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Evolving Cosmetic Regulations in the World

Mubshara Tahir, Aresha Sohail, Hafsa Khalid, Hera Naheed Khan
Department of Microbiology and Molecular Genetics, University of the Punjab, Quaid-e-Azam Campus, Lahore 54590, Pakistan
*__Correspondence__: heranaheed.mmg@pu.edu.pk

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Cosmetic products are an integral part of our daily lives and are found across all cultures, promoting cleanliness and beauty enhancement. Due to the increasing use of cosmetic products worldwide, this sector has expanded significantly, raising numerous concerns regarding consumer safety and rights. Cosmetic regulations now represent an important science-based tool for ensuring consumer safety through risk assessment. This regulatory framework helps ensure consumer safety and supports environmental health through ongoing safety assessments and compliance monitoring. Over the years, the regulatory bodies have evolved significantly and made rapid advancements in three primary interconnected directions: better pre-market surveillance; reduced use of animal models for testing toxic chemicals in products; and stricter criteria for ingredient selection and sourcing (for instance, micro-plastics and PFAS) that illustrate increasing concerns about long-term, consumer-level impacts on the population. This review focuses on the evolution of cosmetic regulations, including global classification and the scientific basis of rules. We first review the established contemporary scientific basis of cosmetic regulation. It should also define international standards that classify products as therapeutic drugs, cosmetics, or both (commonly known as cosmeceuticals). The standard should be important and understood by the manufacturer, the scientific society, as well as the government.

Keywords: Cosmetic Regulation, FDA, ICCR, ISO, Global Classification Systems, ASEAN Cosmetics Directives

Introduction:

Cosmetic use dates back to very ancient times, such as the Egyptian, Chinese, and Indus Valley Civilizations [1]. In the past, these beauty products were manufactured from different natural materials such as plant extracts, animal byproducts, substances, and minerals, without any safety testing. Although these natural products were culturally significant, many products caused several side effects and health risks due to toxic minerals such as lead, arsenic, and mercury; yet their use continued.

The mass production of these products in the early 20th century marked a significant change in cosmetic manufacturing practices. The mass production of these products with synthetic ingredients brought concerns over the safety associated with these products, despite increased availability worldwide. Multiple large-scale cases of harmful cosmetic products or specific ingredients used in them raised the need to establish government regulatory authorities [2]. Consequently, the very first official regulations were issued, primarily aimed at controlling product adulteration and misleading labeling.

The first regulatory body was the United States Food and Drug Administration (FDA), which was established in the early 20th century and progressively gained authority over cosmetics production [3] under the Federal Food, Drug, and Cosmetics Act [4]. After that, European countries also began to develop their own authorities and laws, which later evolved into official organizations such as the European Union [5]. In Asia, similar administrative bodies were observed as the cosmetics industry continued to industrialize, especially in countries such as China and Japan [6]. More recently, such cosmetic regulations have undergone significant changes as make-up trends and global markets have become much more interconnected, with a single product often sold across countries under varying legal systems. Market globalization indicates some gaps and anomalies in the systems involved. In this regard, the regulators have based their approach on standardization, science-based risk management, and transparency. Within the contemporary period, the regulatory developments influenced these issues to a great extent, involving the field of exposure science, toxicology and world trade. ethical concerns regarding animal testing, the rise of multifunctional cosmetic products, and advances in risk management systems have further influenced modern regulatory strategies. The primary determinants involved in the regulation mentioned above in the cosmetics market shall be clarified in the chapter provided below. The primary factors involved are the cosmetic ingredients, such as basic ingredients in [7] the form of product's active ingredients, as well as the "functioning" ingredients, such as preservatives, coloring agents, UV protectants, and fragrances, which lay the scientific basis of cosmetic regulation. This is because the active and functional ingredients are the ones that directly influence the product's safety, efficacy, and consumer exposure, which represents the beginning as well as the important orientation involved in the regulatory issue mentioned above, with the involved cosmetic market in relation to the necessities involved in the various regions [8].

