

Selecting a Drug Testing Supplier for Alcoa's US Operations



Jennifer S. Murray and Mark R. Sobota
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Professor Ernest Forman
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I. Abstract

Alcoa, the world's leading producer and manager of primary and fabricated aluminum and alumina facilities, is sourcing the drug screening program for its US Operations, which includes more than 150 plants. In the current environment, more than 40 suppliers provide drug testing services. With a goal of standardization, the alternatives were narrowed to three suppliers based on their overall ability to align with corporate objectives. The decision model was structured using Expert Choice software, which applies the Analytic Hierarchy Process (AHP) technique of reducing decisions to a series of pairwise comparisons. A weighted matrix was used in parallel to validate the result of AHP and to give management a basis for comparing the results. Both processes incorporated the suppliers' responses to the Request for Proposal (RFP) and yielded the same result: Supplier Q was preferred.

II. The Problem

Alcoa has nearly 150 US locations. Historically, the process of conducting substance abuse testing has been managed at the plant or Business Unit (BU) level. For reference, a BU is generally comprised of 1-20 plants. With leaving the management of drug testing in the hands of lower levels of the organization, Alcoa has naturally developed relationships with a large number of service providers. Through the data collection process we identified over 40 of them. With so many suppliers there is no way for Alcoa to control substance abuse testing at the corporate level. This means that crucial management options such as standardization, liability control, and data management have been impossible to implement.

(a) What does the organization hope to accomplish?

Lowering the Total cost of Ownership (TCO) is a main driver for Alcoa's procurement personnel. The purpose of the TCO approach is to help identify the elements of cost for the lifecycle of a product and/or service. This information is used during the development of the category sourcing strategy to identify opportunities to reduce costs other than purchase price. Key elements include:

- Procurement price
- Maintenance costs
- Service/supplier support
- Finance/accounting
- Switching Cost
- Operating Costs
- Other (Cost to supplier that may impact purchase price)

By moving to a single source supplier for drug testing services we will gain numerous advantages. For one, we will have more corporate control over the drug testing process due to the relationship with executive levels within the supplier organization. The first and possibly most important advantage is standardization of services across the organization. With 150 locations (some with on-site clinics and others utilizing offsite clinics) and over 40 suppliers, it is impossible to standardize with respect to the frequency of drug testing and

supplier methodology. With a single supplier managing all aspects of the process, Alcoa is positioned to achieve the standardization goal without investing significant resources in the day-to-day administration of the program. Efficiency is maximized and TCO is lowered.

There are also technology advantages to moving to a large, single supplier. Large suppliers, like those being considered for contract, have the bandwidth to drive their own internal R&D projects. Alcoa benefits from advances they are making in their medical and technology labs. These advances usually trickle down to smaller suppliers instead of being driven by them. Web-based ordering and tracking are technology items that Alcoa is particularly interested in. This reduces operating cost and is another component of TCO.

As Alcoa is a global company, we must always look at how we can be effective outside US borders as well. By partnering with a single supplier that has an international presence, we are well-positioned to eventually expand our program to non-US operations. As such, the US initiative will also serve as an opportunity to identify inconsistencies in the program and its processes before launching it globally.

(b) Historic and Current Decision Methodology

Different procurement groups use various methods for making decisions regarding supplier selection. Sometimes, when suppliers have been considered “equal” it’s as simple as “lowest price wins”. In other cases, extensive TCO models are created and decisions made based on the outcome. In many of our awards we use a weighted matrix that lists all of the important objectives against which each supplier is evaluated. Then the weights are summed to provide a comparison between suppliers. This can be used a number of ways. For instance, we can use it to select which suppliers to invite for presentations, which suppliers to enter into negotiations with, or even which suppliers to recommend to management for award.

For this decision, management has agreed to the inclusion of Expert Choice output in the award recommendation report. The Expert Choice model is similar to the traditional weighted matrix format, but Expert Choice lends credibility to the former process and validates the decision.

They are similar in nature in that objectives and sub-objectives are organized the same. However, the major difference in the former process is that we don’t weigh each of the objectives (or sub-objectives) against one another. The former process used ordinal measure in that we give each sub-objective a weight (number), and when you add each of the weights, it totals to 100; which is the possible total grade that a supplier can get. Then each supplier is “graded” by getting a 0-5 score. Once all of the weighted scores are tallied the suppliers are then compared against one another. In our case we compared them to see which suppliers to invite back to Alcoa. Suppliers L & Q were invited back for final presentations, while Supplier S was not.

DRUG TESTING SERVICES RFP DECISION MATRIX

Objective: To evaluate and compare potential suppliers by scoring each column and inserting comments where needed.

