices. **Korean** and **Southeast Asian** cosmetics emphasized natural beauty and plant - based skincare using ginseng and green tea.

Middle Ages to Industrial Revolution (500 – 1900 CE):
Cosmetics use declined in medieval **Europe** due to religious opposition, though nobles discreetly used perfumes. In contrast, the **Arabic world** preserved and advanced perfumery using rosewater and herbal extracts. The **Renaissance** revived cosmetic use in **Italy** and **France**, laying the foundation for modern brands like Guerlain and Chanel. Industrial production began in **England**, making skincare and beauty products more accessible.

20th Century to Present:
The early 1900s saw the rise of major cosmetic companies such as Max Factor and Revlon. By the 1960s–1990s, interest grew in anti - aging, sun protection, and eco - conscious beauty. The **green movement** drove demand for sustainable

cosmetics. In the 21st century, globalization, social media, and technological innovations (e. g., nanotech, stem cell skincare) have transformed the industry. Consumers increasingly seek clean, ethical, and environmentally friendly cosmetic solutions. [3 - 4]

The Greek word "kosm tikos, " which means "capable of arrangement, skilled in decoration, " is where the word "cosmetic" comes from. It gives "kosmein" to adornment and "kos - mos" to order and harmony. [5] The history of cosmetics has been continuously recounted throughout human history. In prehistoric times, circa 3000 BC, man used colors as ornaments to attract the animals he wished to hunt. He also adorned his body and skin with colors to protect himself from enemy attacks, making the opponent (human or animal) terrified of him. [6 - 7] Superstition, religion, warfare, and hunting are the origins of cosmetics. They were later connected to medicine. [8]

Cosmetics, also referred to as makeup, are used to protect, maintain, and beautify skin, teeth, hair, and nails. [9] For those with appearance schemas, cosmetics boost body image, draw attention to features, and conceal faults. Women frequently use lipstick, mascara, foundation, hair color, and nail paint on a daily basis. [10]

Generally speaking, cosmetics are applied directly to the body's exterior surfaces to serve four purposes:

(1) to keep the body in excellent shape,
(2) to alter look
(3) for defense, and
(4) for body Odor correction. [11 - 12]

1.1.1. Cosmetics Definition Acc. To D&C Act:

The use of any preparation or material intended to be rubbed, poured, sprinkled, sprayed, inserted into, or applied to any portion of the human body for the purposes of cleaning, perfuming, beautifying, enhancing attractiveness, or altering appearance is prohibited by the Drug and Cosmetic Act of 1940. This ban also applies to compounds intended for use as cosmetic ingredients. Cosmetics are not covered by a drug license preview. [13 - 15]

1.1.2. Cosmetics Classification:

1) Personal hygiene cosmetics (shampoos, deodorants, and soaps);
2) Skin and hair care cosmetics (toothpaste, topical care products);
3) Embellished cosmetics (perfumes, lip colors);
4) Cosmetics for protection (sunscreen and anti - wrinkle products);
5) Cosmetics for correction (face masks, hair dyes);
6) Cosmetics for maintenance (shave creams, moisturizers); and
7) Cosmetics for activity (antiseptics, fluoride toothpaste). [16]

1.1.3. Cosmetics objectives:

Applying cosmetics has three goals (Harry, 1962): psychological, social, and clinical. Applying cosmetics has a significant psychological impact that gives users mental fulfilment. When applied skillfully, cosmetics can frequently conceal or lessen skin and face imperfections while also elevating the sufferers' outlook on life. [17]

1.1.4. Cosmeceuticals:

Topical cosmetic - pharmaceutical mixtures known as "cosmeceuticals" are intended to enhance the biological characteristics of the skin in order to improve its function and beauty. The term "cosmeceuticals" was first used in 1961 by Raymond Reed, a founding member of the US Society of Cosmetics Chemist. The term is also credited to Dr. Albert Kligman. He explained a product category that is a cross between cosmetics and drugs.