Cosmetics Regulations on a Scientific Basis:

The regulation of the industry primarily provides for the safety of human health and that it can safely be used under normal or intended conditions of use. Cosmetics are not to cure any disease or otherwise reduce the risk of any disease compared with pharmaceutical or drug regulations. They are, however directly applied to various parts of the human body like the skin, lips, eyes, nails, and hair, etc. The current regulatory standards for cosmetic products are well-grounded on well-known principles of toxicology, risk exposure, and reduction of risk. The mentioned scientific principles are predominantly practiced by the concerned authorities to form an informed judgment about the nature of the risk, which may be caused either by the compounded product or by the separate components forming the cosmetic product. Thus, over the past few years, the complexity level of the concerned authority has significantly increased, which primarily lies in the complexity of the cosmetic formulations [9].

Hazard Identification and Risk Assessment:

The cosmetic safety assessment also comprises an assessment of risk, which is divided into four parts: hazard identification, dose response, exposure, and risk characterization [7]. Hazard identification is the evaluation of the likelihood of the potential adverse consequence of a cosmetic ingredient based on the type of toxicology tests, models, in-vitro data, and human experience about genotoxicity, skin irritations, sensitization, and reproductive toxicity [10][11]. The dose response will focus on the exposure level relating to undesired effects, in relation to assisting in determining the scientifically acceptable concentration limit [12]. The exposure assessment will assist in determining the rate, time, or route of exposure, as it focuses on products requiring special attention based on high surface area or normal use levels [13].

The risk characterization is a function that links data on possible risks to data on the level of actual exposure to the product; the ultimate end of this function is to establish the level of safety use for consumers. This function serves as a scientific tool that guides the policy-formulation function, in that it may need to use limits, prohibition of some ingredients, or withdrawal from the market as necessary [14].

Safety Assessment of Cosmetic Ingredients:

As per the latest norms, the responsibility of the safety evaluation of cosmetics rests with the industrial units and authorized persons. Not only is the evaluation of the safety of the various constituents is necessary, but it is also required for the final product before it is put into the market. In the context of the last 5 years, administrative personnel in regulatory bodies have been stressing the need for non-animal testing for the evaluation of safety [15][16]. There is also a vast advancement in the development and application of advanced in-vitro human tissue models, in-vitro model testing, and computational model testing for the evaluation of safety [16]. Therefore, the relevance and validity of the evaluation for the safety of cosmetics have also been addressed. Special sub-groups like children and persons with impaired skin are also taken into consideration during the evaluation of the safety of cosmetics.

Involvements of Scientific Committees and Expert Panels:

The regulating country is normally accompanied by independent expert committees in making decisions on cosmetic regulatory issues. The expert committees take advantage of toxicology data, novel scientific information, and provide well-informed expert opinions on safety, as far as the ingredients of cosmetics are concerned [17]. The contribution of expert committees has been on the rise, including some of the novel aspects of cosmetics within the past few years, including nanotechnology and biotechnology materials, among others [18][19]. The decision-making process among the expert committees is responsible for making decisions on regulations, relying on up-to-date scientific information [20].

Transparency is also increasingly making its presence felt in the regulation arena [21]. Many regulators publish summaries of their evaluation and opinion on health to enable citizens to understand the scientific rationale behind the decision.

Role of scientific innovation in shaping regulations:

Developments in the realms of science, technology, and innovation in the cosmetics sector have played a critical role in the regulation of cosmetics in the last few years. For example, developments in bioengineered cosmetics, nanotechnology, and the creation of multipurpose cosmetics have rendered the former regulatory approach ineffective, requiring the adoption of a novel approach based on innovative criteria. At present, there is a need to create a novel set of datasets for cosmetics with innovative physicochemical properties to prevent a boost in toxicity and systemic exposure. This aligns with a science-informed but innovation -sensitive approach to regulation with a focus on consumer safety considerations.

