TenStep, Inc.

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Cost Modeling – An Internal Best Practice

Given the option, companies would prefer to avoid mistakes rather than to take the trouble to learn from their mistakes. Competition today has reduced the profit margin for most companies. They operate on such thin profit margins that even a small setback can cost dearly.

Therefore, supply chain operating costs must be minimal. This in turn demands that the company-wide supply chain policy be infallible, comprehensive, contemporary and above all cost-efficient. In short, an efficient supply chain policy can be defined as one that generates substantial returns on investment.

In order to achieve this objective, unnecessary external/internal costs must be reduced. One such cost that has the potential for optimization is purchasing costs. Since purchasing costs account for a substantial percentage of the overall production cost (40-60%), it is critical to ensure optimal costs by negotiating for the right price with the supplier.

What is cost modeling?

Cost modeling is a tool or a methodology for predicting the cost of a system.

Industrial gurus suggest that the best way to achieve an optimal purchasing cost model is to coordinate with the supplier. A cost model devoid of supplier insight is generally inefficient. Cost modeling is thus not a one-roof activity - close supplier cooperation is a must.

Key measures to be accounted for when devising an efficient purchasing or services cost model are:

Identify cost drivers and elements. Every cost model is built on certain parameters. Two key parameters that must be considered for every cost model are **cost elements** and **cost drivers.**

- **Cost elements:** The key purchasing cost elements to be recorded are raw material costs, labor costs, inventory costs and overhead costs
- **Cost drivers:** Cost drivers to these cost elements must also be identified. Typically, the cost drivers for these cost elements would be labor wages (per hour/per day/per job) and labor productivity.

The advantage of recording not just cost elements but also the cost drivers is that their effect on the cost elements can be identified. It also helps in carrying out the “What If?” analysis. This in turn helps to devise a robust cost model for the purchasing operation.

Consider this - if the batch size is increased, then the cost per product is reduced because there are fewer “set-ups.” However, the inventory carrying cost goes up since the average inventory held on the shop floor increases. Therefore, understanding cost drivers helps in understanding their impact on cost element.

Hence the need to devise efficient cost models by considering all cost drivers like inventory cost and production cost.

Build cost models that are unique to each commodity

Every commodity has different key cost drivers; therefore, the cost models must be unique to each commodity. Let us now consider two commodities - semiconductors and wiring harnesses.

Typically, the largest cost driver for manufacturing **semiconductors** is the cost of setting up a semiconductor facility. The sheer technology and equipment/machinery required for manufacturing semiconductors demands large investments for setting up a semiconductor facility. In contrast, the cost driver for **wiring harnesses** is labor and raw material cost.

These cost drivers will escalate the production and purchasing cost if proper cost models are not built. To avoid this, certain precautions must be taken when building cost models.

The only way to recover the large purchasing cost for the semiconductor facility is to build a cost model that targets optimal facility utilization. This helps increase the rate of return on investment. For the wiring harnesses, the cost model must facilitate design trade-offs to reduce wire wasted during cutting. This is done by employing high quality connectors to join wires. This reduces waste and helps optimal labor force utilization.

Encompass all cost factors

Cost models required to support purchasing operations must be designed for all cost factors, not just raw material price. Also, other cost factors such as transportation cost, inventory storage cost, and raw material handling cost need to be considered to devise a robust cost model.

Keep it simple!

Care must be taken to ensure that the cost model is based on a set of simple yet critical cost factors/elements. Simple cost models are easy to execute and monitor. However, if complex cost drivers form an integral part of the cost model, the initial focus should be on adding the simple and critical cost factors. Complex cost drivers can be added later based on their criticality. Highly complex models cannot be executed efficiently.

Use highly accurate data

Prices must be gathered from as many suppliers as possible, which helps to narrow the actual price of the raw material. Based on this data, the supplier base can be decided. Prior data can also be utilized to improve the efficiency of the cost model.

For instance, the purchasing cost for the same raw material from last year’s records can be used to estimate the current standing price of the raw material. This further helps in narrowing down to the right supplier and reducing the purchasing cost.

