

Development of a simulation model for investigating complex system transformation

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Type:

Master Thesis



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Scientific question

System transformations such as the enforcement of smartphones or electromobility are characterized by complex interdependencies between technological, economic and political changes. In innovation research, the Multi-Level Perspective (MLP) model by Frank Geels (2002) is well established, which heuristically views system transformation through innovation in order to better understand cause-effect relationships. A tool for operationalizing the MLP model is System Dynamics (SD) developed by Jay W. Forrester. So far, the detailed process for applying SD methods to the MLP model has rarely been investigated. The objective of the thesis is to answer the question of to what extent SD can be applied to a MLP. The results will be evaluated by using a self-chosen use case.

Scientific methodology

First, an extensive literature research on the topics System Dynamics (SD) and Multi-Level-Perspective (MLP) is carried out. Then theoretical combination of both approaches are shown. The focus of the thesis lies in the application of the combination capabilities to a use case. The successful realization of this work includes the development, validation and simulation of a numerical SD model. Finally, all results are gathered, critically discussed, the limitations as well as potentials of the thesis are pointed out and the need for further research is outlined.

Objective and expected results

The objective of the thesis is to develop a representative SD model based on MLP in order to gain a better understanding of cause-effect relationships within a complex system transformation. The thesis is offered as master thesis. A publication of the thesis is welcome.