RESEARCH ARTICLE
DOI: https://doi.org/10.4038/ouslj.v21i1.7710

OUSL Journal, 2026
Vol. 21, No. 1, (pp.113-135)

Cosmetic Science in Undergraduate Education in Sri Lanka: An Integrative Review of Educational, Industrial, and Economic Perspectives

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Abstract

Sri Lanka, an island rich in biodiversity and renowned for its medicinal plants, has untapped potential in the herbal and natural cosmetic industry. While local cosmetic producers create a wide variety of products, the industry faces challenges related to scientific validation and research integration. This integrative review examines peer-reviewed research, industry reports, policy documents, and international curriculum models to explore global trends in cosmetic science education, industrial and economic drivers, and the relevance of biodiversity-based natural cosmetics, with particular emphasis on the Sri Lankan context. The review shows that cosmetic science programmes internationally commonly include formulation chemistry, safety and regulatory aspects, and practical laboratory training. It also highlights the connection between science education, industry needs, and biodiversity-based product development. Overall, the literature indicates that cosmetic science is an interdisciplinary area that fits well within modern undergraduate science education.

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(Received 25th August 2025, Revised 15th April 2026, Accepted 25th April 2026, © OUSL)

Further studies may explore how such integration could be practically implemented in the Sri Lankan context.

Keywords: *cosmetic science, Sri Lanka, natural cosmetics, herbal cosmetics, biodiversity, employability*

Introduction

A cosmetic is defined by the U.S. Federal Food, Drug, and Cosmetic Act as "*articles intended to be rubbed, poured, sprinkled, or sprayed on, introduced into, or otherwise applied to the human body for cleansing, beautifying, promoting attractiveness, or altering the appearance*" (Federal Food, Drug, and Cosmetic Act of 1938, 1938a). In some instances, it can be difficult for the general public to clearly distinguish a cosmetic item from a drug. In the same act, a drug is defined as "*articles intended for use in the diagnosis, cure, mitigation, treatment, or prevention of disease in man or other animals, and articles (other than food) intended to affect the structure or any function of the body of man or other animals*" (Federal Food, Drug, and Cosmetic Act of 1938, 1938b). While a regular toothpaste used solely for cleaning is considered a cosmetic, a toothpaste containing fluoride (fluoridated toothpaste) intended to prevent dental cavities is classified as a drug–cosmetic combination due to its therapeutic function.

Cosmetics can be classified by the part of the body to which they are applied or by their specific function. The two dominant categories within the global cosmetic market are skin care and hair care products, accounting for 35% and 25% of the market, respectively (Petruzzi, 2023). Skin care products primarily cleanse, moisturize, protect, and enhance the appearance of the skin, while hair care products are designed to cleanse, condition, protect, and style hair. Colour cosmetics, which make up 15% of the global market, are mainly used for temporary beautification. Currently, there is a growing trend toward hybrid colour cosmetics with added skin care properties. Fragrances account for approximately 10% of the market, while all other categories contribute 5% or less, individually (Petruzzi, 2023).

Every cosmetic product represents a balanced combination of scientific knowledge and innovation, meeting a specific beauty or personal care need of consumers. Manufacturing a safe, effective, and attractive product through the combined knowledge of chemistry, biology, dermatology, pharmacology, toxicology, marketing, and materials science can be considered cosmetic science (Nozaki, 2017). A vital part of cosmetic science is cosmetic chemistry, which focuses on the design, formulation, development, and testing of cosmetic products. Cosmetic science is multidisciplinary, while cosmetic chemistry is an interdisciplinary field. Cosmetic chemistry applies core concepts of organic and physical chemistry, biochemistry, microbiology, and analytical chemistry in real-world projects.

Sri Lanka has strong potential to emerge as a competitive player in the global cosmetic industry, particularly in herbal cosmetics, owing to its rich diversity of medicinal and cosmetically valuable plant resources coupled with centuries-old Ayurvedic knowledge. However, literature suggests that the scientific foundation required to develop globally competitive and commercially viable cosmetic products remains limited. Structured academic training and practical skill development in cosmetic science are not yet well established within undergraduate science education. This review therefore examines the relevance of integrating cosmetic science into local bachelor's degree curricula in light of global educational trends, industrial demands, and biodiversity-based opportunities.

