

Benchmarking of Analytical Laboratories

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The advantages of benchmarking and the benchmarking process





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Executive Summary

Manufacturing excellence keeps being of ever growing importance in many industries such as (petro)chemicals, polymers, food and pharmaceuticals. In this challenging environment the central site laboratory is often under pressure to increase its efficiency and decrease its costs on a yearly basis. Whenever operational constraints appear for the laboratory in this continuing process, Intertek can be asked to consult on basis of a performance benchmarking study. In such study Intertek consultants, having many years of experience as general managers of Quality Control or Research & Development laboratories assess the overall performance of the Company Laboratory in relation to that of its peers. They present the current status and a possible way forward in a report with recommendations. As Intertek shows commitment for its recommendations, it can be requested afterwards to support, drive or lead the by them suggested change in the laboratory.

Introduction

International standard analytical methods describe extensively how to manage and operate laboratories in order to reduce or eradicate mistakes and errors in results. However, there is no formalised approach for which analytical methods or processes to use in order to run a laboratory in the most efficient way. Indeed the meaning of the word “efficiency” depends upon the type of laboratory and its industrial setting. This paper describes the ways in which Intertek uses benchmarking mechanisms to classify and rank comparable laboratories to optimise operational and cost efficiency.

Why should I benchmark my laboratory?

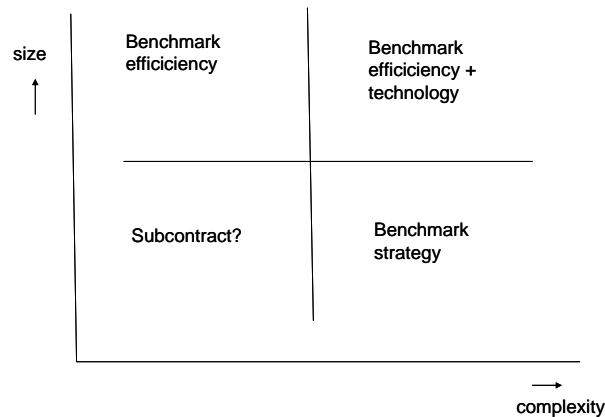
In many industries the laboratory is a critical and integral part of the manufacturing, innovation and quality assurance process. It is the silent ‘expert system’ ensuring that the customer gets the quality he or she is expecting and that the manufacturing yields are optimized for safety and profit; in some senses it is an insurance policy protecting any risk to the ‘Corporate Brand’. However, the laboratory is also often a capital intensive operation, requiring highly skilled staff in some cases or highly experienced staff in others. Such staff is rare to recruit, costly and very time consuming to train. Moreover, in both equipment and staff at the laboratory there is often the need for built-in redundancy, back up for disaster or overspill relief.

Benchmarking is the continuous process of measuring and comparing one’s own operations with those of a valid, reference peer group. Such discrete and confidential comparisons provide opportunities for improvement since they enable any operation to learn and adopt best practices of others, to objectively evaluate risk and to independently measure their own performance against external recognised standards. Even those organisations with multiple laboratories ‘in house’ and internal efficiency and quality testing programmes take great benefit from engaging periodic external benchmarking. By not leading the evaluation with ‘in house’ stakeholders of the laboratory, benchmarking further promotes external orientation and the learning capabilities of the company. It visualizes the strong and the weak points of the operation in a constructive and objective way which improves internal transparency, removing myth.

Against this backdrop any steps an organisation can take to enhance the efficiency of its laboratory operations can, not only materially improve the efficiency and reduce operational cost of the laboratory itself, but it can positively impact all of the product quality, manufacturing yield and safety issues touched by the laboratory. The gain is very often much greater than the footprint of the laboratory as a proper benchmarking exercise can lead to adjustments to very many processes which feed into or are driven out of the laboratory.

Laboratory benchmarking always drives efficiency and quality and often suggests improvements in data management and management information. In today's tough economic environment, clearly it is an instrument which helps organizations enhance their competitive edge!

The focus of a benchmarking study will differ per laboratory but is usually depending on size of the staff and complexity of the laboratory technologies and/or instrumentation. This can be clarified by means of the below graph:



- In case of a small and relatively simple laboratory the benchmark may focus on the need of the organization to have results produced in the shortest timeframe. Depending on the urgency of delivery of results it might be assessed whether the laboratory should stay on the site or whether its activities should be subcontracted to an outside organization.
- In case of a large laboratory with relatively routine tools the benchmark may focus on opportunities for changing to less labour intensive methodologies.
- In case of a small laboratory with complex techniques the benchmark exercise might focus on organizational procedures to keep all instrumentation "in the air" and on manpower constraints versus strategic needs of the company.
- Finally, in case of a large and complex laboratory the operational efficiency of using all technology may be benchmarked.

