Abstract. There are more costs involved with material supply than price. Some costs can seem difficult to quantify. We will discuss ancillary costs involved in a successful supply chain and describe a useful method for quantifying them. Also included are issues normally considered as non-monetary. These too can be quantified, and dealing from data changes the conversation.

Unit Total Cost translates each issue into its cost-per-unit. “Unit” means the quantity in which unit prices are stated. To use Unit Total Cost successfully:
1. Determine the cost factors important to your organization.
2. Translate each into a price-adder formula.
3. Add to each supplier's quoted unit price a debit (or credit) for each factor appropriate to that supplier's performance.
4. Sum the quoted price plus all additional cost factors to get Unit Total Cost.
5. Use Unit Total Cost as measurement criteria when working with suppliers.

Internally, Unit Total Cost will justify the choice of supplier (especially when they are not the lowest priced supplier) to anyone while teaching your organization where and how costs are incurred.

Externally, Unit Total Cost calculations shared with each supplier are a very powerful message about what they have to do to keep your business. They see clearly what issues drag them down, by how much and what improvement means to their competitive position.

Measurement Factors. Identifying all appropriate cost factors is the first step. Factors such as on-time delivery and quality are commonly measured. Lead time, transportation costs, and inventory levels can also be included. Some organizations place importance on political / social policy factors such as recycled material content, social responsibility, and consentual reciprocity. All of these can be included in a calculation of total cost. What is required is the definition of the factor and it’s value to the organization. Forcing such a definition is one benefit of using a system such as total cost. It makes the values of the organization explicit - both to purchasing and to suppliers.

Establishing Formulae. When establishing a formula for any factor, two issues matter:
1. The formula makes sense. It is relevant to the factor in question and can be calculated.
2. The formula can be applied across suppliers and used to differentiate performance among them.

As long as these two criteria are met, a formula will work successfully. Some formulae can be calculated in actual dollars and some may be calculated in approximate dollars. Approximations that meet the above criteria are valid and work successfully.

Classifying Issues. Any issue that the organization identifies for inclusion in a cost analysis
will fall into one of three categories: cost, performance or policy. Cost issues are those that are already stated in monetary terms. Examples include transportation cost, inventory levels and discounts. Performance issues are areas in which suppliers' performance counts and you would like to include the costs to you for their non-performance. Examples include quality, delivery, lead time, service and responsiveness. Policy issues are those normally considered non-monetary and include issues of preference. Examples include management preferences, disadvantaged business status and social responsibility factors that you have identified and wish to include.

Calculating the Data. Cost factors are the easiest to calculate. For each, divide the total cost by the number of units over which that cost applies. Since each occurrence may not be identical, calculate the data for several typical examples and average them to derive a mean cost. Use this mean cost in total cost calculations.

Transportation: If you pay freight, calculate the freight cost per unit of goods. Divide the total freight charge by the number of units in the shipment.

Performance factors can be calculated exactly or approximated. Approximations are much easier to work with and will be illustrated here. Performance must be measured to be considered in total cost calculations and is usually measured in percentages. Use the non-performance percentage as a price adder. For example: On-time Delivery Performance - If a supplier is on time 93% of the time, then they are not on time 7% of the time. So 7% would be applied to their quoted price. Each supplier is subject to the adder dictated by their performance. The non-quality percentage can be used similar to the on-time delivery percentage. Apply the percentage of failures to the quoted price as a price-adder. Each supplier's adder is reflective of their quality performance. Lead time limits your flexibility and may drive high levels of inventory. If lead time matters to your organization (and I hope it does!), then establish a tax per week of lead time. One percent-per-week of supplier's quoted lead time is certainly within the realm of reason. The more important lead time reduction is to you - the higher the tax should be.

Policy factors require a statement of value to be included in total cost calculations. That statement of value should be made by the sponsor of the issue. The sponsor defines the boundary between costs that are allowable and costs that are too much by answering the question, "If all other factors are equal between two suppliers, up to how much more are you willing to pay to incorporate this issue?" Please note that this is a boundary definition only and does not necessarily mean that you will pay anything more in actual practice. Once the boundary has been defined, credit suppliers who comply to the policy to the limit of the boundary value. Here are examples of issues that some organizations have chosen to address:

Recycled Content: Establish a percentage credit for recycled content of the level you require. Credits of 5% to 10% have been commonly encountered. Some organizations have expressed this credit as rules in purchasing that purchasers can pay up to 10% more for recycled products without permission or justification. Crediting the suppliers appropriately is a way to include your preferences in unit total cost.

Consensual Reciprocity: Businesses who wish to favor other businesses for various reasons
- such as non-profit organizations who wish to favor donors or companies doing business abroad who are subject to country-content restrictions - may want to include these as factors in evaluating selection of suppliers. Any social policy factor can be incorporated into the supplier selection process. Use of the total cost process will force the whole organization (not just purchasing) to define what issues it wants to consider and how much weight it wants to give each factor. Once those decisions are made, the formula becomes easy and the decision factors become public. For example, if a non-profit organization that exists only on donations chooses to favor donors in how it awards business, then use of unit total cost will drive the organization policy makers to decide how much more they are willing to pay to give the business to a donor vs a non-donor. Once the decision is made, then the factor can be used either as a credit to donors or a tax for non-donors (but not both).

Reaping the Benefits: Total cost is most useful to select suppliers and to measure supplier contributions over time. Using total cost calculations to select and manage suppliers allows all factors to be considered and makes the selection criteria public (within the organization and to suppliers). It forces the organization policy makers to decide what they value and how much they are willing to pay for exercising those values. It takes the monkey off of purchasing’s back to decide how to treat non-monetary issues. It also conveys a clear message to the supply base about what they have to do to get and keep your business.

Not only is selection clearer, but when each supplier is shown their unit total cost - by which they won or lost the business - the message is very clear about what they have to do to be competitive.

They can either slash their prices (a choice that may be hazardous to their long-term health) and/or they can work on improving their performance to customers' needs (a much healthier choice). They can see exactly how performance improvement affects the "bottom line" for their customers.