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# Application of simulation technique to activity-based costing of agricultural systems: a case study

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## Abstract

The aim of this paper is to analyse the operational costs of the Pu-Shin wholesale fish market in Taiwan, using both the activity-based costing (ABC) model and the simulation technique. By using simulation results in the calculated model of ABC, allocated resource costs are more accurate and arbitrary allocation is avoided. The objective of this study is to compute the processing cost per kilogram of fish. We conclude by providing relevant and accurate information about cost management of the Pu-Shin wholesale fish market, comparing ABC with traditional costing methods, and discussing key related issues which may provide opportunities for future research. We believe that the use of the ABC model in conjunction with simulation techniques can also be applied to agricultural systems in other countries. © 2001 Elsevier Science Ltd. All rights reserved.

*Keywords:* Activity-based costing; Simulation technique; Wholesale fish market; Cost management

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## 1. Introduction

Activity-based costing (ABC; Hansen and Mowen, 2000) is a system that assigns costs to cost objects by first tracing costs to activities and then tracing costs to cost objects. Cost object is a technical term in cost management and is any item such as products, departments, projects, activities, and so on, for which costs are measured

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and assigned. Cost objects are used to assign costs and ultimately the objective to compute the total processing cost is achieved.

The use of ABC is still developing. In recent years, many organizations have improved their cost management by utilizing the ABC system, a tool for providing accurate and relevant cost information. To maintain a competitive advantage, organizations must monitor and promptly remove wasted efforts or other non-productive activities. ABC allows organizations to improve their productivity by eliminating non-productive efforts, as well as managing the operational costs through observation and analysis.

In Taiwan, the wholesale fish market plays a very important role in fish marketing. To strengthen the business of wholesale fish markets, it is necessary to continually modify and improve operational procedures as well as manage operational costs. Hence, this paper discusses activity-based costing in the context of the Pu-Shin wholesale fish market in Taiwan.

This paper consists of four sections. First, the general structure of the ABC model is described. Second, the application of system simulation to the ABC system is discussed. Third, a case study is administered. The resource costs are calculated by simulation results. In this way, allocated resource costs are more accurate and arbitrary allocation is avoided. We conclude by discussing key related issues which may provide opportunities for future research.

## 2. The general structure of the ABC model

Since the efforts of Robin Cooper in the late 1980s, many industries have successfully employed ABC to improve operational performance. ABC has continued to provide relevant and accurate information about cost management. In addition, because the ABC system focuses on activities rather than products, it helps prevent distorted product cost information that can arise from the use of traditional costing systems (Gunasekaran and Singh, 1999; Cooper and Kaplan, 1991). The basic assignments of the ABC model are to identify the activities of an organization, calculate the cost of each activity, and then cost the product based on activity consumption (Gunasekaran and Singh, 1999). Moreover, the ABC approach can be used to allocate various activities to related resources. Costs are appropriately allocated to selected cost objects by using the cost driver<sup>1</sup> of each activity. Therefore, accuracy of product cost is contingent upon both calculations of activity cost and cost driver volume.

The structure of the ABC model is illustrated in Fig. 1. It contains information relevant to organizational resources, activities, and cost objects. The implication is that the cost object is the cause of activities and that resources exist solely to carry out those activities. After the resource costs have been assigned to their respective

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<sup>1</sup> Cost drivers are the factors that drive the cost of operational activities. They include such factors as number of parts, number of moves, number of products, number of customer orders, and number of returned products.

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