These days, it's commonly used to describe a cosmetic product that may or may not have biologic therapeutic effects in addition to pharmacological ones. [18] The biological activity of a cosmeceutical on live tissue is what distinguishes it from a medicine. Another important distinction is that cosmeceuticals are not regulated by the U. S. Food and Drug Administration (FDA), therefore they are not subject to premarket regulations for evidence of safety or efficacy. [19] Cosmetic products are often tested in vitro using silicone skin replacements, and at most, clinical trials are small - scale, open - label research that are usually supported by the cosmetics industry itself. The strict testing regulations that apply to medications do not apply to cosmetics. Their only source of assistance was the Ayurvedic collection of natural wisdom. The science of Ayurveda used a variety of plants and herbs to make cosmetics that were both aesthetically pleasing and shielded from external factors. The botanicals' natural components provide the body with nutrition and other healthy minerals without endangering people. A drug license preview does not cover the cosmetic. [20] The general belief that chemical - based cosmetics are harmful to the skin and consumers' increasing awareness of the advantages of herbal products have led to a desire for natural ingredients and natural extracts in cosmetic preparations. The growing demand for natural goods has created greater prospects for the cosmeceutical industry. [21] According to the Drug and Cosmetics Act, herbs and essential oils used in cosmetics cannot be said to have any therapeutic value or to permeate past the outer layers of the skin. [22]

1.1.5. Regulatory Status

Cosmeceuticals - cosmetics or drugs?

The legal classification of a product as a drug or cosmetic depends on its intended use. However, the boundary between these categories is often unclear, and some products may fall into both—especially when they offer therapeutic as well as aesthetic benefits.

Unlike drugs, cosmetics are generally not subject to pre - market approval by regulatory authorities like the FDA. In contrast, claims made by drugs undergo strict scientific review. The term *cosmeceuticals*—commonly used for products that lie between cosmetics and pharmaceuticals—is not legally recognized under the U. S. Federal Food, Drug, and Cosmetic Act, leading to confusion among consumers and regulators.

Globally, regulatory classifications vary. For example, Thailand recognizes “controlled cosmetics, ” Japan classifies some products as “quasi - drugs, ” and Hong Kong has “cosmetic - type drugs. ” This lack of uniformity complicates international marketing and product development. [8, 14, 23 - 26]

The rapid growth of the cosmetics industry is driven by consumer demand, innovative ingredients, and advances in

dermatological science. Cosmeceuticals represent a hybrid field where cosmetic formulation meets therapeutic intent—blending science, marketing, and consumer expectations into multifunctional products that target aging, repair, and protection.

1.2 Herbal Cosmetics

Herbal cosmetics are beauty products formulated with phytochemicals derived from botanical sources that promote healthy skin and hair. These products are composed entirely or primarily of herbal ingredients—such as oils, extracts, and plant secretions—selected for their therapeutic and conditioning properties. [27] Herbal formulations are valued for their ability to support skin function through natural healing, smoothing, and protective effects. Phyto - ingredients, extracted using various methods, are incorporated due to their purity, safety, and functional benefits.

The shift toward herbal cosmetics has been driven by growing consumer awareness of the potential side effects of chemical - based products and a broader desire for natural, non - toxic alternatives. Lifestyle, environmental exposure, and daily habits have also reinforced interest in products that enhance beauty while offering protection from external stressors. As a result, demand for herbal cosmetics continues to grow, supported by the perception that plant - based ingredients are gentler and safer for long - term use.

1.2.1. Herbal cosmetics can be grouped into following major categories:

- For improving the look of the skin on the face
- For hair development and maintenance
- For skin care, particularly for teens (acne, pimples, and maintenance)
- Shampoos, soaps, powders, and fragrances, among other items. [28]

1.2.2. Scope and Challenges:

Plants have been utilized for simple cures since ancient times since, as was previously mentioned, India is the source of new indigenous medical systems like Siddha, Ayurveda, and Unani. It is also rich in flora. In order to maintain the appearance, texture, and beauty of the skin, traditional medicine practitioners and local believers in various regions of India have traditionally attempted to use indigenous flora as cosmetics.

