

# CUSTOMER SATISFACTION INDEXES

Lindsay SJ

*Alcoa Aluminium, Tennessee, USA*

## Abstract

Customers and suppliers of Smelter Grade Alumina, SGA, can benefit from a common format to highlight and track the physical and chemical properties that are of primary concern to the customer. Alcoa has developed a Customer-Satisfaction Index that gathers the Customer Voice on an annual basis and then works to forge this with the capabilities of the refinery into a numerical index that tracks multiple parameters. The score is tracked throughout the year and serves as a platform of communication between smelters and refineries to discuss the properties of Smelting Grade Alumina within a defined structure.

## 1. Introduction

When it comes to alumina “quality” the information gap between a refinery and its client smelters may be substantial. Contact between the separate parties may be limited to those who arrange logistics and commercial transactions. Interactions between those that make and those that use the product is often limited. Little communication about which specific alumina properties are of concern to smelting customers may filter back to those who are involved with refinery operations and technical support.

At individual smelters information about alumina properties may be limited to Certificates of Analysis or a refinery’s typical properties and shipping limits. Knowing whom to contact about the properties of SGA may also be something of a mystery. Understanding that key properties may shift from year to year as bauxite sources change or as refineries go through production expansions or process updates may also not be implicitly understood by client smelters. It is not always so apparent that the raw material to the refinery comes out of the ground. This is especially so if the smelting representatives have never seen a bauxite mine or a refinery. See Figure 1.



Figure 1. “It All Starts with Dirt.”

When such a disconnect exists it is often easy to “fill in the gaps” with blanket statements such as “the refinery only cares about tons out the door” or “the smelters gripe and complain, but they don’t know what they really want.” However, when such situations are examined more closely it is rare to find a refinery staff that does not care about their product quality or a smelting staff that can not define what they truly need from their SGA.

Such realizations lead Alcoa’s Primary Metals Division and Alcoa World Alumina, AWA, to develop a standard process for how to define what client smelters actually need from their source refinery.

The primary focus of this process was to enable Alcoa, Inc. and AWA to leverage opportunities within a large internal customer base. Matching alumina sources that best meet internal smelting customer needs within broad logistic constraints is good for the combined business performance of the company. It also helps to bring focus to the needs of our downstream customers by forging links from the mines to the metal products that Alcoa produces.

The key to making this process work is to have the internal client smelters work together to define ONE set of product parameters for each refinery that represents what the customers need. The whole methodology that is centered on this “Customer Voice” which is consistently applied over the large internal base of refinery suppliers and smelting customers.

This paper discusses the application of the Customer Voice methodology.

## 2. Discussion – The Origins of the Customer Satisfaction Index

In this modern age many of us as individuals are solicited for customer feedback by companies that have supplied us with various products or services. Such surveys are quite common and are usually initiated by suppliers that wish to improve their business via greater customer satisfaction.

In the case of Customer-Supplier Indexes for SGA the roots of our process began by putting the cart before the horse. A handful of individual smelters independently created internal scorecards for alumina quality. Some were created with refinery involvement at the request of a customer smelter. Others were created unilaterally. In these cases the scores were sent without solicitation to the producing refinery. The results of these various systems were obviously mixed. There were no common standards employed for the factors to include or how to weigh the importance of various factors. There were also not always direct or obvious connections as to why some factors might have a business case for inclusion in the score keeping system.

Many of these had grown from quality efforts to establish something of an internal “contract” on what was acceptable for materials that are used in the various stages of aluminium production. For example, clear internal standards may have been set for what was an acceptable green or baked anode using a quality or standardization program. The same approach was then often extended to raw material streams with various degrees of success. A common stumbling block that arose was around coming to a common understanding of what is “acceptable” quality for a product.

What was learned from these varied initial attempts became of great importance to the eventual development of the standard Customer Satisfaction Index process.

