THE ROLE OF MARKETING IN PRODUCT RECOVERY OPERATIONS

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ABSTRACT

The current state of literature in product recovery (e.g., remanufacturing) and the interface between product recovery and marketing is provided. Based on the four areas of the interface between product recovery and marketing, a matrix of product recovery-marketing is proposed.

Keywords: Product recovery; marketing; reverse supply chain; product recovery types; case studies; and product recovery strategies.

INTRODUCTION

Reverse Supply Chain (RSC) is the process of returning products (e.g. end-of-life or use product take-backs) from the collection centers and consumer destination for the purpose of capturing their value or proper disposal. The value added activities, for the purpose of this paper, are called Product Recovery (PR). The product recovery activities are the core of RSC and the RSC is at the core of sustainability.

Ahiska and King (2010) stated that the necessity for a ‘green image’ has prompted companies to integrate PR management with their manufacturing processes. By the use of case studies, Miemczyk (2008) explored the implications of the institutional environment on end-of-life product recovery capabilities of manufacturing firms. The author argued for proactive use of PR instead of adopting coercive and mimetic product recovery strategy, which the author stated would lead to sub-optimization of the PR efforts. Kara et al. (2007) argued that a structured reverse logistic network is required in order to collect products efficiently at the end of their life cycle for processing.

Reverse supply chain, as a new and enhanced supply chain, has the capability to effectively use resources that were not previously considered or used (Dowlatshahi 2000). The RSC system should be accomplished systematically and efficiently for the product recovery operations to be effective. The RSC system and product recovery operations tie into a firm’s operations strategy and competitiveness posture. Seitz and Peattie (2004) stated that most product recovery strategies are based on laws and regulations. This requires many companies to accept
responsibility for end-of-life or end-of-use products. This paper, however, focuses on PR operations as a strategy within RSC tied to a firm’s operations strategy and marketing/competitiveness posture.

There are many estimates that highlight the significance of RSC operations and its various facets. Many of these estimates belong to the retail industry. For some of these estimates see Dowlatshahi (2010a) and Dowlatshahi (2010b).

The objective, methodology, and organization of the paper

The objective of this paper is, therefore, to explore the interface between product recovery activities and marketing. This is accomplished by identifying the critical dimensions of each factor associated with PR activities and marketing and by considering their interaction effect. The research methodology is based on real-life case studies derived from a variety of industries engaged in reverse logistics. Finally, specific PR-Marketing strategies are formulated by the use of 13 case studies.

This paper has four sections. The next section details the review of literature regarding remanufacturing in RSC and the interface between product recovery and marketing. The next section outlines various types of product recovery. Section 3 discusses the case studies and data collection methodology. Section 4 presents the matrix of product recovery-marketing interface. This matrix identifies the appropriate dimensions of each item in the interface and then proposes specific propositions and corollaries. Section 5 presents the results, managerial implications for the engineering manager, and the future research directions. Sections 3-5 are available upon request from the authors.

REVIEW OF LITERATURE

The review of literature in this study focuses on two areas. First, the available literature in remanufacturing from an operational standpoint in RSC is considered. The remanufacturing is chosen as the most important PR activity and as the embodiment of product recovery activities. Although there are many references in remanufacturing, the available literature does not present remanufacturing from an operational standpoint in RSC. In this study, a review of literature has been conducted to identify common themes and topics for remanufacturing. Many practitioners and academicians consider these common themes as essential in designing and implementing RSC systems. Second, the literature review pertaining to product recovery and its interface with marketing is considered and presented in detail.
Insight for the literature in remanufacturing

Remanufacturing is a set of value-added activities performed in order to transform the returned products/parts into remanufactured products. Since the literature in the first area is not directly related to this work and for brevity’s sake, only a brief insight of it is presented hereby. The details of these references and their analyses are available from the authors upon request.

