

# SMALL BREWERIES AND PROBLEM SOLVING

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We continue the series of articles on LEAN and related supply chain management by Dr Nevan Wright with a specific, hands-on article on the approach to problem solving in small companies, including breweries.

In June, my wife and I, accompanied by Erik Juul Rasmussen, visited several small breweries employing twelve or fewer people (full time and part time employees) in Denmark. We also visited the Carlsberg brewery at Fredericia and their museum in Copenhagen, but that is another story. This article considers small breweries and how they might improve their bottom line without compromising quality and service.

Let me state at the outset that I was most impressed with the in-house efficiency of the breweries we visited and the obvious pride and enthusiasm that our hosts and staff at these breweries exhibited. Nowhere were problems apparent. Obviously we sampled the beer and in every case the quality, taste, aroma and colour was first class. As the brew master at Ørbæk Brewery said, ‘we love making new beers: finding the right colour, head, aroma, degree of bitterness, texture and depth in the right combination. Everything we do is about creating the best beers possible.’

However, no matter how efficient a brewery is in-house, and no matter how good and how consistent the quality of the product there are always likely to be problems. As one of our hosts observed, ‘problems are inherent in the brewing industry’. Problems can be in-house within the brewery or external. External includes up-stream and/or down-stream of the supply chain. Up-stream includes suppliers of materials, service and contractors. Problems can include quality of materials, reliability of suppliers, late deliveries, wrong quantities,

incorrect invoicing, etc., service people, and infrastructure supply. Down-stream includes logistics, warehousing, distributors, retailers, and out to the end consumer. With in-house problems our own direct actions will be needed, with external problems, although we can to varying degrees influence the situation, we rely to a large extent on outside organisations and people to play their part. The distance, up-stream or further down-stream, the cause of the problem is from the brewery will affect the degree of pressure we can bring to bear to solve problems or to improve performance. For in-house problems, although sometimes our actions might not be the best (knee-jerk reactions are not always successful), the problem is ours and it is our own actions that will provide a solution.

## IN-HOUSE PROBLEM SOLVING

In-house problems might be ongoing or intermittent, and can be annoying rather than critical to the operation. Other problems will be more serious, usually not expected, and will require immediate attention. Unexpected problems have a habit of happening at the worst possible time.

In-house problem solving is of three types:

- Reaction to an unexpected incident
- Correction of an ongoing annoying problem
- Improvement of performance (changes to process, change of layout, introduction of new technology, etc.)

## Unexpected problems

Reaction to an unexpected problem, if critical, will require immediate action, often with little time to analyse. Action has to be taken and could well be in the nature of first aid. Once the immediate problem has been dealt with, there will be time for deeper analysis to find the cause and to eliminate the cause so that the problem does not re-occur. The Japanese have an approach known as the five whys. The example below illustrates the approach. In this example, an engine has cut out.

1. Why did the engine stop? A fuse has blown. The quick response would be to replace the fuse. But this is a very short-term solution; the issue is why did the fuse blow?
2. Why did the fuse blow? The engine overheated.
3. Why did it overheat? Lack of oil.
4. Why was there a lack of oil? The pump was blocked with waste.
5. Why did waste get into the pump? The filter was not in place.

The solution would be that first thing every Monday morning the filter will be checked and cleaned, and the oil reservoir topped up as required. The engine will now likely give us many years of good service. If we had only replaced the fuse, the engine might run for a short period, and likewise topping up with oil without cleaning the pump and replacing the filter would only provide a short term remedy. The message being to never take the first obvious remedy as being the final solution. You have to keep on asking why until you get to the root cause. The Japanese say that you will never need to ask why more than five times to get to a root cause. In the June 2011 issue of this journal, in the article 'Six Sigma for Small and Medium Enterprises', I outlined the Ishikawa approach of determining cause and effect. The Ishikawa approach is more suitable to organisations with larger teams of staff and would not be so practical for an organisation employing say 12 or fewer people. The five whys approach provides a simple yet effective way of getting to a root cause. Once the cause is eliminated the effect will not re-occur.

## Ongoing non-critical problems

The correction of an ongoing annoying problem allows more time for consideration and a more structured approach than the five whys approach. The approach also relies on asking why, but considers a problem from several different perspectives. Figure 1 shows the basic problem-solving method.

Figure 1 Basic problem solving-method

WHY?		
WHAT?	WHY?	WHAT ELSE?
WHERE?	WHY?	WHERE ELSE?
WHEN?	WHY?	WHEN ELSE?
WHO?	WHY?	WHO ELSE?
HOW?	WHY?	HOW ELSE?