Methodology

This study employed an integrative review methodology, which utilized several forms of evidence, including empirical studies, theoretical literature, policy documents, industry reports, and curriculum descriptions. A comprehensive literature search was conducted using Google Scholar covering publications from 2010 to 2025, a period selected to capture modern developments in cosmetic science education and industry expansion. The major Boolean search combinations used in the search were ("cosmetic science education" OR "cosmetic chemistry curriculum") AND ("undergraduate" OR "Bachelor of Science"), ("natural cosmetics" OR "herbal cosmetics") AND ("biodiversity" OR "medicinal plants"), ("cosmetic industry" AND "Sri Lanka"), and ("cosmetic regulation" OR "cosmetic safety evaluation") AND ("education" OR "training"). Reference lists of key articles were also manually screened to identify additional relevant sources. Manual searches of institutional websites and policy documents were also conducted to identify curriculum descriptions and national reports, respectively.

Inclusion and Exclusion Criteria

Sources were included if they addressed cosmetic science or cosmetic product development; discussed undergraduate or higher-education curricula, skills development, or workforce preparation related to cosmetics; provided industry, market, regulatory, or policy insights relevant to cosmetic science; or examined natural, herbal, or biodiversity-based cosmetics, particularly within Sri Lanka. Only English-language publications published between 2010 and 2025 were considered. Eligible sources included peer-reviewed journal articles, official government and policy documents, industry reports relevant to cosmetic sector development and established institutional curriculum descriptions. Publications unrelated to cosmetics, personal care industries, or higher-education curriculum development were excluded, as were non-scholarly opinion pieces, purely marketing-oriented materials, and duplicated records.

Data Extraction and Synthesis

Relevant information was extracted from each source and was analyzed using thematic synthesis. The analysis resulted in the identification of four main thematic areas: (i) global and local trends in cosmetic science education, (ii) industrial and economic drivers influencing cosmetic science training, (iii) role of biodiversity and traditional knowledge in cosmetic development, and (iv) cosmetic science in undergraduate science curriculum.

The synthesized themes were used to evaluate the alignment between industry needs, national resources, and undergraduate education in Sri Lanka. Based on this integration, a structured curriculum framework for introducing cosmetic science into Bachelor of Science programmes was developed and discussed, highlighting expected educational, industrial, and economic implications.

Findings and Discussion

Global and Local Trends in Cosmetic Science Education

Internationally, several universities offer full undergraduate degrees in cosmetic science that integrate scientific fundamentals with practical formulation and industry-oriented training. Examples include the BSc (Hons) in Cosmetic Science offered by Lincoln University College, the London College of Fashion, and the University of Sunderland (Lincoln University College, n.d.; London College of Fashion, n.d.; The University of Sunderland, n.d.), as well as the BSc in Cosmetic Science and Formulation Design at the University of Toledo (The University of Toledo, n.d.). In addition, postgraduate programmes such as the online Master of Science (MS) in Cosmetic Science at the University of Cincinnati (USA) reflect long-standing academic engagement in cosmetic science education, blending formulation science, safety evaluation, and industry knowledge (University of Cincinnati, n.d.).

Some innovative curricular developments, such as those at Spelman College (USA), offer cosmetic chemistry or cosmetic science as a concentration or minor alongside majors in health science, chemistry, or computer and information science. These initiatives further illustrate interdisciplinary expansion and responsiveness to diverse industry needs (Spelman College, n.d.). Analysis of international cosmetic science curricula reveals three dominant types, each with distinct characteristics, resource requirements, and applicability to different institutional contexts (Table 1). Collectively, these programmes assure graduate opportunities for diverse career roles in new product development, marketing, research and development, formulation science, quality control, and regulatory affairs, including positions such as cosmetic formulator, cosmetic service provider, cosmetic consultant, and cosmetic entrepreneur. Overall, these international programmes demonstrate increasing academic recognition of cosmetic science as a multidisciplinary field that integrates chemistry, formulation, regulation, and industry engagement, thereby preparing graduates for a wide range of professional roles across the cosmetics and personal care sector.

