Qualityinfo

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Improving Your Root Cause Analysis and Corrective Action Processes

Exploring what, why, and how to improve your processes

If your company develops a problem along the way with one of your processes, how do you resolve it? While the shortcut option is to simply patch up the symptoms of whatever that problem may be, the long-term solution is to perform a root cause analysis and corrective action (RCACA) process.

By utilizing this root cause analysis and corrective action process, your organization strengthens its internal and external procedures by getting to the heart of the problem rather than managing the consequences of it. But what is RCACA, and how can you implement it in your organization? This comprehensive guide has everything you need to get started.

What is RCACA, and why is it important?

RCACA is a process used to systematically analyze a problem to determine its underlying causes. It leads to identifying the cause and effect relationship in the process. Rather than blame people for mistakes, RCACA aims to analyze each step of a procedure to truly understand where errors might arise, track patterns, and more.

When to perform RCACA

Your organization should perform RCACA as part of a corrective action plan, or when not performing one could impact your levels of customer quality, delivery, or satisfaction. Some large customers often make it a mandatory part of their business; for example, Toyota's RCACA is recognized best-in-class in the automotive industry.

Quality problems should always be solved as a team; gather the process experts who should assist with this problem and who have a wide variety of skills and knowledge to provide different perspectives.

Overview of the RCACA process

The RCACA process generally follows these steps:

- Begin with the problem statement.
- Confirm by "going to the *gemba.*"
- Collect data for analysis.
- Formulate a theory.
- Achieve short-term containment
- Develop theories for the long-term corrective action.
- Implement the long-term actions.
- Monitor the solution.
- Verify all is resolved, not just patched up.
- Update relevant documents.

Before diving into each step, however, it's important to apply a systems-thinking approach to the overall process.

Employing a systems-thinking approach to the RCACA process

Many times, due to time and schedule pressure and other factors, it seems easier to solve a problem by treating the symptoms, not the root cause. However, the same problem will recur—and if Murphy's Law has anything to say about it, at the worst possible time. Over time, unresolved root causes build up, resulting in a situation where one is jumping from one crisis to the next. It quickly becomes a rather ineffective and inefficient situation.

Instead, try to use a systems-thinking approach by listing all the factors that created the situation, consider the bigger picture, elicit perspectives from others, and truly seek to understand the weakness in the process. This approach is slower and more methodical but is well worth the effort to fully understand the manufacturing process and reduce the number of "fires" to fight over the long term.

Below is an overview of each step of the RCACA process:

Begin with the problem statement

The problem statement should:

- Focus on one narrowly defined problem.

- Be clear, concise, and factual.
- State the result and/or consequence.
- Describe the problem in measurable terms.

The problem statement does not:

- Assign a cause for the problem.
- Describe how to fix the problem.
- Essentially, you should be able to define the who, what, when, where, and how of the problem!

Confirm by 'going to the *gemba'*

Going to the *gemba* is the act of visiting the shop floor in lean. Translated as "the real place," it pushes the importance that leadership understand what is happening at every level.

This entails:

- Doing a walk-through of the process, also known as *genchi genbutsu*, which translates to "go and see," or, "go to the actual place to see the actual circumstances"
- Analyzing the process: What are the weaknesses?
- Asking yourself if the problem can be duplicated. If not, what would have to change to make it happen again?

Part of this also includes interviewing the process users, such as floor personnel, production leads, supervisors, customers, and suppliers, to review procedures, methods, activities, and tasks.

Collect data for analysis

Once you can define the problem, you and your team must establish why it happened. This step incorporates gathering all the facts of the situation and processing them to determine causal relationships. This will point you in the direction of the root cause of the problem.

Factors to consider might include:

• **Evaluate the equipment:** Is the machine performance and maintenance up to par? Are the methods and appropriate procedures being followed? Do these policies have sufficient detail, or is there room for human error?

• **Materials:** Are the materials involved the appropriate grade or quality? Are they being properly stored and handled? Is there any evidence of contamination?

Formulate a theory

After acquiring the aforementioned facts and context of the problem, state the potential causes of the nonconformity and list all the tasks involved in the particular manufacturing process. Formulate a theory of root cause and designate how information—i.e., due date, days, tally, total—will be objectively recorded.

Review these records. What does this information tell you? Can you identify potential causal factors? Which qualities are leading to the problem: work environment, workflow, lighting, personnel training, distractions, or something else?

Achieve short-term containment

To “stop the bleeding,” you’ll need to establish containment actions. This might entail changing equipment, retraining operators, and switching material suppliers. Short-term containment ensures the customer is protected from being immediately affected by the problem; it’s not a long-term solution, nor does it count as the problem having been resolved.

Develop theories for the long-term corrective action

Next, select and implement the appropriate long-term corrective action solution. There might be several solutions available to you; be sure to choose the solution that:

- Will best eliminate the root cause
- Is most cost-effective
- Is the most appropriate to the magnitude of the problem
- Effectively changes the process

From these factors, identify the best solution by ranking them and assigning importance to each possible path. This will help objectively determine the best course of action for your manufacturing team.

Implement the long-term actions

After selecting the best solution, you need to implement these changes. Start by dividing the solution into sequential tasks, and create an action items list with responsibilities and due dates assigned to each pertinent team member. Be sure to have a contingency plan, however, and ask yourself what could go wrong, how you'll know something has gone wrong, and what could be done to prevent it. Such questions aren't pessimistic; in fact, they demonstrate taking initiative and actively engaging with the RCACA process.

