

Chapter 3.4

Applying Web-Based Collaborative Decision-Making in Reverse Logistics: The Case of Mobile Phones

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ABSTRACT

The increasing environmental concerns and the technological advances have boosted the post-use treatment of nearly all kinds of products and a new area for research and application has emerged described by the term “reverse logistics.” In this chapter, parameters that may affect reverse logistics operation are discussed from a decision-making perspective, so that alternative design options may be proposed and evaluated. In particular, these parameters are used for the qualitative evaluation of the reverse supply chain of mobile phones in Greece. For this purpose, we present an illustrative application of a Web-based decision support tool that may assist collaborative decision-making in conflicting environments, where diverse views, perspectives, and priorities shared among stakeholders have to be considered.

INTRODUCTION

The increasing environmental concerns and the technological advances have boosted the post-use treatment of nearly all kinds of products, regardless of their size, composition, and initial value. Relevant legislative frameworks have been enforced in developed countries aiming at apportioning the responsibilities related to the recovery of end-of-life products. In addition, specific targets regarding product design and recovery rates are set, networks’ requirements are suggested and, last but not least, voluntary schemes are applauded. As a result, further extensions in research and applications of supply chain management have emerged described by the term “reverse logistics.” De Brito and Dekker (2004) defined reverse logistics as “the process of planning, implementing and controlling backward flows of raw materials, in process inventory packaging and finished goods, from a manufacturing,

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distribution or use point, to a point of recovery or point of proper disposal.” In this definition both economic and environmental dimensions of reverse logistics are implied, indicating the potential benefits that companies would have by adopting such practices.

Reverse logistics is a multidisciplinary area of research. For example, operations research, environmental analysis, marketing, and informatics have all a significant role to play in order to assist decision-making regarding the design and operation of reverse supply chains. Moreover, reverse logistics is often regarded in conjunction with forward logistics, since they are interrelated. However, the distinguishing characteristics of reverse supply chains introduce new dimensions in decision-making aspects. In particular, the main differences between forward and reverse supply chains, as stated by Fleischmann, Krikke, Dekker, and Flapper (1999) and Krikke, Pappis, Tsoufas, and Bloemhof-Ruwaard (2002), are the following:

- In contrast to forward supply chains, in reverse supply chains there are a lot of sources of “raw materials” (used products), which may enter the reverse flow at low or no cost at all, and significantly fewer “customers” (recyclers, remanufacturers, etc.).
- The economic value of inputs in reverse supply chains is lower than the one in the case of forward supply chains.
- In the case of reverse supply chains, offer does not follow demand.
- The economic efficiency of reverse supply chains is precarious, since it is not sure that there will be markets to exploit their outputs.
- Reverse supply chains are characterized by higher uncertainty regarding issues like quality, volumes, and composition of reverse flows.

From this perspective, it is important to identify the parameters that may affect reverse logistics operation so that alternative design options are proposed and evaluated. In Tsoufas, Dasaklis, and Pappis (2007), a first attempt to define and categorize them is presented. Given these parameters, in this chapter we discuss a qualitative evaluation of the reverse supply chain of mobile phones in Greece, as presented by Pappis, Tsoufas, and Dasaklis (2006). For this purpose, we make use of a Web-based decision support tool that may assist collaborative decision-making (CDM) in conflicting environments, where diverse views, perspectives, and priorities shared among stakeholders have to be considered.

The remainder of the chapter is structured as follows: First, the parameters affecting reverse logistics operation are discussed. Then, the reverse supply chain of mobile phones in Greece is briefly presented. Next, the CDM tool is presented, followed by its illustrative application regarding the reverse supply chain of mobile phones in Greece. Finally, some concluding remarks are outlined.

PARAMETERS AFFECTING REVERSE LOGISTICS OPERATION

Three major categories of parameters that may affect reverse logistics operation are identified: product-dependant, organizational, and social. These parameters, which cannot be addressed independently since they may interact with each other, may form a nonexhaustive basis for analysis in the following decision-making situations:

- a. When assessing the current situation regarding the operation of reverse supply chains;
- b. When exploring alternative options for the reverse supply chain activities, as well as their interaction with the external environment.

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