## What

The question is what actions/steps are currently done in a given process, the objective being to eliminate non value-adding activities. Asking why each step is taken and 'what would happen' if the step was eliminated can reveal that the step was not really needed. It may be found that an action has become standard practice because we 'have always done it that way'. If a step cannot be eliminated because it is essential, the next question to consider is what else could be done to achieve the same result, with the objective of finding a better way.

The following questions of Where, When, Who and How follow the same pattern of Why and What and What else. However, if from asking the initial 'What' an activity is eliminated, questions of Where, When, Who and How will not be needed.

## Where (place – location and layout considerations)

Would rearrangement of layout add to a smoother flow, take up less room, reduce people or product movement, etc.? The objective being to find the best layout in terms of space usage and movement to determine the best layout.

## When (timing and sequence of activities)

The question being why is an activity done at a particular time? Is it possible to rearrange the sequence of activities? Could some activities be combined?

## Who

First determine who is doing the activity, and is this the best use of that person's skill and time? Ask who else could do the activity.

## How

Can the operation be simplified? Why is it being performed in a particular way? Is there a better way? →

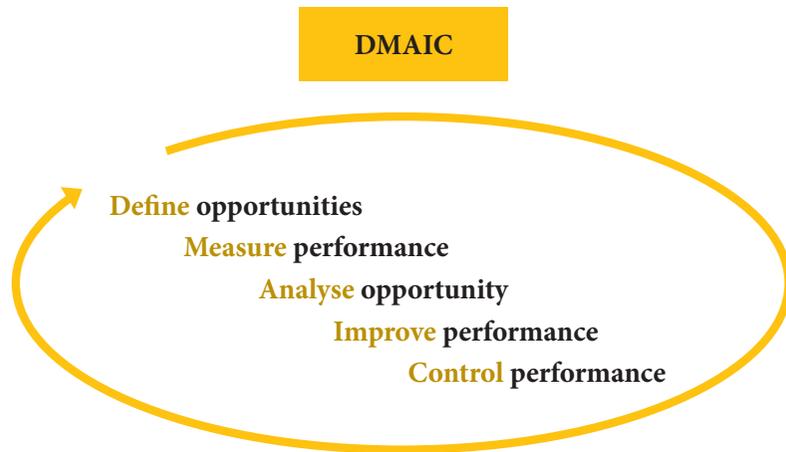


Figure 2

The primary question of What, When, Where, Who and How is to determine the present method with the objective of eliminating unnecessary actions, to combine steps, to re-arrange the sequence and to simplify. The secondary questions of, what else, where else, when else, who else, and how else, are designed to find alternatives and from the subsequent consideration of the alternatives to find a more efficient method. This is a systematic approach which inevitably leads to improvements.

### Six Sigma improvement

The Six Sigma DMAIC method is shown in Figure 2. This approach is not only for looking at a known problem, although it can be very effective if used in that way, but is basically designed to find improvements although there is no apparent or identified problem. Benchmarking against other organisations might have shown that their performance is better than ours. Benchmarking could be as broad as noting that another organisation has a better return on capital investment. The philosophy of Six Sigma being that no matter how well we think we are performing there is always room for improvement.

DMAIC is an iterative process of Defining opportunities, Measuring performance, Analysing opportunities, Improving performance and Controlling performance. In a true Six Sigma project, specialists trained in Six Sigma methodology (Master Black Belts or Black Belts) would head up DMAIC projects. For small breweries, this high (and expensive) level of input is not needed. The approach discussed below is designed as an in-house do-it-yourself approach for small enterprises. However, this is a team approach and if an organisation employs say eight people, it is recommended that most, if not all, of the

people be included in the DMAIC team. Bill Simpson (blog. [cara-online.com/2011/02/systematic-problem-solving-in-the-brewery](http://cara-online.com/2011/02/systematic-problem-solving-in-the-brewery)) says that DMAIC is best deployed with teams of four to 10 people, and that he has applied this methodology within breweries to solve a variety of process problems with good results. Problems have included beer off-flavour, beer taint, beer haze, beer foam, beer flavour stability, brew house extract yield, yeast viability, attenuation, filtration, and packaging efficiency.

