

Root map

Worryingly enough, over 50 per cent of organisations admit that their root cause analysis efforts are 'not very effective'. How can they ever hope to get rid of problems and – most importantly – stop them happening over and over again? Duke Okes outlines some common ways effective analysis fails.

Let's begin by asking one very simple question: how effectively do you believe problems (audit nonconformities, product and process failures, customer complaints etc) are carried out in your organization? We aren't talking here about how long it takes, but whether or not the problem is actually solved as measured by whether or not it recurs.

Survey research conducted by the author in 2004 and 2005 found that about 50 per cent of organisations believe their root cause analysis efforts are not very effective, and it is likely that many who believe they are effective don't truly understand what it means.

There are many reasons that root cause analysis fails, including the belief that software can solve problems. Finding root causes does not mean selecting them from a drop-down menu on a software application (as Dunn wrote in his book *Getting Root Cause Analysis to Work for You*), but instead gaining a comprehensive understanding of the system to be fixed.

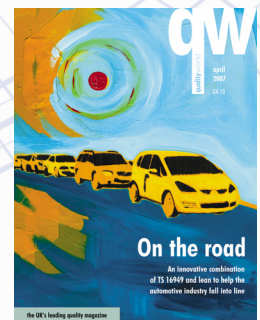
Regardless of the number of corrective action requests that may be initiated, root cause analysis should not be interpreted as a paperwork exercise – it's a cognitive one.

Poor approaches

It isn't unusual for problem solving discussions to jump directly from problem definition to possible solutions. Sometimes there is some discussion about what the causes might be but very little effort is actually put into trying to find out which one is correct. If there is a discussion of causes, it often ends with someone making a subjective decision about which she or he believes, rather than being purely data-driven.

The solution is then often more about show or politics rather than real problem resolution. Such an approach to problem-solving is fine if the situation is a creative problem for which any workable solution would be acceptable – for example, you're stuck in traffic and late for an important presentation. However, if it is an analytical situation, e.g. the projector connected to the computer containing your presentation isn't synchronizing, it calls for systemic incremental cause and effect skills not taught in most schools.

Even if the problem is an analytical one, it may not be worth taking the time to do an in-depth analysis, since not all problems are the same. That is, finding and correcting the physical cause (e.g. a faulty connector on the end of the projector cable) may be sufficient, rather than trying to also



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determine the underlying policy or procedural problem (e.g. there is no standardized way of storing cables to prevent damage to connectors) which allowed it to occur in the first place.

Organisations need a process for deciding what depth of analysis to apply to each problem situation, considering criteria such as failure cost, risk impact, frequency of occurrence and opportunity costs. Unfortunately, many complaints received from customers automatically request an in-depth corrective action, even though rational analysis would indicate that it may not make good business sense.

Since all organisations have limited resources, they must properly allocate them to areas which will result in the greatest payoff for all parties involved. For example, it may make no sense to spend time to correct a deficiency in a product line that an organization plans to discontinue unless there are related risks such as damage to an organisation's reputation.

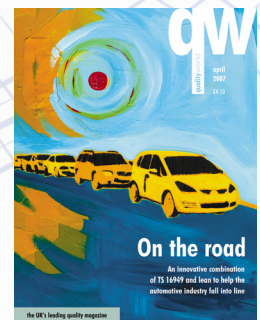
Success principles

- establish executive support: deploy your root cause analysis system only after you have substantial support within the executive management group
- select a root cause analysis system that meets your needs. This determines the quality of information about your problems you will have to work with
- select training that conveys root cause problem solving and analysis skills. Training must focus on the transference of problem-solving skills
- require continual root cause analysis activity. Don't just wait for some major crisis to occur before using your root cause analysis resources
- set the bar for analysis. Establish specific criteria for cases upon which your root cause analysis resources will be applied
- build into your process a way to provide feedback to your trained analysts
- build recognition into your programme. Set one or two ongoing programmes that will provide incentive and recognition for activity and performance
- establish dual metrics. Organisations need to have a way to recognize needs and a way to demonstrate progress in improving operations

Source: www.rootcause.com

Implementation issues

Of course, not all poor problem-solving outcomes are due to poor analyses. Sometimes the implementation process fails. For example, there may be inadequate follow up to ensure that the changed process has been fully and completely implemented. A couple of choices are to reverse the solution to see if the problem returns or do formal follow ups at 30, 60 and 90 day intervals.



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Another potential problem is that there may have been inadequate consideration of unintended consequences of the solution. For example, rumble strips used to warn drivers when they are veering off the highway may actually cause more ice build up in the winter and so making the roadside more treacherous.

Even if an organization successfully resolves a problem, it may forget one potential benefit: the use of leverage. There are likely to be other processes, departments or facilities where the learning from each root cause analysis project could be beneficial. For example, if one facility of a company encounters but successfully solves a labelling error problem, the problem and solution should be communicated to other facilities. Part of the root cause analysis process should then include standardization not only in the specific problem area, but also across the organization.

