Life Cycle Thinking in governance: the case study of bioplastic production in Thailand

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Transition towards Bioeconomy

- Substitution for fossil resources in a wide range of sectors, e.g. health, energy, plastics, by employing **renewable biological resources**
- Technological innovation but also on the **mobilization of increasing amounts of biomass**
- Necessary adjustments along **supply chains**, involving a large number of actors and processes
- Potential socioeconomic and environmental impacts from adaptations in productive systems, ultimately governed by **regulatory frameworks and structures** at different scales (Fig 1).

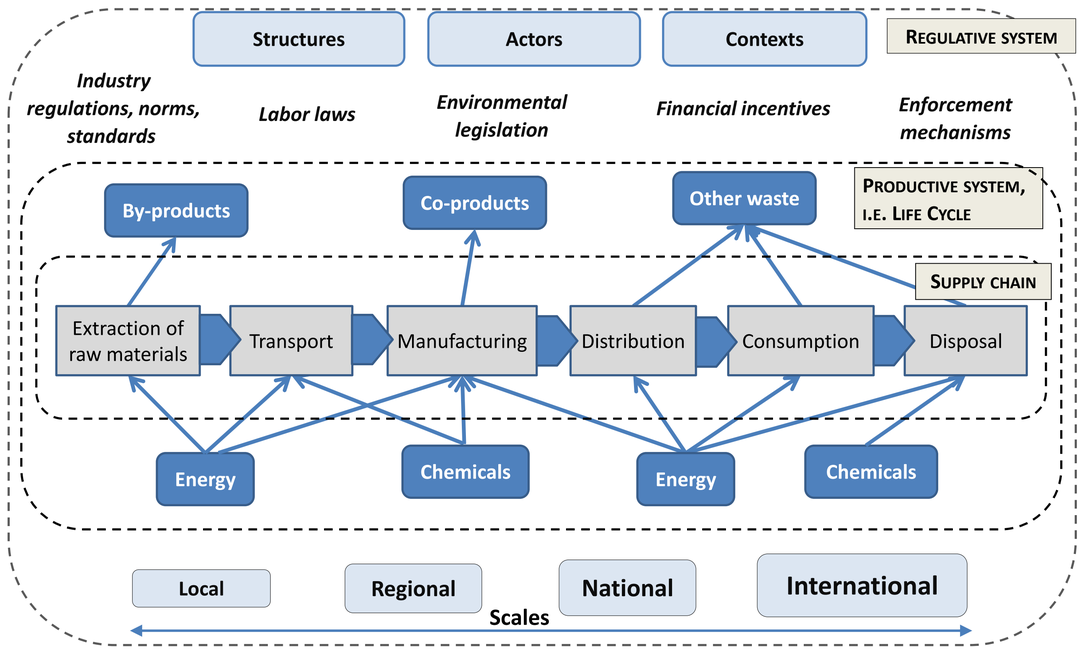


Figure 1. Interface between the regulatory and productive systems.

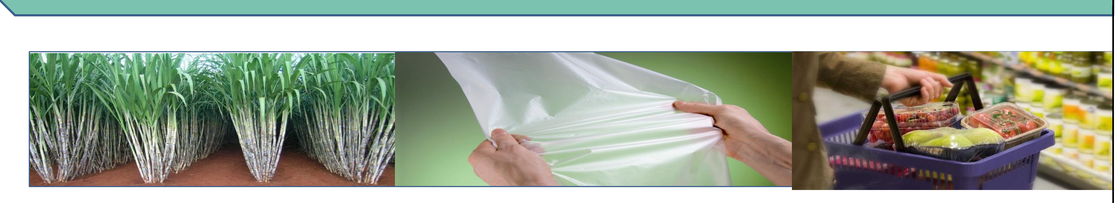
Case study: production of bioplastics in Thailand

- **Polylactic Acid (PLA)** is the frontrunner in the renaissance of bioplastics
- Large scale production only in a few locations: **comparative advantages** based on feedstock availability
- Thailand is the leading producing region, together with the US: **150,000 t/year** of PLA from sugarcane
- **Strategic location** in Southeast Asia, close to plastic markets of China, Japan, Taiwan, and Korea
- Internationally **competitive plastic industry**, with over 3,000 companies in the market

Research questions:

- What are the **institutional and regulatory frameworks** that enhance bioplastic production in Thailand?
- What **specific policies and legal structures**, as well as public and private actors, are involved?
- What are the effects of **governance changes and gaps** on production patterns, from a life cycle perspective?

Need for an analytical framework integrating life cycle and multi-level governance approaches (Fig. 2, 3)



Framework for Life Cycle Governance Analysis (LCGA)