The selection of herbal cosmetics is based on the following criteria:

- It is in harmony with nature and does not cause any harmful reactions;
- 80% of the world's population still relies on natural goods
- Many of these have some scientific and traditional evidence based on ethnobotanical surveys and animal experiments.
- By consulting well - known, verified, and widely acknowledged literature on the natural system of medicines and cosmetics, where the safety and effects have been shown throughout time, selection may be made with ease based on the recognized natural system of cosmetics.
- New claims and findings described in the research review served as the basis for the plants chosen for this investigation.

1.2.3. Benefits

- It normalizes bodily functions and aids in the body's cleansing and beautification without causing any negative side effects.
- Its high vitamin and mineral content give it exceptional nutritional value.
- It boosts the body's energy levels and boosts the immune system without upsetting the body's natural equilibrium
- You can include a variety of phytoconstituents. [29]

1.2.4. Formulation challenges:

- There are now inadequate scientific explanations available
- More prone to inorganic and microbiological contamination.
- Determining the significant identity of herbs.
- The evaluation of several phytoconstituents is challenging.
- The organoleptic characteristics are poor.
- The extract is immiscible with other substances.
- The competency of formulation may be altered by appropriate values of fundamental pharmaceutically considered parameters, such as PH values, acid values, and complexation of natural Phyto - ingredients.

1.2.5. Advantages of herbal cosmetics over conventional or synthetic or traditional:

- Herbal medicine is an eco - friendly and natural product that is suitable for all skin types and offers a wide range of options.
- It is affordable, safe, and has higher stability, purity, and efficacy than synthetic cosmetics.
- Herbal medicine has contributed numerous powerful medications to modern medical science worldwide, offering protection from premature maturation, nutrient packed, no dangerous chemicals.
- It has fewer negative effects and does not cause chemical or allergic reactions.
- Herbal medicine has a long history of use and is more widely accepted and tolerated by patients.
- The renewable source of medicinal plants is the only chance for sustainable supply of affordable medications for the world's expanding population.
- The production and processing of medical herbs and herbal products are environmentally benign.
- Medicinal plants are readily available, particularly in emerging nations with significant agroclimatic, cultural, and ethnic biodiversity.
- Plant extracts provide the right pharmacological effects while reducing the bulk property of cosmetics, ensuring patient compliance.
- When applied topically, natural perfumes produce pleasant feelings with calming and soothing benefits.
- They improve regular functions, are easily absorbed, have therapeutic qualities, and act at the cellular level.
- When used sparingly, herbal cosmetics are far more effective than synthetic ones. [1, 13, 30 - 36]

1.2.6. Disadvantages of Herbal Cosmetics:

- Herbal medications have slower effects than allopathic dosage forms and require long - term therapy.
- They are difficult to conceal, have a difficult manufacturing process, and lack a pharmacopoeia for specific steps or components.
- They are often self - administrated without dosage or warnings.
- Using herbal remedies instead of prescription drugs requires patience and can cause health problems when combined with pharmaceutical medications.
- Some parts of a plant may be poisonous while others are edible.
- Therefore, it is essential to exercise caution when using herbal remedies. [1]

1.3 Green Cosmetics: A Sustainable Approach to Beauty

In recent years, heightened environmental concerns and resource depletion have fueled public demand for sustainable practices. This shift has contributed to the rise of "green consumerism," where consumers favor eco - friendly products and companies adopt green marketing strategies. The cosmetics industry has responded by expanding its offerings of natural and organic skincare products. [37]

The global beauty market, growing at an average annual rate of 4.5%, has seen significant traction in emerging economies. However, increased awareness of harmful chemicals and ethical issues in conventional cosmetics has driven demand for safer, more sustainable alternatives. Organic cosmetics generated $13.33 billion in revenue in 2018, and natural skincare was valued at $33 billion in 2015—projected to reach $50 billion by 2019.