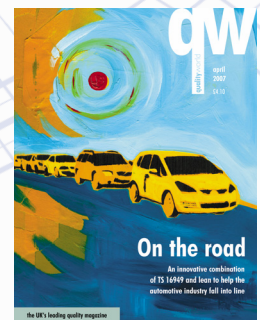
Cognitive support

Although many organisations have conducted training in process improvement – with the seven quality control tools (cause-and-effect diagrams, check sheets, control charts, histograms, Pareto charts, scatter diagrams and flow charts) and the define, measure, analyze, improve and control (DMAIC) model – most still use a problem-solving model that does not have sufficient depth to ensure that good logic is being applied and that the system or process is well analyzed.

Developing a model that recognizes the cognitive shifts required as one works through a problem can help, especially if supported by experiential training. Research on root cause analysis found that nearly two thirds of companies do not have a model and only 20 per cent actually provide root cause analysis training for employees. Following are the first steps of an effective model which takes into consideration different cognitive processes:

- define the problem – a convergent process (where thoughts tend to follow well-established patterns) whereby symptoms are analyzed and formulated into a problem statement
- understand the process and possible causes – a divergent step (using unfamiliar premises and avoiding commonly held assumptions) which requires a suspension of judgement and a degree of stepping back to gain an accurate perspective of the many potential causes
- collect and analyze data – a convergent process that eliminates some causes and thereby leads to a more narrow problem definition (ie return to the first step)

These steps are worked through iteratively until the appropriate level of cause is found. During the process people often rely too heavily on past experience which causes critical information to be ignored. Good root cause analysis needs a thorough integration of theory and experience.



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A good root cause analysis model supported by training becomes a form of Six Sigma 'lite' – it should be logical thinking without all the heavy statistics. It can have a broader impact beyond root cause analysis projects since the building of cognitive skills will spill over into other important decision making processes.

Case studies

Policy conflicts

A company was continually incurring overtime at its heat-treat oven. The oven was continually down for the changing temperature sensors. When it was investigated in more detail it was discovered that the purchasing department had changed suppliers of the sensors in order to save money, which was in accordance with the policy of buying maintenance, repair and overhaul items at the lowest possible cost.

However, even though the less expensive components were technically equivalent in electrical performance, they were shorter in dimension which caused them to perform differently.

This is a useful example of how policies within an organization are often in conflict. While they may be conceptually understood, finding and documenting evidence of problems created by policies is necessary, and one for which root cause analysis is very useful.

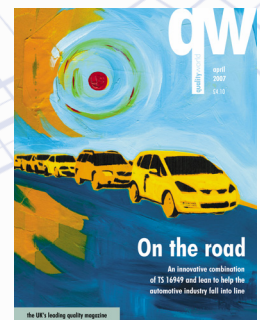
Lack of applied research

One topic that will increasingly be at the forefront of root cause analysis efforts in the future is that of human error. As computerization, 'poka yoke' (mistake proofing) devices and other solutions are applied to reduce machine-orientated causes to Six Sigma levels, human errors will become a larger proportion of the causes needing to be addressed.

While James Reason's classic book on human error and the categories he highlighted (namely he separated errors into skill, rule and knowledge-based) have made a valuable contribution, very little applied research using new models has been conducted and disseminated outside high risk industries such as air travel and nuclear power.

Much of the work in these industries is still related to incidents or events, rather than repetitive problems, which still dominate many root cause analysis situations. Meanwhile, industries such as healthcare, hospitality and education are highly dependent on human decision making, making research on the topic even more pressing.

Root cause analysis is currently a hot topic – since 9/11 and the Enron debacles the desire for accountability has increased. While there are several reasons organisations may not do it well, each needs to apply root cause analysis thinking to their own difficulties and take appropriate action.



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One place to start is by ensuring that senior management understands root cause analysis. Examples of its relevance to not only operational issues but also strategic ones can really help to grab their attention.

Case studies

No customers

A regional chapter of a professional organization had been productive over a number of years, so was in a secure financial position.

One of its members wanted to fund a scholarship programme under the auspices of the case study organization. The programme was developed (i.e. the qualification criteria and application process) and marketed. However, after two years there had been no applications.

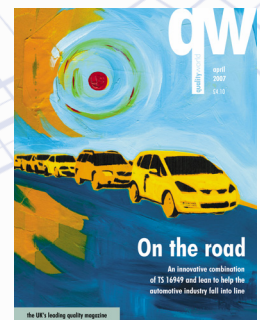
While the problem could have been due to poor communication of the programme or deficiencies in the mail system, the physical cause was found to be a lack of adequate numbers of potential candidates. The qualification criteria were too narrow and the amount of the scholarship was very small relative to the economic status of the families of the potential candidates.

The process root cause was the fact that the organization did not do a market study to determine the potential interest in the programme. Such a study was not part of the normal function of the organization, since its mission did not include the regular development of new products. This is a very clear example of a root cause being a deficient strategy rather than an operational decision.

Note that this example shows how there was a physical problem (the number of potential candidates) that could have been remedied by various means, such as broadening the criteria.

However, such a solution would have only fixed this particular problem, and not the underlying process problem (the lack of a feasibility study to determine the viability of the new programme before launching it). It is this second level that most root cause analyses do not address, and one that should be addressed when it is likely that the same process will produce other problems.

Author bio - Duke Okes is a knowledge architect who provides consulting and training in quality management. He is a fellow of the American Society for Quality. He can be contacted at www.aplomet.com



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SEPTEMBER 2006