Supplier Rating Scale		
5	Exceeds requirement	100%
4	Partially exceeds requirement	80%
3	Meets requirement	60%
2	Partially meets requirement	40%
1	Minimally meets requirement	20%
0	Does not meet requirement	0%

Scorecard ID	RFP ID	Requirement	Wgt Score	Supplier L	LabCorp Wgt Score	Supplier Q	Quest Wgt Score	Supplier S	Sterling Wgt Score
Pricing Competitiveness									
1	2.01	Cost Breakdown	35.00%	4.00	140.00	5.00	175.00	3.00	105.00
Market Basket Competitiveness Total			35.00	4.00	140.00	5.00	175.00	3.00	105.00
U.S. Site Match									
2	2.01	Closest Average Distance	25.00%	4.50	112.50	4.00	100.00	4.25	106.25
General Safety Categories Competitiveness Total			25.00	4.50	112.50	4.00	100.00	4.25	106.25
Commercial Pricing Structure									
3	1.01	Length of supply contract (firm fixed pricing)	1.00	3.00	3.00	3.00	3.00	3.00	3.00
4	1.02	90 day payment terms (or Orbian)	2.00	3.00	6.00	2.00	4.00	3.00	6.00
5	1.14	Pricing Methodology	1.50	3.00	4.50	3.00	4.50	3.00	4.50
6	2.02	Volume Based Discounts	0.50	2.00	1.00	4.00	2.00	1.00	0.50
7	2.04	Year over year cost savings	0.50	0.00	0.00	0.00	0.00	0.00	0.00
8	2.05	Sign On Bonus	0.50	0.00	0.00	0.00	0.00	2.00	1.00
IT Capability									
28	1.16	Reporting	2.00	4.00	8.00	4.00	8.00	3.00	6.00
IT Capability Total			2.00	8.00	12.00	8.00	12.00	3.00	6.00
Implementation/Transition Plan									
29	2.07	Detailed implementation plan	4.00%	5.00	20.00	4.00	16.00	3.50	14.00
Implementation Plan Total			4.00	5.00	20.00	4.00	16.00	3.50	14.00
Innovation & Creativity									
30	1.19	Continuous improvement - cost reduction initiatives	2.00	2.00	4.00	3.00	6.00	4.00	8.00
31		Value added services not currently offered	1.00	4.00	4.00	3.00	3.00	0.00	0.00
Innovation & Creativity Total			3.00	6.00	8.00	6.00	9.00	4.00	8.00
Supplier Diversity Program									
32	2.09	Meets Alcoa Supplier Diversity guidelines	1.00%	4.00	4.00	3.00	3.00	3.00	3.00
Diversity Supplier Program Total			1.00	4.00	4.00	3.00	3.00	3.00	3.00
GRAND TOTAL			100.00%	76%		79%		62%	
				Supplier L		Supplier Q		Supplier S	

III. AHP methodology and decision modeling.

Analytic Hierarchy Process (AHP), developed by Thomas Saaty, is a compensatory decision-making technique that is based in mathematical theory. Compensatory refers to the fact that an alternative that underperforms with respect to one or more objectives can neutralize that deficiency by outperforming with respect to other objectives. AHP allows for the modeling of complex problems in a hierarchical structure, reasoning that people are able to make sound judgments about small problems. By reducing decisions to a series of comparisons (referred to as pairwise comparisons), the process facilitates structured analysis, evaluation, and synthesis of results. Further, AHP clarifies the relationship among goal, objectives, sub-objectives, and alternatives.

We used the clustering, or decomposition, principle of AHP to achieve a couple of important advantages, including the ability to better cope with complexity and the reduction in the number of pairwise comparisons required. For example, our decision had a total of 9 objectives and 24 sub-objectives. Had we not clustered, we would have had 33 (n) nodes requiring a total of 528 pairwise comparisons $[(n*n-1) / 2]$ (2001). Alternately, pairwise comparing 9 clusters required hundreds fewer comparisons. It made our model comprehensive yet manageable in terms of the time investment, which compared with that of the traditional weighted matrix approach.

We used Expert Choice software to implement our AHP-based model. It was constructed using the top-down approach of identifying and clustering objectives before evaluating alternatives. The hierarchy allows the decision maker(s) to consider competing priorities in the correct context by narrowing the focus. For example, when we're comparing Easy Order Placement vs. Quick Turn-Around Time, we are not thinking about pricing or customer service. As a result, the derived priorities are more objective (less arbitrary).

Pairwise comparisons should be both objective and subjective. AHP and Expert Choice help the decision-maker avoid the tendency to derive priorities from hard data alone. Having recently received quantifiable RFP responses from all three suppliers, we were careful to not let the data alone drive our judgments; instead, we used this "raw data" to support our judgments.