The first step is to design the scope of the study. Here, we determine what we are looking at, the reason for the study and we agree on the team leader and the team leader's terms of reference. A big part of the DMAIC approach is measurement. Once a new process is established, the challenge will be to obtain consistence performance, and not to slip back into the old way of doing things. The performance control cycle shown in Figure 3 is designed to achieve a stable system. A stable system is when a standard has been set and is consistently achieved. Changing a process or system can be met with some resistance. Most people prefer to stay with what they know and often are reluctant to change. In selling a change to other members of the organisation, you have to be clear as to why you want to change – what are the driving forces for the change and the benefits that will accrue. In moving from the current state to a desired state, it will be necessary to unfreeze current ways of working, make the change, and then refreeze so that the new method becomes embedded. Restraining forces, such as resistance to change have to be understood. Often the restraining forces will be because people do not understand the wider benefits and are concerned with their own position in the operation and how the change will affect them. Figure 4 shows perspectives on managing change. →

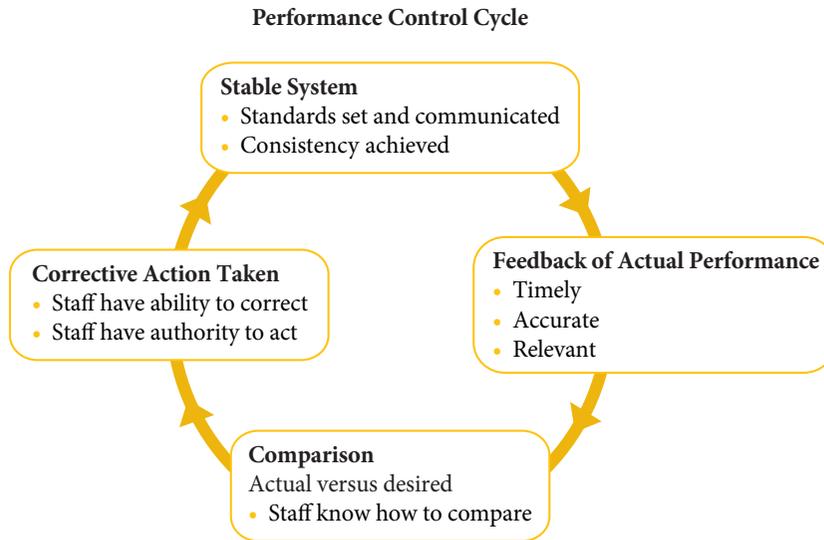


Figure 3

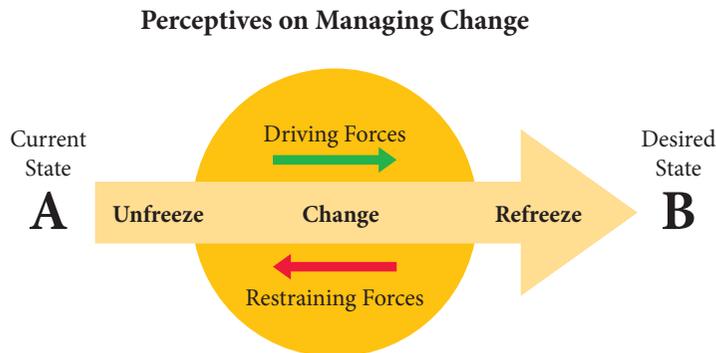


Figure 4

#### INFLUENCING THE EXTERNAL ENVIRONMENT

This article has discussed in-house actions to in-house problems. However, many problems faced by a small brewery will not be of their making. As stated earlier in the article, external problems can be up-stream and/or down-stream of the supply chain. Up-stream includes suppliers and problems can include reliability of suppliers of materials (quality, late deliveries, wrong quantities, incorrect invoicing, etc.), service companies, contractors, and infrastructure. Down-stream includes logistics, warehousing, distributors, and retailers. In these cases all of the quality and control approaches discussed above are applicable, but it is likely that analysis of an issue will only show from where the problems have originated and remedial action will often to a large extent be out of our direct

control. Once we know who or what is impacting on our ability to perform, we can do one of two things. We could seek for a new supplier or contractor, or we can negotiate with our problem supplier. If we decide to negotiate, we will need to arrange a formal meeting with the problem maker to explain our concerns and where possible to suggest a solution. Such meetings need to be carefully planned. We will need to have facts and numbers to back up our concerns. Ideally, we should also be able to suggest actions that could be taken to improve the situation. Ad hoc, heat of the moment meetings should be avoided. Best results are likely to be achieved if our arguments are rational and non-confrontational. The problem-solving tools discussed above will show where the problem is and will indicate actions that should be taken. Good luck! ☺