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Activity Based Costing in the Supply Chain  
Logistics activities cost analysis

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## **Abstract**

After some considerations of the application of cost to logistics activities, the conclusions we want to draw are that through the use of cost measurement systems on performance based on activities, it is possible to identify the opportunities to reengineer the collaboration inter-company processes with the aim of reducing operating costs and thus improve the company's performance.

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# 1 Introduction

The supply chain links suppliers, manufacturing industries, distribution and service companies, in relation to the production and delivery of goods and services in order to meet customer requirements.

Supply chain integration allows, through the fundamental objectives of adjustment and the optimisation of key inter-company processes optimisation, to maximize both the customer value and profit for every participant in the supply chain.<sup>1</sup>

Logistics, in this context, can be formally defined as that part of the supply chain process that plans, implements and controls the effective and efficient flow of goods, services and related information from the point of origin to the point of consumption. Supply chain management has now evolved beyond a mere cost-reducing business function into a core competency and source of competitive advantage because of its impact on customer service. In the highly competitive marketplace where products, price and quality are easily imitated and the speed of the physical and information flows plays a fundamental role for the achievement of the company objectives. Superior customer service can be the key element that ranks one firm above another. Thus, the logistics function obviously plays a vital role in the success or failure of a company.

## 2 The application of the Activity Based Costing in logistics

Logistics activities are oriented to create value for consumers, suppliers and other companies involved in the physical management of goods. The capacity of these companies to produce and deliver value depends on their ability to supply the consumers with the products and services in the location at the moment at which they want to get them, at competitive prices and at the lowest total cost. To realise the required level of customer service at the lowest total cost, it is fundamental to analyse the logistics activities presents in the company and the cost that these activities generate.

Many logistics operations require cooperation among companies. The costs that the companies pay depends on the decisions that they take about the realisation methods of their logistics activities. The cost recording and analysis system has to help the companies to identify the best collaboration

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<sup>1</sup>Pedone P., Rogora C., *Supply chain integration: strategie per affrontare gli anni 2000*, Economia Management, n. 2, 1995, p. 61.

methods, to correctly define economic advantage.

Activity based costing (ABC) identifies and measures, with reference to the single company, the costs sustained to realise logistics activities influenced by the companies that cooperate along the supply chain.<sup>2</sup> The cost of every logistic activity depends on the operating methods adopted by every company involved in the cooperation. Cost measurement associated with the logistics activity is fundamental because with this value it is possible to calculate the cost differentials derived from the cooperating company's behaviour. Through reducing the logistics activity cost it is possible, in turn, to pass this reduction onto the price paid by the consumer, thus making the company's offering more competitive and economic and improving the economics of the whole supply chain. ABC can be defined as a system of calculating the costs of individual activities and assigning those costs to cost objects such as products, customers and delivery channels on the basis of the activities undertaken to produce each product or service.

The application of this analysis method to every point in the chain of distribution allows us:

- to measure the real cost sustained for every logistic operation made with a specific client, supplier or distribution channel;
- to link at every logistics activity cost to their respective performance;
- to reduce the wastes of the resources used in the logistics activities.

Managers need accurate information to identify the cost reduction opportunities, and to re-engineer their logistics processes with the aim of making them more efficient. The success of these attempts depends on the ability of the cost analysis system to identify the resources consumed for specific product, procurement channel or logistic activity.<sup>3</sup> The detail and complexity level of this information depend on the products, services and delivery channels used. The cost analysis for each activity allows a more efficient assignment of the resources identifying the cost reduction and new technology investment opportunities because it informs of real profitability for every client, product or service. The identification and development of the more profitable activities, present along the supply chain, should create an improvement in the business performance.

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<sup>2</sup>Goldsby T. J., Closs D. J., *Using activity-based costing to reengineer the reverse logistics channel*, International Journal of Physical Distribution Logistics Management, no. 6, 2000, p. 500.