The Global Cosmetic Classification System:

Despite the definitions of cosmetics showing a high level of uniformity when crossing the limits that govern such products, there are disparities in the definition being used due to

variations and the level of authority that governs such products. Cosmetics are normally defined as products that are applied to the exterior of the body to clean, beautify, fragrance, or maintain the appearance of the body [22]. To avoid confusion, distinction has been made between drugs and the above products based on the latter having particular physiological effects on the body.

The EU's definition of "cosmetics" is:

"Any preparation or mixture prepared or introduced into the marketplace for use, in whatever way, in contact with the external parts of the human body (epidermis, hair system, nails, lips, external genitalia), or the teeth, or the mucous membranes of the mouth, with the exclusive or predominant intent of cleansing, perfuming, changing the appearance, protecting, caring for, or eliminating body odors [23]."

There may be variations in the issuance of directives due to regulatory differences in standardization for particular over-the-counter medications that are easily accessible in pharmacies without the need for prescriptions that claim to repair the barrier function and improve functionality.

Significance of cosmetic classification:

Cosmetics classification is a critical component in legal frameworks, as it is connected with whether a particular product can be classified as a cosmetic, a drug, a medical device, or a transitional product category [24]. It is important to correctly categorize the products since it will determine which requirements relating to the evaluation of safety, labeling, market authorization, and post-market surveillance are required. Development in functions and formulations of cosmetic products brought about the definition of cosmetic product surveillance [9].

Therefore, it could be concluded that the necessity for cosmetic surveillance was generated by the increased usage of cosmetics, as frameworks have increasingly become complex. Recently, there has been interest in attempts at criteria for the management of products that are either functional, or performance-related claims [25].

Classification of Cosmetics, Borderline Cases, and Regulatory Adaptation:

Cosmetic products generally fall into categories depending on their intended use and surface of application. Most common categories include hair care products, skin care products, oral care products, personal hygiene products, fragrances, cosmetic and decorative products. Among them, skin care products take the largest market share, constituting around 44% which grew 6% in 2023 of the global beauty and self-care market [26]. Another reason why skin care products have stringent regulations surrounding them is that these products are widely used and also applied for a longer period of time on human skin. The hair care products, especially hair dyes, have stringent regulations surrounding them due to higher possibilities of sensitization and damage caused to the human body. The cosmetic products come under regulations regarding color additive safety since it comprises areas such as the eye and the lip region that are highly sensitive [27].

In addition to the general cosmetic categories, there are regulatory hurdles in the categorization of borderline products, especially those that have similar attributes to medical devices [28]. Such products include skin lighteners, acne products, and dandruff products. The task of the authorities is to classify the products depending on their formulation, claim, and mode of action. The significance of classifying products correctly cannot be overemphasized, as an improperly categorized product may cause legal proceedings, recalls, or default on the part of the authorities [29].

New product types, such as microbiome-targeted products and personal care products, raise some issues as to the validity and utility of the traditional systems of classification. While the emergence of the new product type is not considered within most countries as constituting a separate class of product itself, the growing prevalence of such products has affected the law

as to proof of claims and safety [30]. These are the answers to the need for flexible and scientific systems of classifications.

Regulatory environment of major geographical regions:

The current state of global regulations in the cosmetics industry is complex, with prevailing regulatory regimes in three major geographic areas: The European Union (EU), the US, and the Asia-Pacific (APAC) region [24].

The European Union (EU):

The EU is universally acknowledged for its strictest and most complex regulatory framework, which is regulated mainly by the EU Cosmetics Regulation (EC) No. 1223/2009 [31][32].

Classification:

The EU further defines a cosmetic product as any substance or preparation, or any mixture of substances or preparations, intended to be placed in contact with the external parts of the human body, with a view exclusively or mainly to cleaning them, perfuming them, changing the appearance, protecting them, keeping them in good condition, or correcting body odors [33].

Responsible person:

For any cosmetics to be placed on the EU market, a Responsible Person must be established in the EU to ensure compliance [34].

