



## MANAGEMENT ACCOUNTING TECHNIQUES FOR SUPPLY CHAIN MANAGENENT

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**Abstract** Traditional intra-firm cost accounting tools are not appropriate in the context of supply chain management. Various costing approaches such as activity based costing (ABC), target costing and open book accounting have been introduced to provide timely, accurate and relevant financial information for enable supply chain managers to make and execute effective decision-making. The author also argues that the total cost of ownership (TCO) approach provides huge potential which has not yet been fully exploited.

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## 1. INTRODUCTION

Many authors argue that it is essential for a company to know the true costs of supply chain management (SCM) in order to achieve its objectives. In today's businesses, however, there is very little evidence of the integration of accounting measures and sharing of sensitive financial information in order to optimize the entire supply chain from a cost perspective.

Integrating entire accounting systems among different companies will most likely be highly impractical due to confidentiality issues, different accounting standards, technical complexity and eventually immense investment and standardization costs. To overcome these difficulties, the author argues that a simpler and more practical approach can be found by enhancing the total cost of ownership (TCO) approach. In this paper, the author addresses this research gap by overview of the publications in order to examine the status quo of how authors use the TCO approach and assess its capability to analyze the total cost of supply chain.

The remainder of this article is organized as follows. To provide additional focus and relevance to existing practices in an inter-organisational context, various costing approaches have been introduced in past decades such as activity based costing (ABC), target costing and open book accounting. The second section describe each approach and their relevance in supply chain management. The third section examines the literature on the development and the application of TCO initiatives and provides insights on the TCO in purchasing and sales perspective within the scope of supply chain costing. In the last sections, the author elaborates the propositions in light of the overview data and discusses managerial implications and avenues for future research.

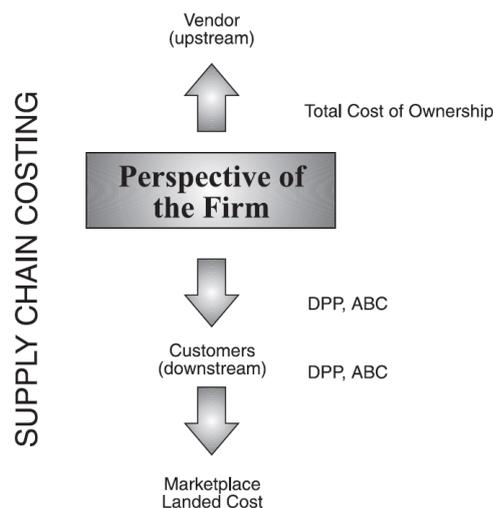
## 2. COSTING APPROACHES TO THE SUPPLY CHAIN

Traditional accounting practices have been criticised as being unable do deliver an inter-organisational focus and associated costing information (Van Weele, 2014), (Jobber & Lancaster, 2012), (Hakansson & Lind, 2006). To provide additional focus and relevance to existing practices in an inter-organisational context, various costing approaches have been introduced in past decades such as activity based costing (ABC), target costing and open book accounting. The following sections describe each approach and their relevance in supply chain management (SCM).

## 2.1. Activity-based costing

Activity-based costing (ABC) is defined in numerous ways. Chartered Institute of Management Accountants (CIMA) defines ABC as: “An approach to the costing and monitoring activities, which involves tracing resource consumption and costing final outputs. Resources are assigned to activities and activities to costs objects based on consumption estimates. The latter utilise cost drivers to attach activity costs to outputs” (CIMA, 2005).

In order for supply chain management to achieve its objectives, the costs of supply chain must be known. However, before the costs can be determined through ABC, a thorough understanding of the logistics activities and their relationships to activity-based costs must be developed. Figure 1 illustrates ABC within the supply chain and in relation to other costing techniques. The total cost of ownership (TCO) and direct product profitability techniques (DPP) illuminate the cost effects of purchasing through a particular supplier and the profit contribution of specific products respectively.



**Fig. 1** Activity-based costing within the supply chain

Several activity-based costing models for inter-firm cost accounting have been proposed – see: (Dekker & van Goor, 2000), (Seuring, 2002a), (Pohlen & Coleman, 2005), (Agndal & Nilsson, 2007), (Schulze, Seuring & Ewring, 2012).