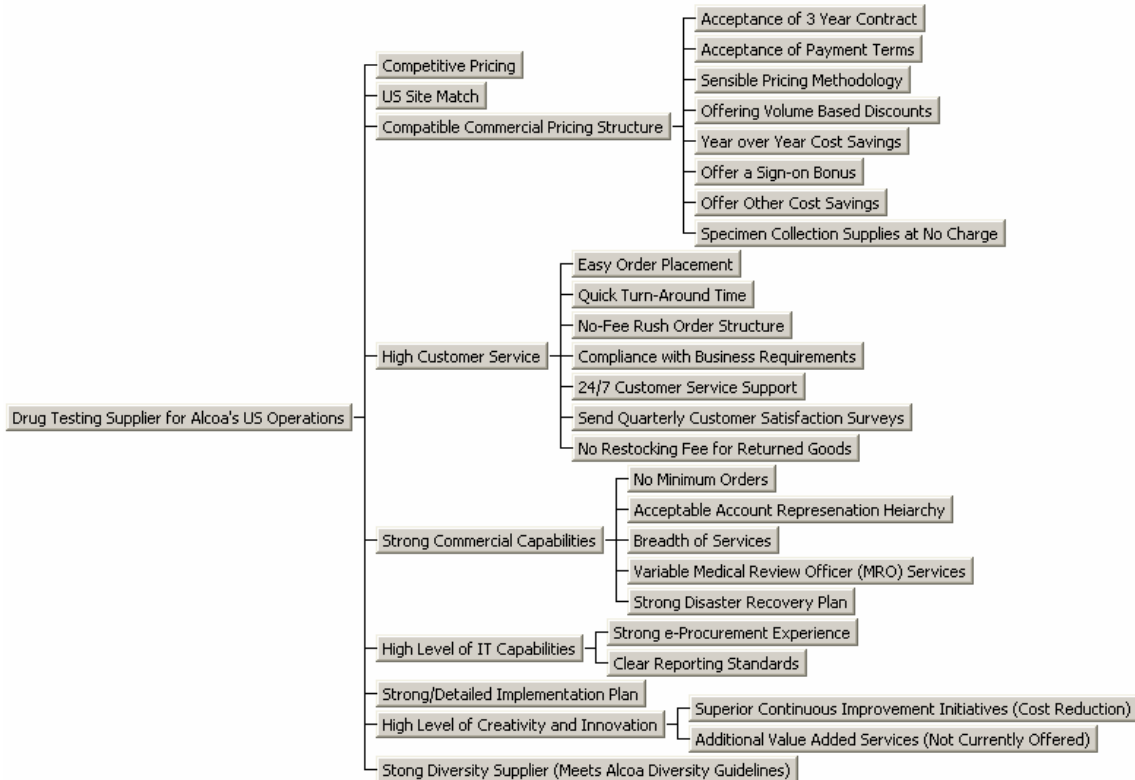


Figure 1 – Hierarchy View of Objectives

Figure 1 shows the hierarchy of objectives and sub-objectives after we built our model. As you can see there are a large number of elements that Alcoa considers when making supplier selection decisions. EC helped to organize these objectives into an easily understandable decision making model.

Relative judgments, where elements are compared to one another, were used to conduct the pairwise comparisons (see Figures 2 & 3).

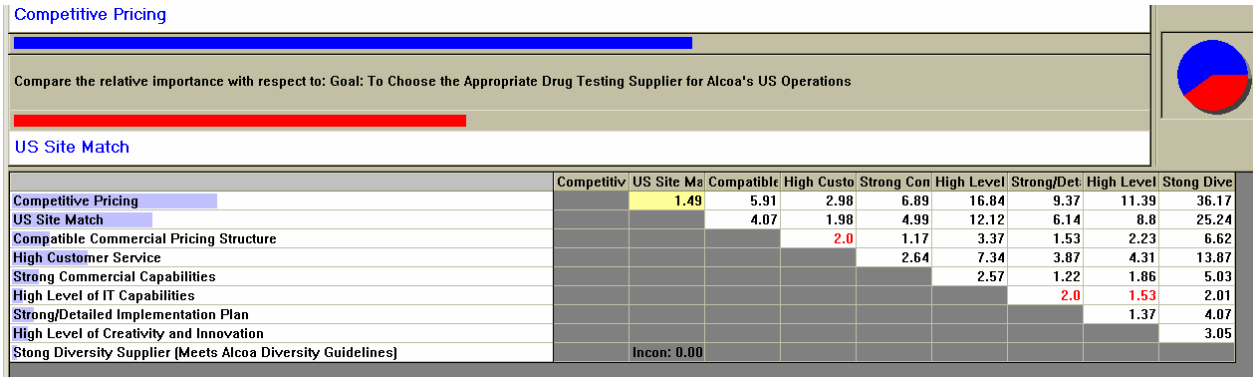


Figure 2 – Pairwise comparison of Top Level Objectives

While deriving priorities for the objectives you can see that the items that have a high (traditional) commercial impact tend to be rated higher. By traditional we are generally talking about price, customer service, and a site march. The end user of these services required that these areas be a focal point for procurement.