Product Information File (PIF):

It is the responsibility of the Responsible Person to maintain a detailed file for each product, which must include a Cosmetic Product Safety Report (CPSR). It is imperative to state that the CPSR, which a competent safety assessor submits, forms the core of any evidence that is to be provided for the substantiation of safety [35].

Central Notification:

Each product must be centrally notified through the Cosmetic Product Notification Portal (CPNP) before it is marketed.

Regulatory Philosophy:

The EU's proactive regulatory policy is primarily reflected in the lists of permitted, restricted, and forbidden ingredients (Annexes Ⅱ, Ⅲ, and Ⅴ of the regulation [35]). It also prohibits animal testing for cosmetic ingredients or products sold in the EU [36].

The United States (US):

Cosmetics regulation in the US is administered by the Food and Drug Administration (FDA) through the Federal Food, Drug, and Cosmetic Act (FD&C Act) and the Fair Packaging and Labeling Act (FPLA). However, with the modernization of the Cosmetics Regulation Act of 2022 (MoCRA), the regulation of cosmetics in the US has shifted [37].

Classification:

The FDA defines cosmetics as an article intended to be rubbed, poured, sprinkled, or sprayed on, introduced into, or otherwise applied to the human body- by either men or women- for cleansing, beautifying, promoting attractiveness, or altering appearance [38].

Voluntary registration before 2022 (pre-MoCRA):

Historically, registration for voluntary cosmetic regulation program (VCRP) and reporting of ingredients were voluntary [24].

Mandatory Requirements after 2022 (post-MoCRA):

The MoCRA has mandated the following key points to be considered when applying for product launch:

Facility registration and product listing
Safety substantiation of products
Adverse event reporting
Adherence to mandatory Good Manufacturing Practices (GMP) [39]

FDA Authority:

Unlike the EU, the FDA does not approve cosmetic products before they go to market; however, it has the authority to take action against unsafe or misbranded products after they are on the market [40].

Regulatory Philosophy:

The US follows a reactive approach, in which the manufacturer is primarily responsible for ensuring safety, and the FDA steps in when a safety issue is identified or when a product is deemed adulterated or misbranded [41].

Asia-Pacific (APAC):

The APAC region reflects a diverse landscape of laws [42] These countries include China as well as those in the Association of Southeast Asian Nations, which are typically known as ASEAN.

China:

Governed by the Cosmetic Supervision and Administration Regulation (CSAR), it is a complex, centralized system that requires mandatory pre-market registration/filing for all cosmetic products and has specific requirements for novel ingredients [43]. China has also relaxed its animal testing requirements for certain "general cosmetics" imported from overseas, provided a particular certification is met.

ASEAN:

Member states generally adopt the ASEAN Cosmetic Directive (ACD), which establishes regional regulation, primarily using the EU model format [44] They require the maintenance of a Product Information File and the submission of a notification to the national authority before market placement for evaluation [45].

