

SEVEN MANAGEMENT AND PLANNING TOOLS

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Abstract: Thanks to globalization and rapid advances in technology, today's manufacturing environment is increasingly competitive. Manufactures need to stay focused on finding new ways to design, produce, sell and deliver products. So, the paper presents seven management and planning tools which promote innovation, communicate information and successfully plan major projects.

Keywords: quality, tools, management, planning, diagram.

1. INTRODUCTION

With continuous improvement (kaizen) and Total Quality Control (TQC) becoming increasingly important to world class companies, there's an urgent need to build quality into every management decision. The tools presented in this paper allow us to do just that. They represent the most important advance in quality deployment and project management. Unlike the seven traditional Quality Control tools, which measure quality problems that already exist and are used by quality circles, these seven new Quality Control tools make it possible for managers to plan wide-ranging and detailed TQC objectives throughout the entire organization. These tools, some borrowed from other disciplines and others developed specifically for quality management, include [1]:

1. Relations Diagram;
2. Affinity Diagram (KJ Method);
3. Tree Diagram (Systematic Diagram);
4. Matrix Diagram;
5. Matrix Data Analysis;
6. Process Decision Program Chart (PDPC);
7. Arrow Diagram.

Together they will help us to:

- Expand the scope of quality efforts company-wide;
- Set up and manage the systems necessary to resolve major quality problems;
- Anticipate potential quality problems and actually eliminate defects before they happen.

2. RELATIONS DIAGRAM

The relations diagram shows cause “C”-and-effect “E” relationships (Fig.1). Just as importantly, the process of creating a relations diagram helps a group analyze the natural links between different aspects of a complex situation.

We can use it when try to understand links between ideas or cause-and-effect relationships (such as when try to identify an area of greatest impact for improvement), when a complex issue is being analyzed for causes, when a complex solution is being implemented, after generating an affinity diagram, cause-and-effect diagram or tree diagram, to more completely explore the relations of ideas.

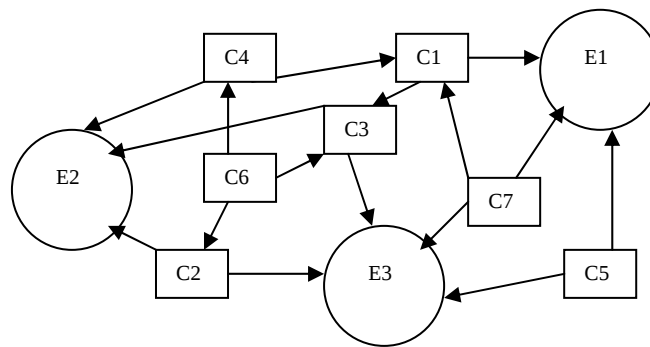


Fig. 1. Relations Diagram

To create a Relations Diagram:

1. Agree on the issue or question;
2. Add a symbol to the diagram for every element involved in the issue;
3. Compare each element to all others. Use an "influence" arrow to connect related element;
4. The arrows should be drawn from the element that influences to the one influenced;
5. If two elements influence each other, the arrow should be drawn to reflect the stronger influence;
6. Count the arrows;
7. The elements with the most outgoing arrows will be root causes or drivers;
8. The ones with the most incoming arrows will be key outcomes or results.

3. AFFINITY DIAGRAM

The affinity diagram organizes a large number of ideas into their natural relationships. This method taps a team's creativity and intuition, that way it is a special type of brainstorming process. It was created in the 1960s by Japanese anthropologist Jiro Kawakita [2].

It is used when we are confronted with many facts or ideas in apparent chaos, when issues seem too large and complex to grasp, when group consensus is necessary.

To create an Affinity Diagram:

1. Define the problem or issue to be explored;
2. Brainstorm for ideas, but instead of everyone shouting out ideas, everyone silently writes down their ideas on sticky notes or index cards.
3. When the brainstorm is complete mix up all of the notes or cards and stick them on the wall or spread them out on a table.
4. Let the group arrange the notes or cards into related groups;
5. Now we can decide what to call each grouping. Header cards are created and placed at the top of each grouping.

4. TREE DIAGRAM

A Tree Diagram is used to break a project down into increasing levels of detailed actions that must be carried out to complete the project.

Some of the improvement projects that we take on are more complicated than others and some are very complex indeed. Some involve many people and many tasks that need to be identified, planned, scheduled, and coordinated. This technique is a simple yet highly effective way of taking a large, complex project and breaking it down into the main stages that have to be covered. It then takes each of these project stages and breaks them down into the specific tasks that need to be carried out to successfully complete the project.

The tree diagram starts with one item that branches into two or more, each of which branch into two or more, and so on. It looks like a tree, with trunk and multiple branches (Fig. 2). Developing the tree diagram helps us move your thinking step by step from generalities to specifics.

A Tree Diagram is much easier to do if you first use an Affinity Diagram to brainstorm for all of the tasks necessary to complete the project.

