Causal Process Models for Efficient Energy Project Consultation and Strategy Development

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Extended Abstract

Process descriptions and models are key to understand the steps involved in projects and are very useful as a good practice convention among affected stakeholders in business development approaches. But often the process views are depicted linear rather than causally explained (e.g. SIA 2014) and therefore fail to take into consideration occurring dynamics.

SD has proven to be suited for the analysis and derivation of causal interrelationships, e.g. the ex-post analysis of failed or flawed projects (e.g. Lyneis & Ford 2007; Rodrigues & Bowers 1996; Love et al. 2002; Nasirzadeh & Nojedehi 2013). Critical phenomena considered in the SD project-literature are: rework cycles (Cooper 1993; Cooper & Mullen 1993; Lyneis & Ford 2007; Lyneis et al. 2001), disruption and delay (Ibbs & Liu 2005; Howick 2003; Eden et al. 1998) and knock-on effects (Lyneis & Ford 2007; Lyneis et al. 2001).

We examine two approaches following good modelling practice (Sterman 2000), which arose out of practical cases with distinct perspectives. Firstly, the project-implementation point of view is considered (here referred to as *implementation approach*). It refers to a case, where a public actor (e.g. municipality) wants to implement a set of projects to foster a regional development and needs guidance on how to timely and successfully implement the project-portfolio. This raises dynamic issues to be taken into consideration and links resource, know-how and stakeholder based viewpoints. Secondly, we consider a business development perspective and analyse critical causalities that explain acquisition success and failure of project-based orders.

The causal relationships concerning the *implementation approach* are depicted in the causal loop diagram (Figure 1). It states that a political target gap drives the implementation of projects and that the target can be met by successfully realising projects (balancing loop “target attainment”). The implementation is favoured by the building up of know-how resulting in more efficient implementation (reinforcing loop “know-how”) as well the building up of trust in actors (reinforcing loop “spiral of success”). The hindering dynamics are the limited resources causing resource conflicts, either financial or workforce conflicts (balancing loop “realisation jams”).

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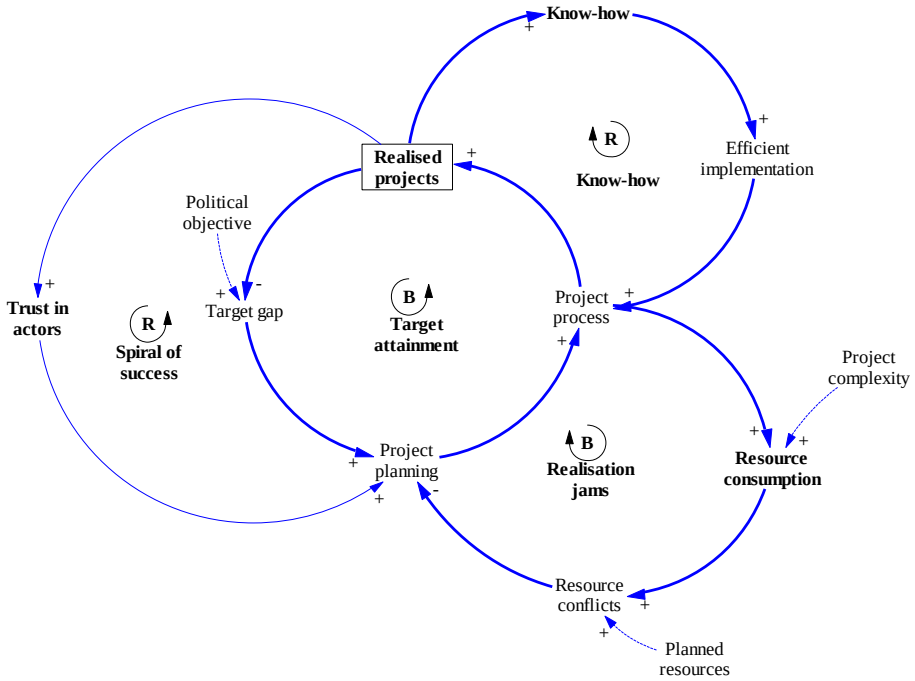
Figure 1: The causal loop diagram of the implementation approach derived from empirical analysis and the phenomena discussed in the SD-literature.



The build-up of a causal model for the *acquisition-approach* is developed in similarly manner.
Results

By merging the SIA-process model (see **Error! Reference source not found.**) and the causal loop diagram (see Figure 1) of the implementation approach as well as by accounting for known structures from the literature, we developed the fully causal structure (not depicted here).

Based on the explicated model, two trecommendations can be derived. First, when having a low initial stock of know-how, it is best to start with rather simple projects to build up know-how and trust first before tackling complex projects. Second, to best possible avoid rework, it is favourable to provide enough workforce, which can also be hired externally. In fact, the overall working hours can be lower when having additional workforce and as stress can be reduced, as well.

A first application of the *implementation approach* shows, that a clear and explicit picture of interrelationships helps in the communication and understanding on why certain aspects (e.g. know-how build up) are important. We observe that the general importance of critical aspects are often known but not why and in which context. Here the SD tools for the implementation approach provides a clear added value. It helps to clarify operating principles of project dynamics in ex ante and to choose most promising implementation strategies. The model supports project planning and communication since it profoundly demonstrates, why certain resources are needed or why collaboration makes sense when know-how is lacking.

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