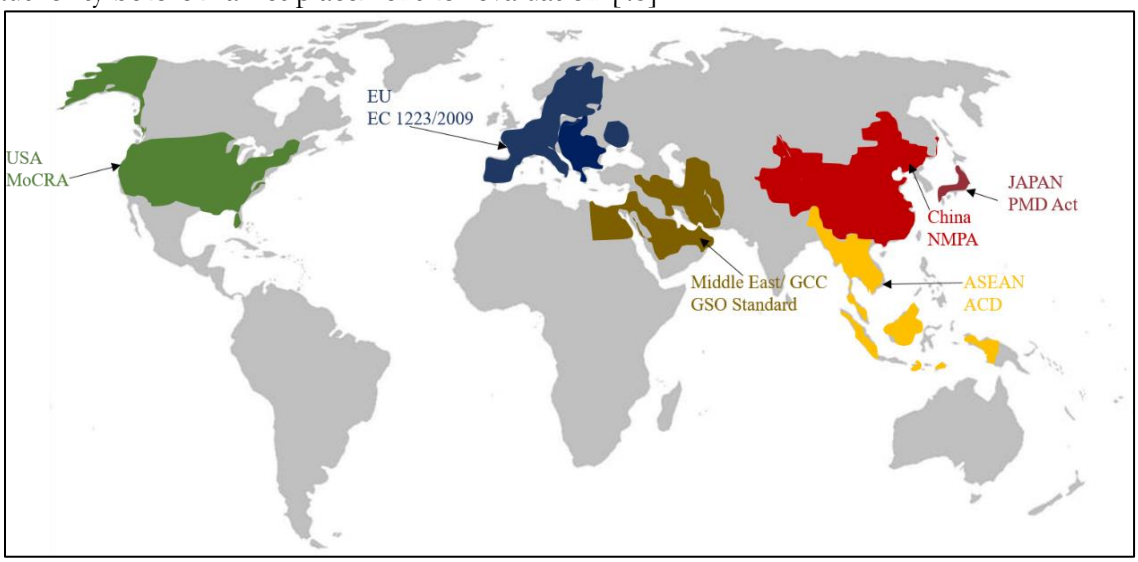

Figure 1. Global Map of Cosmetic Regulatory Framework

Ingredient Regulations and Safety Requirements:

The overall regulation of cosmetic ingredients worldwide is primarily grounded in risk management, in which the safety of a substance can be governed only by regulatory listing by competent bodies, based on sound scientific assessments preceding market approval [46]. In this case, most countries use Annex-type listed systems that primarily list the ingredient as prohibited on account of known toxicity, restricted use subject to conditions of concentration or formulation, or authorized only if included in positive lists of regulations on the restriction of use of certain cosmetics preservatives, colorants, and UV filters [47]. In both the EU and China, the responsibility of proving the safety of a given cosmetics product lies squarely on the producer through a systemic evaluation of toxicological profiles of the product in relation

to hazards of systemic toxicity, irritation, skin sensitization, and photo-toxicity using safety measures of quantification, including Margin of Safety (MoS), which compares the intended exposure of the consumer to the No observed effect Value (NOEL values) [48]. In this regard, the resulting safety information is documented in a Safety Report, which, in the EU, must be signed by a competent toxicologist, after which the product can be certified safe for use and reasonably foreseeable use [49][50].

Product Testing and Quality Control:

Product testing, quality control, and safety are therefore the most important cornerstones that ensure the efficacy, stability, and safety of cosmetics [51]. This will be accomplished by ensuring that the manufacturers adhere to a high standard of quality control to maintain the cosmetic's quality [52]. The base of this framework is adherence to Good Manufacturing Practices (GMPs) and International Organization for Standardization (ISO 22716), an international standard. These standard demands ordered operational discipline with the help of formalized standard operating procedures. These procedures cover production, sampling, and packaging, and overall workflow management as well [53]. It also requires strict contamination control and places strong emphasis on hygiene practices for personnel, equipment, and buildings to avoid microbial and particulate contamination. Strong traceability will be important, with systemic documentation of raw material batches and production records that enable rapid, focused intervention during investigations into quality or product recalls [54].

Other than manufacturing discipline, cosmetic products must undergo a series of required testing protocols to verify safety and performance [55]. Microbiological testing verifies that these formulations are free of harmful pathogens. In contrast, the Preservative challenge test, also known as the challenge test, demonstrates that a formula prevents microbial growth in the product during its shelf life. This also includes multiple uses by a consumer. Other quality controls are stability and compatibility studies that evaluate a formula under accelerated stress conditions, such as high temperature and moisture. This, thereby, ascertains that the formula and packaging materials do not react negatively [56]. Dermatological testing adds to a formula's safety profile through human patch testing to substantiate any claims that may be made about it, such as hypoallergenic, non-irritating, or dermatologically tested [57].