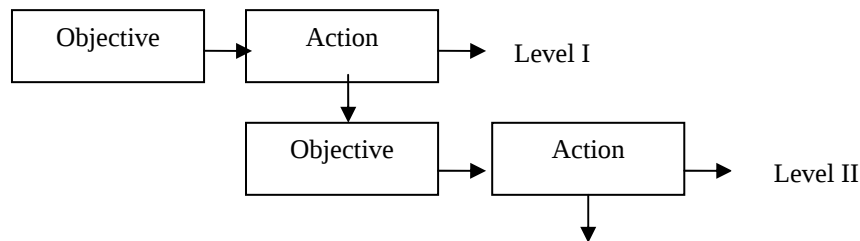


Fig. 2. Tree Diagram

To create a Tree Diagram:

1. Agree an objective to be achieved;
2. Use an Affinity Diagram to deduce objective;
3. Break each objective into action;
4. Confirm that your final list of actions consists of everything you need to accomplish the objective.

5. MATRIX DIAGRAM

The matrix diagram shows the relationship between two, three or four groups of information. It also can give information about the relationship, such as its strength, the roles played by various individuals or measurements. Six differently shaped matrices are possible: L, T (Fig. 3), Y, X, C and roof-shaped, depending on how many groups must be compared.

Customer Requirement Process	Requirement I	Requirement II	Requirement III	Requirement IV
Process I	*	^	*	o
Process II	o	*	^	o
Process III	^	o	o	*

* Strong relationship; ^ Medium relationship; O Weak relationship

Fig. 3. T Matrix Diagram

It is possible to consider that some patient requirements are more important than others. If so, we can assign a numerical weighting to each patient requirement and we can assign weightings of 1, 2, and 3 to the weak, medium and strong symbols. When our Matrix Diagram is complete simply multiply these weightings together to produce a total for each process. In this way we can identify which processes are the real priorities for improvement.

A Matrix Diagram can also be used to identify who needs to be involved in a project, and to what extent. To do this, just put all of the possible departments or functions that could be involved in the project on one axis and all of the tasks that need to be done to complete the project on the other axis. Where there is a relationship between the two, i.e. where a department or function has a responsibility for a task, draw a symbol. In this case the symbols would be used to show whether there is a primary responsibility, a secondary responsibility, or if that department or function should just be kept informed about the task.

6. MATRIX DATA ANALYSIS

Matrix data analysis: a complex mathematical technique for analyzing matrices, often replaced in this list by the similar prioritization matrix. One of the most rigorous, careful and time-consuming of decision-making tools, a prioritization matrix is an L-shaped matrix that uses pair wise comparisons of a list of options to a set of criteria in order to choose the best option(s). It is often abbreviated to MDAC.

Due to the complexity of the statistical method normally associated with this diagram (*Principal Component Analysis*) it can be used with a special computer program.

7. PROCESS DECISION PROGRAM CHART (PDPC)

The process decision program chart systematically identifies what might go wrong in a plan under development. Countermeasures are developed to prevent or offset those problems. By using PDPC, we can either revise the plan to avoid the problems or be ready with the best response when a problem occurs.

It can be used before implementing a plan, especially when the plan is large and complex, when the plan must be completed on schedule or when the price of failure is high.

To create a PDPC:

1. Develop a tree diagram of the proposed plan. For each task on the bottom level tasks on that diagram, brainstorm what could go wrong.
2. Review all the potential problems and eliminate any that are improbable or whose consequences would be insignificant. Show the problems as a fourth level linked to the tasks.
3. For each potential problem, brainstorm possible countermeasures. These might be actions or changes to the plan that would prevent the problem, or actions that would remedy it once it occurred. Show the countermeasures as a fifth level, outlined in clouds or jagged lines.
4. Decide how practical each countermeasure is.

8. ARROW DIAGRAM

The arrow diagram shows the required order of tasks in a project or process, the best schedule for the entire project, and potential scheduling and resource problems and their solutions. The arrow diagram calculates the “critical path” of the project. This is the flow of critical steps where delays will affect the timing of the entire project and where addition of resources can speed up the project. It is known as an activity network diagram.

It can be used when scheduling and monitoring tasks within a complex project or process with interrelated tasks and resources, when you know the steps of the project or process, their sequence and how long each step takes, and when project schedule is critical, with serious consequences for completing the project late or significant advantage to completing the project early.

To develop the diagram:

1. Brainstorm all of the tasks required to complete a given project, including the estimated time required for each task. Again, note cards are useful for this process.
2. Sequence all of the cards from the start to finish, removing duplications, adding new ones as additional tasks are identified, and placing parallel activities where they belong.
3. Reevaluate the shortest, longest, and average estimated times for each task and identify the longest path through the diagram.
4. Use the diagram to track progress of each activity throughout the project life cycle. Any time an element gets in jeopardy, it may need to be examined and necessary resources shifted to complete it.

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