Table 1: *Comparative analysis of international cosmetic science curriculum models.*

	Type 1: Standalone Comprehensive Degree	**Type 2: Concentration / Minor Programme**	**Type 3: Postgraduate Specialisation**
Examples	BSc Cosmetic Science	Cosmetic Chemistry concentration within BSc	MS Cosmetic Science
Programme Duration	3-4 years	18-30 credits within 3-4-year degree	1-2 years
Curriculum Scope	Comprehensive: formulation, product development, regulatory affairs, quality control, business aspects, extensive practicals	Focused: core cosmetic formulation and product development, basics of regulatory affairs, quality control, and business aspects	Advanced: specialised formulation science, research methods, regulatory strategy, industry projects
Target Students	Students committed to cosmetic science career from entry	Science students seeking applied specialisation	Working professionals or graduates seeking advanced specialisation
Expected Graduate Competency Level	Deep specialised expertise; ready for	Dual competency; versatile	Advanced specialist for R&D leadership,

	formulator, R&D, or QC roles		regulatory affairs, innovation
Infrastructure Needs	Dedicated cosmetic formulation laboratories and specific instruments (stability chambers, rheometers, texture analysers, preservative efficacy testing equipment, pilot production facilities)	Some additions to existing chemistry labs (basic formulation equipment, stability testing setup, some analytical instruments)	Advanced research equipment

In Sri Lanka, educational opportunities in cosmetic science remain limited and are primarily offered in the form of diplomas, certificate programmes, or short courses (CINEC Campus, n.d.-b; Industrial Development Board, n.d.; The Open University of Sri Lanka, n.d.; University of Sri Jayewardenepura, n.d.). At present, only a single SLQF Level 6 degree in cosmetic science has been reported, which is offered by a private higher education institution located in the Western Province (CINEC Campus, n.d.-a).

Within the state university system, although several industry-oriented and application-based subjects such as polymer science and technology or pharmaceutical chemistry are incorporated into BSc General and Honours degree programmes, cosmetic science is not formally recognized as either a compulsory or optional course, nor as a defined component within broader streams such as industrial chemistry. From a higher-education policy perspective, this situation reflects a structural gap between emerging global, industry-responsive curricular models and the current undergraduate science framework in Sri Lanka. The limited integration of cosmetic science within SLQF-aligned state university programmes suggests potential opportunities to strengthen graduate employability, support local personal care and cosmetics industries, and align undergraduate science education with national objectives related to innovation and industrial diversification (Asian Productivity Organization, 2025, pp. 42-46; Department of National Planning, 2025; Ministry of Industry and Entrepreneurship Development, 2025).

Of the three global models identified (Table 1), the concentration /minor model (Type 2) appears comparatively adaptable within resource-constrained higher-education contexts as in Sri Lanka. While standalone degrees (Type 1) and postgraduate specializations (Type 3) require substantial investment in dedicated infrastructure and specialized faculty expertise, the concentration/minor approach may leverage existing laboratory facilities and disciplinary strengths in chemistry and related fields. Literature on curriculum integration in developing contexts suggests that such incremental models can facilitate interdisciplinary expansion without extensive structural restructuring. Within this framework, the concentration/minor model may represent a feasible pathway for initial integration, subject to further empirical evaluation and stakeholder consultation.

Industrial and Economic Drivers

Industrial growth and economic expansion are key drivers shaping the demand for cosmetic science education, globally and locally. The global cosmetic market is valued at over USD 300 billion annually and continues to expand (Petruzzi, 2025). Factors such as urbanization, the influence of social media, the rise of male grooming, and an ageing population are among the key drivers of this growth (Ustymenko, 2023). Consumer preferences in the industry are also constantly evolving. At present, there is a noticeable shift toward clean and cruelty-free products (Gwanya et al., 2024), natural or herbal formulations (Morganti et al., 2023), environmentally sustainable packaging (Del Greco et al., 2024), and personalized cosmetics (Sobolieva & Ivanova, 2025). The use of nanotechnology in product development is another emerging trend (Nhani et al., 2024). These developments are creating new opportunities in cosmetic science for research, product development, and education, particularly in response to the growing demand for scientifically validated products.