Labeling and claims regulations:

Labeling and claims regulations are a necessary mechanism for transparency, protection, and conformity in the cosmetic market across the world [58]. Most jurisdictions require harmonized labeling practices as a basis to provide consumers with information clearly and accurately that supports safe and informed product use [59]. A necessary minimum is the use of the international Nomenclature of Cosmetic Ingredients (INCI), which standardizes terminology worldwide and reduces confusion; for instance, aqua needs to be applied consistently instead of water [60]. Labeling legislation also requires the proper durability markings; products with a shelf life of more than 30 months must bear a Period After Opening (PAO) symbol. This indicates, from the date of opening, how long the product will remain safe and efficacious [61]. On the other hand, if products have less than 30 months' shelf life, a best-before date must be clearly marked [62]. Warning statements are also mandatory on products that must contain certain risk-associated ingredients, such as the thioglycolates present in depilatories, or on product categories known to be sensitive, such as oxidative hair dyes [24].

Table 1. Comparison of regulatory standing of ingredients across five major global beauty markets as of 2025

Criteria	European Union (EU)	USA (FDA/MoCRA)	China (NMPA)	Japan (MHLW)
Banned Ingredients	EU prohibited substances list (Annex II): ~1600 [63]	Specific banned substances (~13) under MoCRA; manufacturers must notify the FDA of new unsafe ingredients [37]	Prohibited inventory: ~1400 substances [64]	Negative list: ~30 categories of prohibited substances [65]
Preservatives	Positive List (Annex V)-only allowed preservatives permitted [66]	Manufacturer's safety responsibility; no formal positive list (safety based on MoCRA requirements) [67]	Positive List (51+ allowed) [68]	Positive List – permitted preservatives (Annex 3) [69]
Color Additives	Positive List (Annex IV) – approved [70]	FDA approval or batch certification is required for color additives (specific regulation) [71]	Positive List (157+ allowed) [72]	Positive List – permitted color additives [73]
UV Filters	Positive List (Annex VI) – regulated UV filters [74]	Regulated as OTC drugs; only 2 GRAS filters are currently permitted [75]	Positive List – UV filters (27+ allowed) [76]	Positive List – UV filters (Annex 4) [77]
Endocrine disruptors	Targeted via SCCS opinions and REACH risk assessment [78]	Risk-based screening under TSCA [79]	Integrated into chemical Safety Assessment [80]	Managed via the Chemical Substance Control Law [81]
Micro-plastics	Banned (internationally added; phased deadlines enforced) [82]	Rinse-off microbeads banned [83]	Rinse-off microbeads banned [84]	Phasing out via Voluntary/Draft bans [85]

Table 2. Comparison of Safety Testing Requirements in Different Countries/ Regions

Parameters	European Union (EU) [35]	United States (USA) [37]	China (NMPA) [86]
Stability testing	**Mandatory**; must prove shelf-life/PAO (Period After Opening).	**Recommended**; required under MoCRA/GMP to ensure product integrity	**Mandatory**; data as is necessary for registration or notification.
Microbial limits (TAMC, TYMC)	Mandatory; must comply with the ISO 17156 standards	mandatory; must meet USP 61 and 62 or equivalent	Mandatory; must comply with "Safety and Technical Standards for Cosmetics".
Preserve Challenge Test (PCT)	**Mandatory**; for most formulations (ISO 11930)	**Required** to substantiate safety and preservative efficacy	**Compulsory for the registration**/filing of aqueous products.

Animal Testing (Current Status)	**Strictly banned** for both ingredients and finished products	**Generally, no**; discouraged and banned in several states (e.g., CA, NY).	**Partial ban**; not required for "general" cosmetics (if GMP certified), but **needed** for "special" cosmetics
Nanomaterial Safety	**High**; requires specific notifications 6 months before marketing.	**Moderate**; FDA guidance exists, but no specific pre-market notification.	**High** safety assessment and technical dossier needed for "new " materials.
Market entry requirement	**Pre-market**; requires a Cosmetic Product Safety Report (CPSR) and CPNP notification.	**Pre-market Substantiation**; MoCRA now requires facility registration and product listing	**Pre-market**; registration for "special" use Notification/ Filing for "general" use

