

The Effect of Brand Credibility on the Pricing of New and Remanufactured Short Life-cycle Product

Shu-San Gan*, Didik Wahjudi, Juliana Anggono, Yopi Tanoto

Mechanical Engineering Department

Petra Christian University

Surabaya, Indonesia

gshusan@petra.ac.id*, dwahjudi@petra.ac.id, julianaa@petra.ac.id, yopi.tanoto@petra.ac.id

(*corresponding author)

Abstract—Remanufacturing is one of the recovery process that has become significant among many attempts to mitigate the landfill exhaustion, especially from mountain of wastes that come from short life-cycle products disposal. However, remanufactured product are often perceived to have lower quality compared to the new one. There are misconception about remanufactured product and lack of knowledge about its characteristics. On the other hand, brand credibility is known to be able to increase product's perceived quality, decrease perceived risk, and hence decrease price sensitivity. This paper investigates the effect of brand credibility on the pricing decision, to maximize the profit of the retailer and the manufacturer. We develop pricing decision model for new and remanufactured short life-cycle product in a closed-loop supply chain consists of a manufacturer and a retailer, where the manufacturer is a Stackleberg leader. We find that lower brand credibility would decrease the retail and wholesale prices of new and remanufactured products, but does not affect the sales volume significantly. Also, the speed of change of demand influences the optimum total profit, as well as the time boundaries.

Keywords—*remanufacturing; short life-cycle product; pricing; brand credibility*

I. INTRODUCTION

Due to the rapid development in technology and research innovation, products' life-cycle has become shorter, especially for technology-based product such as electronics products. The period between launching a product and the introduction of newer model, newer design, or addition of new features has become shorter, and this has convinced customers to buy new product even though the previous one is still perfectly functioning. Usually, in the introduction phase, the product's demand would increase significantly, but when newer product or model is introduced, it would decrease rapidly. The demand characteristics of short life-cycle product is totally different from durable product. Therefore it is important to develop demand function that could capture the dynamics. Hsueh [1] claims that product life-cycle in electronic industry is getting shorter due to the high-speed technology advancement. Another examples are mobile phones and computers, where Lebreton and Tuma [2] claim that they have shorter innovation cycle, which leads to faster obsolescence of the previous model or earlier generation.

The fact that product's life-cycle that becomes shorter has led to higher consumption of natural resources for raw material

and more energy to manufacture new product. Furthermore, the disposal volume is also increasing due to the increased obsolescence, both functionally and desirability, when customers discard the current owned product and replace it with the new one. This situation has been a global concern where issues on sustainable development has become increasingly important.

Recently, there are numerous attempt to study closed-loop supply chain, which is a study that is not only considering forward chain but also the reverse chain. In the reverse chain, a used product is collected and sent for a recovery process and then put back to the market with higher value than its discarded stage. This approach could extend product's useful life and slower the disposal rate. There are several recovery processes i.e. repair, refurbishing, and remanufacturing [3]. Steinhilper [4] claims that remanufacturing is the ultimate form of recycling, where product is recovered into one with a quality similar to the new product. Lund and Hauser [5], as well as Gray and Charter [6] argue that remanufacturing is a process of transforming used product into "like-new" condition, where the value added during manufacturing is recaptured. Several studies show that one of the critical factors to ensure successful remanufacturing is durability of the product. However, Gan et al. [7] show that a short life-cycle product is also suitable for remanufacturing, and doing so could be beneficial for the environment and yet maintaining profitability. Moreover, they develop a framework for remanufacturing a short life-cycle product.

Pricing decision is one of the important tasks in attempting to gain economic benefit from remanufacturing practices. Guide & Wassenhove [8] show that there are three main activities in a reverse supply chain, namely return management, remanufacturing operations, and market development. They emphasize the importance of the business aspect such as profitability, product valuation, pricing and marketing issues. Atasu et al. [9] point out that remanufacturing could become an effective marketing strategy, where manufacturer perform price discrimination to protect its market share. Also, a proper pricing strategy developed based on the market composition could avoid cannibalization effect i.e. remanufactured product cannibalizes the sales of new product [10]. Similarly, Souza [11] shows that adding remanufactured product to the market alongside with the new product could expand the market, but