These products are typically marketed as "green," adhering to ecological standards and principles of Green Chemistry, which aim to reduce or eliminate hazardous substances during formulation and production (Anastas & Warner, 1998). [38]

2. Method

2.1 Understanding Green cosmetics:

The market for natural and organic cosmetics is expanding rapidly, projected to grow from USD 34.5 billion in 2018 to USD 54.5 billion by 2027, at a CAGR of 5.2%. This growth reflects increasing consumer awareness of environmental and health concerns tied to conventional beauty products. [39]

Green cosmetics—also referred to as natural or organic cosmetics—are formulated using plant - based and biodegradable ingredients, free from harmful chemicals such as parabens, sulfates, phthalates, and synthetic dyes. [40] They are typically cruelty - free, pesticide - free, and avoid animal testing. These products range from eco - friendly lotions to makeup and personal care items, all aligned with principles of sustainability and ethical sourcing. [41 - 42]

The concept gained momentum in the late 20th century alongside environmental movements advocating for pollution reduction and sustainable living. As a result, the cosmetics industry adopted terms like "organic, " "eco - friendly, " and "cruelty - free, " emphasizing renewable ingredients and biodegradable packaging. In the 21st century, this shift intensified as consumers demanded transparency, safety, and ethical practices. Companies now use certifications such as USDA Organic, Cruelty - Free, and Fair Trade to validate their green claims and appeal to environmentally conscious buyers. [43]

This review explores the evolution, ingredients, environmental advantages, and challenges of green cosmetics, positioning them as a sustainable alternative to conventional formulations that often carry ecological and health risks.

2.2 Characteristics of Green Cosmetics:

The use of natural, organic, and sustainably sourced components is what defines green cosmetics. Synthetic chemicals like parabens, phthalates, and sulphates—which are frequently linked to health and environmental issues—are generally not included in the formulas. The following are the fundamentals of green cosmetics:

- **Sustainability:** utilizing eco - friendly production methods, lowering carbon emissions, and utilizing renewable resources.
- **Health - conscious formulations:** Steer clear of potentially hazardous synthetic compounds and choose skin - friendly substances instead.
- **Ethical production:** Commitment to fair trade, cruelty - free methods, and ethical ingredient sourcing.

Because of these qualities, green cosmetics appeal to consumers who are concerned about their health and the environment, which fuels the growth of this market niche.

2.3 Key Ingredients in Green Cosmetics:

A range of organic and natural substances that are produced and handled sustainably are used in green cosmetics. Among the components that are most frequently utilized are:

- **Natural Emollients and Humectants:** Glycerin, shea butter, and cocoa butter are frequently used as natural substitutes for artificial moisturizers, giving the skin moisture and smoothness
- **Plant - based oils and extracts:** Jojoba, coconut, and argan oils are among the natural oils valued because of their nourishing and moisturizing qualities. Plant extracts with calming and antioxidant properties include green tea, chamomile, and aloe vera.
- **Essential oils:** These natural perfumes and skin - healing properties are derived from plants like lavender, chamomile, and rosemary.
- **Mineral pigments:** Natural substitutes for artificial colorants and sunscreens include iron oxides and titanium dioxide
- **Botanical extracts:** employed for their calming and antioxidant qualities are calendula, aloe vera, and green tea.

Compared to synthetic components, these are recommended because they are biodegradable, have a smaller environmental impact, and are less likely to cause skin irritation. [44 - 48]

2.4 Market Trends and Consumer Preferences:

The global organic personal care industry is expected to reach $25.11 billion by 2025, reflecting the increased demand for eco - friendly cosmetics. The market is being shaped by several trends:

- **Transparency and clear labeling:** Customers are becoming more curious about the provenance and security of ingredients. The terms "organic, " "vegan, " and "cruelty - free" are important marketing term.
- **Sustainable packaging:** To cut down on environmental waste, eco - aware consumers favor companies that employ recyclable or biodegradable packaging.
- **Cruelty - free and vegan formulations:** Demand for cruelty - free and vegan goods has increased due to ethical concerns about animal experimentation and substances sourced from animals.

