

Cause & Effect Analysis

Cause and Effect Analysis

What is it?

Cause and Effect Analysis Diagrams (C & E) are a device for identifying relationships between problems or changes in a system and their potential causes. It is also called the fishbone chart (from its general appearance) and the Ishikawa diagram (after its originator).

The diagram has a main stem (often called the backbone) labelled at one end with the problem or effect being investigated. Ribs leading into this backbone are related to major areas of potential causes. The ribs are progressively subdivided (riblets, or branches, twigs, etc.) to provide detailed cause identification.

The basic steps used in developing a Cause and Effect Diagram are shown on the following diagram.

Relationships between causes and the effect can be studied and ideas for improvement or a strategy for further investigation developed.

Cause and Effect Diagrams are used in three main formats (though various hybrids exist):

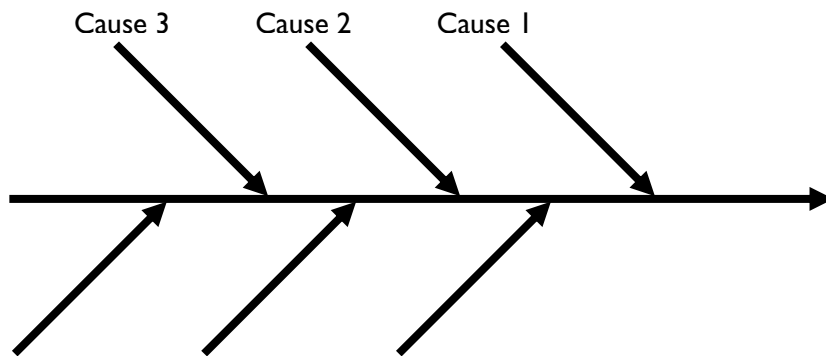
- cause enumeration
- process flow
- dispersion analysis

Steps in the Development of a Cause and Effect Diagram

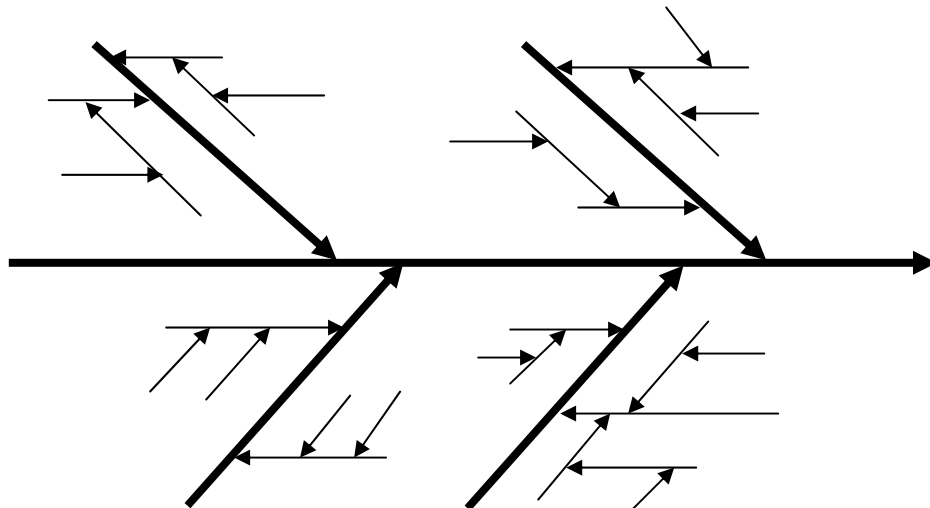
For each effect...



... there is a cause or causes ...



... and the causes themselves have causes.