Post-Market Surveillance:

After a cosmetic product is brought into the market, the regulatory tasks do not end with approval but involve post-market surveillance to ensure that the cosmetic is still safe when used on a mass scale, in actual usage conditions. The monitoring process basically helps the regulatory body and the manufacturing company keep track of the actual performance of the cosmetic in the market, after mass exposure [87]. The process that plays a crucial role in monitoring cosmetics in the market involves monitoring and analysis of adverse effects that might result from usage. The adverse effects that are considered in this process include reactions such as allergy, irritation, and unexpected sensitivity experienced by the customers. The reporting of adverse effects occurs in accordance with the regulatory frameworks in place in different countries. For example, in the European Union, a company is required to make a "serious undesirable effect" report with regard to cosmetic products. In other countries like the United States, China, and Japan, reporting occurs through customer complaints, healthcare feedback, and a company reporting system, respectively [88]. Besides the monitoring of adverse events, the authorities also engage in market surveillance to make sure that cosmetic product complies with the laid-down safety and quality requirements. This is done by taking samples of cosmetic goods from both physical stores and online stores. Consequently, the samples are analyzed in the laboratory to find out if they contain microorganisms, heavy metals, or banned substances [89]. Sometimes, the issue of safety can also emanate from the interaction of the cosmetic product and its packaging material. This is especially the case if the cosmetic item is not stored under the right conditions [90].

Another rising feature of post-market surveillance in modern days is cumulative exposure evaluation. In general use, people tend to use several personal care products at the same time, leading to cumulative exposure to preservatives, fragrances, or color ingredients [36]. With a view to reflecting real-life use, health organizations have gradually begun including cumulative risk evaluation methods in their surveillance strategies [91]. In addition to voluntary surveillance, proactive surveillance in the form of product sampling from both online and offline sources takes place with a view to ensuring compliance with regulations [92]. Testing is usually conducted for microbial quality, composition accuracy, and the presence of possibly harmful materials in the products [93]. In addition, the manufacturing plants are inspected for compliance with Good Manufacturing Practice guidelines. This enhances regulatory control, thereby ensuring that possibly harmful or substandard products are not widely available in the markets [94].

For instance, when a cosmetic is recognized to pose some kind of danger to consumers, there are various steps that can be taken depending on the severity involved. These can include requesting that formulations for the product change to something else, as well as warnings or product recalls [95]. A strong trace in documentation is core for an efficient product recall program [96] these steps point out that there is a shared responsibility among stakeholders in protecting consumers.

Changing Trends in Present-Day Cosmetic Regulations:

The demands and needs in the field of cosmetics are continuously evolving and are being updated on the basis of advancements made in various sectors, such as science and technology, the demands of consumers, and end-users of the various products in the cosmetic industry. A number of emerging patterns are now being seen to impact the regulation of cosmetic goods across the global landscape [97]. One of the most prominent areas that is undergoing a shift in terms of regulation is that of animal testing in the assessment of cosmetic product safety. A growing number of global nations have already banned animal testing in favor of alternative testing [98]. Reconstructed skin models, computer simulation toxicity prediction software, and high-throughput screening are some examples of alternative testing methodologies [99].

Nanotechnology is another field that is receiving significant attention in the context of cosmetic regulation. Nano-materials are commonly used in a product to enhance product texture, improve skin penetration, or boost UV protection, and so on [100]. Environmental sustainability is another trend significantly dominating the development of regulatory policies. Bans on microplastics, the utilization of biodegradable packaging materials, and sustainable sourcing practices are slowly being integrated in different regions of the world [101]. Such practices are an indication of the growing need to take care of an even bigger cause regarding the conservation of the environment and sustainable development [102]. In the cosmetics sector, developments in the field of biotechnology have influenced the creation of new ingredients such as fermented materials, lab-created peptides, and microbiome derived materials. These have caused the regulating bodies to modify the methodology of safety assessments concerning the distinct nature of bio-derived ingredients [103]. Nevertheless, with the recent rise in the online sale of cosmetic products, there are new complexities in regulation. These complexities make regulation more difficult in online platforms. As a consequence, there is a focus on supervising the manner in which advertising is done online, coupled with an intensified government control over e-commerce platforms [104].

