

# Outsourcing or capacity expansions: Application of activity-based costing model on joint products decisions

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## Abstract

Because of capacity constraints, the companies who produce joint products have to assess the desirability of further processing joint products beyond the split-off point. Especially in a situation in which market demands exceed the company's production capacity. In order to satisfy customer's orders and maximize total profits, these companies must study the feasibility of expanding capacity or outsourcing the production of parts. The aim of this paper is to develop an ABC joint products decision model which incorporates capacity expansions and outsourcing features, by using a mathematical programming approach. With the model presented in this paper, we can evaluate the comparative benefits of expanding the various kinds of capacity and outsourcing simultaneously. By applying this model, the companies who produce joint products can derive an optimal decision about further processing, capacity expansions or outsourcing.

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## 1. Introduction

Many companies, such as petroleum refiners, lumber mills, meat packers or flour mills, produce a multitude of products in their manufacturing processes. Joint products are produced simultaneously by common process or series of processes. All costs incurred before the split-off point of joint products are referred to as joint costs, and costs incurred for further processing and disposal are referred to as separable costs. Due to capacity constraints, when joint products can either be sold at the split-off point or after further separate processing, the companies who produce joint products have to assess the desirability of further processing of joint products beyond the split-off point. Especially in a situation in which market demands exceed the company's production capacity. In order to satisfy customer's orders and maximize total profits, the feasible way for these companies includes capacity expansions or outsourcing part of the products. Such decisions involve resource allocation and require accurate analysis of relevant costs associated with each option.

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Efficient firms allocate their own resources to those activities within the value chain for which they enjoy a comparative advantage over competitors [1]. Other activities not enjoying such advantages are increasingly outsourced to external suppliers. Outsourcing is expected to involve production cost savings relative to internal production because outside suppliers benefit from economies of scale, smoother production schedules and centralization of expertise [2,3]. Based on a survey of more than 1200 companies, Deavers [4] identified the top five reasons for outsourcing as: to improve company focus, access to world-class capabilities, acceleration of benefits from reengineering, sharing of risk and freeing of resources for other purposes. De Kok [5] considers outsourcing as a measure to allocate capacity. The additional capacity needs are not postponed but are instead outsourced. Thus, in the situation that market demands exceed current capacity, outsourcing may be a good way to obtain the advantages of cost saving and share the risk.

In recent years, because of dissatisfaction with the distortions created by traditional costing systems [6], activity-based costing (ABC) has become a popular cost management technique both with accounting academics and in business practice. Many managers now use ABC to guide decisions and establish priorities. The ABC model is composed of both the cost assignment view and the process view with activities as the intersection of these two views [7]. The cost assignment view provides information about resources, activities, and cost objects. The process view provides financial and non-financial information about cost drivers and performance measures for each activity or process. Relying on ABC's analysis of how products consume resources, it models the causal relationship between products and resources used in their production. This enables ABC to provide an understanding of how costs are driven by the demands for activities within a process, and more accurate product cost information for evaluating the profitability of the firm's product lines [8].

The purpose of this paper is to develop an ABC joint products decision model incorporating capacity expansions and outsourcing features by using a mathematical programming approach, in order to lead to an optimal joint products further processing, capacity expansions or outsourcing decision. The remainder of this paper is organized into five sections. Sections 2 and 3 will detail the literature about the concepts of ABC and outsourcing. We develop our ABC model for joint products decision in Section 4. A numerical example is used to demonstrate how to apply the model in Section 5. Finally we present our conclusions in Section 6.

## 2. Concept of ABC

ABC techniques developed in practice and reported by Cooper and Kaplan [6] are seen as accurately assigning overhead costs to products. The detailed cost assignment view of ABC is shown in Fig. 1 [7,9]. ABC assumes that cost objects (e.g., products, product lines, processes, customers, channels, markets, etc.) create the need for activities, and activities create the need for resources. Accordingly, ABC uses a two-stage procedure to assign resource costs to cost objects. In the first stage, resource costs are assigned to various activities by resource drivers. Resource drivers are the factors chosen to approximate the consumption of resources by the activities. Each type of resource traced to

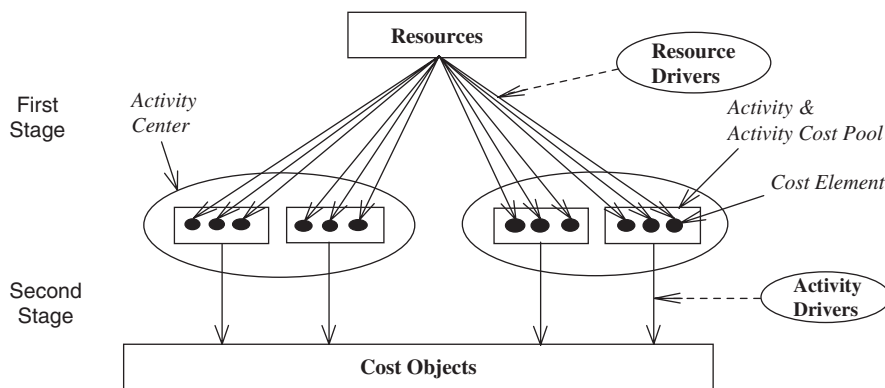


Fig. 1. The detailed cost assignment view of ABC. Source: Adapted from Turney [7, p. 97].

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