

## Modelling and simulation of a SD model for industrial chain planning in circular economy\*

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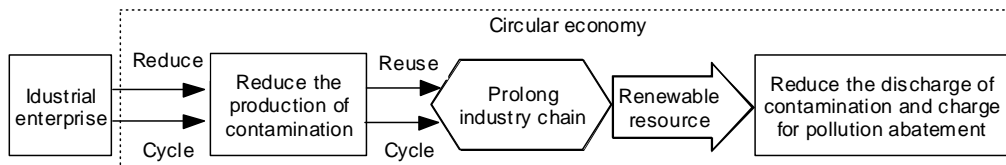
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**Abstract.** Industrial chain can be regarded as the accumulation of value chain or supply chain during region economy, and is one form of industrial cluster. Through analysis to the research methods of value chain, supply chain and industrial cluster, system dynamics (SD) is one of the most useful research methods. The aim of this study is to optimize the planning of industrial chain, following this demand system dynamics model can be developed to simulate the industrial chain. Therefore, we will concentrate on developing a modeling framework for the planning of industrial chain in circular economy. Finally some conclusions can be drawn from the simulated results, and it can provide scientific evidence for the decision-making on industrial chain development in region circular economy.

**Keywords:** system dynamics, industrial chain, circular economy, model simulation

### 1 Introduction

The main characteristic of circular economy is low exploitation, high usage, low pollution. All the materials and energy can be utilized reasonably and durably in circular economy to reduce the influence to the smallest possible amount<sup>[5]</sup>. Focused on main industry, designing and planning the industrial chain, can extend products value chain and make more economic and environmental benefit. The role industrial chain plays in region circular economy is as what showed in Fig. 1.



**Fig. 1.** The relation between circular economy and environment benefit

A literature review finds few studies that utilize models to investigate how to design and plan industrial chain. The research of industrial chain are focused on the theory of industrial chain and its stabilizing mechanism (Jiang, 2004)<sup>[11]</sup>, the relation between industrial chain and region economy (Gong, 2004), establishing mechanism and stability of symbiotic industrial chain in eco-industry parks (Cai, 2006)<sup>[6]</sup>. The academic foundation of industrial chain can be drawn from the theories of value chain, supply chain and industrial cluster.

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