These patterns show a change in consumer behavior, as more people give ecological and ethical issues top priority when it comes to their beauty regimens. [49 - 54]

2.5. Green Cosmetics Brands:

Worldwide Brands

- Group Hain Celestial
- Estee Lauder Corporations
- Purity Cosmetics. True Botanicals
- Tata Harper
- Weleda AG
- Limited by Shiseido Company
- Arbonne Worldwide
- Natura and co
- Yves Rocher [55]

Indian Brands

The Indian herbal cosmetic industry is growing due to the rise in natural products, including medicinal items and pharmaceuticals. Major players include Dabur, Himalaya, Zandu, Baidyanath, Hamdard, Patanjali, and Organic India. Consumers base their purchase decisions on personal experiences and perceptions, making brand positioning crucial for understanding and developing the brand's image. [56]

Table 1: Indian Brands [56]

S. No.	Brand Name	Description
1	Himalaya Herbals	Since 1930, a trusted Indian herbal cosmetics brand, known for its natural, safe products, utilizes rare Himalayan herbs, ayurvedic compositions, and advanced pharmaceutical technology.
2	Khadi Natural	Khadi Natural, a leading Indian manufacturer of herbal cosmetics, ensures quality and purity of its customized products for all skin and hair types.
3	Patanjali	Patanjali, a popular, natural brand, offers a wide range of affordable beauty products, including herbal shampoos, face creams, and body lotions, all backed by its commitment to desi and natural ingredients.
4	JOVEES Herbal	JOVEES Herbal offers 85 natural products to Indian and international customers, offering high - quality herbal cosmetics with a wide range of options to meet individual needs.
5	Lotus Herbals	Lotus Herbals, an Indian herbal cosmetic brand, offers over 250 beauty and cosmetics items with medicinal and therapeutic herbs, offering long - term results through an ISO 9001 holistic healthcare approach.
6	Ayur Herbals	Ayur Herbals provides a wide range of natural beauty and cosmetics products to both Indian and international customers, renowned for its authenticity and affordability.

2.6 Extraction Methods

Extracting is the process of selectively removing therapeutically useful components from plants, crucial for medicinal plant research. Modern extraction methods offer benefits like lower solvent use, faster extraction times, and higher yields.

Green cosmetics extraction techniques prioritize sustainability and avoid harmful substances, ensuring the integrity of natural ingredients and reducing environmental impact.

Typical techniques consist of:

1) **Cold Pressing:**
   - Method: Mechanical pressing without heat is used to extract oils and extracts from plants or seeds.
   - Advantages: Perfect for delicate skin care products, it preserves the oils' inherent vitamins, minerals, and nutrients.
   - Applications: Frequently used to extract fruit, seed, and essential oils (such as jojoba, coconut, and argan oils).
2) **Distillation by Steam:**
   - Procedure: Essential oils are vaporized by steam as it moves through plant matter before condensing back into liquid form.
   - Advantages: Guarantees the integrity of essential oils, which are frequently used in natural skincare and aromatherapy.
   - Applications: Commonly used to extract essential oils from flowers and plants, such as eucalyptus and lavender.
3) **Extraction of Supercritical CO2:**
   - Method: To extract oils from plants, carbon dioxide is employed in a supercritical state, which is between a gas and a liquid.
   - Advantages: Low temperatures and the absence of solvent residues help preserve delicate substances. incredibly eco - friendly and efficient.
   - Applications: Perfect for obtaining active plant components, antioxidants, and premium botanical oils.
4) **Extraction of Solvents (using Green Solvents):**
   - Method: Extracts plant chemicals using environmentally friendly solvents such as ethanol, water, or biodegradable solvents.
   - Advantages: Can extract a wide variety of chemicals; environmentally favorable in comparison to traditional petrochemical solvents.
   - Applications: Commonly utilized for cosmetic oils, perfumes, and botanical extracts.
5) **Extraction by Enzyme:**

