

# Chapter 29

## Strategies for an Integrated Distribution Problem

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### ABSTRACT

*Problems arising in the logistics of commercial distribution are complex and involve several players and decision levels. One of the most important decisions is the design of the routes to distribute the products in an efficient and inexpensive way but also satisfying marketing objectives such as customer loyalty. This chapter explores three different distribution routing strategies. The first strategy corresponds to the classical vehicle routing problem where total distance or cost is minimized. This one is usually an objective of the Logistics department. The second strategy is a master route strategy with daily adaptations where customer loyalty is maximized, which is one of the objectives of the Marketing department. The authors propose a third strategy which takes into account the cross-functional planning between the Logistics and the Marketing department through a multi-objective model. All strategies are analyzed in a multi-period scenario. A metaheuristic algorithm based on the Iterated Local Search is proposed and applied to optimize each strategy. An analysis and comparison of the three strategies is presented through a computational experiment. The cross-functional planning strategy leads to solutions that put in practice the coordination between the two functional areas of Marketing and Logistics and better meet business objectives in general.*

### INTRODUCTION

The growing number of problems that firms are facing nowadays in relation to the distribution of their products and services has lead Logistics

and Marketing to be of primary concern to many industries. An important aspect of the logistics management task is to coordinate the activities of the traditional distribution functions together with purchasing, materials planning, manufacturing, marketing and often R&D. One important aspect of the integration process is cross-functional

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planning, which consists of coordinating different areas inside the firm, allowing for cost reductions and service improvement (Christopher, 1998).

The motivation of our work arises in the context of integration of logistics functions with other functions of the firm. In our case, we will focus our study on two key areas: Distribution and Logistics management and Marketing management. One source of competitive advantage for many firms is the development of an integrated relationship between the firm's marketing and logistics functions, as this integration has the ability to further enhance the firm's customer focus. This integration can be obtained by doing an integrated and coordinated planning of the logistics operations. In our case we focus on the distribution strategies. On one hand, the importance of good distribution strategies in today's competitive markets cannot be overstressed. In many industries, an important component of distribution systems is the design of the routes of vehicles to serve their customers' demand. On the other hand, as pointed out by some industry leaders, new trends in supply-chain management include, "...better customer service... greater customer sophistication" (Partyka & Hall, 2000). Customer service is becoming more important. Customers demand more than a product. They demand a product arriving on time via an easy ordering system or just-in-time distribution.

In this work, we will study integrated distribution management from a strategic point of view. The logistics distribution problem consists of deciding how to assign customers to vehicles and how to design the routes made by each vehicle minimizing a transportation cost function. This is the well-known Vehicle Routing Problem (**VRP**) (Toth & Vigo, 2002b). The transportation cost represents a large percentage of the total logistics costs, so it makes sense to try to reduce this cost. Having the products arrive on time is also an important objective of the logistics department when planning distribution.

However, after interviews with several retailing companies, we realized that many of them

do not consider minimizing transportation cost as the prime objective, but rather place greater importance on the customer relationship and customer service in the designing of distribution routes (Ribeiro, 2004). Marketing and Sales departments argue that drivers also perform sales activities and have responsibilities for promotion and the introduction of new products. So, if a driver is assigned always to the same customers this creates a good relationship and it leads to a sales increase.

We thus identified the two different primary strategies in the design of distribution routes: the Logistics department wants to minimize transportation costs and the Marketing and Sales department wants to maximize customer relationships, i.e. assign the same driver to each customer every day or most days.

This led us to the following question: What is the best strategy for an efficient distribution? On the one hand we have the classical VRP minimizing a transportation cost function. On the other hand, we have the strategy to always assign the same driver to the same customer to maximize customer loyalty. Beyond evaluating these two strategies, we propose a third one based on a bi-objective approach that tries to balance the two previous ones. This last strategy involves the implementation of integrated distribution processes.

The motivation for the present work arose from distribution problems faced by the food and beverage industry. In these industries, the tendency is to have lower inventories and higher delivery frequencies. Please note that the objective of this work is not to provide a system to optimize a particular distribution problem, but to study and analyze what is the best planning strategy for the distribution of a product among a set of customers.

In the next section, we present in detail the different distribution strategies proposed:

1. the classical VRP strategy, where the objective is to minimize the transportation costs;

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