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Understanding the Impact of Strategic Sourcing: Identifying the Optimal Approach in Managing a Global Network

Niraj Kumar Mahapatra

Abstract

Strategic sourcing is an important practice in the sourcing/procurement activities that help major corporations to achieve their objectives. It is imperative that organizations which are growing in an unprecedented way should utilize this approach which leverages their corporate buying strategy and optimizes the entire supply chain network with lead time advantage as well as cost-effectiveness. In this paper, the author tries establishing an approach used by U.S. based high tech company, which is sourcing from its two manufacturing locations in China and Mexico. There are several characteristics which determine the process, but there are factors like manufacturing cost, flexibility, inventory – target & safety stock, and responsiveness. Setting a base demand or in other words allocating the demand is critical towards micro and macro conditions. For establishing a better understanding of such paradigm, the author extends the study for over a year based on demand in the U.S. Also, determine whether single sourcing or multi-sourcing is best suited based on the current sourcing scenario. Furthermore, there is a bank value associated with each period, which provides a financial standing at every point based upon the sourcing destination.

Keywords: ***Single-Sourcing, Dual Sourcing, Allocation, Manufacturing Cost, Target Inventory Level (Safety Stock), Lead time.***

Article Classification: ***Research paper***

Introduction

With today's competitive global landscape where corporations are growing more competitive in all areas, and that resonates around the cost factor (Arif Khan K, Rajesh K. Pillania, 2008). A culmination of all the requirements that go into the making of a product or a service until the delivery of that product or service to the customer is what we call as Supply chain management (SCM). The components of such a chain include planning, coordination, control, quality, and most significant one is customer value. Organizations today all across the world are dynamically responsive and deploying technologies on a large scale to stay ahead of their competitive frontiers. The cost of procurements of general goods or services represents two main factors which are COGS (Cost of Goods Sold) as well as Revenue, where the former usually is 10 to 20 percent more. Such a ratio has been constant as well as incredibly consistent despite more extensive macro and micro-economic impacts. Today, organization have a control strategy which would systematically govern the entire cost of supply chain Companies have identified that strategic sourcing is saving nearly ten to twenty times as much as it costs to operate their sourcing operations. Strategic sourcing comprises a variety of tasks including making strategy for selecting and assessing suppliers, procuring goods and services and maintain relationship with supplier. (Anderson and Katz, 1998).

Strategic sourcing is becoming a business capability, which is an import Key Performance Indicator (KPI) in achieving the company's goals. Sourcing or Procurement decisions are predominant for any industry which wants to leverage its cost leadership and retain a competitive advantage.

University of Southern California, Los AngelesE-mail - nmahapat@marshall.usc.edu

Corresponding author :
Niraj Kumar Mahapatra, University of Southern California, Los Angeles E-mail - nmahapat@marshall.usc.edu

In this paper, the author displays a classic example of a Local Manufacturer with Global Network to support the entire business operations. The world-wide competition has significant repercussions on the operating margins and cost of working capital. There is a good portion of the first-line supply chain phenomenon dependent on international sourcing, which in this case, is China and Mexico along with a Bonded Warehouse in Texas. The Research rationale aims to analyze what exactly goes into the assessment of strategic sourcing to meet the everchanging customer demand in North America. The overall operational strategy, as well as the vision of this organization, are dependent on these critical drivers such as cost, lead-time, and variation demand. Long-term partnership or continuously mutually co-dependent relationship is the central DNA of such strategic sourcing quests which organizations attempt to deliver consistent performance as well as high service level. It delivers a benchmark and constant feedback to suppliers and in some cases, involves in supplier pruning activities (Tomas and Hult, 1998; Talluri and Narasimhan, 2004).

Strategic sourcing flexibilities deal with the better responsiveness and cost-effectiveness at which the company can devise and deploy new products into the system, aggregating the long-horizon capacity of the system, and company's ability to react to the volatility of the market. The readiness of a firm to architect a framework to create operational excellence around the supply planning process to cope with the market uncertainty as well as reach maximum fulfillment requires systemic visibility along with end-to-end data sharing ability. The benefits of supply chain flexibility, to name a few could be delayed differentiator or the postponement strategy, dynamic forecasting accuracy adjustments, reactiveness at various demand nodes, and better order fulfillment & tracking.