<sup>3</sup>Pohlen T. L., La Londe B. J., *Implementing activity-based costing in logistics*, Journal of Business Logistics, no. 15, 1994.

### 3 Logistics and the ABC process

To reduce logistics costs and provide the level of customer service demanded, it is important to know the resources used in every activity through an efficient logistics cost analysis system.

ABC introduction could be subdivided in the following operating phases:

- identifying and classifying of the main logistics processes;
- breaking the processes down into activities;
- identifying the resources consumed in performing the activities;
- determining the costs of the activities through resource driver;
- assigning the costs to the cost objects through activity driver;
- assessing the total cost.

The typical logistics processes in a manufacturing company are: demand forecasting and planning, procurement, material handling, inventory management, warehousing, order processing and transportation. A firm may have more or fewer processes depending on the nature of the business and the level of outsourcing implemented.<sup>4</sup> To correctly analyse of the logistics cost, it is necessary to break down the processes down into activities, creating a map of the logistics activities for the company.

An analysis of the resources consumed in each activity will identify inefficiencies caused by poor logistics activities planning that generate an excessive consumption of the resources.

Different kinds of resources are consumed according to the logistics activities presents in the company and the way in which they are used.<sup>5</sup> To define for each activity the utilisation of resources, ABC uses the concept of

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<sup>4</sup>Lin B., Collins J., Su R. K., *Supply chain costing: an activity-based perspective*, International Journal of Physical Distribution Logistics Management, no. 10, 2001, p. 702.

<sup>5</sup>“However, most resources in any company can be divided into the following major categories: labour, materials, equipment, facilities, property and capital.” Kaplan R. S., Cooper R., *Cost effect using integrated cost systems to drive profitability and performance*, Boston, Harvard Business School Press, 1998. “Using an illustration of the truck driving activity in the delivery process, obvious resources used include: labour - the truck driver’s compensation; equipment - the truck, assuming it is company owned; and capital - the money used to pay the price of gasoline and oil. All of these resources, and possibly others depending on how the activity is performed, can be identified with the truck driving activity.” Lin B., Collins J., Su R. K., *Supply chain costing: an activity-based perspective*, International Journal of Physical Distribution Logistics Management, no. 10, 2001, p. 702.

resource driver. For a specific activity the resource driver is simply a factor that causes or influences costs. The activity focuses on the most important processes and sub-processes carried out in the company involving several business functions. Once the resources for the activities have been imputed, it is necessary to identify the factors that generate the demand for that activity from each cost object. The activity drivers measure the frequency and intensity of activity arising from each cost object.

Through ABC for each activity, it is possible to identify at least one activity driver. Some costs may have numerous drivers, but only the most relevant should be used. The selection of cost driver is an important phase because it influences the level of accuracy of the final object cost assessment. The most relevant drivers can often be determined by questioning those employees who are most familiar with the activity to indicate which factor causes an increase or decrease in the time and effort they spend on the activity. The cost drivers should have direct relationship with the amount of effort required by the activity.<sup>6</sup> A cost driver is usually expressed on a cost per unit basis. To assess the total cost of an activity for an individual cost object, the ABC multiplies the usage amount of a cost driver in performing that activity by the unit cost of the driver.

Allocating resources directly to activities and specific cost objects that utilise those activities, are the most important phases of the ABC system. Through the identification of the costs sustained for each operation, connected to specific cost objects, it is possible to value the cost differential between customers, products, market segments or distribution channels. The ability to trace the costs to specific cost objects has immeasurable benefits in corporate decision-making roles. Nevertheless the information related to costs sustained in each business activity might not be sufficient. To face up to important management decisions, it could be necessary to determine the costs sustained from all of the companies in the the supply chain to fully understand the logistics activities and the variations that these costs undergone in relation to changes in the collaboration relationship.