Categorizing the purchasing function

Building reliable cost models requires detailed information regarding the purchasing function. Since the purchasing cost is a combination of many discrete costs, it is crucial

to identify and categorize each of them. Categorizing the purchasing function in turn demands that few issues be resolved:

1. Commodity coding helps clearly demarcate purchasing commodities. This can be achieved by assigning purchasing commodities with universal codes. These codes must reflect the same commodity throughout the organization.

   Sadly, however, many organizations do not have a universal coding system. Similar items are assigned codes as per departmental convenience. Hence, the same commodity is purchased by different departments at different costs. This creates an inaccurate cost for the item.

   Accordingly once a clear coding system is devised, categorizing the purchasing costs becomes easier.

2. Create commodity families. Grouping similar commodities into common families facilitates easy categorization of the purchasing costs.

Approaches to categorize costs

Many approaches exist to categorize costs. For instance, categorizing could be based on commodity, commodity family, process technology used or material (e.g. ferrous or non-ferrous). The best way, however, is to categorize based on the commodity purchased.

For instance, if a company were buying castings for motors and generators, then it is recommended that the purchasing spend be categorized under castings and not under two different categories, i.e. one for the motor and the other for the generator. This helps build better purchasing cost models. It also avoids creating two different cost models for the same commodity.

Incorporate the total cost package

Once the purchasing cost is categorized, the next step is to find factors that drive the total purchasing cost. This includes many discrete costs. A few of these are easily identifiable, like transportation cost, material acquisition costs, and purchasing overhead, while others are not so apparent.

There are some difficult to calculate costs like commodity-related downtime costs, warranty costs for the purchased items in case of damage, and material waste cost. Since these costs are barely visible, companies often ignore them while building cost models. The result is an inconclusive cost model.

It might not be possible to easily calculate the warranty costs or material-related downtime costs. In such cases, the unapparent cost drivers can be assumed as a percentage of the apparent cost drivers. For instance, the material-related warranty cost can be assumed as a percentage of the total warranty cost.

Ultimately, care must be taken to build cost models with these costs to prevent them from being inconclusive.

Build a cost model with a supplier base

Since the purchasing costs account for a major portion of the total manufacturing cost, it is essential to find all possible ways to optimize the purchasing cost. Most companies do not recognize the potential of reducing purchasing costs by creating a common base with the supplier.

Instead of demanding a reduction in price, companies can build a supplier cost model to justify the supplier's price quote. An ideal way to build a supplier cost model is to break down the total price into smaller measurable cost functions, such as labor charges, transportation charges, overhead, infrastructure, manufacturing cost and profit.

In short, the total price quote of the supplier can be essentially split into two segments - commodity procurement cost and desired profit margin. If the profit margin is not affected, the supplier will be willing to reduce the commodity procurement cost. To accomplish this, company personnel can visit supplier facilities to study processes and devise solutions to reduce the total purchasing cost function.

Another way of reducing the purchasing cost function is to study the potential suppliers. Once potential suppliers are located, a detailed cost fragmentation of their quotes can reveal facts about transportation costs, labor costs and infrastructure. Based on this, a cost model can be built in conjunction with the supplier.

Devise tables to visually reflect cost drivers

Cost tables that reflect the impact of cost drivers, cost elements and total-cost-of-ownership, i.e. the total purchasing spend, must be drawn. Such tables help communicate critical information to one and all. They not only help communicate vital learning, but also offer some cautionary information to be used during the purchasing and designing processes.

However, the tables are not merely a source of information. They must depict how to operate cost drivers without actually increasing the purchasing cost.

For instance, instead of displaying the purchasing cost for motor or generator castings, the table should communicate that by increasing the motor/generator wall thickness by 2mm, the purchasing cost for the castings increases by 50 cents.

Furthermore cost tables can also be used to estimate the transportation cost for castings. On such tables, the column heading can be the casting number/model number and the row heading can be the distance for which the casting is transported, with the final row indicating the total transpiration cost.

Ultimately, cost modeling aims to distribute purchasing cost information throughout the organization. In short, it is critical that employees understand key cost drivers to build accurate cost models.

Cost modeling is not a miracle-solution. However, if used effectively and in the right manner, it can iron out excess purchasing cost factors.