ROOT CAUSE ANALYSIS

Root cause analysis (RCA) is a method of problem solving used for identifying the root causes of faults or problems. It is a structured team process that assists in identifying underlying factors or causes of an Abnormality. Understanding the contributing factors or causes of a system failure can help develop actions that sustain the correction. A factor is considered a root cause if removal thereof from the problem-fault-sequence prevents the final undesirable event from recurring.

In this note two concepts of RCA are briefly explained:

#1 FIVE WHY ANALYSIS

#2 CAUSE & EFFECT ANALYSIS / ISHIKAWA DIAGRAM

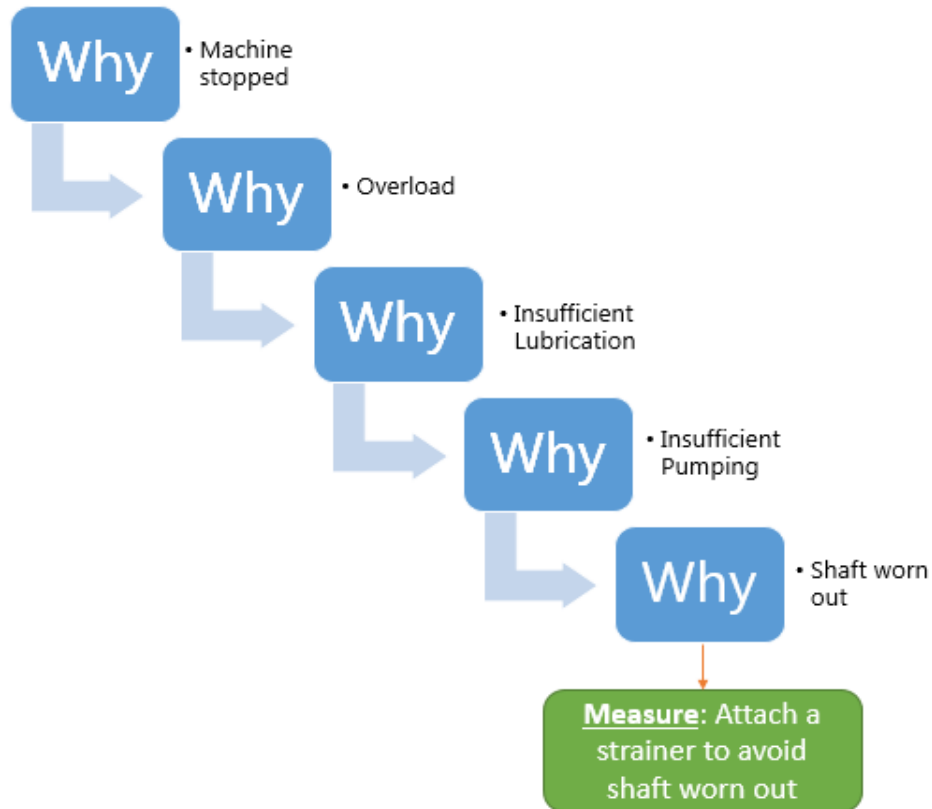By ANM Strategic & Management Consultants, Raipur

#1 FIVE WHY ANALYSIS

1. ## OVERVIEW

Five Why analysis is a scientific method employed in Toyota manufacturing systems which lead to the discovery of many lean philosophies and tools used today. Five whys analysis is the art of systematically drilling down to a real root cause. It's a simple, yet effective way to determine the root causes in almost any situation. Essentially, you can find the root cause of a problem and show the relationship of causes by repeatedly asking the question, "Why?".When confronted with a problem, ask "Why?" repeatedly five times to uncover the root cause of the problem.

2. ## APPLYING FIVE WHYS ANALYSIS

You could say five whys analysis is the art of asking the right question at the right time. It's important not to skip levels of questions or hurry through them to reach a perceived root cause. You must approach this analysis step by step with logical questions summarizing the observations from earlier questions.

EXAMPLE

Why • Machine stopped

Why • Overload

Why • Insufficient Lubrication

Why • Insufficient Pumping

Why • Shaft worn out

Measure: Attach a strainer to avoid shaft worn out

1. Why did the machine stop?
There was an overload and the fuse blew.

2. Why was there an overload?
The baring was not sufficiently lubricated.

3. Why it was not lubricated sufficiently?
The lubrication pump was not pumping sufficiently.

4. Why it was not pumping sufficiently?
The shaft of the pump was worn and rattling.

5. Why the shaft worn out?
There was no strainer attached and metal scrap got in.

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If this procedure was not carried out, one might simply replace the fuse or the pump shaft and the problem would have recurred within a few months.

3. THINGS TO REMEMBER

It's important not to leave any loose ends. Each loose end must be tied up with a fresh why question or it should become part of another question being asked.

Another critical point in this analysis knows when to stop asking why. Sometimes it is not necessary that the root cause is always encountered at the 5th why. Some experienced practitioners say that you have reached the true root cause when the answer to your why question is a process, policy or a person. Often, these answers turn out to be the real root causes.

Knowing when to stop mostly depends on three questions:

- How relevant are the questions and answers to the original X or Y you are investigating?
- Did you find a root cause that helps you control or avoid the situation?
- Are the questions and answers significant enough, considering your project scope?