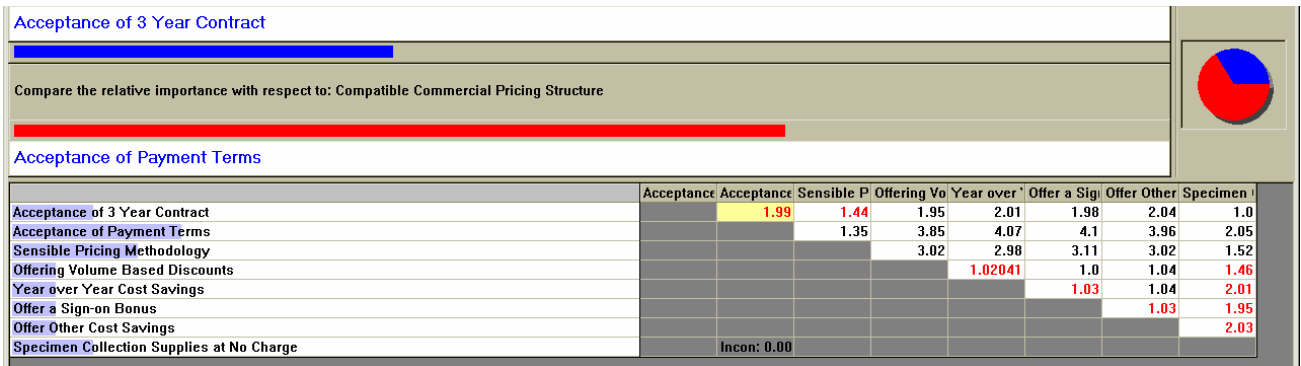


Figure 3 – Pairwise comparison of Commercial Pricing Structure Sub-Objectives

Each of the sub-objectives will have similar commercial impact requirements as the objectives with pricing showing as a higher priority. Although we try to get the best TCO value for our customer, Procurement is evaluated heavily on savings achieved, so the common theme of pricing being most important is not surprising.

After conducting all of the pairwise comparisons, Competitive Pricing is derived as the most important objective with respect to the goal (see Figure 4). This result is consistent (in terms of the overall ranking of suppliers) with the weighted matrix approach and it reflects the organization's focus on lowering the total cost of ownership. It was not unexpected. In fact, none of the derived priorities was unexpected.

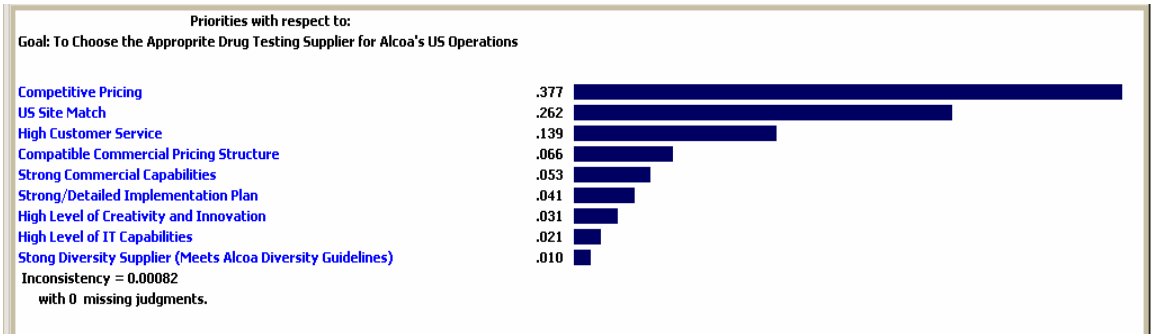


Figure 4 – Priorities with Respect to the Goal

Figure 5 displays the alternative rankings that were derived from pairwise comparisons. It is also a hierarchical view of priorities with respect to the goal. We can now begin to synthesize the results to put them in better context.

