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# SUSTAINABILITY INDEX DEVELOPMENT FOR BIOSURFACTANTS IN CLEANING PRODUCTS USING BIBLIOMETRIC ANALYSIS

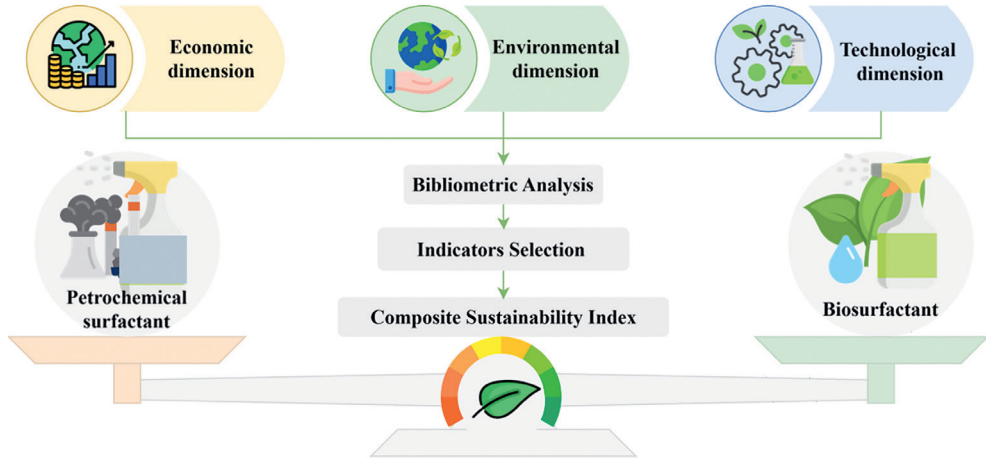
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**Abstract** – Growing interest in environmentally friendly cleaning products has led to increased attention to biodegradable surfactants, particularly biosurfactants, as an alternative to traditional petrochemical surfactants. A large part of petrochemical surfactants is harmful to the environment, as they degrade poorly and pollute water environments. Therefore, biosurfactants offer a sustainable alternative; they are of natural origin, less toxic and easily degradable. The aim of the study is to analyse biosurfactant technology, its economic and environmental aspects, and to apply it to cleaning products by developing a structured sustainability index. The bibliometric analysis method was used to determine the indicators for the three main sustainability dimensions, which were defined as technological, environmental and economic. From the Scopus database, all-keywords co-occurrence was generated and visualized by using the VOSviewer software. The analysis was used to identify frequently occurring keywords related to the three dimensions in the biosurfactant literature. The related keywords were grouped according to their relevance to the environmental, economic, and technological sustainability dimensions, and then defined as indicators. These indicators show the key aspects discussed in the literature, like biodegradability, pollution, production, optimization and cost-related factors. The study results highlight an imbalance in the current scientific agenda: while significant attention is paid to the production and environmental performance of biodegradable surfactants, the market and economic aspects of their implementation remain relatively underrepresented. The proposed integrated methodological framework is a transparent, data-driven assessment tool that will provide a foundation for future research on biosurfactants and sustainable cleaning products, across technology, economy and environment.

**Keywords** – *Bibliometric analysis; biodegradable surfactants; biosurfactants; cleaning products; composite sustainability index; sustainability; economic aspects*



Methodological framework for biosurfactant sustainability evaluation

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