## Key Learnings

- 1) The Customer Satisfaction Index, CSI, had greater impact when both the supplier and the customer were involved in the process of creating and managing the goals.
- 2) It was essential to develop a unified customer voice from the many clients of each refinery rather than individual plant preference lists for alumina properties.
- 3) Keeping the list short with focus on the most critical parameters gave more meaningful results and scores. Indexes with dozens of parameters often resulted in customers that were upset about some aspect of alumina "quality", but that rewarded the supplier with a Customer Satisfaction Score of greater than 95%. Such a circumstance sends mixed messages.
- 4) Not all of factors are equal in importance and some effort to differentiate between the factors of greater and of lesser importance added value to the process.
- 5) It was essential for smelting customers to be able to understand what they truly needed of the alumina to successfully meet annual goals vs. what might be desirable to have.
- 6) It was also essential to have a facilitated "negotiation" when it came to establishing CSI goals for the coming year. The facilitation had to respect both the voice of the Customer and the capabilities of the refinery.
- 7) It was more important to display results visually in trend charts vs. targets than to present a numerical score.
- 8) Show-Stoppers or mismatched parameters identified by the Customer Voice methodology did not need to progress to the CSI process. Such situations require proper alignment between the alumina source and the client smelter, not score-keeping systems.

The other key learning along the development path of the Customer Satisfaction Index was that getting all the parties with vested interests together to work through a value-added process worked a lot better than throwing stones at one another via electronic communications. When the groups had an expectation set to work together of an annual basis at a minimum, identification of the properties of greatest importance began to be an accomplishable task for both the suppliers and the customers.

### 2.1 Discussion – Alcoa's Internal Customer Satisfaction Index

The lightning rod event occurred in mid-2006 when the General Manager who oversaw the alumina refineries and the smelters called for the establishment of a Customer-Satisfaction process.

The underlying goal was to optimise business performance that stretched across a long value chain from bauxite mines to metal products by forging a tighter link between Alcoa's refining and smelting. The Customer Satisfaction data has become the foundation of that link.

The timing of the General Manager's request matched well with more than a year of successful trials of a Customer-Satisfaction Index that one refinery had built around the key learnings noted above. This became the general template for all CSI's in Alcoa/AWA.

Alcoa then began to fully develop its Customer Satisfaction Indexes, or CSIs, in late 2006 when the first set of wide scale customer metrics were defined. From the start this process has involved all of the customer-supplier linkage points between Alcoa's smelters and AWA refineries.

The outputs of the methodology include:

- Defining those physical and chemical properties of SGA that are important to the clients
- Defining a unified Customer Voice for all critical properties

- Assurance of reasonable matches between refinery product and customer needs
- Ranking the importance of each important property
- Use of a scoring system that is revisited annually
- Visual presentations of progress vs. targets

The result is a monthly reporting and score-keeping system that the refinery uses as a measure of customer satisfaction that also has ownership by the client smelters. The number of critical properties ranges from as few as four to a pragmatically mandated maximum of eight parameters.

These ground rules are clear, yet flexible enough that all refineries and their customer groups can establish CSI's that best fit their own circumstances. Each Customer-Satisfaction Index is then "built" around each SGA shipping facility and its internal customers.

Each shipping facility focuses on one product and the CSI structure revolves around this center with the maximum of eight parameters that can be included in score-keeping. See Figure 2. This wisely selected maximum keeps smelters from listing everything as important. It also keeps the annual focus on a short list of important factors. In practice most CSI's have less than eight factors.

Results are tabulated, graphed and distributed monthly. When a client smelter refers to the CSI a visual image or icon typically comes to mind. These visuals go beyond the meaning of a "score". They capture targets, trends and the Customer Voice simply and cleanly.

CSI's are then re-visited and updated at least annually. The principle behind the CSI is not just to gauge how happy or dissatisfied clients may be. It is to get smelting and refining representatives together on a regular basis so that they could work together towards meaningful measures of product quality. The development of this professional relationship enables trust and cooperation.