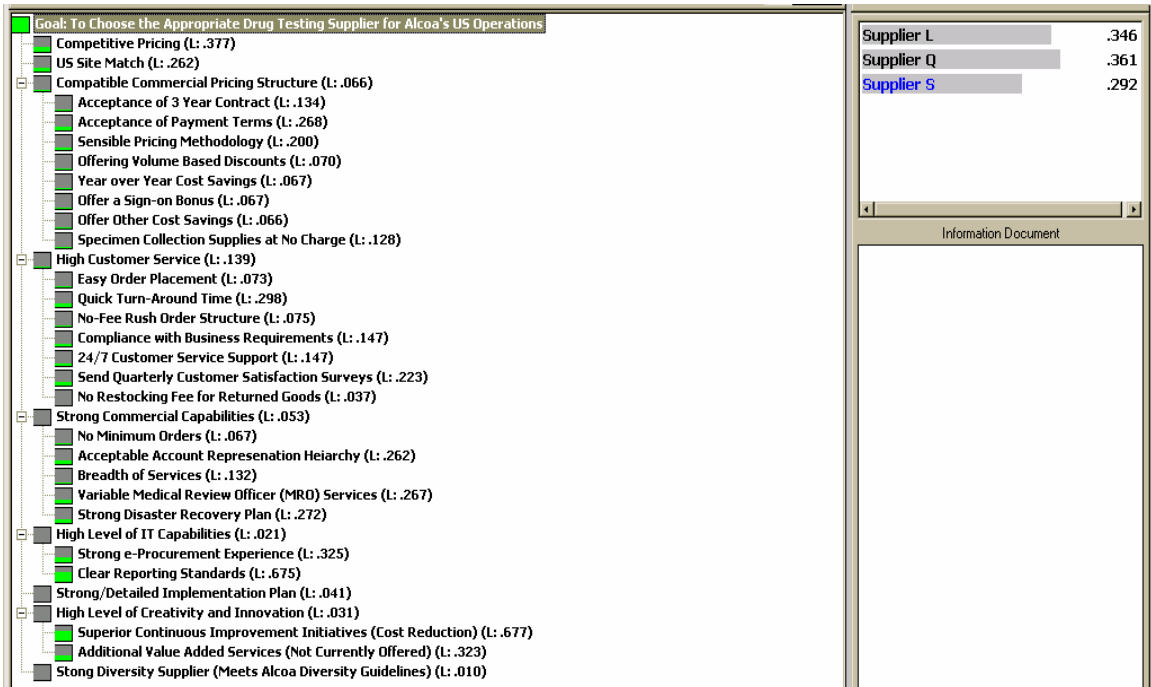


Figure 5 – Alternative Rankings

IV. Discussion of Sensitivity Analyses

(a) Performance Sensitivity

The Performance Sensitivity analysis (Figure 6) reflects how each alternative performs with respect to the goal and each objective. The y-axis displays the relative priorities derived and the x-axis displays the objectives. For example, the analysis in Figure 3 shows no difference in performance between Suppliers Q and L when evaluated with respect to Strong Commercial Capabilities. This is illustrated by the intersection of red and blue lines. While Supplier Q ranks ahead of Suppliers L and S in only three of nine objectives, it is still the preferred alternative. It reflects the high priority derived for Competitive Pricing and reinforces that counting is not appropriate for ranking alternatives. It is mathematically insignificant to count rankings; our preference for a particular supplier is a non-linear measure.

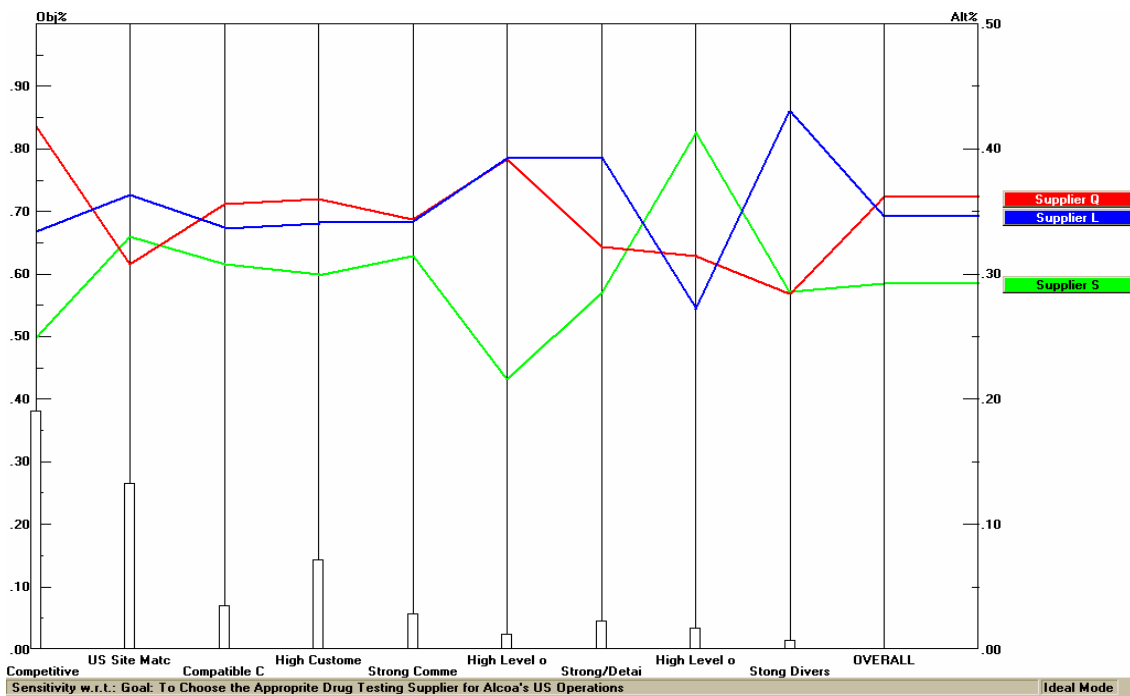


Figure 6 – Performance Sensitivity

(b) Dynamic Sensitivity

This view of the dynamic sensitivity analysis shows the priorities of the alternatives before any of the objective priorities are changed. Supplier Q is preferred (see Figure 7).