Cause Enumeration Cause and Effect Diagram

With the Cause Enumeration Cause and Effect Diagram areas of activity relating to some or all of certain features common to most diagrams are labelled as the main stems. These labels are often taken to be:

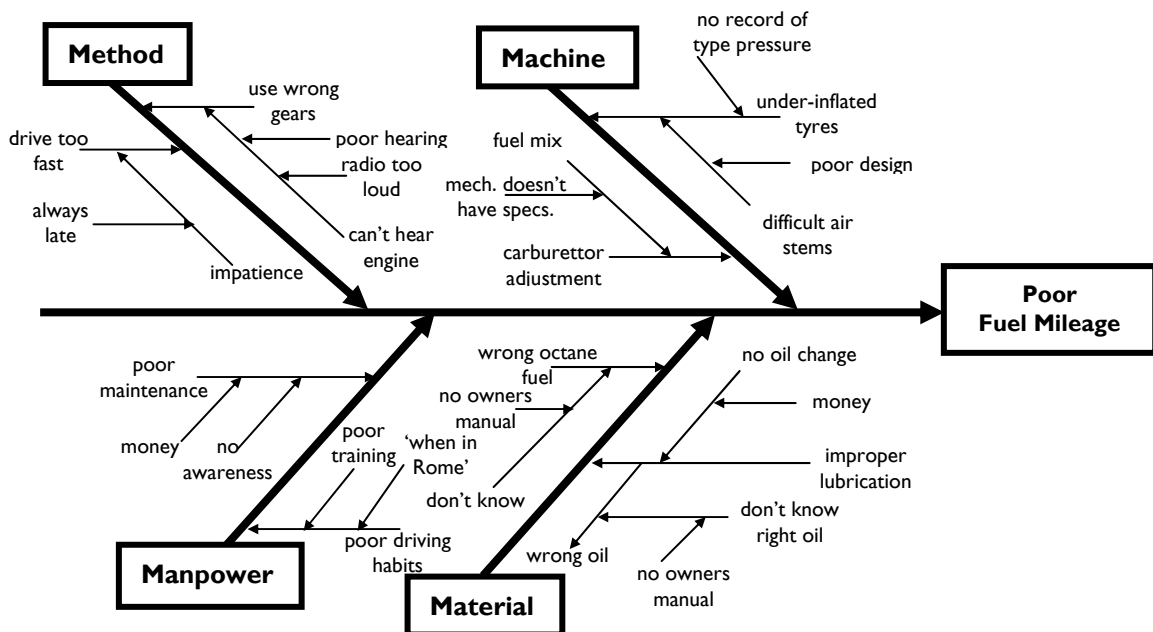
for product/service related processes:

- method, equipment, people, environment and material (MEPEM)
- man, method, machine, material and maintenance (5M)
- workers, tools, material and maintenance

for administrative processes:

- people, procedures, practices and plant (4P)

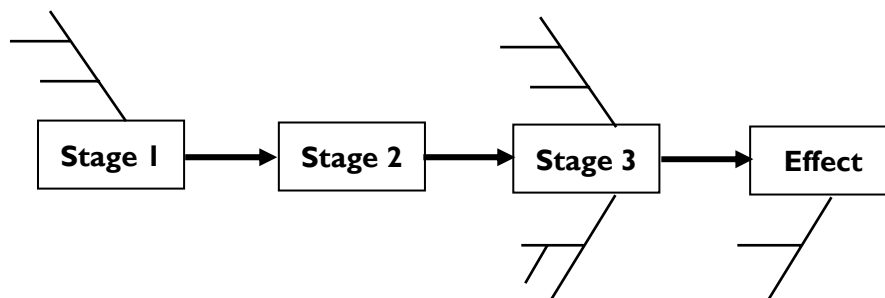
An example of a cause enumeration Cause and Effect Diagram is shown below.



Process Flow Cause and Effect Diagram

With the process Cause and Effect Diagram the effect is identified as the output of a process and the main ribs are identified with the principal process stages (in sequence). The figure shows that it is developed from a basic process flow diagram. It thus demands specific process knowledge on the part of the participants. The process can be analysed on a progressive basis, stage by stage, by considering the question:

- What can cause the effect at this stage of the process?

