

## Chapter- 8

### Brainstorming

**Brainstorming** is the process of free thinking and generating ideas without being bound by restraints. Example such as "is this a good or bad idea?"

Brainstorming is one of the best-known techniques available for creative problem-solving. This concept describes the technique and explores its benefits and weaknesses. It goes on to set out procedures for organising effective brainstorming sessions and offers some examples of brainstorming drawn from past experiences of renowned organisations.

When to use it-

- Generating a list of ideas
- Identifying possible data requirements
- Developing objectives for solutions
- Generating possible solutions
- Developing action plans

What does it achieve?

- Provided the rules and principles are carefully followed, brainstorming can achieve the following:
- Many ideas are produced in a short timeframe
- Enable participants to both contribute individually and to benefit from the ideas generated by others.
- Encourage the generation of 'unusual' ideas

- Encourage deeper thinking about particular problems
- Create the environment that will enhance group activity and teamwork
- Create a more positive environment in which to approach problem solving

The following **are various steps or process of brainstorming** to ensure brainstorming sessions are productive and efficient.

## 1. Assemble a diverse team

It takes multiple perspectives and a collaborative team to come up with an idea or solution that's truly unique and innovative. When you are designing new products or services, you especially want a diverse range of opinions to help address the many facets of developing and selling a new product.

- **Sales**– Provide sales experience on competitive products and the voice of the buyer
- **Marketing** – Offer insights into consumer demand and marketing strategies
- **Design** – Communicate aesthetics and usability of your product idea
- **Engineering** – Advise on the feasibility of a product idea and unique mechanical solutions
- **Customer Service** – Present the voice of the consumer

Whether you're working on a new product idea or something completely different, you want diverse, informed opinions to contribute to the discussion.

## • 2. DO YOUR HOMEWORK

- It sounds obvious, but so many creatives overlook preparation because they believe in their instincts. No matter how creative you are on the spot, your brainstorming sessions can only get better when you prepare beforehand.
- Encourage each member of the team to do independent research *before* your brainstorming session. Ask team members to answer project related questions or bring in an object that will inspire new thinking around a solution.
- Preparing not only gets team members excited to attend the session, but it will save all of the time it takes to get everyone on the same page. It also

provides an ice-breaker for the brainstorm session if one is needed to introduce team members and/or warm the team up to think creatively.

### **3. SIMPLIFY THE PROBLEM**

Brainstorming sessions are far less productive when you are trying to accomplish too much in one meeting. There's a finite amount of mental and creative energy you can expend in one sitting, and you want to ensure that energy is used most efficiently.

### **4. SET A TIME LIMIT AND QUANTITY GOAL**

A simple way to accomplish this is to give your team a goal of a set amount of ideas in a specific time limit.

### **5. CREATE A FUN ENVIRONMENT**

At the heart of every successful brainstorm is creating a noncritical atmosphere that is informal and non-judgemental. To do this, the leader needs to create a productive environment where there are no bad ideas, and no team member can say anything negative.

### **6. RECORD EVERY CONTRIBUTION**

Successful brainstorming sessions don't end when the meeting is over. Oftentimes the concepts that get most of the attention while your team is together overshadow the ideas that end up being more important for your project later on.

We recommend recording every brainstorming session by recording with an audio or video recorder, by taking notes of every contribution, and even by drawing images to help you visualize different ideas. Documentation allows you to squeeze every last drop of creativity from each session.

### **7. ENCOURAGE BUILDING ON IDEAS**

The best ideas are often the end result of a series of revisions from one basic concept that looks nothing like the final product. Rather than dismissing contributions at the first sign of trouble, encourage your team to build on ideas by finding ways to mix multiple ideas together or to brainstorm solutions to the flaws in an idea you like.

## 8. STIMULATE THINKING

A brainstorming session is a perfect place to question everything. Question all assumptions and traditional thinking because that is what keeps the flow of creativity going.

## 9. RANK/DOCUMENT IDEAS

We recommend evaluating ideas on merit, categorizing ideas, and ranking them based on your team's feedback.

This follow-up is essential and should be done as promptly as possible

## 10. ACKNOWLEDGE THE TEAMWORK

Everyone enjoys acknowledgment for his or her work, no matter how modest they act. It is a good idea to follow-up with your team after your brainstorming sessions to recognize their efforts and to let them know what came out of the session.