Base-Surge Policy:

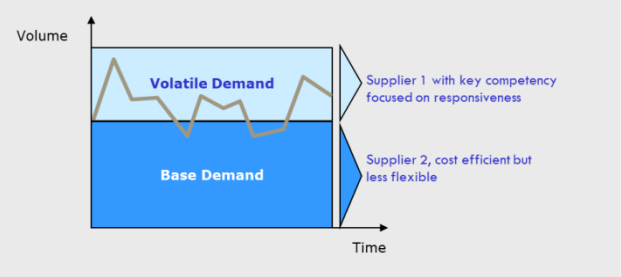

Figure 1 Higher Base Demand Allocation to China

Base Allocation Approach:

Base Allocation : $1 - \sqrt{(H/2\mu\Delta c)}\sigma$

- μ: Mean Demand
- σ: Standard Deviation
- H: Unit Holding Cost
- Δc: Unit Cost Differential

Target Inventory Determination:

- μ: Mean Demand
- σ: Standard Deviation of Demand Per Period
- L: Lead Time
- The average on-order inventory = pipeline stock
- The average on-hand inventory = safety stock

Target inventory level $\cong \underbrace{\mu L}_{\text{Pipeline stock}} + \underbrace{z\sigma\sqrt{L}}_{\text{Safety stock}}$

Objective

The main idea in this paper is to identify the approach of global dual sourcing and how it is a challenge for most of the corporations. We consider the following decisions/tactics in the study:

- Dual Sourcing
  - Inventory level (Safety Stock)
  - Quantity to order from China
  - Quantity to order from Mexico
- Single-Sourcing from China
  - Inventory level (Safety Stock)

- Quantity to order from China
- Single-Sourcing from Mexico
  - Inventory level (Safety Stock)
  - Quantity to order from Mexico

The primary objective of this approach is the optimize the total landed cost, which is excluding the inventory & service considerations (working capital). Furthermore, establishing a buying strategy to support such approach is imperative for maximizing the fill rate at each period.

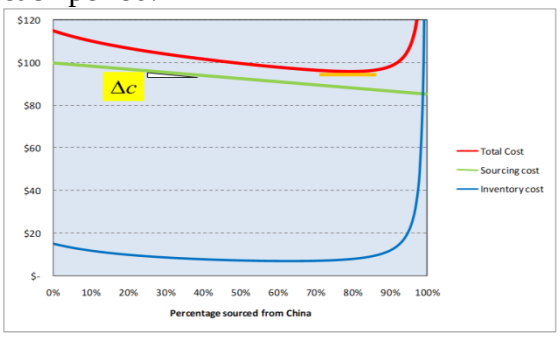

Figure 2 China with 15% sourcing cost advantage

Methodology

Input Parameters

- Sales price/unit is $10,000
- China sourcing cost/unit is $7,250.
- Mexico sourcing cost is $8,000.
- Lead time for China is 4 periods
- Lead time for Mexico is 1 period.
- Interest rate per period is 1%.

Measures

- The demand is variable based on the macro and micro-economic factors, based on real-world activity, which is variable as well random.
- Inventory pipeline based on the following format:
  - Three periods out for a period t: Order placed to China in period t-1
  - Two periods out for a period t: 3 periods out in time t-1
  - One period out for a period t: 2 periods out in time t-1
  - On-hand inventory for period t:1 period out for t-1+ on-hand inventory t-1+order place to Mexico t-1 – sold unit in t-1
- Fill rate based on the number of units sold concerning the demand for the period t.
- Profit/loss based on the sales of the unit during the period t.

Procedure/Approach

- First, the author sets the base demand to China as it has a cost advantage so, the source quantity could be kept constant per unit. The surge in demand goes to Mexico.
- Second, he uses the periodic review model to assume no supply uncertainty and normally distributed demand.
- Thirdly, with single-sourcing as a policy consideration, the strategy would need to be modified if there were fixed costs of ordering. Then, the company would not place an order unless the inventory position was a certain distance below the target level.
- Depending upon the order size and the inventory build, the sourcing pattern will change from at each period, and the decision thereof would be based out of the current bank value associated with that period.
- Setting the target inventory level, which corresponds to the sum of your order in the current period, incoming orders and on-hand units, reduced by current

period demand is imperative based on the changing market landscape.

- The buying strategy was dynamic concerning the demand by maintaining a constant safety stock to combat the unknown surge in demand as per the market conditions.
- The forecasting strategy might lead to an increased risk of inventory accumulation which could lead to more costs, being mindful of the lead time from China could be an essential indication to align the company's inventory pipeline.
- Maximizing the fill rate should be under the consideration which could have the capability to clear our on-hand inventory.