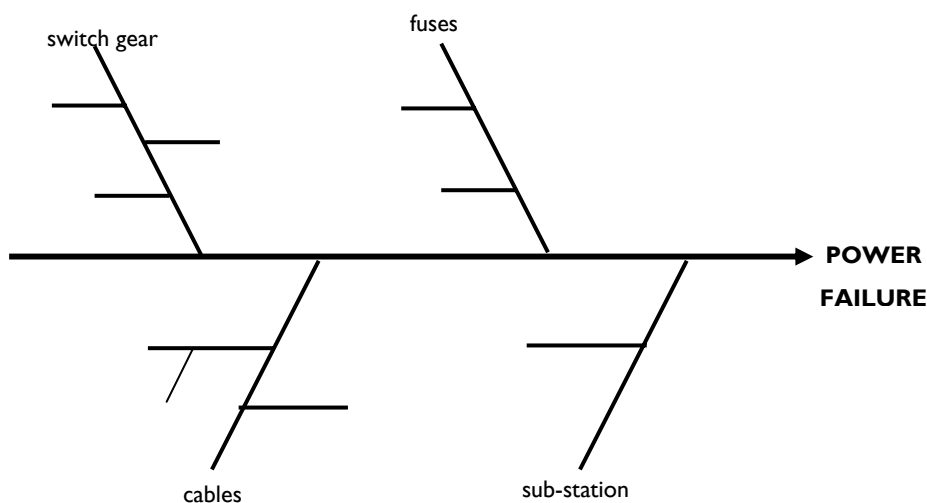


Dispersion Cause and Effect Diagram

Here the main causes are labelled as the principal ribs, subdividing into contributory and sub-causes. It is developed by continually asking and answering the question:

- Why does this aspect cause the effect?

As no starting point is given for the heading of the main ribs, as with, for example, the MEPEM diagram, it requires considerable knowledge on the part of the participants.



Solution Effect Diagram

What are they?

Solution Effect Analysis is a technique for identifying the likely effects of a proposed solution to a problem. A Solution Effect Diagram is a visually effective way of recording the possible effects, particularly those which might themselves cause problems.

When to use them

- considering the effects of a particular solution
- comparing alternative solutions

What do they achieve?

A problem may have one or more possible solutions and, to help select the best solution, it is necessary to evaluate the implications of all of them. This can be achieved by using a Solution Effect Diagram to identify major and minor effects.

By doing this we can identify and prevent any unwanted 'side effects' of our solution.

More specifically, Solution Effect Diagrams can be used to:

- assist both individuals and groups to generate ideas
- serve as a recording device for ideas generated

As for Cause and Effect Diagrams, the level of development or analysis is reflected in the amount of detail on the diagram.

Tell me more

Most problems have more than one solution and it is important, if remedial action is to be effective, that these are identified and their full effects assessed to enable the best solution to be applied. A powerful way of analysing solutions will combine analytical and creative thought with team effort.

We can make use of a similar format to that used for Cause and Effect Diagrams.

What do I have to do?

Constructing a Solution Effect Diagram is a four step process:

Step 1:

The first step is to define the solution. This is placed in a box and a long process line is drawn pointing away from the box.

Step 2:

The second step involves defining the major types of effects. These major effects are placed parallel to, and some distance from the main process line.

Step 3:

The third step is to Brainstorm for possible effects, which are written on the chart clustered around the major types of effect. The effects should be divided and sub-divided as necessary. Mark any inter-linked effects.

Step 4:

The fourth step is to analyse and evaluate the possible effects. Treat the groups of effects as theories, and apply logical analysis. This will reveal which are valid.

Points to Remember

Developing a Solution Effect Diagram is essentially similar to developing a Cause and Effect Diagram. The same techniques to ensure success apply.

Refer to the Cause and Effect Diagram section for complete details.

Example

The outline example that follows shows the diagram constructed around the solution 'Provide additional training' to the problem 'Late wage payment'.

