

A biomimetic framework for sustainable innovation in the cosmetics industry

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OBJECTIVE: Though a variety of sustainability performance indicators exist [1], the cosmetics industry lacks a comprehensive sustainability framework. Nature is the best model and benchmark of sustainability, and scientists have identified key principles of nature that create and maintain systems that are simultaneously innovative and regenerative [2, 3]. This study uses biomimicry – the emulation of nature’s principles and mechanisms to solve human challenges – and sustainability metrics to create a nature-inspired framework that can be used by researchers and companies to (1) evaluate how industry is performing in terms of sustainability and (2) guide the design of new products (e.g. ingredients, formulas, packaging) such that they are both innovative and sustainable.

METHODS: A literature review was done to study nature’s principles of sustainability and to find examples of their application in industry. These principles and case studies were used to build a nature-inspired framework that can be applied in cosmetics and related industries. Finally, the use of the framework was demonstrated in two different scenarios.

RESULTS: The framework created in this study incorporates nature’s key characteristics for sustainability – described here as Evolving, Networked, Adaptive, Benign, Local, and Efficient (ENABLE). Each of these six characteristics are defined in detail. The application of the ENABLE framework to the evaluation of an existing product showed the usefulness of the framework for highlighting the strengths and shortcomings of the product’s sustainability performance. In the scenario of designing a new product, the framework enabled greater integration of ecological principles into the design. When compared to several existing sustainability approaches in the cosmetics industry, the ENABLE framework was found to be one of the most comprehensive and holistic, including but extending beyond the singular concepts of circular economy and naturality.

CONCLUSION: This study suggests that the application of nature’s sustainability principles to the cosmetics industry offers several potential benefits, including products and processes that are more innovative and ecologically regenerative, as well as more attractive communication about sustainability with the public and customers. The next steps to further develop this work should include linking the ENABLE framework to ecosystem services and benefit-cost analyses.

Keywords

biomimicry, framework, sustainable innovation, regenerative, systems thinking

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