

SAMPLING SPECIAL SECTION

The ultimate manager's argument for representative sampling

D. Aldwin Vogel

Technical & Quality Director, Commodities Global Service Lines, Bureau Veritas, Rotterdam, the Netherlands



From **management's** perspective the cost of sampling must be as low as possible: samples are "just" a necessity to enable the laboratory to do its tests. Once the lowest cost sampling method has been identified and implemented—either by the in-house quality department or through a Testing, Inspection, Certification (TIC) service provider—management is done with sampling... Well, except for the occasional slap on the wrist to the samplers when there is a complaint on quality, or a dispute: "Our client does not get the same control results as our own". This must clearly be the samplers' fault; they took the wrong sample!

Anyone with Theory of Sampling (TOS) knowledge will disagree with this scenario and will go through fire and water to try to explain that there is no such thing as a right (or wrong) sample. When there is no representative sampling process, there are only *specimens*... those pesky

lumps of matter collected uncontrollably from a lot: specimens are **not** representative by TOS definition.

Sampling experts always find themselves explaining the "risk of being wrong" and love to bring up the hidden cost of using a non-representative sampling process. These confident boffins happily



and relentlessly illustrate with numerical examples, or graphs with error margins, precision and accuracy ... that a non-representative sampling process is very likely to significantly reduce, e.g., life-of-mine or result in a financial loss during a transaction (they have an endless array of horror stories from all over industry to tell).

Yet often the experts are met by a **yawning** manager, or by a manager having a trader mind set, who is feeling lucky that he or she may also benefit. The "risk of being wrong" may just as well flip into "the 50 % possibility of being favoured". Especially when we TOS illuminati throw in statistics, standard deviations, variances, use "±" signs and may top it all off with a normal distribution graph etc., **then** the managerial thinking still goes: "Even in the worst case, on balance I will be okay!"

WRONG, sadly!

The real world

The process of *representative sampling* depends on two critical success factors:



1) elimination of Incorrect Sampling Errors (ISE) and 2) reduction of the Correct Sampling Errors (CSE) to an acceptable level.

Here, in order to avoid the **yawn**, we will completely skip all further *explanations*, those dull "technical explanations", but leave the reader with sufficient references (should the interest develop) for proper sampling *access to* how to make sure every particle can and will be *included* in the sample, and how to decide on the necessary-and-sufficient number of increments to *select* (thereby also fixing the all-important question about the optimal sample mass); for references, just look at all other contributions above and below.

The technical truth

Thus, for now, we can refer to what is easily understood by managers—Murphy's Law, which states that that there **cannot** be an overall "on balance" when representative sampling is addressing significantly heterogeneous materials and lots, as when compromised by the desire to involve the least expensive sampling approach (grab sampling), which unfortunately is tantamount to allowing a significant *sampling bias*. This is a single-sided effect that is *always* a **cost** and *never* a **benefit**; again, just look at all other contributions above and below.

The magnitude of this cost?

The costly truth

Well, let Murphy's Law decide that for you, instead of us experts trying to make "reasonable" *assumptions* about inherent heterogeneity and shaky, but dead-cheap, sampling procedures (again grab sampling) in order to quantify a monetary amount or build the resource model

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for the new mine for example, you know much better yourself!

But, by the way... now that you know this critical issue in these simple terms, imagine how your shareholders will react next time the results from a non-representative sampling process interfere with the bottom line of your annual reports!

What to do—how to go forward?

Simplified there are just three phases for representative sampling.

- 1) The planning phase, *prior* to sampling
- 2) The actual sampling
- 3) Making managerial, *inter alia* decisions based on the sample (results)

The TOS' focus is overwhelmingly on phase 1) and phase 2), e.g. to determine essential stuff like heterogeneity which is needed for better planning. Phase 3) is only for the user... e.g. the manager.

The economic impact

The economic impact of *representative* sampling is abundantly clear: it is essentially *neutral* and does not favour,

nor prevent, a specific wishful thinking. Ironically representative sampling delivers **exactly what a manager expects** from a sample: something that can be considered as factual and true... as fully representative of the bulk from which it was taken from, and for which reason one can have complete faith in the corresponding analytical results.

How to tell it to management

So, no big Dollar or Euro amounts to be presented here, no complicated statistical results, no graphs, no error margins. Just you, your imagination and the knowledge that *representative* sampling is a process that can remove all your fears of a financial claim, or of upsetting your shareholders, or the fear of prosecuting regulators.

Ultimately the economic argument for *representative sampling* is just that, the most coveted position regarding all business risks: "peace of mind".

Just a warning though: If the adjective "representative" is removed from any sampling process—all the above goes away in a blink!



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