



Integration of reverse logistics activities within a supply chain information system

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Abstract

This article deals with problems related to the integration of reverse logistics activities within an organization and to the coordination of this new system. Reverse logistics activities refer to the recovery and processing of unused products and to the redistribution of reusable materials. For better control and management of these activities, new approaches and information support system are proposed here. A new organizational system, which represents the course of the operational processes and the management of the organization's resources (labor, material, etc.), and an information system architecture are proposed for a rehabilitation center.

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1. Introduction

The recovery and processing of unused products are concerns which increasingly affect organizations, be it to improve customer service or to meet environmental pressures. Mail-order, online purchases and after-sales

services, such as the maintenance of guaranteed products, are all situations which contribute to the increase of returns within an organization. Also, environmental regulations require them to gradually reduce their consumption of non-renewable resources and to decrease the amount of waste materials produced. Some recent regulations require certain industries to recover their products once they have reached the end of their useful life or when they are unused. This increase in return rate will have significant effects on the current practices of these industries.

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Until recently, organizations did not pay much attention to their returns. Commercial returns are the most common, but returns of guaranteed products, by-products, packaging and returns of unused products can also be found [1]. At present, returned products are generally collected at the point of sale, inspected and sorted by employees to the best of their knowledge. Moreover, the employee determines if the return is accepted and the actions to be taken (credited amount, exchanges, etc.). Thereafter, a certain amount of time can pass before further actions are taken in regards to these recovered products. These products are generally reintroduced directly into the market as new, and when this is not possible, resold at discounted prices or simply disposed of. In fact, because of the uncertainty factors related to returned products (quality, quantity and time) [1–5], each business unit seeks to minimize the impact of returns on their current activities, which are generally associated with the distribution of new products. Therefore they will choose the simplest and quickest disposal means for the returned products, without concern for other means of reintroducing the product into the market. Thus, they function primarily on a local level. Hence, these activities are generally sources of cost rather than income.

Given economic and environmental contexts, some organizations are becoming aware of the importance of focusing their efforts on activities surrounding the return and processing of unused products. They seek to structure, organize, support and plan these activities so as to make more efficient use of available resources (labor, new, recovered and processed or, in this paper, valorized material, etc.). Valorization activities refer here, as for Thierry et al. [6], to repair, refurbishing, remanufacturing, cannibalization (dismantling for reusable material), and recycling activities that prolong the life cycle of product [7]. With an adequate integration of reverse logistics activities, in an economic or environmental context, organizations will be able to notice a double effect with their supply chain [1,8,9]. First, while focusing efforts on returns of products and their processing, competitive strategies will be set up which, at various levels, will contribute to a better performance of current activities of the supply chain, concentrated until now primarily on the distribution of new products [7,10]. Secondly, the new supply

chain, which integrates reverse logistics, will orient itself to ensure a robust management of any additional activities. The aim of this new supply chain is to ensure clean and adequate distribution of recovered products. Organizations will thus be interested in the emergent field of reverse logistics.

It is in this perspective that the public health insurance of the Province of Quebec (Canada), which handles a great part of the distributed mobility aids (wheelchairs in our context) in this market, intends to improve the efficiency of activities related to the recovery and the processing of unused products. This organization, the Régie de l'assurance maladie du Québec (RAMQ), applies and manages various programs related to the healthcare system. The mobility aid program for people with reduced mobility is one of them. At present, 13 rehabilitation centers have been mandated and have their costs defrayed by the RAMQ to ensure the distribution and maintenance of its wheelchairs and they have been responsible for the recovery and processing of unused ones, since June 2000.

However, one of these establishments, the Quebec Rehabilitation Institute (QRI), has been performing these additional activities on a voluntary basis for nearly 10 years. They started when they realized the potential impacts that these activities could have on their operation. Thus, with the goal to improve its internal management and contribute to this initiative undertaken by the RAMQ, the QRI created a research project concerning the valorization of wheelchairs. The present research is part of this project.

Within this project, a reengineering of the business process was carried out. This reengineering created a new organizational structure, which represents the operational processes and the management of the organization's resources (labor, material, equipment, etc.), and an information system architecture to integrate all activities. The context that led to this business process reengineering and some its results are presented in this paper.

2. Creating an effective and efficient supply loop/sustainable development

The integration of reverse logistics activities into the regular supply chain will result in a new logistic

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