Despite significant economic challenges in 2022, the Sri Lankan cosmetic market was estimated at around LKR 90 billion, representing 0.4% of the country's GDP and reflecting a notable increase from LKR 75 billion in 2021 (Jayasundara, 2024). Of the total production in 2022, LKR 58 billion came from local sales while imports accounted for approximately LKR 32 billion. As of 2019, the domestic market comprised about 120 local manufacturers and over 100 importers (Wijerathna, 2021). Sri Lanka's cosmetic exports reached roughly LKR 14.29 billion in 2021 (Jayasundara, 2023) and are expected to grow steadily (Reportlinker, 2023; Statista, n.d.). This growth is likely to be driven by rising global demand for natural, herbal, and organic products, which aligns well with Sri Lanka's strengths in herbal cosmetics, its rich biodiversity, and centuries of traditional Ayurvedic knowledge. The global herbal cosmetic market size was around USD 78.5 billion in 2019 (approximately LKR 14.02 trillion) and is expected to grow at an annual growth rate of 5.2% during 2020-2027 (Export Development Board, n.d.; Wijerathna, 2021).

The evidence presented in this section suggests a clear relationship between industrial growth and the evolving skill demands within the cosmetic sector, highlighting the relevance of examining how undergraduate science education may respond to these economic and technological developments.

Sri Lanka's Rich Biodiversity and Traditional Knowledge

Plant extracts and plant-derived ingredients continue to be important raw materials for the cosmetic industry, driven largely by increasing consumer demand for natural and sustainable products (Bourgaud et al., 2025). Although most cosmetic ingredients listed in international databases originate from Asian plant species, the participation of biodiversity-rich Asian developing countries in the global cosmetic industry remains relatively limited (Bravo et al., 2020).

Sri Lanka possesses one of the highest levels of biodiversity in the world, with a considerably high number of endemic plant species. Many of these plants have been part of traditional Ayurvedic practices for centuries. Sri Lanka's rich biodiversity and traditional medicinal knowledge offer significant potential for developing natural cosmetic products. A recent study by Gamage et al. (2021a) reports that 115 different plant species are currently used in the herbal cosmetic industry. Among these plant species, the most frequently used in local cosmetic production are listed in Table 2 (Gamage et al., 2021a). Additionally, cinnamon and coconut oil are also now increasingly incorporated into cosmetic formulations.

Table 2. *Frequently used plant species in Sri Lankan cosmetic production*

Scientific name	Common name	Plant part(s) employed in cosmetic formulations	
Aloe vera (L.) Burm.f.	Aloe	leaf gel	
Santalum album L.	Sandalwood, Suduhandun	heartwood	
Coscinium fenestratum (Goetgh.) Colebr.	Calumba wood, Weni wel	stem	
Azadirachta indica A.Juss.	Neem, Kohomba	bark, leaves	
Kokoona zeylanica Thwaites	kokum	bark	
Phyllanthus emblica L.	Emblic myrobalan, Nelli	fruit	
Citrus aurantiifolia (Christm.) Swingle	Lime, Dehi	fruit, fruit rind	

Centella asiatica (L.) Urb.	Pennywort, gotukola	whole plant	
Curcuma longa L.,	Turmeric, Kaha	rhizome	
Caryophyllus aromaticus L.	Clove, Karabu	flower bud	
Curcuma aromatica Salisb.	Wild turmeric, Kasthuri kaha	rhizome	
Eclipta prostrata (L.) L.	False daisy, Keekirindiya	whole plant	
Indigofera tinctoria L.	Indigo blue, Nil-awariya	leaves	
Glycyrrhiza glabra L.	Liqourice, Walmee	root	
Cinnamomum verum J.Presl	Cinnamon	extracted oil	
Cocos nucifera L.	Coconut	extracted oil	

