

## Supply Chain Cost and Investigation of point to Assess

Alireza Goodarzi

Department of Accounting, Faculty of Human Science, Garmsar Branch, Islamic Azad University, Garmsar-Iran

### Abstract

*To increase net income, Organizations focus on reducing costs in their supply chains. A company needs to know how to measure Supply Chain Cost (SCC) In order to reduce costs. This paper aims to investigate Supply Chain Cost and how can be used in industry. A proposed model for measuring Supply Chain Cost has been provided in this study. 30 companies in 10 different business sectors were interviewed on how to measure costs in their supply chains, focused on identifying the difference on SCC based on estimated standard cost compared to actual cost. In this study, a case study describing the difference between measuring SCC based on calculated standard cost and actual cost has been provided, indicating that general thorough cost and supply chain analyses in many companies can be improved.*

**Keywords:** Supply Chain Cost, Measurement, Actual cost, Economic

### Introduction

A supply chain consists of all parties involved, directly or indirectly, in fulfilling a customer request. The supply chain not only includes the manufacturer and suppliers, but also transporters, warehouses, retailers, and customers themselves. A supply chain is dynamic and involves the constant flow of information, product, and funds between different stages. Within each organization, such as manufacturer, the supply chain includes all functions involved in receiving and filling a customer request (Chen, J., 1997). These functions include, but are not limited to, new product development, marketing, operations, distribution, finance, and customer service. In a study by Schary and Skjøtt-Larsen in 2001, argued that revenue and cost describe the supply chain, believed that cost data gives more information about the supply chain than any other source. Cutting costs increases net income, and a higher income would be found with greater earnings per share and also a higher market value. Su and Lei in 2008 stated that reduction in Supply Chain Cost (SCC) has become a means for achieving competitive advantage. This paper discusses the concept of SCC and what should be included in SCC, different ways of measuring SCC, and how SCC is used within the Swedish industry. On the basis of Major aims of Supply Chain Management, stated that Conventional goals of supply chain management include reduce waste and non-value-added activities including excess inventory, increase customer service/responsiveness, improve supply chain communication, reduce cycle time, and improve coordination of efforts (Lambert, J.D., 1998). Among the most widely Various definitions of Supply Chain Management used is the one provided by Handfield and Nichols, that is, The supply chain encompasses all activities associated with the flow and transformation of goods from raw materials stage, through to the end user, as well as the associated information flows. Material and information flow both up and down the supply chain. Supply chain management is the integration of these activities through improved supply chain relationships, to achieve a sustainable competitive advantage. Supply Chain Management has received an increased amount of interest both from researchers and in the industry. More and more companies have to focus on their Supply chain in order to be successful in their business (Kumar, Chang, 2007).

### **Logistics cost versus Supply Chain Cost**

Logistics cost and Supply Chain Cost (SCC) are two terms that are used both in the industry and the academic world. SCC cost has a wider definition than Logistics cost in accordance with the wider scope for supply chain management compared to logistics management. Supply Chain Cost has been defined as cost components related to purchasing, stock handling, manufacturing and so forth.

### **Measurements of Supply Chain Cost**

The problem is composed of a three-layer supply chain including the supplier, manufacturing and customer. Due to several products provided by the supply chain, customers express their satisfaction level in a category of requirements to be fulfilled by the manufacturing segment. The manufacturer also has limited resources to satisfy customers' needs. Different phases of manufacturing costs are divided in maintenance, quality assurance, transportation and machine related costs. Suppliers are also effective in the decision making since the raw materials different suppliers provide cause different improvements or drawbacks in the aforementioned phases. Therefore, a mathematical model is developed both to consider customer satisfaction requirements and the manufacturing resource limitation. Based on a study by Hoole in 2005, the total Supply Chain Cost can vary by annual revenues between companies in the same industrial sector, stated that companies having a mature supply chain are reducing costs more quickly than those with less mature supply chains (Huber, B., 2007). As both cost management and supply chain management are rather platforms for a wide variety of methods, concepts and instruments, it becomes evident, that costs are not only created by material and information flows along the supply chain, but also by the relationships with the supply chain itself.

Supply Chain Cost highlights the costs linked to the supply chain, in practice; this cost can be estimated in different ways and with different degrees of accuracy. Rough standard allocations can be used to span transportation costs, order-processing costs, where on actual costs can be reported directly to a customer project. A mixture of standard costs, from the companies' budgets and cost accounting systems, and actual costs is necessary for the most accurate SCC, considering the fact that some cost drivers must distribute indirect costs. Hence, measuring an accurate SCC might be difficult, and the reason for difficulty lies in a fact that measuring SCC in companies' accounting systems is not adjusted to SCC measurements. Conventional accounting systems group costs into broad aggregated categories in which the detailed analysis needed to identify the true costs of servicing customers is not allowed, regarding study by Christopher in 1998. The dissatisfaction with conventional cost accounting related to logistics management has been summarized by Christopher in this way that there exists general ignorance of the true cost of servicing different customers, channels or market segments, and further conventional accounting systems are functional rather than output oriented, and the last companies understand product costs, but not customer costs(Christopher, 2005).