How can I produce in the most efficient operation without compromise to quality and safety?

Around the globe industries are finding themselves operating in an ever faster changing environment, in an increasingly tough economy and along with fiercer competition. Margins erode because of increasing prices for feedstock while prices of products remain stable or even decline. In such situations it becomes imperative to be best-in-class for all parts of the production process. Here benchmarking of the stake-holding departments in the production process helps to reveal efficiency levels and areas for improvement. For laboratories, a benchmarking process is often requested because of questions like:

- How efficient is our lab compared with our peer group?
- Are we actually over-testing?
- How can we conduct the minimum level of testing for maximum business value?
- How does our laboratory manage peaks and troughs in the work load and work pressure best in order to minimise overtime and still deliver results in time?
- How can we stay leanest in costs but best in quality?
- How can we exploit at/in/on-line analysis best?
- Is the relationship and cooperation of our central lab with all plantlabs on the site efficacious and productive with lowest Total Cost of Ownership?

Here it should be remarked that the first answer to these questions will come from the manager of the laboratory himself! As every manager believes his lab operates very efficiently with the available resources and assets, the answer will most likely be that not much can be optimised and that further changes come with a cost. Here the lab manager will be helped by the provision of external data in a benchmarking process.

Benchmarking by whom?

Benchmarking is commonly performed by consultants with special experience and expertise in the area under investigation. Intertek is one of the few companies who offer laboratory benchmark exercises based on its experience with operating Quality Control (QC) and Research & Development (R&D) laboratories and with managing the laboratories of manufacturing companies once these have been outsourced. Intertek is the world's leading laboratory outsourcing and analytical services company, operating commercial laboratories worldwide in the chemical, petroleum, pharmaceutical, food, consumer and related industries. Thus significant laboratory operation expertise resides in the company. These experts audit, measure and evaluate laboratory operations with a keen eye on quality, efficiency and productivity. All background data provide ample material for comparisons and show clear insight into best practices for specific groups of laboratories.

This article focuses on benchmarking of laboratories of manufacturing companies. These laboratories mostly operate in Quality Control areas but benchmarking of Research and Development laboratories is also feasible although the metrics are different. The benchmarking further focuses on efficiency of operation and not on an intercompany comparison of results of analyses; such comparisons are normally organized by the laboratory itself as part of its (ISO) quality certificate or accreditation.

Tangible Benefits

- *Lower cost of operation*
- *Manpower optimization*
- *Space utilization*
- *Lowest cost of ownership*
- *Business focus*

Intangible Benefits

- *Less focus on lab administration*
- *Reduced risk of non compliance*
- *Simplification of management structure*
- *Reduction in IT complexity*
- *Other intangible benefits*

In addition to the tangible benefits as indicated in the above scheme, Intertek adds “non-tangibles” because of its experience in the area.

How is the performance of the laboratory benchmarked and evaluated?

A laboratory is rather dissimilar from most of the other departments in the company. Differences appear in quality systems and quality behaviour, cultural behaviour, instrumentation, maintenance, safety aspects, use of laboratory information management systems and so on. All these aspects need to be taken into account and be compared with situations in other labs in relation to the operations at that particular plant site. Therefore a laboratory performance evaluation begins with a study of all analytical measurement activities on the site. Intertek applies laboratory evaluation metrics to analyze and benchmark the internal laboratory performance, from productivity to quality.

Lab benchmarking measures by Intertek experts include:

- Laboratory ROI
- Laboratory unit costs
- Laboratory productivity
- Laboratory efficiency
- Laboratory quality
- Laboratory customer service
- Laboratory reliability
- Laboratory technology
- Resident expertise
- Potential for 3rd party work

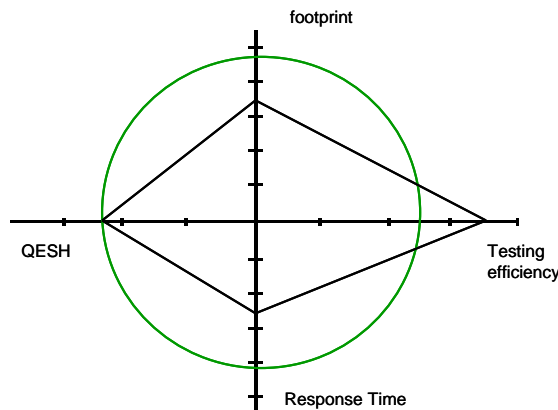
A benchmark study usually consists of several stages. In the first stage upfront information material from the laboratory is studied off site. This material is absorbed and further discussed with laboratory management during a site visit. This visit is also used for discussions with all stakeholders of the laboratory at the plant-site (staff of the laboratory, Operation, Maintenance, Technology, Finance, HR etc). Finally all data is compiled in a report with graphs, conclusions and recommendations and presented to management. The activities in this consultation phase during/after the site visit are summarized

below:

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- Review of provided data
- Onsite Visit for data review
- Interview with key Stakeholders
- Attend on site meetings with client
- Discuss and remove perceived roadblocks
- Preparation of study report
- Presentation to client

See the below graph as an example of various performance levels of the laboratory in relation to the mean performance of benchmarked peer laboratories. Axes shown are for testing efficiency (number of tests/technician/year), QHSE (performance as for safety, health, environment and quality), “footprint” (staff numbers in laboratory versus all staff on site; this is a fairly constant parameter when determined over sites, industries and geographies) and response time (time for reporting back measuring results to the plant in relation to the service level agreements). The mean performance is indicated by the green circle; a result that outranks the circle is above par and a result inside the circle is below par.



Interesting discussions are always held around the topic of changing the role of the laboratory from a provider of quality data on feedstock, intermediates, processes and end products to a guardian of consistency, accuracy and precision of the analytical at/in/on-line equipment on the site.

Because Intertek focuses on searching for areas of improvement in a constructive way, buy-in from the organization is always guaranteed. This helps as for receiving the right and meaningful data, as for acceptance of the recommendations and for facilitating implementation. One of the unique things of Intertek is that it is always prepared to further support its customers with implementation of its recommendations from the benchmarking study. In the area of changes in operation of the laboratory these recommendations are implemented with the help of techniques like Six Sigma and/or Kaizen change management.



Because this type of benchmarking covers all aspects of laboratory operation and not only focuses on the testing itself but also on sampling, logistics, robotization, automation, measurements near or in the plants, LIMS, quality, instrumentation, sample retain, consumables etc it will be obvious that a particular study will not be repeated the next year; it is a benchmark with peers and not so much aimed as to measure progress in efficiency of a single laboratory over consecutive years. Such progress can be very well measured and tracked by means of a set of meaningful Key Performance Indicators. It is not very common for a company central control laboratory to report its performance to its major stakeholders in a detailed way but below a scheme is attached in which a set of KPI's and typical corresponding values are provided.

Service	Pass/Fail KP Measure
Samples meeting agreed SLA Turnaround times	>95%
Samples analysed to work schedule	>99%
Justified customer complaints per month	< or = 1
Support for unscheduled work requests	>90%
Response time for process critical support requested	>50% within 30 min
Process critical instrument down time	<2 days/instrument/year
Quality	
Maintain key quality/environmental certificates/accreditations	fully compliant
Safety	
Injury frequency rate and LT frequency rate	<site average
Financial	
Decrease of annual spent by reducing activity	>5%
Decrease contractual activity prices by increasing efficiency	>2.5%

Benchmarking and Laboratory Outsourcing

After the benchmark study, depending upon circumstances, corporate and individual owners of laboratories may even consider transferring various analytical testing and laboratory functions to Intertek or outsource the complete operation. Also in this case, the benchmark study is to be considered as an important first step in such an evaluation.

Benchmarking exercises can also be conducted to test the opposite goal: when management considers outsourcing the laboratory one can decide to conduct a benchmark study to assess the performance of the lab to underline that there are really no gains to win by outsourcing.

In another white paper we focus on the ins and outs of outsourcing.



About Intertek:

Intertek is a leading provider of quality and safety solutions serving a wide range of industries around the world. From auditing and inspection, to testing, quality assurance and certification, Intertek people are dedicated to adding value to customer's products and processes, supporting their success in the global marketplace. Intertek has the expertise, resources and global reach to support its network of more than 1,000 laboratories and offices and over 30,000 people in more than 100 countries around the world. Intertek Group plc (ITRK) is listed on the London Stock Exchange in the FTSE 100 index. www.intertek.com

About the author:

Dr Niek Klooster is a senior global benchmarking consultant with Intertek plc. He has been laboratory director in QC and R&D laboratories of several multinationals in which position he drove benchmarking exercises of his own laboratories with those of others. He was chairman of the Dutch Analytical Laboratory Managers Association.

See also:

www.intertek.com/outsourcing/laboratory/benchmarking/magazine-article/

www.labmanager.com/?articles.view/articleNo/3970/article/The-Devil-in-the-Details