What to Look For in a Strategic Sourcing Decision Optimization Solution

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Before one can evaluate a potential solution for strategic sourcing decision optimization, one has to understand what strategic sourcing decision optimization is. The following definition can be used as a starting point:

Strategic Sourcing Decision Optimization is the application of rigorous analytical techniques to a well-defined sourcing scenario to arrive at the absolute best decision out of a multitude of possible alternatives in a rigorous, repeatable, and provable fashion.

There are four key components to our definition:

1. **Rigorous Analytical Techniques**
   In mathematical terms, the techniques used must be sound (and analyze the scenario correctly) and complete (and be capable of analyzing every possible solution). This means that products built on MILP (Mixed Integer Linear Programming) make the grade but that products built on evolutionary algorithms alone don't cut it (as there is no guarantee they will explore all possible solutions in a finite amount of time).

2. **Well Defined Sourcing Scenario**
   The solution must be capable of accurately modeling the scenario at hand. If the organization sources from multiple locations to multiple distribution centers and the product is not capable of representing a many-to-many network or if the organizational freight costs vary significantly depending on origin, destination, LTL vs. FTL and product type and the solution can only handle one fixed cost per unit, then the solution is not capable of supporting a well-defined sourcing scenario and is not a strategic sourcing decision optimization solution with respect to the organization's needs.

3. **Best Decision**
   Given sufficient time and resources, the solution must be capable of finding the absolute best decision. It should also be capable of quickly finding near-optimal solutions since an analyst doesn't always want to wait days for the absolute best answer if an answer within 99.99% can be obtained in less than an hour (and the value of the model is under one hundred Million).

4. **Repeatable and Provable**

Given the exact same inputs, the platform should come out with either the exact same output or output that is equivalent. If a random solution with a random cost is returned each time the model is run (for the same amount of time with the same inputs), the solution is not reliable and does not qualify as a true strategic sourcing decision optimization solution.

Given this definition, it is now possible to define some core capabilities of a strategic sourcing decision optimization platform.

1. **Solid Mathematical Foundations**

Given the requirements for rigorous analytical techniques, best decision capability, and repeatability (and provability), it is quite clear that the foundations of such a tool must be based on rigorous mathematics such as linear programming, mixed-integer linear programming, quadratic programming, and convex optimization. (Even if the model is concave, the solution must be capable of decomposing it into convex regions which can be analyzed piece-wise to analyze the full solution space.) Random sampling, Monte Carlo simulation, and evolutionary or genetic programming, on their own, are not sufficient. While these techniques might be capable of uncovering an optimal answer, there is no guarantee.

2. **True Cost Modeling**

A model is only useful if it allows for accurate capture and representation of costs and their interactions. In a multi-million dollar model, approximations are not enough since it is easy to be off by five percent or more and five percent of ten million is five hundred thousand dollars, which is too much money to leave at risk.

3. **Sophisticated Constraint Analysis**

Models are about more than costs. They are also about business constraints as not all theoretical solutions are feasible. For example, an organization cannot source one hundred thousand units from a plant that can only produce fifty thousand units. An organization cannot source one hundred percent of demand from new suppliers if a contract is still in place to source thirty percent from an existing supplier. An organization might have a risk mitigation rule that at least twenty five percent of supply of a food product must come from two different geographies to mitigate loss of supply due to natural disasters. The solution must be capable of accurately capturing and enforcing all of the significant constraints. At the very least, the solution should support the following four constraint types:

- **Capacity**

These constraints capture plant and supplier capacity limits and business

imposed buying limits from any location, geography, supplier, or supplier group.

- **Basic Allocation**
  These constraints allow the buyer to indicate that a supplier, or a set of suppliers, must be awarded a minimum amount of one or more items or lots and / or cannot be awarded more than a maximum amount of one or more items or lots. They enforce contracting requirements and business rules.
- **Risk Mitigation**
  These constraints allow a buyer to indicate that one or more suppliers from a group must receive a minimum or maximum award without specifying which particular supplier, or set of, must receive the award. They model geographic and business risk mitigation strategies as they can be used to limit how many suppliers in a particular geography get an award.
- **Qualitative**
  These constraints allow a buyer to impose a minimum or maximum qualitative score on each product or lot being sourced. They can enforce an average reliability of ninety five percent or a maximum waste of three percent and other similar business requirements.

4. **What If? Capability**
   The "holy grail" of strategic sourcing decision optimization is the ability to generate, analyze, and compare multiple "What If" scenarios as this is what allows the business to truly understand how much each constraint or supply requirement costs the business. The ability to model different supply scenarios (restricted supply, unrestricted supply, forced award, etc.) is what allows an analyst to understand all of the advantages and disadvantages associated with a particular award.

If a tool has these basic capabilities, then it is a true strategic sourcing decision optimization solution and will provide a solid foundation to meet the organization's needs. Of course, the best tools will also provide a host of other capabilities, which could include:

- **constraint impact analysis**, which determines which constraints are restricting the solution (and preventing additional cost reductions)
- **network modeling**, which can analyze demands across multiple categories and suggest a better network design and
- **automatic scenario generation** which can automatically generate additional what-if scenarios on constraint subsets for a scenario comparison analysis

but not all of these advanced capabilities will be required by an individual organization,

especially if it has never used a strategic sourcing decision optimization solution before and is just beginning its next level supply management journey. As long as the basics are in place, the organization has a powerful tool in place that will help it achieve, on average, double-digit cost reductions year-over-year (as per multiple studies from the Aberdeen Group that found that organizations that employ advanced sourcing based on strategic sourcing decision organization save an average of twelve percent).

This article is based on papers and posts previously written by the author on the subject. For further information, the reader is referred to:

- the e-Sourcing wiki-paper defining Strategic Sourcing Decision Optimization in detail: http://www.esourcingwiki.com/index.php/Sourcing_Decision_Optimization

- the transcript of the What is Supply Chain Optimization interview: http://www.nextlevelpurchasing.com/podcast/RWISCO9plusnotes.pdf

- the Decision Optimization category on Sourcing Innovation: http://blog.sourcinginnovation.com/categories/Decision%20Optimization.aspx