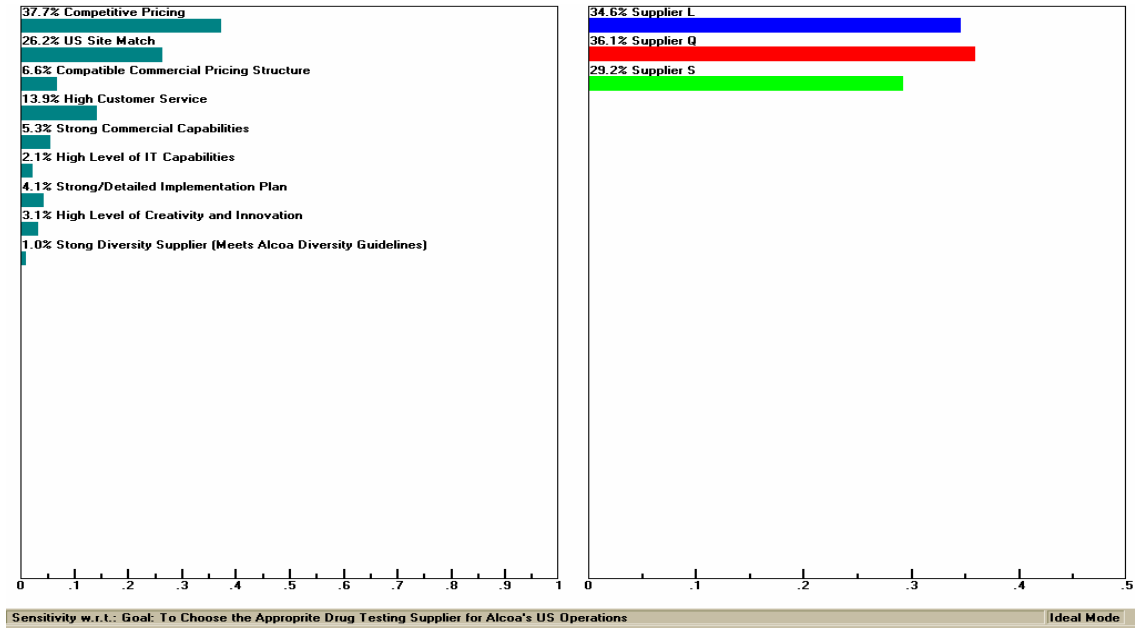


Figure 7 – Dynamic Sensitivity

The slide in Figure 5 illustrates that alternative rankings are sensitive to changes in the importance of objectives. By decreasing the importance of the Competitive Pricing objective to 22.5%, Supplier L becomes the preferred alternative. Likewise, all of the other objectives increase as competitive pricing decreases.