Summary and insight in remanufacturing: The literature in the area of remanufacturing is mature and advanced. Prior to advent of SCM and RSC, remanufacturing and recycling had received a great deal of attention. The available literature focuses on the role as well as the importance of remanufacturing. Various technical aspects of remanufacturing operations (as categorized above) have also been extensively addressed and discussed, albeit in a uni-dimensional fashion. Little attempt has been made to consider remanufacturing from the operational standpoint in RSC.

This paper considers the missing issues of product redesign from the literature and extends the focus and orientation of remanufacturing in the broader context of RSC. This paper also integrates product redesign and remanufacturing into one framework.

Review of literature for remanufacturing-marketing interface

The second area of literature review pertains to the interface of PR activities and marketing. Again, remanufacturing is chosen as the embodiment of PR activities. Some available literature is presented as follows:

1. The general role of marketing function in product recovery. Mukherjee and Mondal (2009) discussed the remanufacturing technology in a case of an Indian company. The paper concluded that the key drivers for remanufacturing are user's environment (source of returns) and marketing of remanufactured products. Atasu et al. (2008) advocated remanufacturing as a marketing strategy by considering demand-related issues, such as the existence of green segments, original equipment manufacturer competition, and product life-cycle effects. The authors showed that under competition, remanufacturing could become an effective marketing strategy. Kobayashi and Kumazawa (2007) focused on transforming a product selling business into a reuse business. The authors cited two major approaches to starting a reuse business: a manufacturing-driven approach and a marketing-driven approach. Jayaraman and Luo (2007) redefined a value chain strategy by elevating the returns process to a new marketing opportunity that builds a loyal customer base and also attracts new ones. Ferrer (2001) stated that most product designs focus on optimal marketing and ease of manufacturing. But many of these product designs do not consider or favor the product recovery. The author indirectly indicated that the link between product recovery and marketing is absent.
2. The involvement of marketing factors in product recovery. Debo (2002) in a dissertation analyzed the economics of technology selection and market segmentation for remanufacturable products. The analysis specified the product and market characteristics that dictate whether producing a remanufacturable product is profitable. Haynsworth and Lyons (1987) in an attempt to make remanufacturing desirable proposed four solutions as follows: 1. including remanufactured items as part of the total marketing effort. 2. advertising remanufactured lower cost 3. offering "like-new" warranties and 4. offering higher trade-ins on older models, thus increasing new model sales. Mukhopadhyay and Setoputro (2004) developed a profit-maximization model to obtain optimal policies for price and the return policy in terms of certain market reaction parameters. The authors used marketing and operational strategy variables to influence the reaction parameters in order to maximize profits from the market. Tibben-Lembke (2002) explored the impact of product life cycle on marketing and logistics within the framework of RSC. This study showed how RSC is impacted by changes in sales over the product's life cycle. The author further stated that more study of the impact of marketing on returns is warranted.

Summary and Insights for remanufacturing-marketing interface. The interface between manufacturing and marketing is a mature area, which is well-researched. The interface between remanufacturing and marketing is, however, the least developed area in product recovery within the RSC system. Most works state that marketing is important for the product recovery area but they do not discuss in any depth the marketing factors that affect product recovery activities. An effective product recovery operation can have an intangible effect in enhancing customers' perceptions of product quality. Even if the customers are not directly engaged in or are the beneficiary of the items return, the ability of the company to manage its returns effectively can positively enhance the image of products in the forward logistics area.

TYPES OF PRODUCT RECOVERY

There are several distinct types of product recovery. Each has its own features and characteristics. The types of PR are easily misunderstood or at times used interchangeably. This lack of definition and proper use has made it even more difficult for companies to take advantage of the benefits offered by product recovery operations. Given the difficulties inherent in RSC as opposed to forward logistics, it is important to have clear-cut definitions for product recovery types. In order to better understand the concept and definitions of PR, seven PR types are categorized into three main groups.

Group 1: Repairs, Refurbishing, and Remanufacturing. This group includes the most well-known and most advantageous types of product recovery. These are explained below:

1. Repairs. This involves fixing or replacing the parts that are not in working order. The focus of repairs is not on the manufacturing process but on defective parts that are investigated and
replaced. Repair is the most elementary form of product recovery. The extent of operations involved in repairs is minimal and many aspects of the products may be affected (disassembled or replaced). The repair operations are directed toward the entire product.