## 2.2. Target costing approach

Target costing aims to identify the cost at which a product should be manufactured by determining the expected selling price, derived from the market

(as opposed to the costs), before the product is developed, and then subtracting the expected profit.

The importance of the supply chain is often stressed in the target costing literature. For example, (Ansari & Bell, 1997) argue that “An optimized supply chain is one of the most critical elements in attaining the target cost”. (Sakurai, 1996) even goes as far as claiming “the primary objects of target costing are direct material costs and direct conversion costs”.

Target costing should be of relevance to supply chain management since it captures all costs involved in the entire system of suppliers contributing to the product. The supplier is usually involved when the target cost is broken down to component level. One of its important characteristics is that it tends to push cost pressure further upstream in the supply chain (Seuring, 2002b).

(Everaert, 2006) identifies characteristics of target costing in three European companies that used the technique and found that those characteristics are related to the way a target is set and how progress towards that target is measured. She suggested further studies might investigate whether degree of openness to suppliers, leadership position, time pressure and position in the supply chain can explain the noted differences in characteristics among companies. In lean supply, the target costing process is extended into the supplier, in order to identify specific needs for cost reduction which become targets for the attention of both parties working together.

### **2.3. Open book accounting**

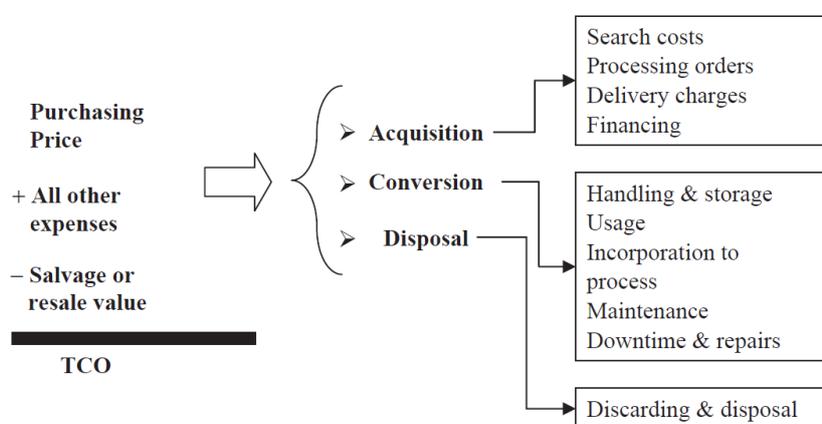
Traditionally, management accounting practice has limited its scope to the boundaries of the firm. This limitation makes it difficult for the firm to take advantage of any cost-reduction synergies that exist across the supply chain. Such synergies can only be achieved by coordinating the cost-reduction activities of multiple firms. The coordination requires the firms in the supply chain to extend their cost management programmes beyond their organizational boundaries. To be successful, such efforts may require a greater degree of cost transparency than customarily associated with buyer-supplier relationships. In this vein, a number of studies performed demonstrate how supply chain members disclose cost and similar data generated by their accounting systems. This phenomenon is often referred to as open book accounting (Romano & Formentini, 2012).

The concept of open book accounting concerns the disclosure of cost and other data generated by the accounting systems among supply chain members. In practice, data disclosure is often unidirectional, from supplier to buyer (Agndal & Nilsson, 2010). For the buyer the aim is to acquire knowledge about upstream processes and to conduct joint activities with supply chain partners to reduce costs. In fact, opening the books allows the buyer to support the supplier in identifying critical areas where efficiency improvements can be implemented.

### 3. INTEGRATING ASPECTS OF THE TOTAL COSTS OF OWNERSHIP (TCO) CONCEPT

The academic literature mentions several definitions for total cost of ownership (TCO) but all have a common denominator. In essence, a broader view is used to identify the true costs of purchasing and using a product or service from a supplier.

(Anderson & Narus, 2004) define TCO as “the sum of purchase price plus all expenses incurred during the productive lifetime of a product or service minus its salvage or resale price”. Figure 2 shows the different elements of TCO.