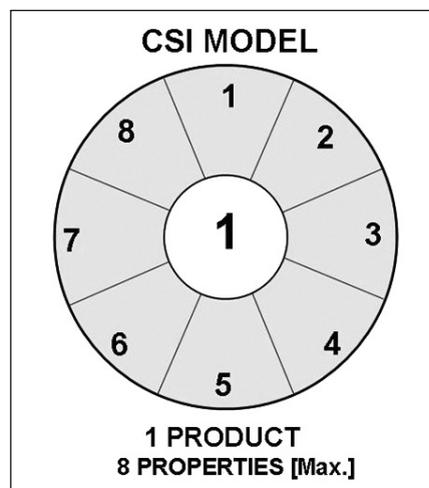


Figure 2. Customer Satisfaction Index Model with 1 Product & 8 Properties [maximum]

This framework put structure around what had been a successful CSI at one refinery with its internal customers that was able to be rapidly adapted and implemented for each of the SGA shipping facilities. The system wide roll out of this happened in a little more than three months.

One of the more important outcomes of the process is closure of some rather large communication gaps that have existed for years between some refineries and smelters. This is significant progress in itself, and has enabled refineries and smelters to work more closely on projects of mutual interest. This further

enables the connections over a long value chain between mines and metal customers.

At times the CSI process has also helped to shift focus for refineries. In some cases there has been a shift away from some traditional quality measures to more specific concerns around smelting sub-processes and specific metal products.

## 2.2 Customer Voice

The first step in the process is to assemble the customer representatives that receive SGA from a specific shipping facility. If at all possible this is done at face-to-face meetings. The process is as much about getting the right people together as it is in developing a score keeping system. In some cases conference calls over a wide range of time zones have needed to be set up. This has also worked well with the same facilitation and planning that goes into the face-to-face meetings.

As the Customer Voice was established the refinery representatives were invited to sit in. The meeting is not run as a "council of war" or used as a chance for the client smelters to "gang up" on the refinery. Since the refineries do not have much direct involvement beyond facilitating discussions with presentation of historical production data their role is quite limited at this point and attendance is invited, not mandatory.

The main objectives of Customer Voice discussions are to:

- Sort out which few properties are really important.
- Put a unified "Customer Voice" to each of these on what is needed rather than desired.
- Base the needs on data as much as possible and stick to parameters that the refinery will have some degree of control over.

One boundary condition is to keep the focus on the properties that are of importance at current typical levels in SGA. For example, at some level every metallic impurity may be important. If the historical performance of the refinery indicates that there is no current threat to the metal products or processes of client smelters then it is generally not included in the Customer Voice exercise or the CSI.

Typically this requires structured and facilitated discussion that follows a listing of alumina property proposals that have been submitted by the individual customer plants prior to the meeting. It was quickly learned that it is best to begin discussions around the list of chemical properties and to save particle size distribution parameters for last. Initial meetings generally take about four to six hours to complete and this is somewhat dependant upon the number of client smelters.

This powerful initial step was not immediately obvious. It came from a location that has a co-located refinery and smelter. The quality program at this facility demanded Customer-Supplier Agreements, but the refinery and the smelter had issues in sorting out what the smelter perceived as its needs vs. what the refinery was capable of producing. The resolution to avoid deadlock was to assure that the smelting customer was "heard" by respecting and acknowledging their "Customer Voice" input. The Customer-Supplier agreement then included this information but acceptable parameters were then negotiated on a more pragmatic basis.

To those outside this process the Customer Voice may appear to be a "pacifier" to the client smelters. But the process of having the customers sort out and put data behind a unified "Customer Voice" and then to present it to technical counter-parts from the refinery becomes the foundation for building the path forward. Real content becomes obvious at this point as does any "fluff". It also serves as the starting point for real dialogue between refineries and smelters around issues that benefit the whole of

the organization and what is needed to ultimately support the needs of Alcoa's metal customers.

## 2.3 Customer Satisfaction Index Structure

Along the path of the Customer Voice process the framework of the finished product is being constructed. Metallic impurities of concern are often few, but it is quite clear as to which ones are truly important for specific metal products. It is also quite clear that these factors rank high on a scale of 1 to 5, with 5 being the most important factors. It also became clear that metallic impurity levels could be bracketed into ranges at which everything was normally OK [Green], there might be a problem [Yellow], and there was sure to be a problem [Red]. This eventually fed into a "Stop Light" point-keeping system for each CSI parameter.

A parameter status of Green was rewarded with 100% of possible points. Yellow shipment parameters might get only 50% to 80% of possible points. Red parameters get zero points for that particular part of the overall CSI. Figure 3 shows a visual example of this.

