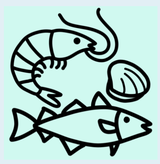
Towards a sustainable valorization of seafood side-streams: a critical review of environmental, economic and social assessment approaches

Iris Joy Abrigo[1], Erasmo Cadena[1], & Jo Dewulf[1]

Introduction

- Global seafood consumption and production continue to increase, leading to increased generation of side-streams from seafood processing.
- These side-streams contain valuable nutritional and functional compounds.
- Valorization can convert underutilized materials into high value products.
- Since valorization requires additional inputs, it is essential to assess whether it genuinely delivers sustainability, across the environmental, economic, and social dimensions.


Aquatic Biomass

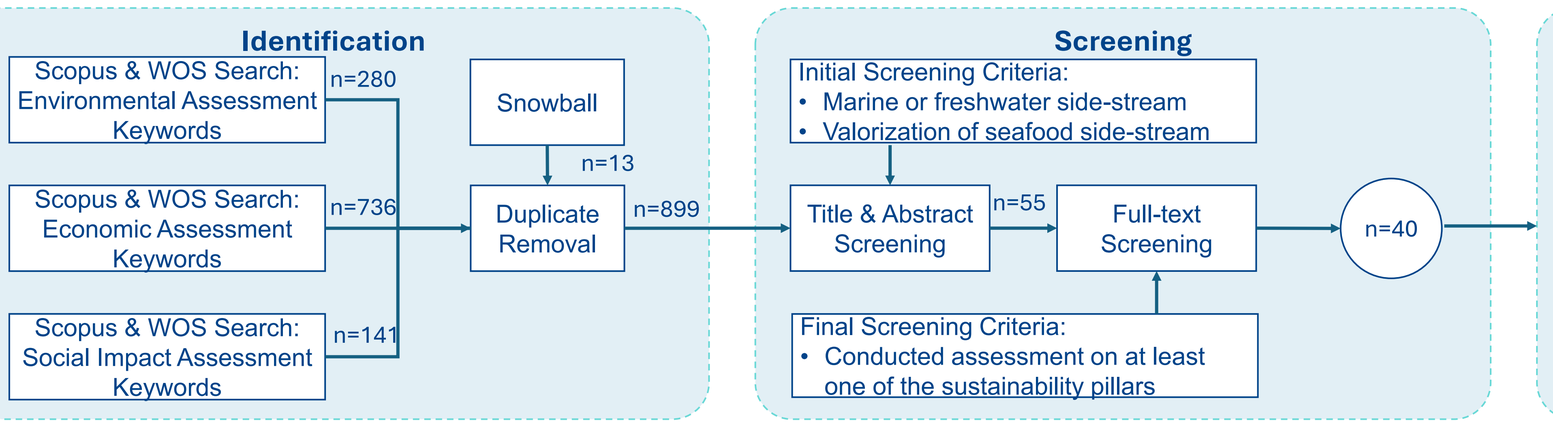

Seafood Side-streams (Input)


Valorization Processing Technology


Valorized Product (Output)