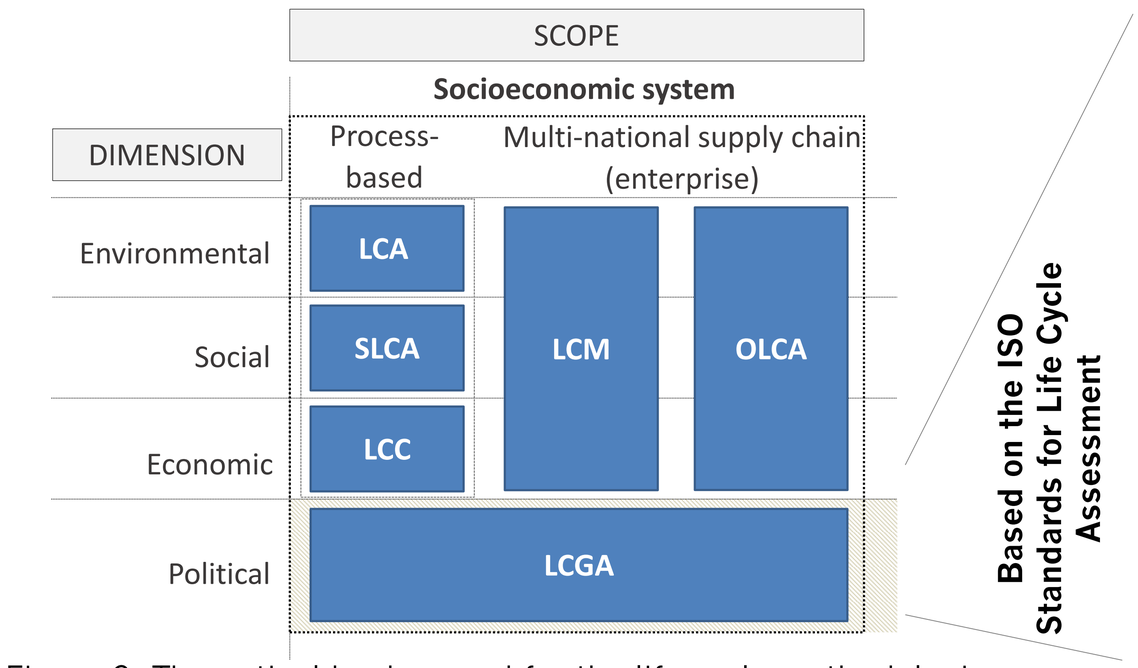


Figure 2. Theoretical background for the life cycle methodologies.

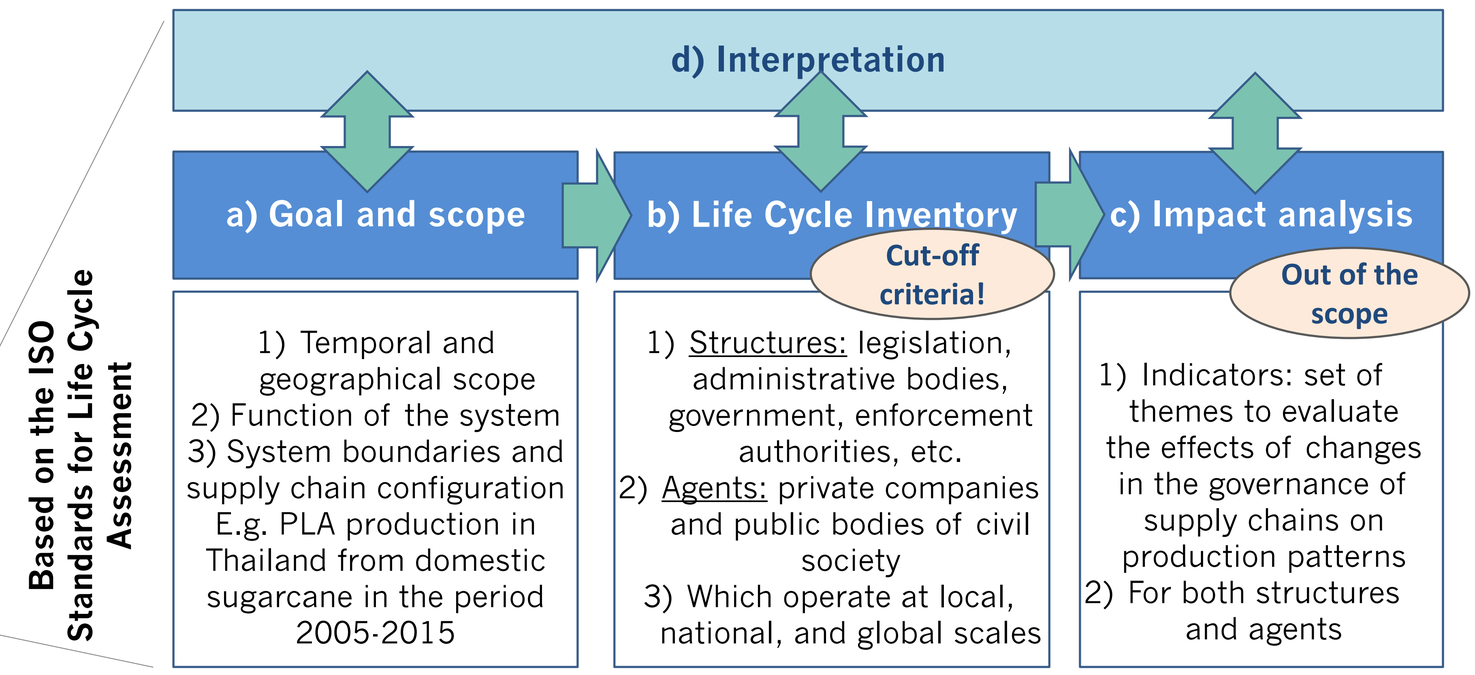


Figure 3. Phases for the LCGA procedure.

Preliminary results and conclusions

STRENGTHS	GAPS
➢ Strong government support (R&D investment, tax incentives) ➢ Guidance of the Thai Bioplastics Industry Association ➢ Well established plastic supply chain ➢ Sugarcane and cassava readily available	➢ Technological innovation to increase cost competitiveness (vs. Malaysia) ➢ Research on agricultural byproducts (e.g. rice straw and husk, tree bark) ➢ Support regimes for bioplastic usage ➢ Policies promoting recyclability and biodegradability of plastics

- A framework for LCGA is proposed as an incremental procedure for multi-level governance assessment
- LCGA goes beyond firm-centered organizational and institutional approaches
- The case study identifies the need for national regulations for product specification, since global standards are rarely effective in national domains

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