In this study, a suggested model for measuring Supply Chain Cost has been represented. Using this model, 30 representatives from different companies representing 10 different branches were interviewed, mentioned that results of these interviews are presented. The case of one company, showing the importance of allocating costs correctly and not using rough standard costs compared to actual costs has been mainly considered in this study. To sum up, conclusions are presented (Kumar, 2006).

### **Measuring Supply Chain Cost regarding the model**

The costs in the supply chain controlled by the company are considered in this model, where on its own supply chain is a part of the company structure, considering the fact that this is generally based on the view that companies are divided into different functional areas including research and development, marketing and sales, sourcing, supply, after Sales, finance, human resources and general administration, refer to figure 1 to see this. Note that each area is

responsible for its own costs and work methods. Costs for all areas are included in the total cost in each company. Supply chain cost is the cost for handling the supply chain area meant that the entire supply chain controlled by the company. Direct material, direct labor and overhead production costs are included in manufacturing costs. All costs related to administration, such as costs to pay the people that handle customer orders, people that purchase material and people that book transportation are included in administration costs. Costs for stockholding and treatments in warehouses are spanned in warehouse costs. Inbound and outbound transportation and its administration are included in distribution costs. Installation costs are for companies that install their products in their customers' facilities, that capital costs are associated with investments in the company's facilities, depending on the supply chain and type of business what is precisely included in each cost. There are many different supply chains and the SCC components vary. The Manufacturing cost in some supply chains is the dominant part, the distribution cost can dominate and warehouse and distribution costs may dominate (Hosang, J., 2005). The reason for dividing supply chain cost is to see where in the supply chain the cost originates, the Supply Chain Cost divided to six areas can be seen in figure 1. Each of them can be divided into more detailed groups.

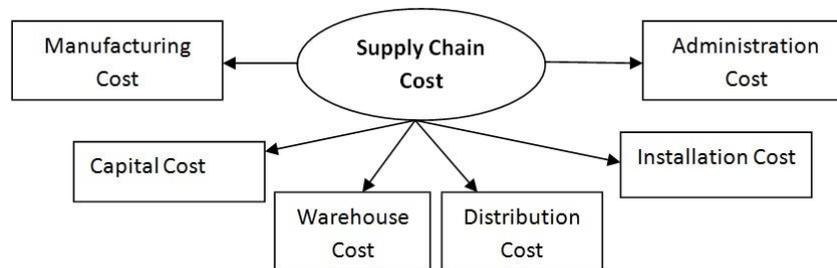


Figure 1. Supply Chain Cost divided to six areas

A large part of the total cost in a company, but only parts that are included in the supply chain is covered in Supply Chain Cost. The costs for research and development, marketing and sales, human resources and general administration are not included. The costs for the parts that are not included in Supply Chain Cost covers should be a part of a total full cost analysis of products, customers etc. Supply Chain Cost should primarily be used for analyzing the supply chain. The analysis can, for example, focus on evaluating whether the right number of people is allocated to the supply chain. Supply Chain Cost can also be used in an analysis to decide whether parts of the supply chain should be outsourced to another company or moved to another country. It can also be used to determine whether a cost reduction activity has reduced Supply Chain Cost covers in one part of the chain and increased it in another part (Pettersson, A., 2008). Manufacturing costs but also Administration costs and Warehouse costs should be used to estimate the value of items in inventory. Supply Chain Cost should be used to monitor the profitability of a product, customer, market and etc. Overhead costs should also be allocated to the cost object to complete a full-cost analysis. It is important to analyze and allocate all the costs in the supply chain that can hinder variable costing where on Supply Chain Cost presented in a full-cost manner and variants of variable costing are also possible, considering the fact that an analysis on Supply Chain Cost can be performed on the different objects that can be defined in a supply chain. The smallest cost entity and unit is product, and natural aggregates are product families, customers and markets (Hoole, R., 2005).

**The use of Supply Chain Cost**

A study about performance and efficiency in supply chains has been done, that a part of the study was related to Supply Chain Cost. Supply Chain Management professionals from 30 different companies were interviewed, that the questions in interview grounded on supply chain cost. Interviews were conducted by phone or face to face with people who were familiar with the supply process. People were selected with a management-level person working with Supply Chain Management. The sample of companies used for this study is rather small, but the

companies included span a large portion of the largest companies operating in Tehran, active in 10 different industrial sectors. Many are international companies with activities in many countries. Different measurements of Supply Chain Cost vary between the 30 companies in the study. With respect to Supply Chain Cost, 3 companies out of 30 reported that they do not measure Supply Chain Cost ever. The companies measure costs related to their supply chains, that only one company uses the term Supply Chain Cost, 22 companies are measured some of the Supply Chain Cost components, used the actual costs; refer to figure 2. Two of the companies measure parts of the components, but not based on actual cost. This means that, for example, the Distribution cost is measured as a percentage of the total distribution cost in the company. The percentage figure is decided by budgets and earlier calculations.

