

## Management Insights

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### **Efficient Take-Back Legislation**

Atalay Atasu, Luk N. Van Wassenhove, Miklos Sarvary

Industrialization and population growth have increasingly burdened the environment by resulting in large waste streams. One of the fastest growing waste streams is electronics waste. Thus, product take-back is becoming more regulated by countries to protect the environment. In general, collection, recovery and recycling targets are set collectively for an industry (influenced by lobbying.) Such regulation creates an economic burden on firms, while creating fairness concerns and missing its primary target: environmental benefits. The right policy would (i) make producer responsible for their own waste to avoid fairness concerns and (ii) favor eco-design producers to create stronger environmental benefits. At a time when sustainability concerns are becoming more and more important, this study has important implications for policy makers as well as for practicing managers that are interested in their environmental footprints.

### **Product Design and Supply Chain Coordination under Extended Producer Responsibility**

Ravi Subramanian, Sudheer Gupta, Brian Talbot

As global concerns about the environmental impacts of products increase, goal-oriented approaches such as Extended Producer Responsibility (EPR) are being sought. EPR policies aim at shifting environmental responsibility toward manufacturers and customers to provide incentives for environmentally friendly product design and use. We consider two design attributes – performance (such as energy efficiency, which influences the environmental impact of the product during use) and remanufacturability (the extent to which the embedded value in the product can be recovered, thus influencing the environmental impact post-use). We offer insights into how EPR levers, consumer behavior, and supply chain coordination affect design incentives and profits. First, lower regulatory charges during product use encourage manufacturers to provide superior performance but lower remanufacturability. Second, as customers bear an increasing share of charges during product use, manufacturers have stronger incentives to improve product remanufacturability. Third, we outline how

contracts such as price-replacement interval contracts, two-part tariffs, and leasing, can be used to coordinate a supply chain so as to not only improve overall profit but also drive environmentally superior product design. Finally, even when manufacturers lack perfect information about consumer behavior, we demonstrate how contracts can be designed to improve profitability and environmental product design.

### **How Plant Managers' Experiences and Attitudes Toward Sustainability Relate to Operational Performance**

Mark Pagell, David Gobeli

Operational managers generally do not think in sustainability terms. Instead they treat employee well-being and environmental issues as separate entities, only voluntarily pursuing environmental improvements that improve profits, while pursuing many employee well-being improvements regardless of the impact on profits. And these cognitions have significant performance implications. The plants have the highest levels of operational performance either when they ignore everything but profits or when they have high levels of environmental and employee well-being performance. The typical operational manager is then thinking in a manner that does not support strategic initiatives to become more sustainable, or for that matter initiatives that ignore sustainability in an effort to maximize short term profits.

### **The Value of Quality Grading in Remanufacturing**

Mark Ferguson, V. Daniel R. Guide, Jr., Eylem Koca, Gilvan Souza

We consider the tactical production planning problem for a remanufacturer when recovered products have different quality levels. The decision variables include the amount to remanufacture each period for each returned quality level and the amount to carry as (unremanufactured) inventory and finished goods (remanufactured) inventory. The model is grounded with data and operational information from Pitney-Bowes' remanufacturing group. We show that, under mild assumptions, the firm will always remanufacture the exact demand each period. The results also show that using a nominal grading system increases profits by an average of 4% and that this value increases as the volume of recovered products increases.

## **Product Positioning in a Two-Dimensional Market Space**

Chengxin Qu Christoph H. Loch Stylianos Kavadias

This paper examines the issue of portfolio design of products with different qualities and features. Our key results are as follows: (i) Offering more varieties is much more effective than offering multiple quality levels in terms of profit generation, and is therefore a better proliferation strategy. This result is driven by the different nature of cannibalization of multiple varieties or multiple quality levels (ii) High unit production cost relative to fixed cost is one factor that might favor multiple quality levels, even though doing so has only marginal benefit. (iii) In a portfolio, the number of low quality products should be higher than that of high quality ones. A portfolio with three low quality products and two high quality products is better than a portfolio with two low quality products and two high quality products. Overall, we link the market positioning of the portfolio products with their cost structure through a comprehensive theoretical framework.

## **The Impact of Absenteeism on Assembly Line Quality and Throughput**

Dennis E. Blumenfeld, Robert R. Inman

Assembly lines function best when every worker is a trained expert. When a worker is absent, management must scramble to quickly find a substitute. Rarely will the substitute be as proficient as the absent worker. Without an Andon system, absenteeism can reduce quality (because the substitute may run out of time, may not know when the task is finished correctly, and may not get help if the team leader is busy helping someone else.) With Andon, absenteeism can reduce throughput (because the substitute worker will stop the line more often) thereby converting absenteeism's quality damage into a throughput damage. Large assembly lines typically arrange their

workers in teams supported by a team leader who has no line tasks of his or her own. If one team member is absent, the team leader can support the substitute nearly full time. But if two or more team members are absent, the team leader can become overloaded. Hence absenteeism's damage can be compounding making variable absenteeism worse than constant absenteeism. Regardless of the type of assembly line or worker organization, absenteeism is damaging, and reducing absenteeism has a payoff.

## **Optimal Pricing, Ordering, and Return Policies for Consumer Goods**

Michael E. Ketzenberg, Rob A. Zuidwijk

Although there has been research to show that the choice of a retailer's product return policy impacts consumer behavior, there has been little research on control policies to manage them. A lenient return policy reduces the cost of reversing a bad decision and thus enables consumers to make decisions while maintaining flexibility. At the same time, lenient policies are costly to operate. The dilemma that managers face in setting a policy is evident in the market place where it is easy to observe a variety of different return policies, even among direct competitors. The authors address the inherent trade off and identify conditions in which lenient or strict return policies are preferred and find a wide range of operating environments in which an intermediate policy is best. Where returns are unavoidable, the authors find that reducing the recovery cost or the uncertainty with respect to returns provide little value. They do find, however, that product type (innovative or functional) is an important classification in understanding how firms should invest to improve operating performance. For innovative products, investments to reduce the return rate are generally most valuable, while for functional products, reducing the speed of product recovery is generally most valuable.