

## 两种激励条件下三级供应链产品质量控制策略研究

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## Product Quality Control Strategy in Three-Echelon Supply Chain under the Condition of Two Incentive Policies

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**摘要** 本文基于四阶段Stackelberg博弈分析,研究了在三级供应链中如何进行产品质量控制策略问题。构建了由制造商、零售商与最终顾客组成的三级供应链博弈模型,制造商进行产品质量决策,即生产高质量产品或者低质量产品,零售商进行产品采购决策和零售定价决策,最终顾客根据两种产品质量水平和零售价格的差异,决定产品的购买数量;当零售商采购高质量产品时,制造商将会向其提供价格折扣策略;当零售商采购低质量产品时,制造商将会向其提供延迟付款策略。运用最优化原理,求解了制造商的产品质量水平、价格折扣、延迟付款期限和零售商的零售价格、最终顾客的购买数量,及期望收益函数。进行了算例分析,结果表明:高质量产品零售价格关于价格折扣下降幅度更大,而低质量产品零售价格关于延迟付款期限下降幅度更大;制造商提供的价格折扣越大、延迟付款期限越长,其期望收益将会减少,此时零售商的期望收益将会增加,最终顾客产品需求量将会增加;制造商的总期望收益函数将呈现"倒U"型,求解了期望收益的最大值及各契约参数的值,结果证明所提出的产品质量控制策略是可行的。

关键词: 三级供应链 产品质量控制策略 价格折扣 延迟付款

**Abstract:** Based on four-stage Stackelberg game theory, how to design product quality control strategy in the three-echelon supply chain is studied. A game model which composed by manufacture, retailers and customers is constructed. The manufacture will make the product quality decision (high product quality or low product quality), the retailers will make the product purchasing decision and retail pricing decision, and the customers will make ordering quantities decision. When the retailers purchase high quality product, the manufacture will provide price discount strategy. When the retailers purchase low quality product, the manufacture will provide delay payment strategy. Optimization theory is used to solve the manufacture's product quality level, price discount, delay payment period, retailer's retailing price, customer's ordering quantities and expected profits function. The results of a numerical example show that: the retailing price of high product quality has a more decreasing according to price discount, the retailing price of low product quality has a more decreasing according to delay payment period; when the manufacture provide price discount much more and delay payment period much longer, the manufacture's expected profits will reduce, retailer's expected profits will increase, customer's ordering quantities will also increase; the manufacture's joint expected profits are inverse U-shaped. The maximum expected profits and contract parameters are solved, which demonstrate that the product quality control strategy is effective.

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

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