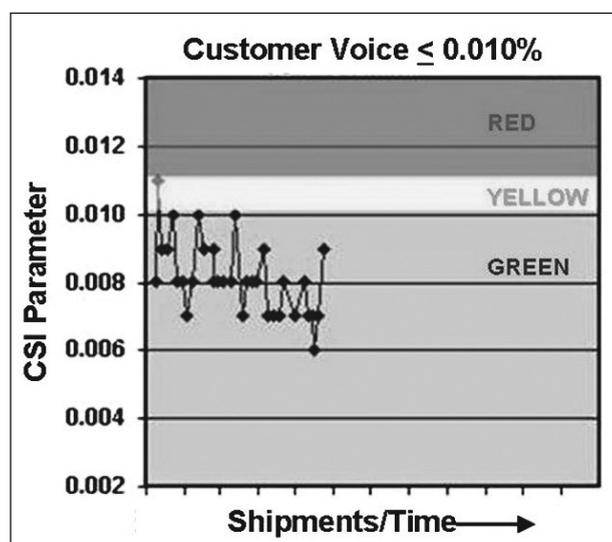


Figure 3. CSI points are awarded or deducted according to a visual Stop Light structure

Some alumina properties impact products and metal customers and may have rather serious potential consequences. Others have serious potential consequences on customer process control or plant stability. Both categories command high rankings or weighing of 4 or 5 on a scale of 5 points.

Some factors will be important in that they have a clear financial impact. For example %Na<sub>2</sub>O has direct impact on the rate of consumption of AlF<sub>3</sub> at a smelter. The ratio of %CaO to %Na<sub>2</sub>O may require expensive dilution of %CaF<sub>2</sub> in pot room bath when this ratio is high, or additions of %CaF<sub>2</sub> when this ratio is low. Parameters with moderate financial impact generally have a ranking of 2 or 3 on the 5 point scale.

There are some parameters that may be important to a client smelter or two, but data to support the process or financial impact may not be clear. These factors generally have a low weighing of 1 or 2.

The same applied when the factor is of importance to the client smelters but the refinery has only a very limited ability to control the outcome, as with Attrition Index. These also generally get a low ranking of 1 or 2 points on the 5 point scale.

These descriptions help to bracket the 1 to 5 importance scale. See Figure 4. There is one other category with a score-keeping weigh 0 that appropriately are called a zero-weighted factors. More discussion follows on this point later in the paper.

CSI Ranking Guideline	
5	Serious potential for impact on products or stability.
4	Falling between 3 and 5.
3	Clear financial impact only, such as average %Na <sub>2</sub> O.
2	Falling between 1 and 3.
1	Important to smelters, but limited ability to control.
0	Important to any client to keep track of.

Figure 4. CSI Ranking Guideline

## 2.4 Customer Satisfaction Index Negotiation

The process steps described above are generally developed into an initial proposal by the client smelters before the meeting take will take place with the refinery representatives. At the combined meeting of smelters and the refinery the great majority or participants are generally technical or operating representatives. With the customers having prepared a Unified Customer Voice for each parameter of importance the stage has been set. Now it is time for an effective meeting and negotiation to create a Customer Satisfaction Index that in the end will likely not completely satisfy any customer or the supplier completely. The goal is to end with a CSI that all parties can live with for the coming year.

Again, the key to this process is needs-based communication that is supported with data in combination with a pragmatic approach to what is attainable and reasonable for the coming year. The refinery has its historical product trend data and its operating plan to anticipate what is to come. The smelters have a Unified Customer Voice and a clear understanding of their needs and the relative importance of each parameter.

As with the Customer Voice activity it is best to begin the Customer-Supplier meeting with the metallic impurities of concern and save the particle size distribution points for later. The smelters present what they need for specific impurities. Data is presented to support each position. If need be the refinery tempers these discussion with what can be reasonably expected. The give and take is facilitated. For parameters that will very likely not satisfy the Customer Voice the outcome is directed towards what are reasonable expectations for the refinery that will also respect the customer needs.

In some rare cases there is a complete mismatch between alumina properties and smelter or metal product needs. These rare events are a signal to exit the CSI process and to revisit the internal matching process that must also fall within the constraints of logistics.