Although numerous small- and medium-scale local companies manufacture herbal and natural cosmetics, many lack formal scientific validation of their formulations and standardized quality control procedures (Gamage et al., 2022). The survey by Gamage et al. (2021a) revealed that, while local herbal cosmetic manufacturers produce a wide variety of products, many rely on traditional, family-based formulations that have not undergone rigorous scientific evaluation. Napagoda et al. (2016) noted that only a limited number of studies on the bioactivity of Sri Lankan medicinal plants exist to support cosmetic development. Apart from study of Nirmalan (2017), few ethnobotanical investigations have systematically examined the cosmetic potential of Sri Lanka's medicinal plants. A broader review suggests that limited participation of developing countries in the global cosmetic industry may be associated with gaps in trained personnel, research capacity, regulatory infrastructure, and public–private collaboration (Paranagama, 2022; Barber et al., 2014).

Taken together, the literature highlights an intersection between biodiversity resources, traditional knowledge systems, and scientific capacity development. In this context, discussions on integrating cosmetic science within undergraduate programmes may be viewed as part of broader efforts to strengthen research validation, product development, and sustainable utilization of biological resources. Figure 1 conceptually illustrates the potential interaction between scientific training, traditional Ayurvedic knowledge, and Sri Lanka's plant biodiversity in supporting value-added cosmetic innovation.

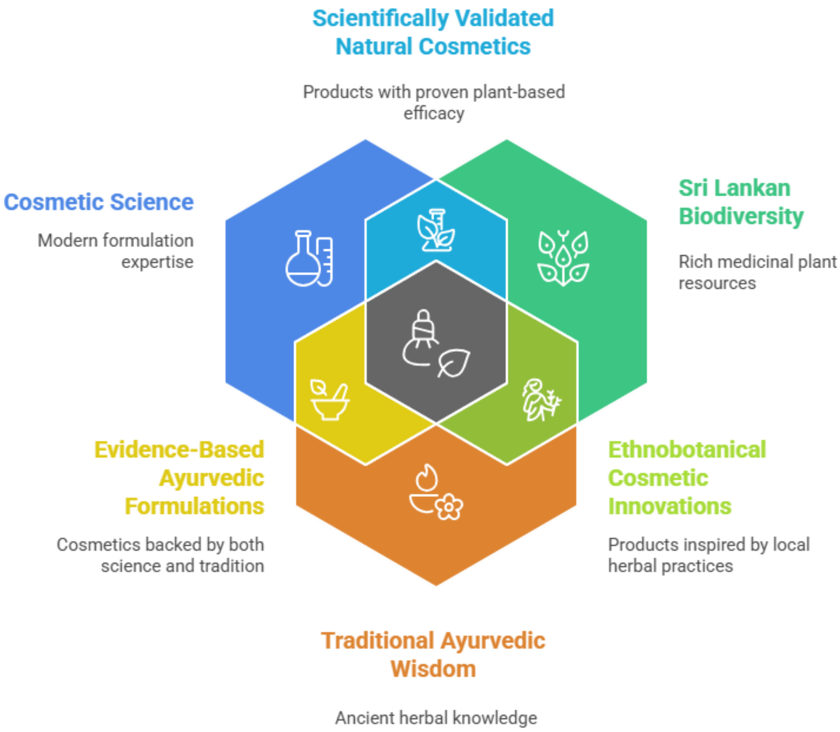

Figure 1. A schematic representation illustrating the synergistic interplay between Sri Lanka's rich biodiversity, traditional Ayurvedic

knowledge, and modern cosmetic science. This figure was generated with the assistance of Napkin.ai (Napkin AI, 2025)

Cosmetic Science within Undergraduate Science Education

Evidence drawn from educational trends, industrial and economic drivers, and Sri Lanka's biodiversity and traditional knowledge systems discussed in previous sections highlights the academic relevance of cosmetic science within undergraduate science education. The literature suggests that cosmetic science is inherently interdisciplinary, integrating knowledge from chemistry, biology, microbiology, physics, materials science, regulatory science, and business-related domains.