- Procedure: Beneficial chemicals are released when plant cell walls are broken down by enzymes.
- Advantages: Waste is decreased and bioactive ingredients are preserved through a gentle procedure.
- Applications: Frequently used in the extraction of proteins, polysaccharides, and bioactive peptides for skin - soothing and anti - aging products.

6) **Extraction via Ultrasonic:**
   - Method: Plant cells are broken and their contents are released when ultrasonic vibrations produce cavitation.
   - Advantages: Quick, effective, and uses less solvent, which lessens the impact on the environment.
   - Applications: Bioactive substances, antioxidants, and essential oils are frequently extracted using this method.
7) **Maceration:**
   - Method: To extract the active components, plant material is soaked in oil or a solvent for a long time.
   - Advantages: Easy and conventional approach; no specialized equipment is required.
   - Applications: Frequently utilized for oil - based extracts and herbal infusions.
8) **Extraction Assisted by Microwaves (MAE):**
   - Procedure: Plant material is heated by microwave energy, hastening the extraction process.
   - Advantages: It is more sustainable because it saves time and uses less solvent.
   - Applications: Beneficial for removing natural components from plants, such as essential oils. [13, 57 - 64]

2.7. Growth of the Green Cosmetics Market:

Over the past ten years, the demand for eco - friendly cosmetics has increased dramatically due to a number of factors:

2.7.1 Knowledge of Consumers

The absence of a universal standard for green cosmetics has led to consumer confusion. Definitions and certifications vary widely across regions, particularly between the U. S. and Europe, creating inconsistent messaging around what qualifies as eco - friendly. This inconsistency, coupled with exaggerated marketing claims, raises concerns about *greenwashing*—where brands falsely promote products as sustainable. [54] Brand perception also influences consumer trust. Traditional cosmetic companies are often associated with environmental harm, leading consumers to question the authenticity of their green initiatives. A lack of transparent, reliable information further complicates consumer decisions, as many rely on peers or unverified online sources for guidance. Despite these challenges, consumer demand for transparency is growing. With the influence of social media, beauty influencers, and conscious consumerism, more buyers now seek cruelty - free, toxin - free, and environmentally responsible products. [65] This shift in awareness has fueled the rise of green beauty brands, though skepticism remains a barrier to wider adoption.

2.7.2 Celebrity Endorsement:

Awareness market demand requires an awareness of the impact of brand equity and celebrity endorsements (Ilicic and Baxter, 2014). [66] Customers' attitudes are influenced by celebrity endorsements (Patel and Basil, 2017). [67] However, the three aspects of celebrity endorsement—attractiveness, trustworthiness, and cause - fitness—have an impact on attitudes (Tantawi and Sadek, 2019). [68] Brand personality has grown to be an important feature of products, and today's marketing management relies heavily on establishing buy intention and storing customer memory (Ozdemir et al., 2020). [69] Brand value and celebrity endorsements are important for building consumer brand equity. [37]

2.7.3 Social Media Impact:

Social media now has a significant impact on how consumers think, feel, and make decisions about what to buy. [70] Several academics have examined the influence of social media on customers' green behavior and buying intentions, notably in the cosmetics industry. Social media personalities have the power to influence consumers' perceptions of green cosmetics, [71] and social networks can encourage and maintain environmental behavior. [72] Social media has developed into a crucial platform for information exchange, content creation, and opinion and information expression. [73] Social media has made it possible for customers to have a more engaging shopping experience and has transformed the way that businesses and consumers communicate, especially when it comes to green products. [74] Social media is the main source of product information for consumers. [75] Social media has emerged as a crucial communication tool in the cosmetics sector. In 2019, a global study found that 37% of consumers found online beauty brands through social media advertisements, 33% through social media recommendations and comments, 22% through expert blogger posts, 22% through brand social media pages, and 22% through celebrity endorsements on social media to learn about new products. [76]