**Fig. 2** Elements of Total Cost of Ownership

The main goal with TCO analysis is to make better purchasing decisions by considering cost issues beyond price. Apart from improved supplier selection and volume allocation, TCO analysis can also be used for supplier performance evaluation. In comparison with widespread supplier selection models such as ratings models and linear weighting models, the theoretical advantage of TCO analysis is that it makes different criteria comparable in monetary terms without resorting to subjective valuations.

During the last 20 years several authors contributed to TCO theory building and several studies have been published analyzing the adoption of TCO models in companies.

TCO models encountered in literature have many similarities and we were able to identify some common features of these models.

First of all, TCO models are mostly considered as supplier selection and evaluation tools, focusing in most cases on the goods exchanged instead of the bundle formed by goods and service.

Secondly, with the several exceptions, authors do not consider the perspective of supply chain actors other than suppliers in determining TCO.

Third, TCO models mainly assume the buyer's perspective.

This chapter presents an overview of the theoretical background on TCO and provides insight on the purchasing versus sales perspective within the scope of supply chain costing.

### 3.1. TCO in purchasing perspective

The total cost of ownership (TCO) reflects the resources consumed in performing the purchasing-related activities and measures all the costs and benefits of a firm's relationships with its suppliers. Recent development in management and cost accounting, such as Activity Based Costing (ABC), make it possible to quantify the various costs related to the purchasing process.

The essence of ABC is to first allocate factory overhead, corporate overhead and other organizational resources to *activities* performed by the organization and then make allocations to *products* on the basis of the products' demand for activities. In TCO analysis on the other hand, costs are allocated to *purchases* on the basis of the activities that the purchases impact. Such activities may occur on hierarchically on the supplier level, order level, batch level and unit level. Every purchase is followed up by supplier and item, thereby making it possible to compare the total costs brought about by different items from different suppliers (Wouters, Anderson & Wynstra, 2005). To put it briefly, while traditional ABC allocates overhead to individual products, TCO analysis allocates overhead to individual factors of production. Several authors acknowledge the significant connection between the TCO approach and ABC, but the most interesting is proposition of (Degraeve & Roodhooft, 2005).

In order to identify all the costs of company's relationships with its various suppliers, their method analyzes the activities and cost drivers relevant to the problem, by constructing a matrix representation of all total cost of ownership elements. The result is a flexible mixed integer programming formulation that allows (based on ABC and TCO minimization) to take a variety of cost elements, discounts and strategic constraints into account.

This matrix as a key element in their approach has two cost dimensions: (1) position in the value chain (within the first cost dimension five stages are distinguished: initial acquisition, reception, possession, use and elimination/recycling) and (2) hierarchical level represents the main levels at which costs can be aggregated (supplier level, ordering level, unit level).

The philosophy of TCO using activity based costing information can be summarized as follows:

- STEP 1: Define the activities related to external purchasing - these activities are specific to every enterprise and should be expressed through activity-analysis; obvious examples include negotiations with suppliers, placing orders, and reception of incoming goods,

- STEP 2: Assign costs to the different activities; this is a traditional step in every activity based-costing system,
- STEP 3: Define cost drivers - determine the factors raising the cost of a given activity,
- STEP 4: Determine which activities are generated in the purchasing organization, by each individual supplier.

Even though the extension of ABC through TCO reduces the limitations of ABC, the concept is still not able to truly quantify all lifecycle costs throughout the whole supply chain. Instead of determining the lifecycle costs of a given product, in most practical cases, the TCO concept remains focused on intra-firm analyses and lacks the important aspects of supply chain wide cost analyses.

### 3.2. TCO in sales perspective

The previously discussed literature defines, conceptualizes and applies TCO with the goal to minimize costs for the purchasing side of the seller-purchaser dyad. This section contrasts the purchasing with a sales perspective.

While TCO analysis is an established procurement methodology, it does *not* automatically follow that the method can be successfully applied on the opposite end of the negotiating table. Sell-side use of TCO does not appear to be widespread, as is indicated by (Ellram & Siferd, 1998), which identified 21 uses for TCO analysis in 11 industrial companies, *none* of which was using TCO analysis as a sales tool.