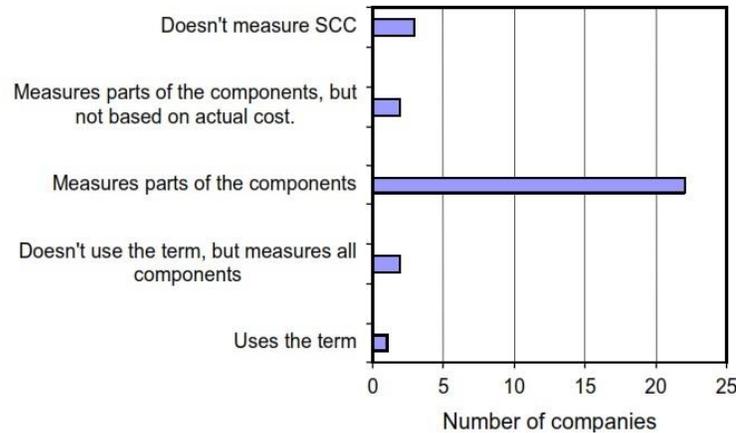


Figure 2. Measurement of Supply Chain Cost

The company that measures all of the parts is in the commodity industry sector. Methods for measuring are different from those used in other sectors. The focus is on distribution cost in the pharmaceutical sector in measuring SCC in the Paper industry, where greater emphasis is placed on the manufacturing and distribution costs.

This small case study was done at an anonymous company with business in Tehran. It is a large company with many different products. The company is divided into different product areas, with an own profit and loss responsibility. The company was using calculated standard cost to measure the Supply Chain Cost.

#### Supply Chain Cost based on actual cost

Measuring SCC based on the model presented gives the cost types including Manufacturing cost, Administration cost, Warehouse cost, Distribution cost and capital cost. There is no installation in the selling price. The company categories map into the cost types including Production cost correspond to Manufacturing cost; Order handling cost, Purchasing cost and Support function cost correspond to Administration cost. The administration cost was calculated by adding the cost for all people involved in managing the supply chain (Ballou, R.H., 2004). There are 10 people involved from Demand planning and Production support, 2 people from Order management, 3 Sales support people and 10 Product support people. The Net sales for the studied product were 6 Money Units (MU) for the studied months January–June 2012 (Alnestig, 1996).

#### Research Findings

SCC measurement based on actual cost rather than calculated cost provides a more reliable result to be used when taking decisions regarding the set-up and design of the supply chain. The wrong decisions regarding management of the supply chain when using a calculated cost that is too rough can be made; resources may be used inefficiently; and it may unknowingly

have too many people involved in the supply chain. If the product should carry its own cost then the number of people and resources involved has to be reduced. A company should benefit from measuring SCC; it should know how to measure SCC, and the measurement should as far as possible be based on actual cost. Companies are advised to start measuring the real and total SCC.

### **Conclusion**

Total SCC is the sum of Manufacturing cost, Administration cost, Warehouse cost, Distribution cost, Capital cost and Installation cost. The reason for dividing SCC into these six main groups is to identify, and not forget, where the SCC comes from; the groups are further subdivided. The suggested model for measuring SCC presented in this paper may be used as a checklist. The development of management accounting and control systems already allows the user very fast access to real, actual costs instead of calculated costs. The proposed model considers the cost in the whole supply chain and it wants to clearly show where Supply Chain Cost arises. The costing systems, by tradition, often concentrate on the Manufacturing cost. It is hoped that our suggested costing model for SCC will stimulate the development of more flexible computer costing systems (River, 1996). The company may take the wrong decisions regarding the set-up and management of the supply chain when using a calculated cost that is too rough; it may use its resources inefficiently; and it may unknowingly have too many people involved in the supply chain. The cost is absorbed somewhere else in the organization. If the product should carry its own cost then the number of people and resources involved has to be reduced. A company should benefit from measuring SCC; it should know how to measure SCC, and the measurement should as far as possible be based on actual cost. Future costing systems and management accounting systems must also take into account that more of the processing in the supply chain may be performed by subcontractors and suppliers and not, as before, by the companies themselves. The empirical study including 30 companies shows that many companies do not measure the total SCC. Instead, they only measure parts of the SCC such as the Manufacturing cost complemented with the Distribution cost. The case study of one company shows that measuring SCC based on a calculated standard cost that is too aggregated may present a false impression about how cost-effectively the supply chain is being managed; decisions based on such calculations may therefore end up not supporting the most cost-efficient methods for the company. Legislation requires that inventories not be overvalued or undervalued; external auditors check that companies follow current rules. However from our interviews we dare to conclude that general thorough cost and supply chain analyses are underdeveloped in many companies.

