

## SYSTEM DYNAMICS MODEL OF SUPPLY CHAIN DISTRIBUTION NETWORK WITH THE REPLACEMENT-POLICY

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**Abstract.** In this article, we establish a home appliance industry closed-loop supply chain distribution network system dynamics simulation model of replacement policy which is introduced into the simulation model to boost household appliances recycling efficiency. The simulation result shows that increasing the proportion of replacement policy ratio can increase the quantity of recycle household appliance and also can reduce the proportion of recycled parts. Next, we analyzed the effect of the policy on household appliance supplier, electrical home appliances manufacturers and core home appliance retailers. The results show that improving replacement policy ratio can effectively reduce the home appliance suppliers, home appliance manufacturers and core home appliance retailers bullwhip effect.

**Keywords.** System dynamics; Home appliances; Distribution network; Bullwhip effect; Supply chain.

## 1 Introduction

The amounts and types of electrical appliances increase rapidly, and have been updated ever faster. However, their useful working life is shortened. The consequence is the recycling and reusing of old household appliance. In 2004, our government issued the "regulations on the administration of recycling of waste electric and electronic products", which explicitly includes the implementation of extended producer responsibility (EPR) of waste Electrical and Electronic Equipment(WEEE), adding waste televisions, refrigerators, washing machines, air conditioning, computer products to the list of the first five recycling product catalog. So electrical appliances makers need to consider not only the traditional production, inventory, distribution problems, but also the recycling and reuse of old home appliances, while making the decision.

In recent years, many scholars began to study problem of the electrical products recycling. Debo, Toktay and Van Wassenhove[1] Remanufactured