(Zachariassen & Arlbjorn, 2011) argue that research on TCO should not be limited to a focal company perspective, but should also deal with the suppliers' side, as the use of TCO not only affects the focal firm, but also inevitably the focal firm's suppliers. This observation leads to the development of a differentiated approach to TCO. The purpose of their paper is therefore to explore, how the concept of TCO can be applied in a differentiated way. They proposed a taxonomy based on the strength of the relationship between the selling and buying companies involved and the complexity of TCO cost drivers. There are four main findings:

1. When the relationship with the supplier is at arm's length and the level of TCO cost driver complexity is low, the use of TCO can be seen as manipulation. The research found that "indirect costs associated with negotiating with suppliers actually increase due to the increased emphasis on cost data, which runs counter to the original intention of TCO". In this case it is thus better for the sales personnel to not use TCO data when communicating with a customer.
2. When the relationship is not strategic and when the complexity of TCO cost drivers is high the use of TCO is not advised. They found that TCO can serve as an irritating tool for both sales personnel and the customer and it ultimately precludes rational decision making.
3. In contrast, when the relationship proves to be a partnership and the TCO cost drivers are of low complexity then confirmation is given. Here "TCO served as

a relatively uncomplicated confirmation of the partnership for both the focal firm and the respective suppliers". Here TCO functions as a confirmation of the mutual interests of the parties.

4. When the relationship is more complex learning occurs. "Based on the empirical data, both parties remarked that they would have a strong incentive to mutually obtain information about the total costs that arise due to transactions among the parties". The parties used the information gained from TCO calculations to identify indirect costs that are unnecessary high and improve them.

In conclusion, the described taxonomy allows firms to more effectively allocate their sales resources in TCO calculation efforts. The practical implications indicate the usage of TCO calculations should be done for customers with a strong relationship (partnership). Thus when using TCO calculations in negotiations and proposals to prospects, this could best be done for prospects where there is an expected long-term relationship.

Sales organizations can use TCO models as selling tools to measure, document, and communicate the value that their offering can create for customers versus competition. Major uses of TCO models by sellers include the following applications:

- understanding the customer's value function: TCO models allow suppliers to gain a better understanding of how their offering creates value for their customers; the comprehensive analysis required to estimate TCO gives suppliers a better understanding of the customer's cost drivers and activities related to the offering; by analyzing buyer's operations and processes, suppliers get an in-depth comprehension of the customer's needs and requirements; such knowledge provides excellent clues for future offering enhancements,
- a TCO model can be a powerful tool to help suppliers unveil potential problems that a customer may have; working together, buyer and seller find ways to improve processes and to be more efficient, expanding the size of the joint profits,
- improving communication and strengthening relationships with customers: going through a process of information sharing, communication, and collaboration, the inter-organizational ties become stronger, favoring a long-term relationship; the customer incurs lower search costs, and the commitment to the supplier; the supplier's commitment to the customer also increases due to deeper understanding of the customer's needs.

#### **4. CONCLUSION**

Existing literature has investigated TCO from a focal perspective, and as such limits the analysis of TCO to a technical question of selecting appropriate cost drivers, identifying pre- or post-transactions or mathematically modelling TCO

frameworks. Although literature has stressed the usefulness of TCO, it is, however, surprising to find that the use of TCO in industry is limited.

A possible reason for the limited use of TCO could also be found in the currently undifferentiated management approach to TCO. As literature often stresses the difference between relationships ranging from arm's length to strategic partnerships due to their different purposes for the focal firm, it seems intuitively clear that TCO should be not used in the same way across all relationships. Existing literature has neglected to study how an undifferentiated use of TCO across all relationships might be ineffective and even potentially harmful for the buyer-supplier relationship. Consequently, this paper puts forward the argument that research on TCO should also deal with the suppliers' side, as the use of TCO not only affects the focal firm, but also inevitably the focal firm's suppliers. Sellers can use TCO models to measure, document, and communicate the value that their offering represents to a customer in the way of lower costs relative to the next best alternative.

This paper argues that the application of TCO models to the supply chain level is a promising area of research. As a matter of fact, value-based, multi-firm models might be an important driver to support supply chain integration and collaboration, since they represent a tool to assess costs and benefits embedded in business-to-business transactions.