## References

1. Amaro, A., Barbosa-Póvoa, A., 2009. The effect of uncertainty on the optimal closed-loop supply chain planning under different partnerships structure. *Computers and Chemical Engineering* 33 (12), 2144–2158.
2. Alnestig, P., Segerstedt, A., 1996. Product costing in ten Swedish manufacturing companies. *International Journal of Production Economics* 46–47, 441–457.
3. Aras, N., Aksen, D., Tanugur, A., 2008. Locating collection centers for incentive-dependent returns under a pick-up policy with capacitated vehicles. *European Journal of Operational Research* 191, 1223–1240.
4. Ayers, J.B., 2001. *Handbook of Supply Chain Management*. St. Lucie Press/APICS, Boca Raton, Fla.
5. Ballou, R.H., 2004. *Business Logistics/Supply Chain Management: Planning, Organizing, and Controlling the Supply Chain*, 5ed. Pearson Prentice-Hall, Upper Saddle River, NJ.
6. Bowersox, D.J., Closs, D.J., 1996. *Logistical Management—The Integrated Supply Chain Process*.
7. Bojarski, A., Larínez, J., Espuña, A., Puigjaner, L., 2009. Incorporating environmental impacts and regulations in a holistic supply chains modeling: an LCA approach. *Computers and Chemical Engineering* 33, 1747–1759.
8. Chen, J., 1997. Achieving maximum supply chain efficiency. *IIE Solutions* 29 (6), 30–35.
9. Christopher, M., 1998. *Logistics and Supply Chain Management: Strategies for Reducing Costs and Improving Services*, 2ed. Pitman, London.
10. Cai, G., 2010. Channel selection and coordination in dual-channel supply chains. *Journal of Retailing* 86 (1), 22–36.
11. Christopher, M., Gattorna, J., 2005. Supply chain cost management and value-based pricing. *Industrial Marketing Management* 34, 115–121.
12. Drury, C., 2004. *Management and Cost Accounting*. Thomson Learning, London.
13. Hoole, R., 2005. Five ways to simplify your supply chain. *Supply Chain Management: An International Journal* 10 (1), 3–6.
14. Hosang, J., Bongju, J., 2005. Decentralized production-distribution planning system using collaborative agents in a supply chain network. *International Journal of Advanced Manufacturing Technology* 25 (1–2), 167–173.
15. Huang, C., Yu, G., Wang, S., Wang, X., 2006. Disruption management for supply chain coordination with exponential demand function. *Acta Mathematica Scientica* 26 (4), 655–669.
16. Huber, B., Sweeney, E., 2007. The need for wider supply chain management adoption: empirical results from Ireland. *Supply Chain Management: An International Journal* 12 (4), 245–248.
17. Kumar, S., Chang, C.W., 2007. Reverse auctions: How much total supply chain cost savings are there? A conceptual overview. *Journal of Revenue and Pricing Management* 6 (2), 77–85.
18. Kumar, S., Kropp, J., 2006. Studying the operational efficiencies of a multi-product supply chain using Excel spreadsheet model. 26 (10), 1186–1200.
19. Lambert, D.M., Cooper, M.C., Pagh, J.D., 1998. Supply chain management: implementation issues and research opportunities. *International Journal of Logistics Management* 9 (2), 1–19.
20. Meixell, M., Gargeya, V., 2005. Global supply chain design: a literature review and critique. *Transportation Research Part E – Logistics and Transportation Review* 41 (6), 531–550.
21. Min, H., Ko, C., 2006. A genetic algorithm approach to developing the multi-echelon reverse logistics network for product returns. *Omega* 34, 56–69.
22. Nikolaidis, Y., 2009. A modeling framework for the acquisition and remanufacturing of used products. *International Journal of Sustainable Engineering* 2 (3), 154–170.
23. Pettersson, A., 2008. *Measurements of Efficiency in a Supply Chain*. Licentiate Thesis. Luleå University of Technology, Luleå.
24. Qi, X., Bard, J., Yu, G., 2004. Supply chain coordination with demand disruptions. *Omega* 32 (4), 301–312.
25. Yan, R., 2008. Profit sharing and firm performance in the manufacturer-retailer dual-channel supply chain. *Electronic Commerce Research* 8 (3), 155–172.
26. Zhang, R., Liu, B., Wang, W., 2012. Pricing decisions in a dual channels system with different power structures. *Economic Modelling* 29 (2), 523–533.