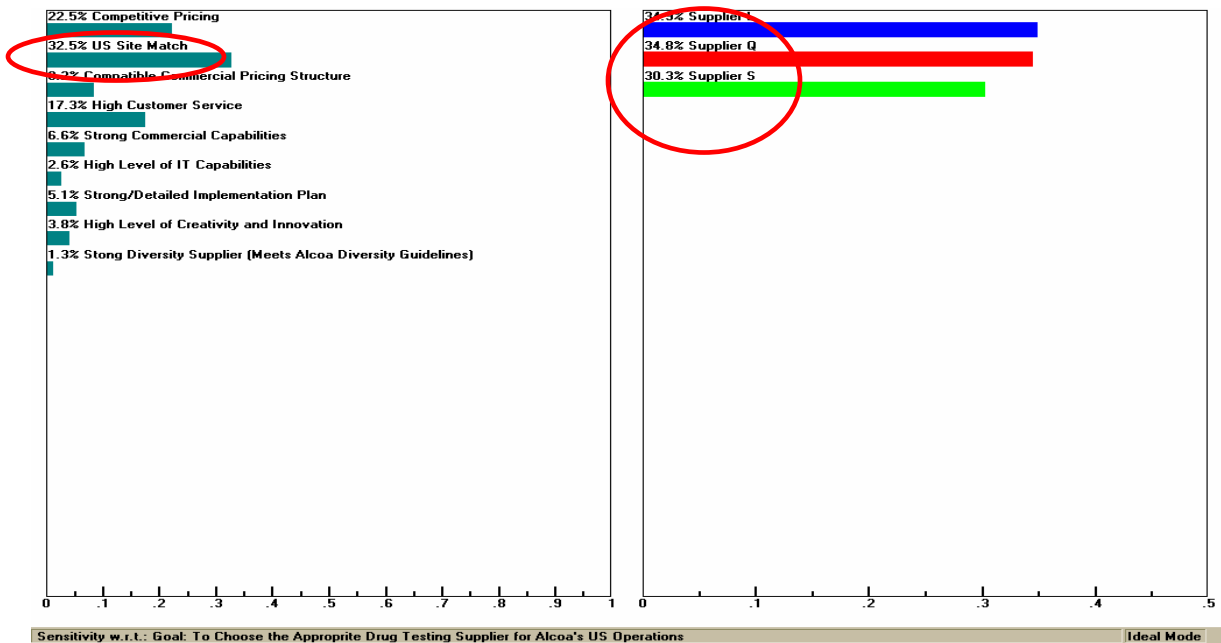


Figure 8 – Revised Dynamic Sensitivity

(c) Gradient Sensitivity

A gradient sensitivity analysis of Competitive Pricing reinforces the fact that alternative rankings respond to changes in priority (see Figure 9). The current priority of the alternatives is represented by the point at which the horizontal lines intersect the solid vertical line. The dotted vertical line represents the point at which Supplier L would become preferred to Supplier Q; the priority, or emphasis, on Competitive Pricing would have to decrease from 37.7% to 22.5%. (Note: Even though all three suppliers look relatively close, there is no scenario where Supplier S becomes the preferred supplier in our model.)

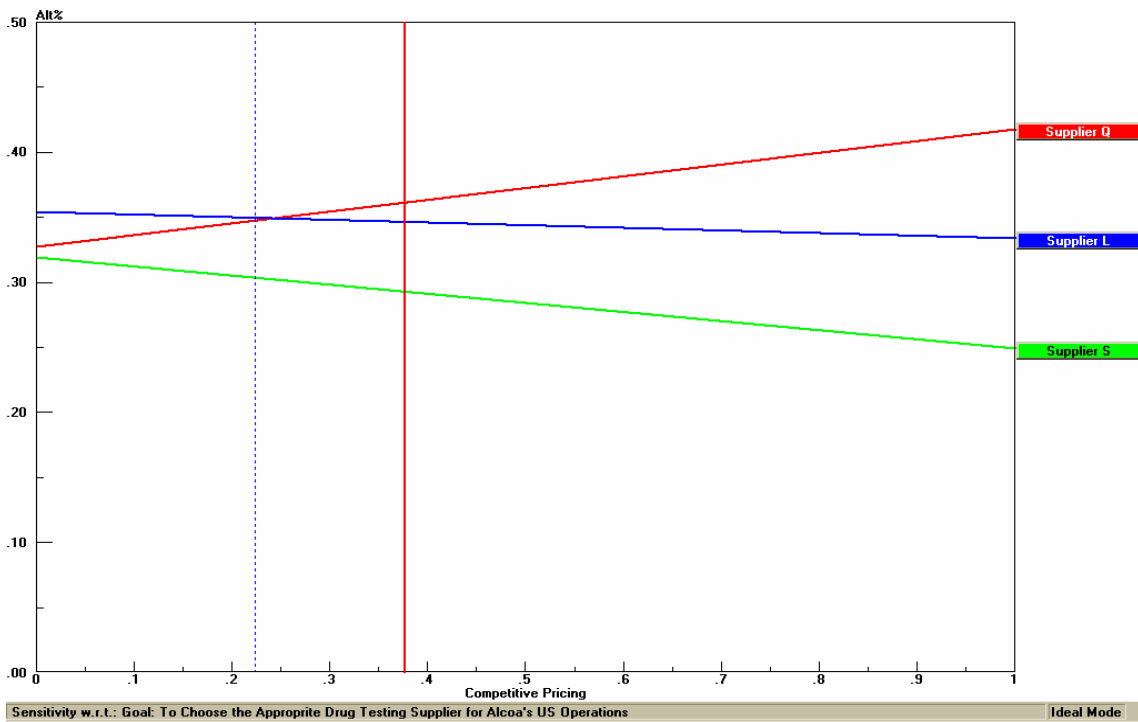


Figure 9 – Gradient Sensitivity

(d) Head-to-Head

A head-to-head sensitivity analysis between Suppliers L and Q (Figure 10) reflects how the two alternatives compare with respect to the goal and each objective. The size of the bars represents the relative magnitude of the preferences. Competitive Pricing and US Site Match are the objectives with the greatest magnitudes. The judgments for all of the other objectives indicate a strong comparison between Suppliers L and Q. In fact, they compare exactly with regard to two of the objectives: Commercial Capabilities and IT Capabilities.