## REFERENCES

- Agndal H. & Nilsson U., (2007). "Activity-based costing: effects of long-term buyer-supplier relationships", *Qualitative Research in Accounting & Management*, Vol. 4, No. 3, pp. 222-245.
- Agndal H. & Nilsson U., (2010). "Different open book accounting practices for different purchasing strategies", *Management Accounting Research*, Vol. 21, No. 3, pp. 147-166.
- Anderson J.C. & Narus J.A., (2004), *Business market management: understanding, creating, and delivering value*, 2nd ed., Prentice Hall, Upper Saddle River.
- Ansari, S., Bell, J.E. & The CAM-I Target Costing Group, (1997), *Target Costing – The Next Frontier in Strategic Cost Management. A CAM-I/CMS Model for Profit Planning and Cost Management*, Irwin, McGraw Hill, New York.
- CIMA Official Terminology, (2005), Chartered Institute of Management Accountants, London.
- Degraeve Z., Roodhooft F. & Van Doveren F., (2005), "The Use of Total Cost of Ownership for Strategic Procurement: A Company-Wide Management Information System", *Journal of the Operational Research Society*, Vol.56, No.1, pp. 51-59.
- Dekker H. & Van Goor A.R., (2000), "Supply chain management and management accounting: a case study of activity-based costing", *International Journal of Logistics: Research and Applications*, Vol. 3, No. 1, pp. 41-52.
- Ellram L & Siferd S., (1998), "Total cost of ownership: A key concept in strategic cost management decisions", *Journal of Business Logistics*, Vol.19, No.1, p. 55-84.

- Everaert P., (2006), "Characteristics of target costing: theoretical and field study perspectives", *Qualitative Research in Accounting and Management*, Vol. 3, No. 3, pp. 236-263.
- Hakansson H. & Lind J., (2007), Accounting in an interorganizational setting, *Handbook of Management Accounting Research*, Chapman C.S., Hopwood A.G., Shields M.D. (Eds.), Volume 2, pp. 885-902, Elsevier, Amsterdam 2007.
- Jobber D. & Lancaster G., (2012), *Selling and Sales Management*, 9th ed., Prentice Hall, Edinburgh.
- Pohlen, T. & Coleman, B.J., (2005), "Evaluating internal operations and supply chain performance using EVA and ABC", *SAM Advanced Management Journal*, Vol. 70, No. 2, pp. 45-58.
- Romano P. & Formentini M., (2012), "Designing and implementing open book accounting in buyer-supplier dyads: A framework for supplier selection and motivation", *International Journal of Production Economics*, Vol. 137, No. 1, pp. 68-83.
- Sakurai M., (1989), "Target costing and how to use it", *Journal of Cost Management for the Manufacturing Industry*, Summer, pp. 39-50.
- Schulze M., Seuring S. & Ewering C., (2012), "Applying activity-based costing in a supply chain environment", *International Journal of Production Economics*, Vol. 135, No. 2, pp. 716-725.
- Seuring S., (2002a), Supply chain costing - a conceptual framework, Seuring S., Goldbach M. (Eds.), *Cost Management in Supply Chains*, Physica, Heidelberg, pp. 16-30.
- Seuring S., (2002b). Supply chain target costing – an apparel industry case study. In Seuring, S. and Goldbach, M. (Eds). *Cost Management in Supply Chains*. Physica-Verlag, Heidelberg, pp. 111-126.
- Van Weele A.J., (2014), *Purchasing and supply chain management: Analysis, strategy, planning and practice*, 6th ed., Cengage Learning Business Press, London.
- Wouters M., Anderson J. & Wynstra F., (2005), "The Adoption of Total Cost of Ownership for Sourcing Decisions – A Structural Equations Analysis", *Accounting, Organizations and Society*, Vol. 30, No. 2, pp. 167-191.
- Zachariassen F. & Arlbjorn J.S., (2011), "Exploring a differentiated approach to total cost of ownership", *Industrial Management & Data Systems*, Vo. 111, No. 3, pp. 448-469.

## BIOGRAPHICAL NOTES

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