International curricula indicate that cosmetic science education typically emphasizes connections between theoretical scientific foundations and applied product development. Students are often exposed to the full product development cycle, encompassing ingredient chemistry, formulation design, analytical testing, quality assurance, regulatory considerations, and market awareness. Such integration allows scientific principles to be contextualized within real-world industrial applications. Across the reviewed programmes, competency development commonly includes laboratory experimentation, operation of analytical instruments, interpretation of physicochemical and microbiological data, troubleshooting formulation challenges, and application of evidence-based decision-making within established safety and regulatory frameworks. Table 3 lists core thematic areas and competency domains recurrently identified in international cosmetic science curricula and related scholarly literature.

Table 3. *Core thematic areas and competency domains identified in cosmetic science education literature (Sakamoto et al., 2017; Singh, 2010)*

Topic	Subtopics
Introduction to Cosmetic Science	History and evolution of cosmetic science, skin and hair biology, and cosmetic product types
Ingredient Chemistry	Active, non-active, and functional ingredients, chemistry of different cosmetic ingredients,

	functions of various ingredients: emollients, humectants, occlusives, surfactants, emulsifiers, preservatives, antioxidants, UV filters, colorants, fragrances, viscosity modifiers, etc.
Herbal Cosmetic Science	Historical and ethnobotanical use of plants in beauty care, plant-derived active ingredients (polyphenols, alkaloids, terpenoids, essential oils, etc.), Sri Lankan biodiversity and endemic plants with cosmetic potential, and botanicals as cosmetic ingredients
Product Formulation and Formulation Technology	Cosmetic dosage forms (creams, lotions, pastes, ointments, gels, etc.), formation and colloidal science, solution-based formations, suspension-based formations, rheology, and associated instrumentation, formulation and/or development of a cosmetic product to fulfil a set of specific cosmetic goals or to address a particular customer requirement
Sustainable Practices and New Trends	Sustainability and green chemistry: green extraction, green and herbal products, life-cycle considerations and packaging impacts, cruelty-free cosmetics, nanotechnology in cosmetics, personalized cosmetics
Analytical Testing	Ingredient and product testing; different testing types: stability, safety, efficacy, microbiological, physical, and chemical testing; analytical techniques in cosmetic science: spectroscopic, chromatographic, thermal techniques, etc.
Regulatory & Quality Management	Ethical aspects, global and local regulations, norms, and compliance standards, labeling and packaging requirements
Market and Industry	Market overview, packaging strategies, Good Manufacturing Practices (GMP), and industry standards

The reviewed literature indicates that foundational components frequently include the historical development of cosmetics, skin and hair biology, and classification of product types. *Ingredient literacy*, which is the understanding of the physicochemical properties and functional roles of cosmetic ingredients, is consistently emphasized as central to safe and effective formulation practice. Knowledge of active compounds such as antioxidants, UV filters, and botanical derivatives is particularly important for predicting stability, compatibility, and performance within complex formulations.

In biodiversity-rich contexts such as Sri Lanka, literature on herbal and natural cosmetics highlights the relevance of ethnobotanical knowledge, secondary metabolite chemistry, and extraction methodologies (Gamage et al., 2021a, 2021b, 2022). Integration of such domains within cosmetic science education reflects the intersection between traditional knowledge systems and modern scientific validation.

Formulation science and product testing also emerge as central competency areas across international models. Understanding colloidal systems, rheology, and physicochemical parameters (such as pH, spread ability, organoleptic properties, and shelf-life) enables the design of products with appropriate stability, texture, safety, and shelf life. Analytical evaluation, including safety, stability, and efficacy, microbiological, chemical, and physical testing, forms a critical component of quality assurance in cosmetic production. Table 4 summarizes testing categories and applications commonly referenced in cosmetic science literature.