## 4 Possible trade-offs identification

The development of an integrated logistics systems needs the organisation of an efficient cost analysis system that helps to identify beneficial collaboration relationships among the companies present in the supply chain, and to recognize the possible trade-offs existing between the different logistics activ-

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<sup>6</sup>Lin B., Collins J., Su R. K., *Supply chain costing: an activity-based perspective*, International Journal of Physical Distribution Logistics Management, no. 10, 2001, p. 702.

ities made with the object of minimizing total cost while achieving a desired customer service level. The evaluation of possible cost trade-offs within the logistics system requires the identification, measurement and comparison of several factors. Tyndal identified the following necessary factors:

- identifying cost drivers or the structural determinants of the company's logistics activities and their behaviour;
- measuring cost drivers in sufficient detail so as to understand causes and effect activities;
- measuring the interaction of cost drivers (determining whether they reinforce or counteract each other);
- identifying the specific service levels that matter to customers and measuring their value;
- recognizing the correct trade-offs among the logistics and service criteria;
- evaluating these, both as a whole and incrementally, to contain costs without undermining needed differentiation in the distribution function.

The information obtained from integrated logistics management supports such key logistic decisions as determining needs for warehouse space, identifying warehouse locations, choosing delivery channels, deciding to outsource, etc. Despite the significant impact and costs involved in these decisions, the information needed to make these decisions remains largely inaccessible.<sup>7</sup> Furthermore the planning of a integrated logistics system doesn't need only the total cost valuation for a logistics activity, but it is necessary to consider the effects produced on other important business processes such as production and marketing in order to minimize the company's total cost.

## 5 The application of ABC in the supply chain

### 5.1 Advantages

ABC addresses to solve the problems concerning the use of traditional cost accounting system based on volume and the improvement of business profitability. The activity cost analysis provides managers with useful information about labour and other resources, including consumption for products,

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<sup>7</sup>Pohlen T. L., La Londe B. J., *Implementing activity-based costing in logistics*, Journal of Business Logistics, no. 15, 1994.

consumers and supplying channels, leading to the management and control of the overheads present in the company. Through the analysis of factors that determine the overhead consumed it is possible to make the logistics activities more efficient by eliminating redundant or unnecessary tasks, and optimising resource allocations to activities adding more value to the product or customer. Also, ABC permits the planning of more efficient collaborative relationships among the companies in the supply chain. The identification of costs reciprocally influenced allows for a choice of collaborations as a method which is more convenient for the whole partnership.<sup>8</sup> Correct information about the differential costs arising from possible alteration of the collaboration relationships help companies to make those appropriate strategic decisions with their logistics activities. This in turn helps them realise, with other companies, how best to modify the object of the cooperation in order to make the whole supply chain more competitive.

## 5.2 Disadvantages and drawbacks

Implications of the application of ABC to logistics activities are not always positive, however. Typical drawbacks include, the lack of perfect cost data; the reluctance of companies to communicate their data; and the loss of attention on the customers. It has long since been understood that no one cost analysis system could be considered perfect. ABC does not always allow allocation to every activity or every cost concerning the resources employed. To identify and measure some logistics activities requires a lot of time and work. Even if ABC helps to analyse the resources consumed and to highlight the real cost connected at every logistic activity, the managers have to know that, sometimes, the correct and complete information is not available, especially when in the process of making important strategic management decisions. ABC provides important information about the costs incurred by the companies in the realisation of their logistics activities. In order to express financial judgement on the collaboration relationships present along the supply chain, it is first necessary for every company to share with the other companies in the supply chain its costs structure concerning the activities reciprocally influenced. The company's recording system has to help the other companies with which they interact to choose the cooperation modalities which are more effective in order to optimise the operation of the whole supply chain.

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<sup>8</sup>The sum of the costs reciprocally influenced correspond with the supplier costs influenced by the costumers plus the costumer costs influenced by the suppliers plus the margin of profit. Q uagli A., *Il "costo di interfaccia". Un nuovo approccio alla contabilità analitica*, Economia Management, no. 6, 1996, p. 35.



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