

The Conceptual Framework of Information Technology Adoption Decision-making in a Closed-loop Supply Chain

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Closed-loop supply chain has gained a significant attention during the recent decades since there is an increased awareness toward sustainable development. However, the implementation of closed-loop supply chain is confronted with numerous barriers and challenges due to uncertainties in input as well as in process. In contrast to manufacturing process where the input is mostly homogeneous raw material, the reverse chain's input comes from product's end-of-use or end-of-life; therefore the quality and quantity are uncertain. The recovery process also brings other challenges due to various quality grades of the product returns and various recovery options. On the other hand, information technology has been studied extensively in relation to supply chain management. Most of the works show that the use of information technology could enhance supply chain performance. However, the study on the importance of information technology in closed-loop supply chain is still limited. In this paper, we discuss the role of information technology and then propose a conceptual framework of decision making in adopting IT in closed-loop supply chain management.

Keywords: information technology; closed-loop supply chain; framework; decision-making.

1. Introduction

In the recent decades, closed-loop supply chain (CLSC) has gained significant attention. The world has come to realize that there is a limitation to natural resources provided by our Mother Earth, and to the landfill for slow-decomposing materials. Government regulations are also playing an important role to the growth of CLSC. Many firms decided that closing the loop should not be a burden, but on the contrary, should bring tangible benefit (such as increased profit by market expansion, lower cost from using used-product rather than virgin material) or intangible benefit (such as green image, flexibility in the supply chain).

Closed-loop supply chain management is defined as “the design, control, and operation of a system to maximize value creation over the entire life cycle of a product with dynamic recovery of value from different types and volumes of returns over time”.¹ Several literatures describe closed-loop supply chain as the integration of forward and reverse supply chain.^{2,3,4,5} The focus of a CLSC should be on value creation over the entire product's life cycle.