

# Statistical analysis and a statistical approach

– *training and consultation*

A company is influenced by many factors, opposite wills, different point of views and others that processes and people in co-operation consist of. In many of these intersections numerical results are often used in order to understand or stress certain aspects or arguments.

Sometimes we 'let the figures speak for themselves' which is only possible in trivial or obvious situations.

Statistical work or a statistical approach is coined by a strong interaction between knowledge of statistical methods, a view of data and measurements and handling of a computer and a software.

In addition, a certain measure of fresh ideas are necessary to steer away from routine-like reports irrespective of using figures or graphical methods.

## Some common situations

- **"Do you say that by exchanging the chemical content we can decrease the manufacturing time?**  
Let us perform an experiment to eliminate the uncertainty. Let us do this using statistical methods and the equipment of our own. By planning it in a smart way we can include many parameters in few objects. In this way we also eliminate our own opinions and let the process speak for itself!" (Design of Experiments, DoE) .
- **"We have received a letter from Volvo about excessive variation of dimensions of our ABC-products**  
Volvo has sent us a letter stating that the variation of some of the critical parameters in several of our products, is too high. They want us to present our own figures together with a basic statistical analysis by 7QCT ('seven Quality Control Tools'). They also want us to describe a plan of actions and how we will follow up the improvements." (7QCT analysis).
- **"Is there really any correlation between the X- and Y-results?**  
On our meetings we often state that there is a correlation between number of particles in the air and number of incorrect components being produced. Can somebody please perform a trustworthy investigation of this?" .
- **"What will be the result if we change the electronic component A?**  
We have a rather complicated product. Now we have a suggestion stating that if we buy and install a more expensive component, having a smaller tolerance interval, we will radically decrease the testing time and readjustment work. I want to see a thorough investigation that shows that the total variation and the costs, decrease!" (As the component is a part of a relatively complicated product, a computer simulation is simple and cheap way of investigating the possibilities.)
- **"How large should our store of spare parts be?**  
We have up-to-date delivered 2700 units and we know that the demand for new sealings is approximately 1 per two years. I think that our store of spare parts is too large and thus too expensive. On the other hand I want a small risk for a customer not getting a spare part when needed. I want to design the store getting this risk, say, 1 in a 1000. Anyone to help me?" (With statistical tools we can give the size of the store fulfilling the requirements.)
- **"We have received new goals from our main office regarding the delivery times, from order to delivery**  
The other day we received new goals for 2009. As usual they are a little unclear but I thought that we this time should look at it a little bit closer. It is not obvious what is meant by 'maximum 10 days'. We do not know if they mean 'on the average' or that it is valid for all deliveries. Neither do we know how we will evaluate these goals against the measurements.  
We also need to break this goal into sub-goals and follow the progress. I have spoken to some people that know about statistics and now I have the following suggestion: ...in this way we more easily can see the progress and not..."
- **"Since last autumn we have lots of data. Do we use the data in the right way?**  
Our newest machines generate a lot of data that we do not use. You asked for this option in the software and therefore I suggest that you use the data. I am convinced that many of our problems can be solved or eliminated if we only cared for own information!" (The data detective at work; "data mining" is the term.)
- **"Every week many diagrams are distributed, but, to be honest, I throw them away**  
I have heard that we will put our reports on the intranet in a near future. I have to admit that I think our graphs neither report or illuminate our problems. A number of percentage bars, one for each quarter, does not make anybody happy. We ought to begin from scratch and create something that is useful and also shows our largest problem, namely the variation!"
- **"I want to change our process of handling Trouble Reports**  
We get a number of complaints about our trouble report handling (TR), it takes too long time. I am convinced that if we increase the personal we can show decreases in costs in time and fines because of delays. Last Thursday I met a man that knows how to simulate processes on a computer. He showed me an interesting example how we can test different options using our own data. Therefore I suggest that we..." .
- **Customer requirements, supplier requirements, ISO-requirements**  
There are usually a number of requirements from e.g. customers, suppliers, authorities, including ISO, on a company. In order to understand, meet, suggest, fulfil, etc, these requirements the company must be able to show that it can handle a certain process or commitment. For this a non-trivial level of understanding of variation, statistics and statistical analysis is a must.

## Understanding variation

An ability to understand and measure, discuss, handle, assess, eliminate, etc, variation is of outmost importance when improving processes and making them more effective. To this need there are many simple and strong tools available.

When an organisation starts to use statistics, statistical methods and a statistical approach there are many positive effects to be seen:

- A common language for handling the data
- Focusing on the problem and decisions based on facts rather than personal opinions or beliefs
- Avoiding putting the blame on other departments, designers, suppliers, customers, etc.
- Better co-operation between design and manufacture
- Better integration of purchasing and related questions and problems
- Better co-operation with vendors, customers, authorities, etc
- Less routine in connection with tolerances or other goals
- Better reasoning when choosing measures and measurements
- Application of methods in other, less obvious, areas
- Better incorporation of the creativity and the participation of the staff
- Better awareness in connection to promises and statements of new processes, new methods, new machines, etc
- Easier to explain why a perhaps better method is used instead of what has been specified in certain documents
- A preparedness to more advanced methods

## We offer...

...training, support and consultation within the area of statistical analysis:

**Basic courses in statistics • Statistical process control • Design of experiments  
Regression analysis • Graphical methods and 7QCT • The use of computer program  
Six Sigma • Planning of measurements and investigations • Capability analysis  
Simulation as a tool to understand processes • Assessment of sub-suppliers**

## We can -

- assess tolerances and chains of tolerances from a statistical perspective
- perform capability studies of new or suggested processes or machines
- carry out statistical analysis of existing data
- follow up results of changes or improvement work
- build model and simulate processes by using a PC-software
- assess sub-suppliers and their systems for measuring and analysis
- perform comparative studies between different options when installing new machines or processes
- develop data bases, measurement or information systems and graphical presentations
- suggest or develop suitable measurement, design or explanatory variables
- give general advice in statistical matters

## Together with...

...the client we look at the current status, level of understanding and needs. After this we suggest a tailor-made training or support.

After a training each participant can take part in a world-wide network for questions within statistics, new approaches and new tricks, etc.