Table 4. *Cosmetic product testing types and their applications (Singh, 2010)*

Category	Purpose	Common Tests
Safety testing	Ensures the product is non-toxic and safe for human use.	Ingredient safety test, Skin irritation test, Eye irritation test, Patch test, Acute dermal toxicity test, Sensitisation test (e.g., HRIPT-Human Repeat Insult Patch Test), Phototoxicity test
Stability testing	Evaluates how the product performs over time under	Accelerated aging test, Real-Time stability test, Temperature/humidity cycling test, Centrifuge test, Packaging

	various conditions.	compatibility test
Efficacy testing	Validates the claims made on the label (e.g., SPF, anti-aging, etc.)	In-vitro testing (Cell-based assays, tests using skin models), In-vivo testing (Human volunteer testing), Consumer perception studies (Surveys)
Microbiological testing	Ensures products are free from harmful microorganisms.	Total Aerobic Microbial Count (TAMC), Total Yeast and Mold Count (TYMC), Preservative efficacy test (PET) - Challenge test, Pathogen detection
Chemical and physical testing	Verifies consistency and active ingredient content.	pH measurement, Viscosity testing, Active content analysis, Heavy metal analysis, Colour, Odour, and Texture evaluation

Global demand is increasingly oriented towards herbal and green cosmetics, environmentally sustainable packaging, and clean-label formulations. Personalized cosmetics represent another emerging development within the industry, whereby individual genetic information, skin type, microbiome composition, lifestyle factors, and consumer preferences are considered in the formulation of tailored products (Bhosale et al., 2023). Advancements in artificial intelligence, skin-imaging technologies, and microbiome analysis are further supporting this shift toward customization (Bhosale et al., 2023; Bom et al., 2025). These new trends and sustainable approaches are progressively reflected in modern cosmetic science curricula and educational practice. Collectively, they illustrate the evolving technological, scientific, and regulatory landscape within which cosmetic professionals operate.

Collectively, the reviewed literature portrays cosmetic science education as extending beyond formulation to encompass regulatory awareness, quality management, ethical considerations, and industry standards. Rather than prescribing a specific course structure, the analysis highlights how competency domains identified internationally may inform broader discussions on aligning undergraduate science education with interdisciplinary, industry-responsive fields.

Implementation Limitations and Considerations in the Sri Lankan Context

Within the Sri Lankan higher-education system, the integration of cosmetic science into undergraduate programmes would be influenced by institutional infrastructure, faculty expertise, and industry engagement capacity. Many state universities already possess core analytical laboratories equipped with instruments such as HPLC systems, UV–Vis spectrophotometers, pH meters, and rheological equipment, which may provide a foundational platform for applied cosmetic science training. However, specialized formulation facilities and stability-testing infrastructure may be more limited, potentially shaping the scale and depth of practical implementation.

Industry engagement represents another contextual factor. Sri Lanka's cosmetic sector includes small- and medium-scale manufacturers, exporters, and herbal product developers. Structured partnerships between universities, industry stakeholders, and Ayurvedic practitioners may enhance applied research, validation of traditional formulations, and student exposure to real-world practices (Barber et al., 2014; Paranagama, 2022).

Ethical and sustainability considerations are particularly significant in Sri Lanka, given its biodiversity richness and reliance on traditional knowledge systems. Responsible sourcing of botanicals, equitable benefit-sharing mechanisms, and environmental impact assessment including concerns related to microplastics and persistent chemical contaminants are relevant dimensions of modern cosmetic science. Aligning educational discussions with national sustainability initiatives (Clean Sri Lanka, n.d.) and global green cosmetic trends (Alviri et al., 2025) further situates cosmetic science within broader development priorities.

Collectively, these factors suggest that the feasibility of integrating cosmetic science into undergraduate education in Sri Lanka is shaped by institutional capacity, regulatory frameworks, biodiversity governance, and industry collaboration.

Conclusions

This integrative review examined global cosmetic science education models, industrial and economic trends, and Sri Lanka's biodiversity and traditional knowledge systems to explore the relevance of cosmetic science within undergraduate science education.

Sri Lanka's rich biodiversity and longstanding Ayurvedic traditions provide a strong resource base for herbal and natural cosmetic development. At the same time, literature identifies gaps in scientific validation, product standardization, and regulatory expertise within the local sector. The synthesis of international curriculum patterns, industry developments, and local resource potential indicates that cosmetic science represents an interdisciplinary field aligned with emerging workforce competencies and biodiversity-based innovation.

Although feasibility depends on factors such as institutional capacity, faculty expertise, and industry collaboration, the findings of this review provide a literature-informed basis for recognizing cosmetic science as a contextually relevant domain within undergraduate science education in Sri Lanka.

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