In most cases discussion follows on where each CSI parameter has been in the current year, what the real impact has been at the smelters, and what levels should be set for the Yellow and Red thresholds for CSI points allowances of 100%, 50% to 80% and 0% for each CSI factor. This is often mixed with discussion on the factor weightings as well.

The finished CSI typically includes parameters dealing with particle size, metallic impurities and factors that impact bath chemistry such as %Na<sub>2</sub>O.

While the process may appear to be potentially as cumbersome as contract negotiations the entire process generally takes about two hours to complete when the pre-work has been done properly. The outcome puts the refinery and client smelters on common ground for the coming year.

## 2.5 Zero-Weighted Factors

In many cases the pre-work and negotiations reveal some parameters of limited concern to the client smelters, but that are not supported with hard data. Some individual customers may also have concerns that are not shared by any of the other refinery clients. Since the monthly output of the CSI is not just a numeric score, but a series of charts that represent performance against the Customer Voice these issues often fall into graphing of "zero-weighted" factors. See Figure 5 for an example.

Zero weighed factors are reported along with the other factors in the CSI. The difference is: they do not affect the CSI score. The Customer Voice is made clear for any such factors and negotiation with the supplier refinery includes discussion on the need to include any zero-weighted factors. Time is not spent on negotiation of a target value, a ranking factor, or scoring thresholds. Each year any zero-weighted factor automatically comes up for review as to continue to include it or to drop it.

## 2.6 Visual Presentation of Data

The format for the presentation of the CSI is visual. This intentionally de-emphasises the numeric CSI score for individual alumina shipments. The goal is a dash-board of how the properties of concern are doing at any given time and how they are tracking throughout the year.

This is important since clients can be dissatisfied when any key parameter is well outside a target range. It is not expected that any smelter manager would ever say that "I am 73% satisfied with my alumina supplier today." The customer focus is placed upon discrete impurities in the alumina or its physical properties. Although score-keeping does serve the end of not weighting all factors evenly it does completely serve customer needs. The visuals fill this gap with data points in green, yellow or red zones conveys the message. See the generic CSI example shown in Figure 5.

## 2.7 Annual Review Process

As the end of the calendar year approaches each CSI comes up for renewal. This provides an opportunity for the refinery and client smelters to avoid loss of contact. It also addresses any shifts that may have occurred in raw material sourcing to make sure that the CSI continues to represent the combined Customer Voice. Just as raw material sourcing may shift at a refinery, the metal product mix may shift at a smelter. A different focus on metal products or in bauxite supply can drive changes in the metallic impurities to be included in the CSI or their relative importance in scoring.

## 3. Conclusions

The gaps in understanding of which product qualities are important to the clients of a refinery can be substantial. Closing these gaps helps to forge a stronger value chain for Alcoa's mines, refineries, smelters and ultimately the metal customers.

A step-wise methodology to build upon a unified Customer Voice aids process optimization along this value chain and it has been presented here.

Groups that have operated separately in the past use the Customer Satisfaction process to get to know each other's issues and to get closer to the needs of our metal customers. The process is then renewed annually keeps these connections alive and healthy.

While there are multiple possibilities for score-keeping systems the focus of the Alcoa CSI process on visuals that indicate satisfaction or dissatisfaction is more powerful than a numeric value or score.

Consistent application of the Customer Voice methodology has added real value. It has helped the smelters to know their needs and forge a tighter link with their major raw material supplier. It has helped the refineries to clearly understand the few and important needs of its customer base through to metal products.

The engine behind the process is in bringing the right people together using the discipline of the Customer Voice and Customer Satisfaction process to focus on the few items of greatest importance.

