

Exposé – Empirical Master's Thesis in Cooperation with phosfad

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Business model analysis of an innovative phosphorus recovery process in the circular economy: a case study approach

1. Problem Statement and Relevance

Phosphorus is a critical raw material essential for all life on Earth and non-substitutable. Natural reserves are limited, while agricultural demand remains high, placing phosphorus recycling increasingly in the spotlight under the EU Green Deal and European circular economy policies. *Phosfad* represents an innovative, research-based biotechnological startup idea originating from research at TU Dortmund, employing specific bacteria to sustainably recover phosphate from anthropogenic waste streams and return it to agriculture as a valuable fertilizer.

2. Objective

The task of this master's thesis is to investigate market needs, barriers, and business opportunities for *phosfad*'s technology and develop 1-3 business cases based on prior identified scenarios as a foundation for a StartupTransfer.NRW application. This provides a practice-oriented contribution to the strategic positioning of *phosfad* in the growing market for phosphorus recycling solutions within the circular economy.

3. Deliverables

- Structured market research (technologies, actors, regulatory environment)
- Stakeholder mapping and prioritization (farmers, fertilizer industry, waste water treatment plants)
- Empirical evidence (interviews/survey)
- Identification of 1-3 scenarios and development of business case per scenario
- Co-development of a business model and outline of a Minimum Viable Product (MVP)

4. Potential Research Questions

1. Which market actors, value chains and cooperation potentials are relevant for commercializing *phosfad*? How does *phosfad* position itself?
2. Which regulatory, economic and social factors influence market acceptance of P-recycling technologies?
3. Which 1-3 commercialization scenarios are most promising for *phosfad*, given target waste streams, customer needs, partnering set-up and regulatory constraints?
4. What are the expected unit economics and funding requirements per scenario and which scenario delivers the most attractive risk-adjusted financial case for near-term market entry?

5. Methodological Approach

Literature and market analysis, Qualitative expert interviews, Optional online survey, Business Model Canvas

The outlined deliverables and research questions are an initial idea and we can gladly consider your interests and tailor the focus of the thesis to you. The supervisor will be from the TIE Institute.

If interested, please feel free to contact us via ronja.weidemann@tu-dortmund.de