Application

Methodology



Results

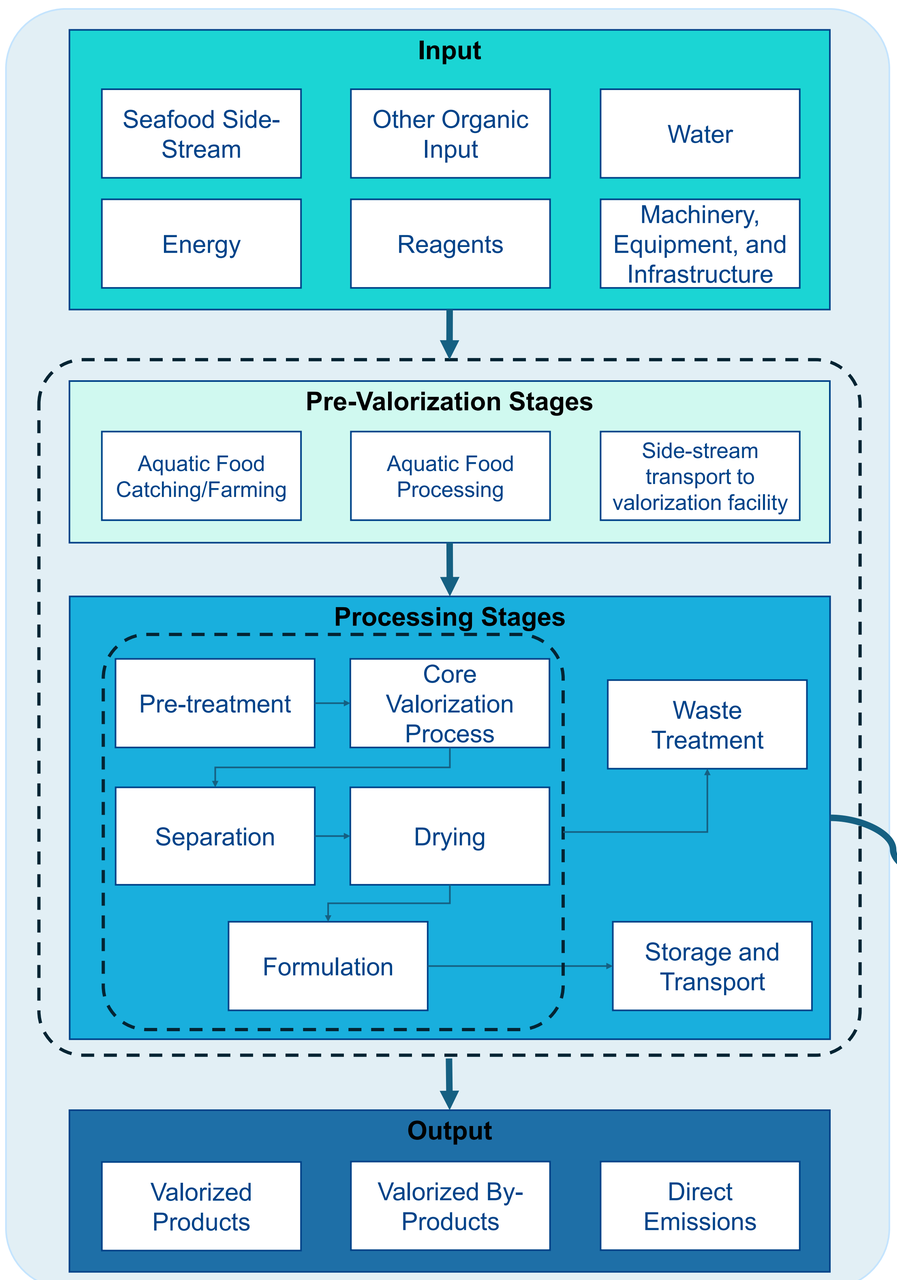


Figure 2. Summary of contributors to Global Warming Potential (GWP) reported by papers in the results and their relative ranking.