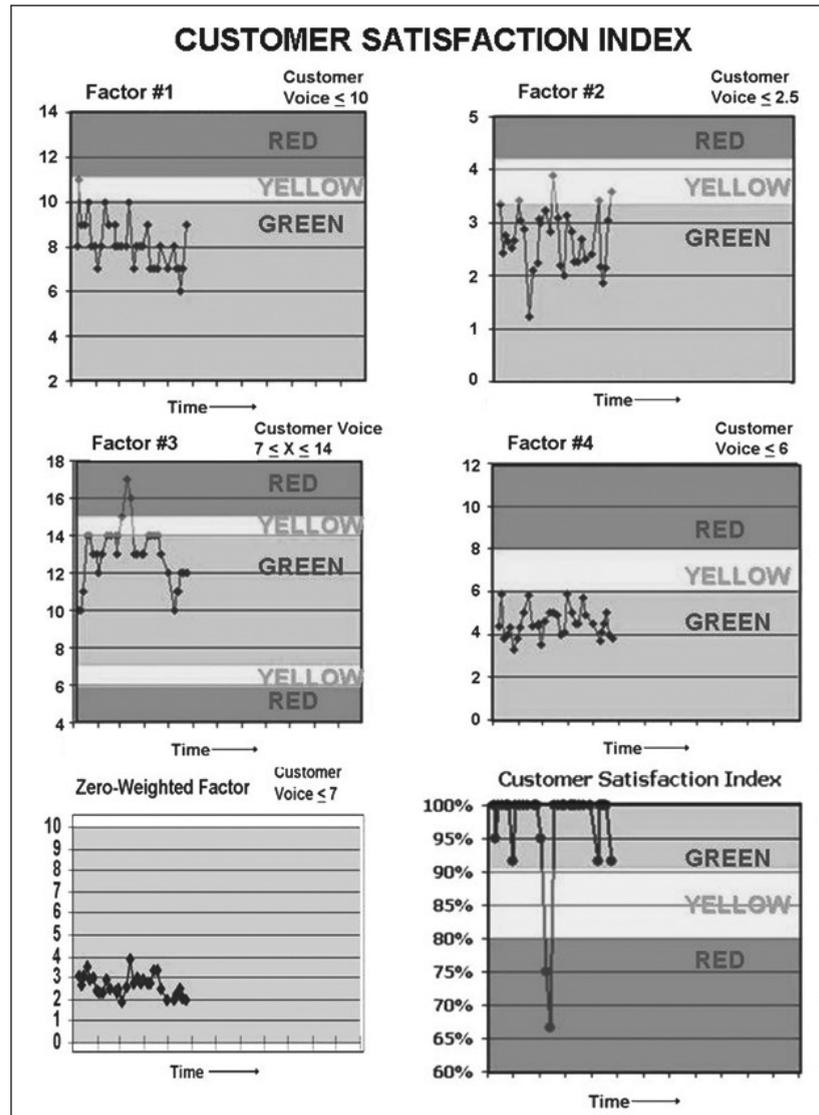


Figure 5. Visual CSI Scorecard or Dashboard

### Acknowledgements

Costa, Julio Diniz (Alcoa, Inc.) Introduction to “Customer Voice”  
 Joaquín Fernández Fernández, Jose Ricardo Docal Paz, Peter G. De Wit, (Alcoa Inc.) - Support for the development of current CSI format.  
 Alan Cransberg, Jay Bruggeman, Laurie Stonehouse & David Olney - Strong sponsorship for CSI development.

Alcoa's Customer-Supplier Teams for SGA - On-going support of the CSI process.  
 David Olney (AWA) Editorial comment and review.  
 Merino, Dr. Margarita R. (Ph.D. Florida State University) - Constant dedication and support.

### References

1. Lindsay, S., “Bridging the Gap Between Refineries and Smelters”, the proceedings of the 8th Australasian Smelting Technology Conference, 2004, pp 148-162.
2. Lindsay, S., “SGA Requirements in Coming Years”, Light Metals, 2005, pp 117-122.
3. Lindsay, S., “SGA Properties and Value Stream Requirements”, the proceedings of the 7th Alumina Quality Workshop, 2005, pp 16-21.
4. Homsí, P., “Alumina Requirements for Modern Smelters”, 6th Australasian Smelting Technology Workshop, 1998, pp 73-90.
5. Chandrashekar, S., Jackson, D., Kislér, J., “Alumina Fines’ Journey from Cradle to Grave, the proceedings of the 7th Alumina Quality Workshop, 2005 pp 5-9.
6. Alcoa Inc. 1996 Annual Report - “It All Starts with Dirt”, Front cover.