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Developing a Mathematical Model for Trade-Off Analysis of New Green Products

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Abstract : In the near future, companies will be increasingly forced to shift their activities along a new road in order to decrease the harmful effects of their design, production and after-life on our environment. Products must meet environmental standards to not only prevent penalties but to consider the sustainability for future generations. However, the most important factor that companies will face is selecting a reasonable strategy to maximize their profit. Thus, companies need to have precise forecast from their profit after design stage through Trade-off analysis. This paper is an attempt to introduce a mathematical model that considers effective factors that impact the total profit when products are designed for resource and energy efficiency or recyclability. The modification is according to different strategies based on a Cost-Volume-Profit model. Here, the cost structure consists of Recycling cost, Development cost, Ramp-up cost, Production cost, and Pollution cost. Also, the model shows the effect of implementation of design for recyclable on revenue structure through revenue of used parts and revenue of recycled materials. A numerical example is used to evaluate the proposed model. Results show that fulfillment of Green Product Development not only can reduce the environmental impact of products but also it will increase profit of company in long term.

Keywords : green product, design for environment, C-V-P model, trade-off analysis
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