Results

- **After allocating the base demand to China, we get the following:**

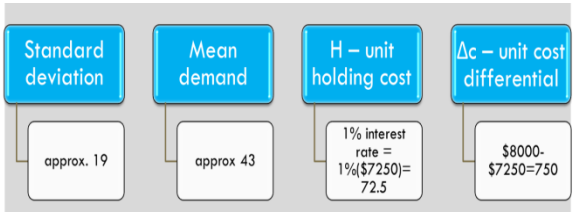

Figure 3 Illustration of Base Demand Allocation

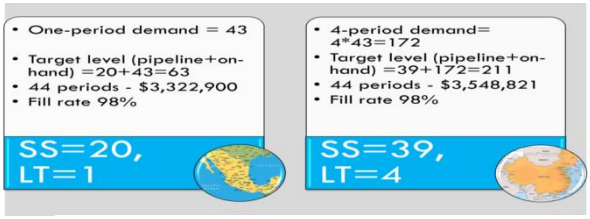

Figure 4 Illustration of Parameters from Two Sourcing Destinations

- **China gets a 36% target inventory level** (pipeline+safety), then:
  - *The Mexican Safety Stock is 20, which allows the company to order faster.*
  - *Average order size is 43; Standing order from China 0.36(43) =15.*
  - *Target level: 15*4+(43-15) + 20=108*
  - ***Total bank value for** 44 periods - $3,465,842 with a Fill Rate of 98%.*

- From the extended data points, there is a change in demand pattern at period 30. Here the red line indicates actual demand and black line indicates forecasted demand (which is the average of all possible demand variations reported with other lines).

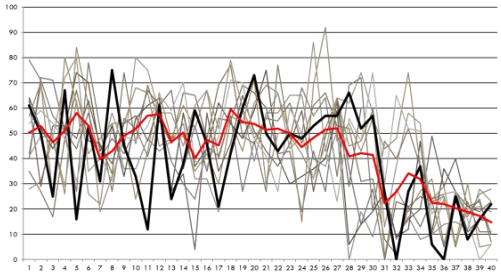

Figure 5 Illustration of Actual Demand Vs. Forecasted Demand where the Blue line indicates the fall in trend

- After calculating the standard deviation and mean demand separately for periods 1-30, and periods 31-44. The base demand allocation goes to China where there is a periodic categorization after the trend changes at period 30, the following parameters shows:

Parameters over the periods	Periods 1-30	Periods 31-44
Mean demand	50	29
Standard deviation	15	18
Base allocation	$1-\sqrt{\frac{72.5}{2\cdot 50\cdot 750}}15 \approx 0.53$	$1-\sqrt{\frac{72.5}{2\cdot 29\cdot 750}}18 \approx 0.27$
Base demand	50*0.53=27	29*0.27=8

Figure 6 Illustration of Base Allocation

Calculating the target inventory levels (pipeline+ safety) with two distributions (LT=4 for order size change in China):

Parameters over the periods	Periods 1-27	Periods 28-30	Periods 31-44
Average Order Size	50	50-27+8=31	29
Safety Stock	1.036*15* sqrt(1)=16	1.036*15*sqrt(1)=16	1.036*19*sqrt(1)=19
Standard Order from China	53%(50)=27	27%(29)=8	27%(29)=8
Target Inventory Level	27*4+(50-27)+16=147	27*3+8+(50-27) +16 =128 27*2+8*2+(50-27) +16 =109 27+8*3+(50-27)+16=90	8*4+(29-8)+19=72
Profit	$3,628,767		
Fill Rate	97%		

Figure 7 Illustration of the Target Inventory Management at different periods

- Allocating the base demand to China allows China to minimize variations and maximize efficiency while the surging demand allocated to Mexico takes advantage of the proximity enabling better responsiveness to the volatile market.
- The right service level is often a managerial decision and involves a trade-off between the cost of holding inventory and the "cost" of not filling the demand.
- Order more from China to make an inventory build that takes care of the surge as well as it allowed to reduce the total sourcing costs as the inventory pipeline led to the decision to handle future demands.
- It was only from period 30 onwards where the idea to track the units sold, and on-hand inventory was detrimental to the sourcing strategy of the firm.
- On-hand inventory build based on the volatile demand was the basis of the dynamic buying pattern, which made sure that there is a 3-period pipeline to fulfillment plan.
- Using single sourcing strategy would have been an excellent course of action with regular inventory updates, which would help not to run out of on-hand inventory and make sure the business operation management at extremes in demand changes.
- Inventory Flow Planning is an essential aspect of this strategy is to needs adequate consistency to use a higher fill rate for given safety stock.

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