Monitor the solution

Monitor the problem to ensure that the nonconformance does not reoccur. If it does, reject the root cause, then implement an alternate solution. Always determine if the nonconformance affected the product elsewhere in the organization, or if any nonconforming product was shipped to the customer. You'll want to resolve that with them as soon as possible.

Verify all is resolved, not just patched up

Allow sufficient time for the problem to reoccur to determine if you properly addressed it. The problem might not reappear for a couple of weeks, for example, but that doesn't mean it won't return if the chosen corrective actions aren't enduring. Verify that the identified problem has been addressed, and it no longer occurs. There's no official time limit, but your solution must work consistently.

Update the relevant documents

Revise existing documents with the new solution. Be sure to revisit:

- Procedures and user handbooks
- Guidelines specifications
- Service manuals
- Create new work instructions to document any new processes
- Distribute the new procedures
- Document the RCACA process in the corrective action request

Quality tools to use in RCACA processes

These quality tools can help your manufacturing organization improve your RCCA process.

Histogram

A histogram is a graphical representation that organizes a group of data points into user-specified ranges. Similar in appearance to a bar graph, the histogram condenses a data series into an easily interpreted visual by taking many data points and grouping them into logical ranges or bins.

Brainstorming

Brainstorming is a group creativity technique by which efforts are made to find a conclusion for a specific problem by gathering a list of ideas spontaneously contributed by group members. Your employees can provide valuable insight into the manufacturing process, so gathering their input along the way of your RCACA process is important.

Control chart

Control charts, also known as Shewhart charts or process behavior charts, are a statistical process control tool used to determine if a manufacturing or business process is in a state of control. In other words, it's a graph used to study how a process changes over time.

Scattergram

A scatter plot is a type of plot or mathematical diagram using Cartesian coordinates to display values for typically two variables for a set of data. This method of organizing data can reveal any present correlations between variables.

Pareto analysis

Pareto analysis is a formal technique useful to graphically represent the impact of various causes. They are based on the Pareto Principle, also known as the 80/20 rule. According to the Pareto principle, over time, roughly 80 percent of the defects, for example, will come from 20 percent of the causes. So, by gathering and charting data, you gain visibility of the causes that will have the greatest impact. Take care of 80 percent of your problems or defects by focusing your energy on those causes that are most important.

Check sheets

Check sheets are not complicated to create. But oddly, they are probably the least used and most valuable of the quality tools. A check sheet is a form used to collect data in real time at the location where the data are generated. The data the check sheet

captures can be quantitative or qualitative. When the information is quantitative, the check sheet is sometimes called a tally sheet.

Process flow diagrams

A process flow diagram (PFD) is a diagram commonly used in chemical and process engineering to indicate the general flow of plant processes and equipment. The PFD displays the relationship between major equipment of a plant facility and does not show minor details such as piping details and designations.

Cause and effect diagram

Sometimes referred to as a fishbone diagram, cause-and-effect diagrams are a visual tool used to logically organize possible causes for a specific problem or effect by graphically displaying them in increasing detail, suggesting causal relationships among theories.

The 5 Whys

Ask “why?” at least five times; stop when going further adds no more value. When done, add the word “so” or “therefore” at the end of each response, and then work backward, to the top of the page, to confirm the logic.
For example: Why did the lights go out?

W1: Why did the lights go out? The fuse blew.

W2: Why did the fuse blow? The motor overheated and caused a burning odor.

W3: Why did the motor overheat? The motor’s bearing failed.

W4: Why did the motor’s bearing fail? The wrong seal was installed, and it allowed the lubricant to leak out.

W5: Why was the wrong bearing seal used? It was assembled incorrectly.

W6: Why was the bearing assembled incorrectly? The assembly process was not robust; it was designed without checkpoints for the operator, and there were no work instructions to follow.

SIPOC diagram

A SIPOC (suppliers, inputs, process, outputs, customers) diagram is a tool used by a team to identify all relevant elements of a process improvement project before work begins. It helps define a complex project that may not be well scoped and is typically employed during the measure phase of the define, measure, analyze, improve, control (DMAIC) problem-solving methodology. It is similar and related to process mapping and "in/out of scope" tools, but it provides additional detail.

FMEA analysis

Failure mode and effects analysis is the process of reviewing as many components, assemblies, and subsystems as possible to identify potential failure modes in a system and their causes and effects. It's a systematic and proactive method for evaluating a process to identify where and how it might fail, and to assess the relative impact of different failures, thereby identifying the parts of the process that are most in need of change.

Concentration diagram

A defect concentration diagram is a graphical tool that is useful in analyzing the causes of the product or part defects. It's a drawing of the product, with all relevant views displayed, onto which the locations and frequencies of various defects are shown.

Eight disciplines analysis

This is a method developed at Ford Motor Co. and is used to approach and resolve problems. It's typically employed by quality engineers or other professionals. Focused on product and process improvement, its purpose is to identify, correct, and eliminate recurring problems.

There are eight disciplines of problem-solving:

- Establish the team.
- Describe the problem.
- Develop interim containment actions.
- Define and verify root causes and escape points.
- Choose and verify permanent corrective actions.
- Implement and validate permanent corrective actions.
- Prevent recurrence.
- Recognize team and individual contributions.

RCACA supports quality improvement by promoting a problem-solving culture of team communication, which results in behavioral change and stronger company culture. People learn to address the root causes and not the symptoms of problems. This line of thinking promotes deeper employee engagement and overall empowerment among your employees.

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