2. **Refurbishing.** This is a more complicated process than the repairs are. The refurbished, restored and reconditioned products are the ones that are brought back to their original condition (or specified quality standards). In refurbishing, all critical sub-assemblies of major components are investigated and fixed or replaced. The sources of products for the products that need refurbishing come from two sources. The first source is the products that have failed the quality control tests during the manufacturing operations. The second source comes from the returned items by customers, possibly due to some failure during product use. Either source presents an opportunity for a product to be refurbished.

3. **Remanufacturing.** This is the most common and well-known type of product recovery. Remanufacturing is viewed as the most generic form of adding value to returned items. In remanufacturing products are disassembled, cleaned, repaired or replaced, and reassembled to be used again as a new product. Any product that can be manufactured is capable of being remanufactured as well. Remanufacturing involves the investigation of and the repair and replacement of all parts in a product. Stringent quality standards on par with the quality standards of virgin products are observed in remanufacturing operations. This remanufacturing operations is credited with large energy savings, extending the lives of landfills, and cutting down on the amount of air pollution that would normally occur when a product goes through a remanufacturing operations.

**Group 2: Cannibalization and Recycling.** This represents the second tier of PR activities. These types of product recovery may not be as profitable as group 1. These are explained below:

4. **Cannibalization.** In cannibalization a small amount of parts and components are salvaged from the returning products. This is in direct contrast to the amount of materials re-used in group 1 of the product recovery. The original (returned) products are usually disposed of and the remaining salvaged parts are used for repair, refurbishing, and remanufacturing operations. The process of cannibalization could be a selective one. Some firms only salvage items of high value. On the other hand, some firms salvage all items that meet certain quality standards. The cost and time involved in cannibalization and the quality standards desired are the determining factors in the extent of the cannibalization process.

5. **Recycling.** The word recycling is perhaps the most common and familiar form of product recovery. The words ‘recycling’ and ‘remanufacturing’ are erroneously used interchangeably. A remanufactured product is not a recycled one. Recycling usually involves using a product or its parts as raw materials for a different product. Recycling is mostly used for consumable or consumer products such as newspapers, bottles, and cans. The product that is recycled loses its
identity and no longer has the functionality it once had. The main purpose of recycling is to obtain as many raw materials/parts that can be used in similar or different products. The importance of recycling in an economy cannot be overestimated. Dobos and Floriska (2007) investigated how recycling extends the availability of non-renewable natural resources for the future generations in an inter-industry framework. The authors explored whether recycling/reuse increases the growth possibility of an economy. The authors concluded that a possible sustainable development of the economy is based on the product recovery (recycling).

Group 3: Incineration and Disposal (Land filling). This represents the third tier of PR activities. These types of product recovery are the least beneficial (albeit needed) aspect of PR operations. The last two types are also referred to as waste management. These are explained below:

6. Incineration. Incineration is a waste treatment process that involves the combustion of organic substances contained in waste materials (Knox 2005). Incineration, also known as thermal treatment, converts the waste materials into ash, flue gas, and heat. The ash is mostly formed by the inorganic constituents of the waste, and may take the form of solid lumps or particulates carried by the flue gas. Incineration may or may not involve energy and materials recovery.

7. Disposal (Land filling). This is the final stage of PR activities. A product disposed or sent to landfills is devoid of any value or its value has already been recovered in a previous stage. Land filling is a method of solid waste disposal in which refuse is buried between layers of dirt so as to fill in or reclaim low-lying ground. This is done in order to reduce contamination of the surrounding land.

ANALYSIS, CONCLUSION AND FUTURE RESEARCH DIRECTIONS

The case studies and data collection, product recovery-marketing interface, the case studies, the analyses, conclusions, assessment, and the future research results are available upon request from the authors.

REFERENCES

References are available upon request from the authors.