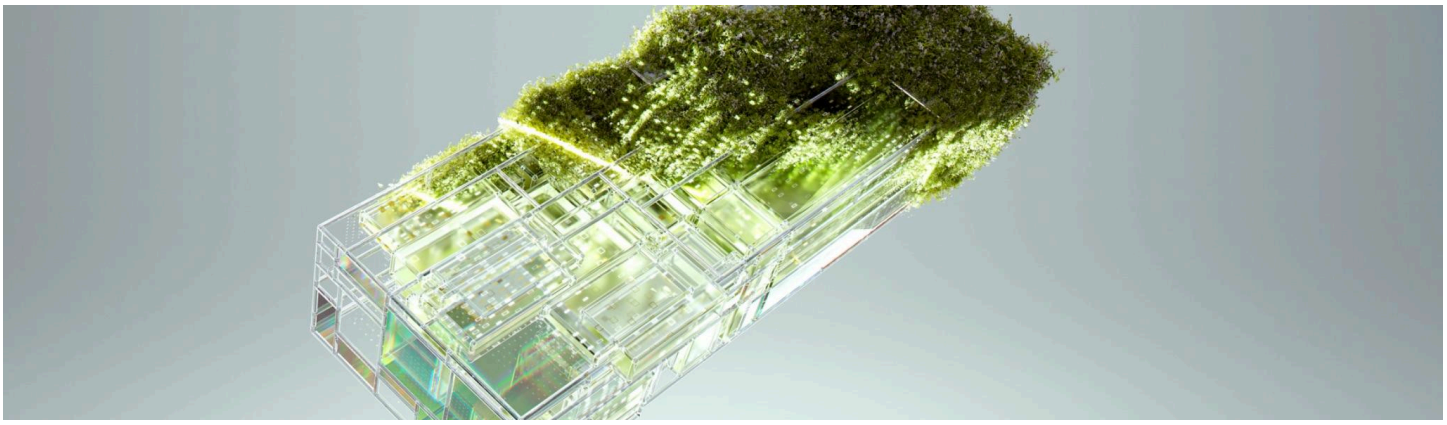
TUM Entrepreneurial Masterclass
Technical University of Munich

Tech Venture Challenge

Enabling Circular Economy Through Collaborations in Manufacturing Industry

Development of an Economical Indicator Set / Assessment Methods for Collaboration Projects



Picture: Google Deep Mind / Pexels

Challenge description

The transformation to a circular economy (CE) in manufacturing is driven by collaborative initiatives between companies—whether intra-industry or cross-sectoral. These partnerships hold great potential to enable innovation, technology transfer, resource efficiency, and business model shifts. However, the economic impact, evaluation and potential of such projects often goes unmeasured due to the lack of standardized evaluation tools.

To support better decision-making and strategic alignment, there is a need to develop a structured set of economic indicators tailored to these collaborative projects. This thesis will directly contribute to the development of an analytical tool within a comprehensive CE collaboration framework, led by the Chair of Materials Handling, Material Flow, and Logistics at TUM.

Thesis Focus

Your master thesis will support the ongoing doctoral research on enabling CE implementation through collaboration. The focus will be on identifying, classifying, and operationalizing economic indicators that can be used to evaluate the performance of collaborative CE projects in manufacturing. Key research directions may include:

- Defining economic success criteria for intercompany CE collaboration
- Developing or adapting indicators (e.g. ROI of shared initiatives, cost avoidance, value co-creation)
- Mapping indicators across project phases (e.g. business case, validation) and system levels (e.g. micro/meso)
- Embedding economic indicators into an existing multi-dimensional indicator taxonomy
- Contributing to the design of an analytical module used in case studies across supply chain, R&D, and logistics

Why this matters?

This work will feed directly into a modular collaboration framework consisting of:
1. An organizational tool (project canvas by collaboration phase)
2. An information & data logistics concept (interoperable data flows)
3. An analytical tool (multi-dimensional indicator system covering economic, environmental, technical, and social dimensions)
Your contribution will specifically strengthen the economic dimension, enabling objective, data-driven assessment of collaborative CE efforts in manufacturing.

Profile and process

You apply individually with a motivation and a CV (but no project draft) and will write an individual master thesis which is suitable to your study program. At the same time, you will be brought together in a group of 3-5 students. We are looking for motivated and methodical master students who:
- Study industrial engineering, business, economics, or related fields
- Are interested in sustainability, industrial innovation, and value chain design
- Have strong analytical thinking and independent working skills
- (Optional) Have prior experience with multi-criteria decision analysis, business model design, or LCA/MFA

Upon successful application, you will become part of the TUM Entrepreneurial Masterclass with all according benefits, such as real added value for the ecosystem in and around Munich and access to the UnternehmerTUM ecosystem. You also have the opportunity to contribute a real industry use case in collaboration and circularity with a scientific publication potential.

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