The demand for transparency practiced by the consumer has also had a considerable effect on the regulation of cosmetics. Many countries have adopted stricter rules on the disclosure of ingredients, allergens, and claims, among others [105]. The claim of a product to be "anti-aging", "skin barrier repair", or "microbiome friendly" must be based on proper scientific evidence and not solely on marketing language and claims [106]. Being clearly labeled and having open product ingredients have assisted in providing accurate and factual information for the consumer to make their own proper informed decision [107].

Global Harmonization Efforts:

Global distribution of cosmetic goods can be quite daunting based on the distinct requirements of each country. In this regard, global players such as international organizations are making strides in the process of ensuring a degree of harmonization among the requirements of countries. ISO 22716 is part of the guidelines that incorporates Good Manufacturing Practicein the cosmetic industry. This helps in ensuring that goods are of the right standard irrespective of the market [108]. Global harmonization is also facilitated by the capacity-building process that is especially done in developing countries. By embracing the technical recommendations regarding the implementation of GMP requirements as well as the regulation infrastructure, developing countries can easily be part of the global market [109].

The International Cooperation on Cosmetic Regulation (ICCR) is a pivotal aspect of this that gathers regulatory bodies of major continents such as European Union, the United States of America, the Canadian government, the Japanese government etc [24] regional frameworks include the ASEAN Cosmetic Directive. The ASEAN members have one of the most harmonized markets of cosmetics, apart from the EU, with mutual standards on ingredient listing, labeling, Good Manufacturing Practices (GMP) standards, and notification systems [42]. ICCR has been mainly important in encouraging global acceptance of alternative methods for safety testing [110]. ICCR, through facilitating collaboration between experts and regulators, fosters international recognition of in vitro and in silico testing approaches. These efforts lower redundant testing, foster responsible research, and stimulate the use of sophisticated methods of safety evaluation. Regulatory harmonization also reduces regulatory burdens for manufacturing in such a way that efforts are better placed for innovation, quality, and safety for consumers [111].

Nevertheless, regardless of all these advancements, having a unanimous global harmonization is challenging. Culture and national approaches to regulation still affect cosmetic legislation globally [24]. Some nations adopt a more precautionary policy, while

others focus on innovations and accessibility to the market [112]. As such, harmonization is generally based on shared science principles and not on an equal set of rules [113].

Conclusion:

The control of cosmetic products has become progressively stronger due to an expansion in scientific knowledge and consumer awareness. Current regulatory frameworks include ingredient regulation, product testing, manufacturing regulation, labeling regulation, and post-market surveillance. Cosmetic products are widely used across the world, but their regulatory frameworks and systems are region-specific. While the European Union has a focus on safety assessment and ingredient regulation of cosmetics in the pre-market, the United States has a post-market approach, whereas other countries like China, Japan, and South Korea have their region-specific policies and frameworks. These differences show definite regulatory philosophies: precautionary pre-market control in EU, post-market oversight in the US, and the multi-perspective risk-assessment in the East Asia.

Efforts for global harmonization, in terms of ISO, ICCR collaborative agreements, and regional harmonization like the ASEAN Cosmetic Directive, are finally starting to bring about harmonization among cosmetic regulatory systems across the globe. While achieving a complete harmonization process within a short period seems difficult, the movement toward a common scientific perspective is underway and collaborative regulation is in motion. The regulation of cosmetics continues to keep up with innovations in science and technology and increasingly addresses interdisciplinary areas like toxicology, material science, biotechnology, and environmental science in the years to come for the continued safety, efficacy, and responsible manufacture of cosmetic products.

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