2.7.4 Environmental Concerns:

Customers are increasingly searching for methods to reduce their environmental impact as environmental concerns including deforestation, plastic pollution, and climate change garner attention on a worldwide scale. The cosmetics industry has come under fire for using harmful chemicals and plastic packaging excessively. Customers who care about the environment have a more responsible option thanks to green cosmetics' emphasis on sustainability. [77]

2.7.5 Regulations and Certifications:

Numerous nations have enacted laws encouraging the use of organic and natural components in cosmetics. Customers can be sure that the items they are buying satisfy certain safety and environmental requirements by looking for certifications like USDA Organic, ECOCERT, and COSMOS. These certificates are frequently regarded as a mark of credibility in the market for eco - friendly cosmetics. [78 - 81]

2.8. Environmental and Health Benefits of Green Cosmetics:

2.8.1 Reduced Environmental Impact:

The goal of green cosmetics is to leave a smaller environmental impact. Because the ingredients are frequently sourced sustainably, ecosystems are protected and biodiversity is maintained. Furthermore, petrochemicals,

which come from fossil fuels and cause pollution, are typically avoided in green cosmetics.

Another important area where green cosmetics have an impact is packaging. To cut down on plastic waste, several firms are choosing packaging that is minimal, recyclable, or compostable. The introduction of "naked" packaging - free goods by companies like Lush and Ethique has greatly decreased waste in the cosmetics sector. [42, 49, 68 - 69, 82 - 85]

2.8.2 Safer for Human Health:

Synthetic chemicals found in many traditional cosmetics have the potential to be harmful to human health. For example, phthalates and sulphates have been proven to cause allergies and skin irritation, while parabens have been connected to hormone disruption. Green cosmetics provide safer substitutes for both short - term and long - term use by removing these dangerous chemicals. [86 - 88]

2.8.3 Cruelty - Free and Vegan Options:

Animal welfare has also received more attention as a result of the trend for ecological beauty. Numerous cruelty - free cosmetics companies take pride in the fact that they don't use animals in their product testing. Furthermore, cosmetics that are vegan - friendly—that is, free of any substances originating from animals—are gaining popularity. [89 - 90]

2.9 Challenges in the Green Cosmetics Industry:

Notwithstanding the many benefits of eco - friendly cosmetics, the sector nevertheless confronts a number of obstacles:

- **Greenwashing:** The problem of greenwashing is among the biggest obstacles. Numerous companies advertise their goods as "natural" or "organic" without following stringent guidelines. Customers may find it challenging to discern between products that are actually green and those that merely seem ecologically friendly due to this deceptive practice. By promoting accountability and openness, certification organizations like ECOCERT and COSMOS are assisting in resolving this problem.
- **Increased Prices:** When compared to traditional goods, green cosmetics are frequently more expensive. This is because it's expensive to find sustainable, high - quality components and follow moral production guidelines.
- **Limited Shelf Life:** Many green cosmetics have a shorter shelf life because they don't contain artificial preservatives. Despite their effectiveness, natural substances may deteriorate more quickly than synthetic ones. Because items would need to be used within a certain duration to stay effective, this might provide a problem for both makers and users. [42, 91]

2.10 The Future of Green Cosmetics:

With ongoing innovation and rising customer demand, the future of green cosmetics appears bright. The following are a few trends that are probably going to influence the industry:

- **Biotechnology and Green Chemistry:** Thanks to developments in biotechnology, lab - grown plants and bioengineered compounds can now be used to create sustainable ingredients. While offering the same advantages as components sourced historically, these advances can also lessen the burden on natural resources.
- **Zero - Waste and Circular Beauty:** The beauty industry is seeing a rise in the zero - waste movement. Reusable packaging, biodegradable materials, and creative approaches to cutting waste at every level of manufacturing are being investigated by brands. Circular beauty, where products are designed to be recycled or reused, is another trend that is likely to gain momentum.
- **Personalized and Inclusive Beauty:** As consumers seek more personalized beauty solutions, green cosmetics brands are expanding their offerings to cater to diverse skin types, tones, and preferences. This inclusivity ensures that green beauty is accessible to a wider audience.
- **Microplastics and Green Alternatives:** Assessing the effects of microplastics in traditional cosmetics on the environment and investigating natural, biodegradable substitutes for glitter and exfoliants.
- **Probiotic and Fermented Ingredients in Green Cosmetics:** Researching the advantages and difficulties of using probiotics and fermented substances in natural skincare products to improve skin health and support the microbiome.
- **Waterless Beauty:** Evaluating the consumer acceptability and environmental advantages of waterless beauty products as a sustainable substitute for conventional formulations, such as solid shampoos, serums, and powders.
- **Blockchain for Transparency in Green Beauty Supply Chains:** Investigating how blockchain technology may be applied to enhance the traceability and transparency of
- materials used in green cosmetics, guaranteeing fair trade and ethical sourcing.
- **Plant - Based Retinol Alternatives:** Researching the effectiveness of plant - derived components, such as bakuchiol, as substitutes for synthetic retinol in anti - aging skincare products with an emphasis on sustainability and performance.
- **Sustainable Extraction of Natural Ingredients:** To lessen the environmental impact of ingredient sourcing, research is being done on ethical and sustainable techniques for removing natural oils, pigments, and active compounds from plants.
- **Green Cosmetics' Effect on Skin Microbiome:** Examining how green cosmetic formulas affect the skin's microbiome and whether they provide a more balanced, healthful option than traditional cosmetics that contain artificial chemicals.
- **Consumer Behavior and Perception of Greenwashing:** Researching how consumers' perceptions and understanding of greenwashing methods in the cosmetics industry affect their decisions to buy and their level of trust in brands. [92 - 96]

3. Results & Discussion

This review highlights the growing prominence of green and herbal cosmetics as a response to consumer demand for safer, sustainable, and ethically produced beauty products. Analysis of historical developments shows a global tradition of plant - based cosmetic use across civilizations, forming the foundation of today’s herbal formulations.

Market trends suggest steady growth in the organic and natural cosmetics sector, with the global market projected to exceed USD 54.5 billion by 2027. This expansion is driven by consumer awareness, regulatory pressure, and ethical concerns regarding conventional cosmetics. The integration of principles such as Green Chemistry and cruelty - free certifications has further validated green cosmetic claims.

However, the sector faces significant challenges. The absence of standardized global definitions and inconsistent certification systems creates confusion and mistrust among consumers. Greenwashing, exaggerated claims, and inconsistent labeling have raised skepticism, despite growing demand. Regulatory frameworks like "quasi - drugs" in Japan or "controlled cosmetics" in Thailand indicate regional efforts, but a universal approach remains lacking.

Furthermore, while herbal ingredients offer promising therapeutic benefits, scientific validation, formulation stability, and large - scale sustainable sourcing are ongoing issues. Consumers seek transparency, eco - certifications, and evidence - backed safety—needs that green beauty brands must address to build lasting trust.

4. Conclusion

Green and herbal cosmetics represent a transformative shift in the personal care industry, bridging tradition with innovation. They offer eco - conscious, skin - safe alternatives to conventional products, meeting the expectations of modern, mindful consumers. However, to fully realize their potential, the industry must overcome regulatory inconsistencies, improve consumer education, and invest in research - backed formulations. Sustainable packaging, transparent marketing, and universal standards are critical to maintaining consumer trust and long - term growth. With global interest on the rise, green cosmetics have the opportunity not just to compete—but to lead—in defining the future of ethical and sustainable beauty.

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