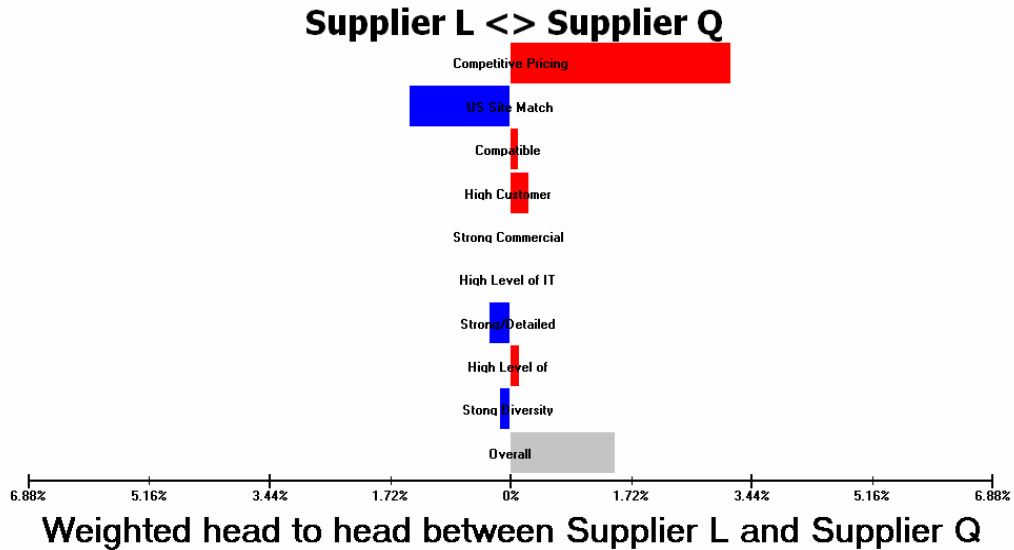


Figure 10 – Head-to-Head Analysis (Suppliers L & Q)

The head-to-head analysis between Suppliers L and S (Figure 11) indicates that Supplier L is strongly preferred.

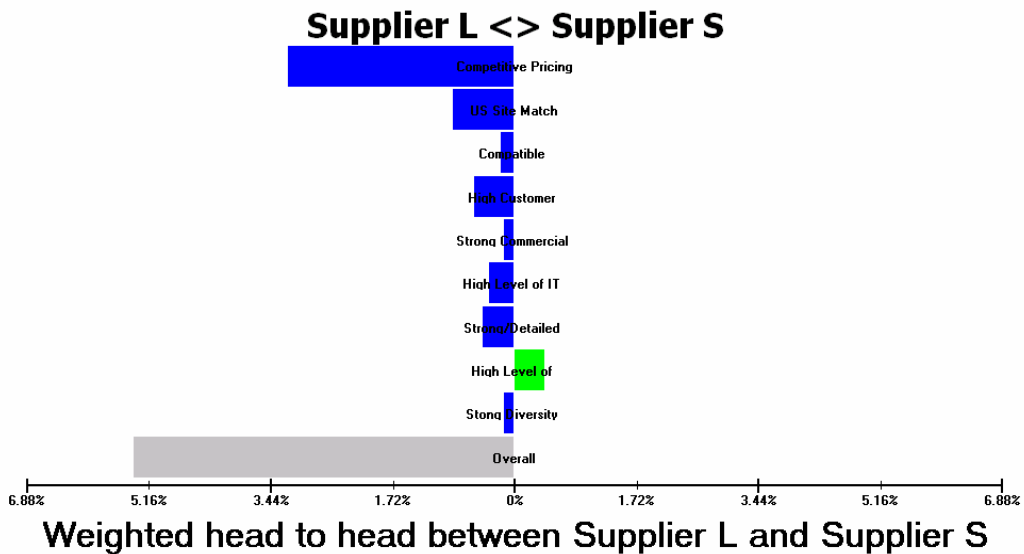


Figure 11 – Head-to-Head Analysis (Suppliers L & S)

V. Conclusion/Recommendation

Based on achievement of objectives, which included input from Alcoa's corporate medical staff, the recommendation to management will be to award the contract to Supplier Q. Together, the syntheses illustrate that the priority derived for Competitive Pricing was substantial and, because Supplier Q was (for the most part) competitive with respect to the other objectives, it was enough to have the effect of neutralizing Suppliers L and S. The result is not surprising to us. Not unlike most sourcing projects, cost was a major factor in this decision and we knew from the outset that the supplier who could help Alcoa realize the largest cost savings would have a clear advantage.

At the same time, the syntheses drew our attention to the fact that Suppliers L and Q performed within a few percentage points of one another with respect to five of nine objectives. This encouraged us to factor in the opinions of the medical staff whose collective intuition gave Supplier L a slight edge. When questioned as to the basis for this preference, it was determined that it wasn't strong enough to change the rankings. Still, it was an observation that might have gone unnoticed (and unexplored) without the benefit of the Performance Sensitivity Analysis.

The weighted matrix technique was executed in parallel with AHP and Expert Choice and it yielded the same overall result in terms of ranks. While the weighted matrix used ordinal measures, our Expert Choice model used interval measures and was a more precise reflection of the suppliers' responses to the RFP. It's too soon to tell whether the application of AHP via Expert Choice will be adopted by management, but it was well-received and we are hopeful that it will serve as the first in a series of improvements over the organization's current decision-making protocol. It's worth noting that a result as close as the one between Suppliers L and Q using only the weighted matrix technique would normally merit a second pass at the decision criteria and judgments. However, in this case, management was comfortable with the validation of the matrix by the Expert Choice model (or, perhaps, vice versa) and Mark was not asked to re-visit any of the inputs or outputs. Supplier Q was accepted as the final decision and it proceeded to contracting.

Bibliography

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