#2 CAUSE & EFFECT ANALYSIS / ISHIKAWA DIAGRAM

1. OVERVIEW

A cause and effect diagram, often called a "fishbone" diagram, can help in brainstorming to identify possible causes of a problem and in sorting ideas into useful categories. A fishbone diagram is a visual way to look at cause and effect. It is a more structured approach than some other tools available for brainstorming causes of a problem (e.g., the Five Whys tool). The problem or effect is displayed at the head or mouth of the fish. Possible contributing causes are listed on the smaller "bones" under various cause categories. A fishbone diagram can be helpful in identifying possible causes for a problem that might not otherwise be considered by directing the team to look at the categories and think of alternative causes.

2. APPLYING CAUSE & EFFECT ANALYSIS

The team using the fishbone diagram tool should carry out the steps listed below:

● Agree on the problem statement (also referred to as the effect). This is written at the mouth of the "fish." Be as clear and specific as you can about the problem. Beware of defining the problem in terms of a solution (e.g., we need more of something).

● Agree on the major categories of causes of the problem (written as branches from the main arrow). Causes *Determination is explained briefly at the end of this literature*. Major categories often include: equipment or supply factors, environmental factors, rules/policy/procedure factors, and people/staff factors.

● Brainstorm all the possible causes of the problem by Why Analysis. Ask "Why does this happen?" As each idea is given, the facilitator writes the causal factor as a branch from the appropriate category (places it on the fishbone diagram). Causes can be written in several places if they relate to several categories.

● Again asks "Why does this happen?" about each cause. Write sub-causes branching off the cause branches.

● Continues to ask "Why?" and generate deeper levels of causes and continue organizing them under related causes or categories. This will help you to identify and then address root causes to prevent future problems.

CAUSE   **EFFECT**
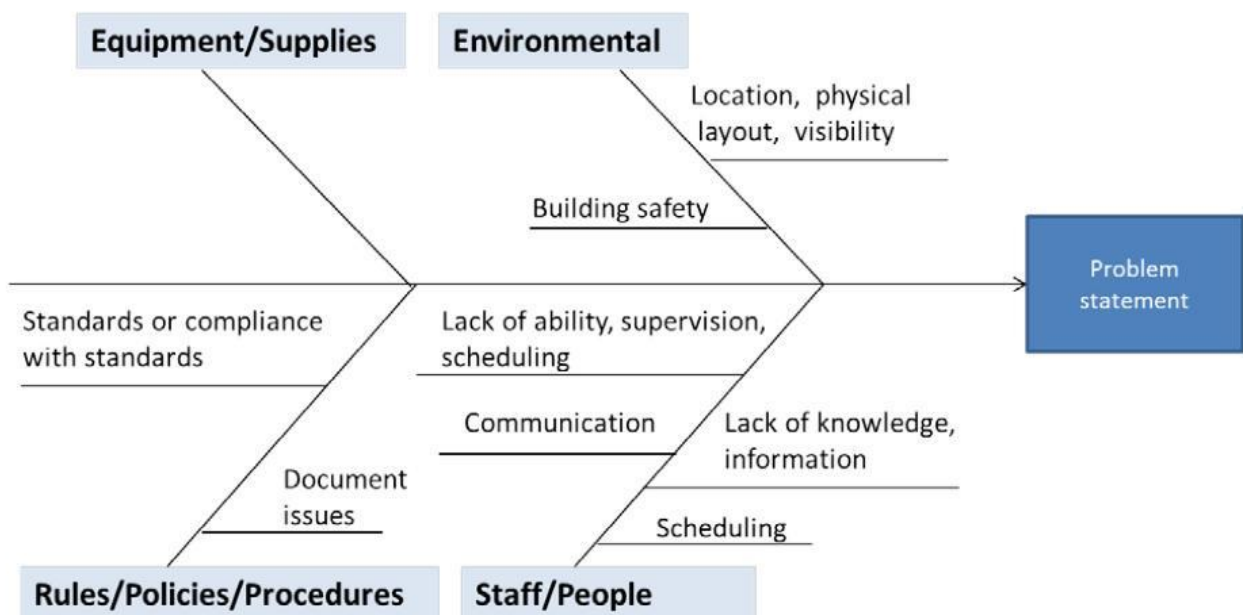
An example of the start of a fishbone diagram that shows sample categories to consider, along with some sample causes.

CAUSE CONSIDERATIONS IN THE DIAGRAM

The 5 ms (used in manufacturing industry)

- **MAN:**Anyone involved with the process
- **MATERIALS:**Raw materials, parts, pens, paper, etc. Used to produce the final product
- **MACHINES:**Any equipment, computers, tools, etc. Required to accomplish the job
- **METHODS:**How the process is performed and the specific requirements for doing it, such as policies, procedures, rules, regulations and laws
- **MEASUREMENTS:**Data generated from the process that are used to evaluate its quality

  Even at times environment is also considered in the same

****ENVIRONMENT**: The conditions, such as location, time, temperature, and culture in which the process operates.

3. **THINGS TO REMEMBER**

● Use the fishbone diagram tool to keep the team focused on the causes of the problem, rather than the symptoms.

● Consider drawing your fish on a flip chart or large dry erase board.

● Make sure to leave enough space between the major categories on the diagram so that you can add minor detailed causes later.

● Encourage each person to participate in the brainstorming activity and to voice their own opinions.

● Note that the "five-whys" technique is often used in conjunction with the fishbone diagram – keep asking why until you get to the root cause.

● To help identify the root causes from all the ideas generated, consider a multi-voting technique such as having each team member identify the top three root causes. Ask each team member to place three tally marks or colored sticky dots on the fishbone next to what they believe are the root causes that could potentially be addressed.