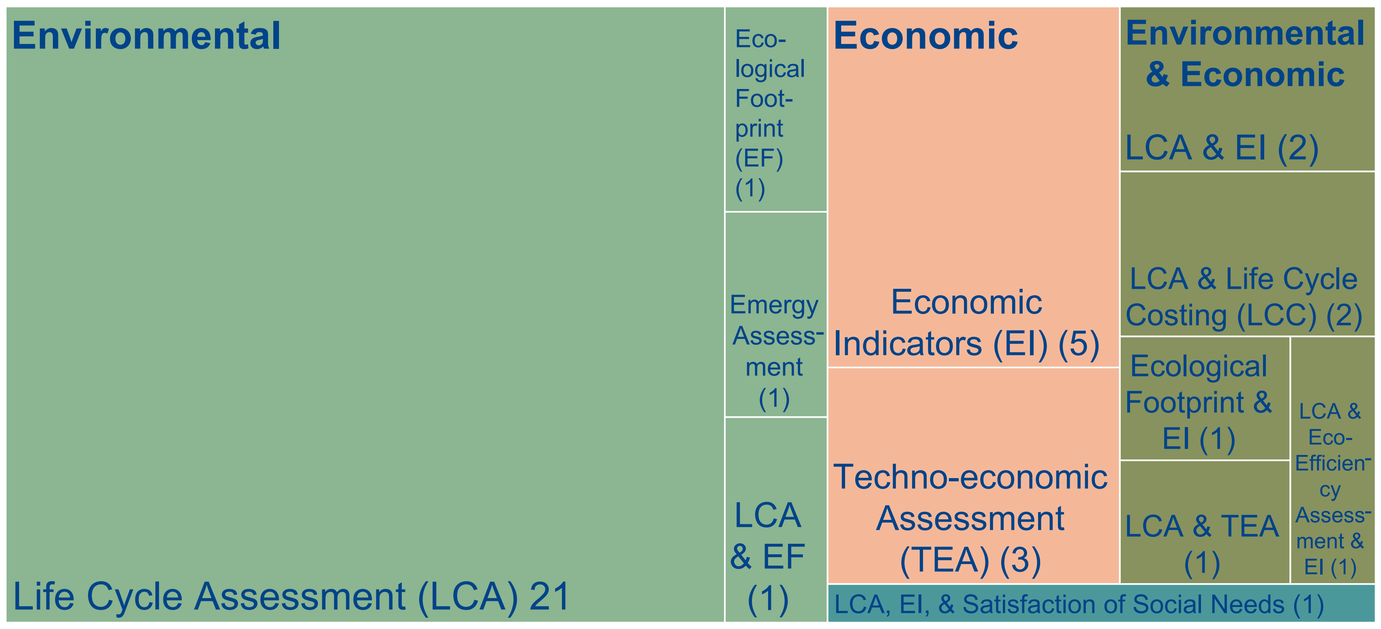
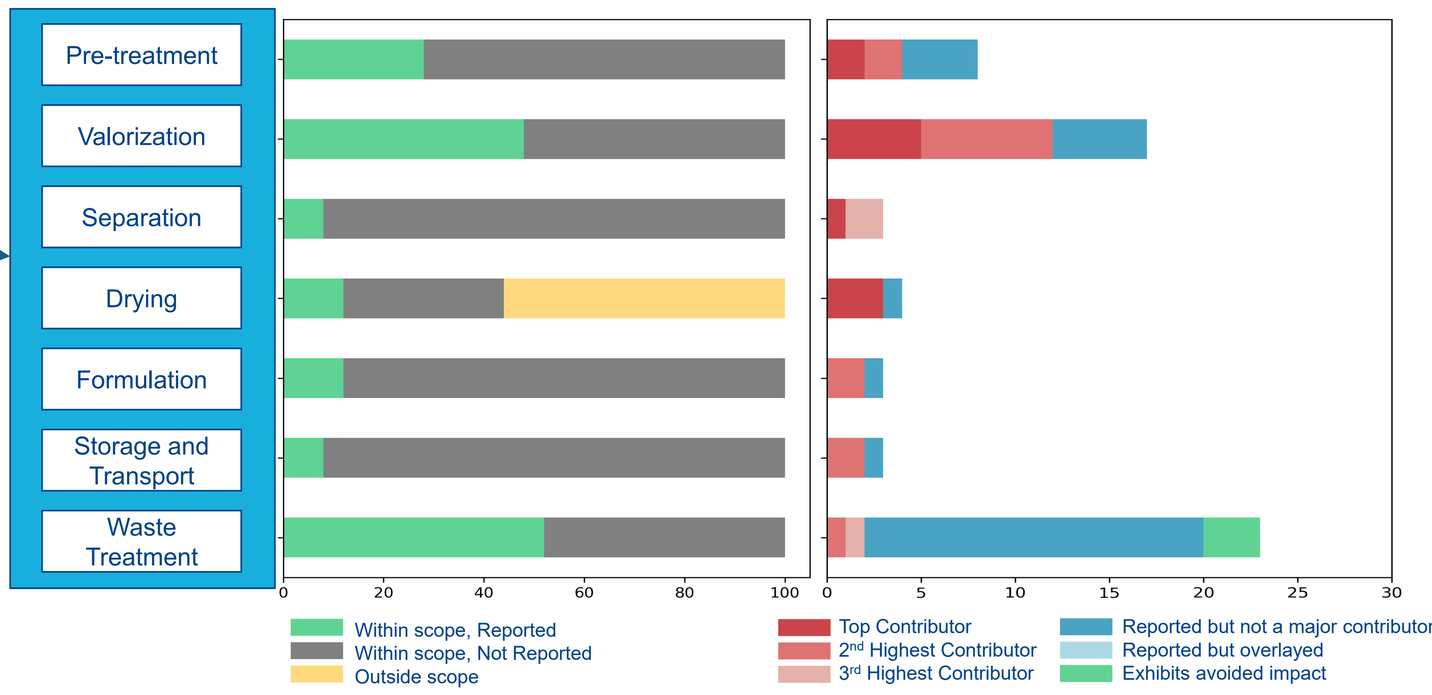


Figure 1. Methodologies applied by selected papers in each of the sustainability pillar.



Valorization showed lower environmental impacts than current end of life options.

Economic Feasibility was influenced by plant size, product selling price, and process efficiency.

The social pillar was underrepresented; with one study which did not encompass a comprehensive social impact across the product's life cycle

Conclusion

- Valorizing seafood processing side-streams offers a compelling pathway toward a more circular and sustainable bioeconomy.
- Value chain identified can serve as a guide for future sustainability assessments.
- A deeper integration of life cycle methodologies, encompassing environmental, economic, and social considerations, is necessary to support informed decision-making

This research was conducted by **(1) Sustainable Systems Engineering (STEN)** research group of **Ghent University** funded by **Research Foundation-Flanders (FWO)** through the **FOODIMAR** Project.

9th-12th September 2025, Palermo, Italy