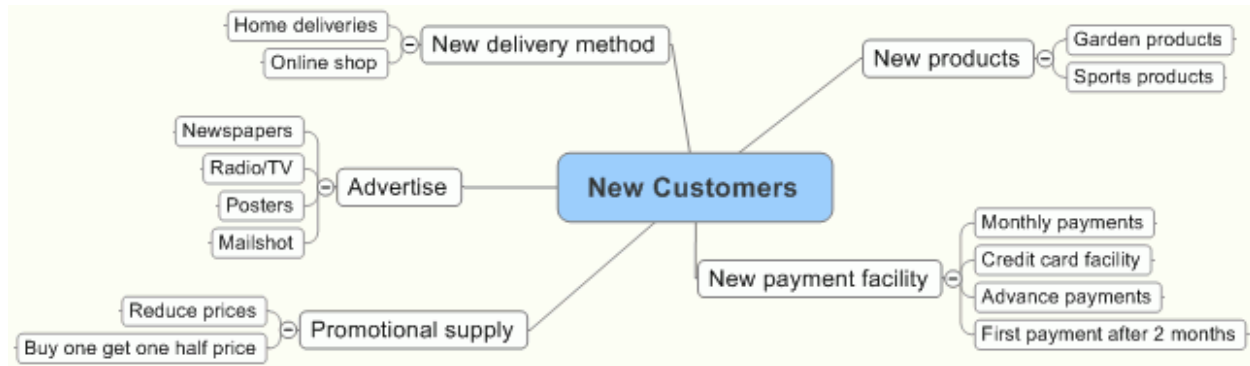
### **Benefits-**

- Improved problem-solving
- Better decision-making
- Find optimal solutions
- In-depth analysis
- Goes beyond task level planning
- Visual organization

### **Example-**

- Situation: The number of customers to a shop has reduced in recent months; the owner is looking for new ways to attract new customers and to increase the frequency of existing customers  
**Problem:** How can we get more customers?

- A mind map -



**Ishikawa diagrams** (also called **fishbone diagrams**, **herringbone diagrams**, **cause-and-effect diagrams**, or **Fishikawa**) are causal diagrams created by Kaoru Ishikawa (1968) that show the causes of a specific event. Common uses of the Ishikawa diagram are product design and quality defect prevention, to identify potential factors causing an overall effect. Each cause or reason for imperfection is a source of variation. Causes are usually grouped into major categories to identify these sources of variation. The categories typically include:

- People: Anyone involved with the process
- Methods: How the process is performed and the specific requirements for doing it, such as policies, procedures, rules, regulations and laws
- Machines: Any equipment, computers, tools, etc. required to accomplish the job
- Materials: Raw materials, parts, pens, paper, etc. used to produce the final product
- Measurements: Data generated from the process that are used to evaluate its quality
- Environment: The conditions, such as location, time, temperature, and culture in which the process operates

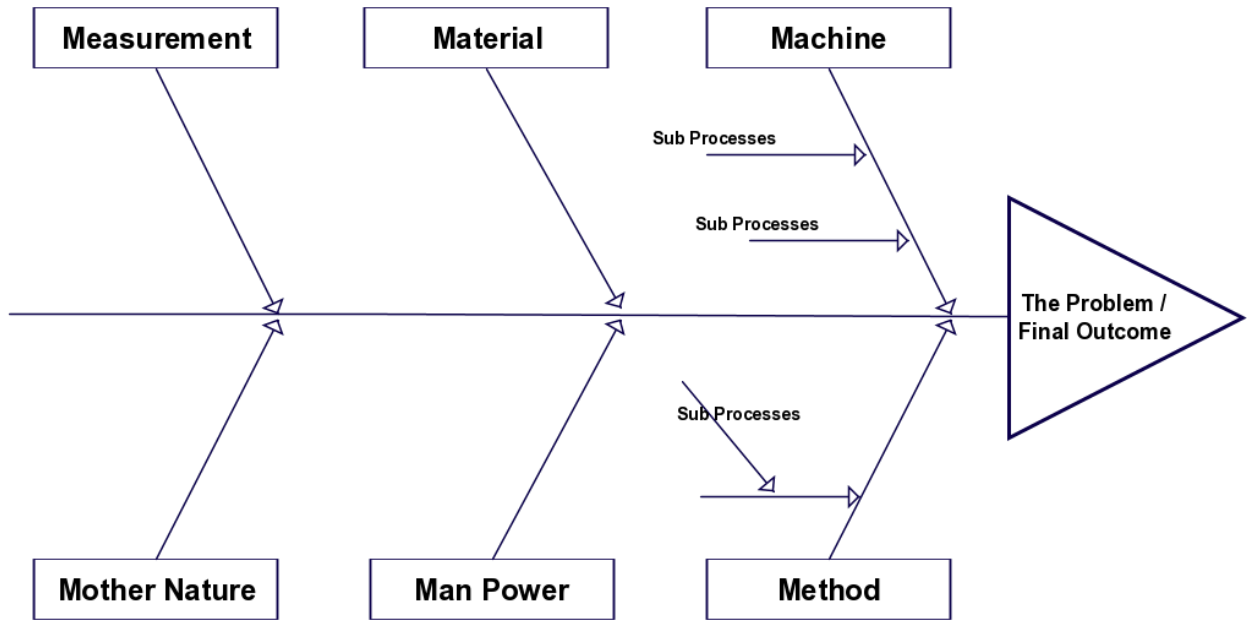
Causes in the diagram are often categorized, such as to the 6 M's, described below. Cause-and-effect diagrams can reveal key relationships among various variables, and the possible causes provide additional insight into process behavior.

Causes can be derived from brainstorming sessions. These groups can then be labeled as categories of the fishbone. They will typically be one of the traditional categories mentioned above but may be something unique to the application in a specific case. Causes can be traced back to root causes with the **5 Whys (5 w)** technique.

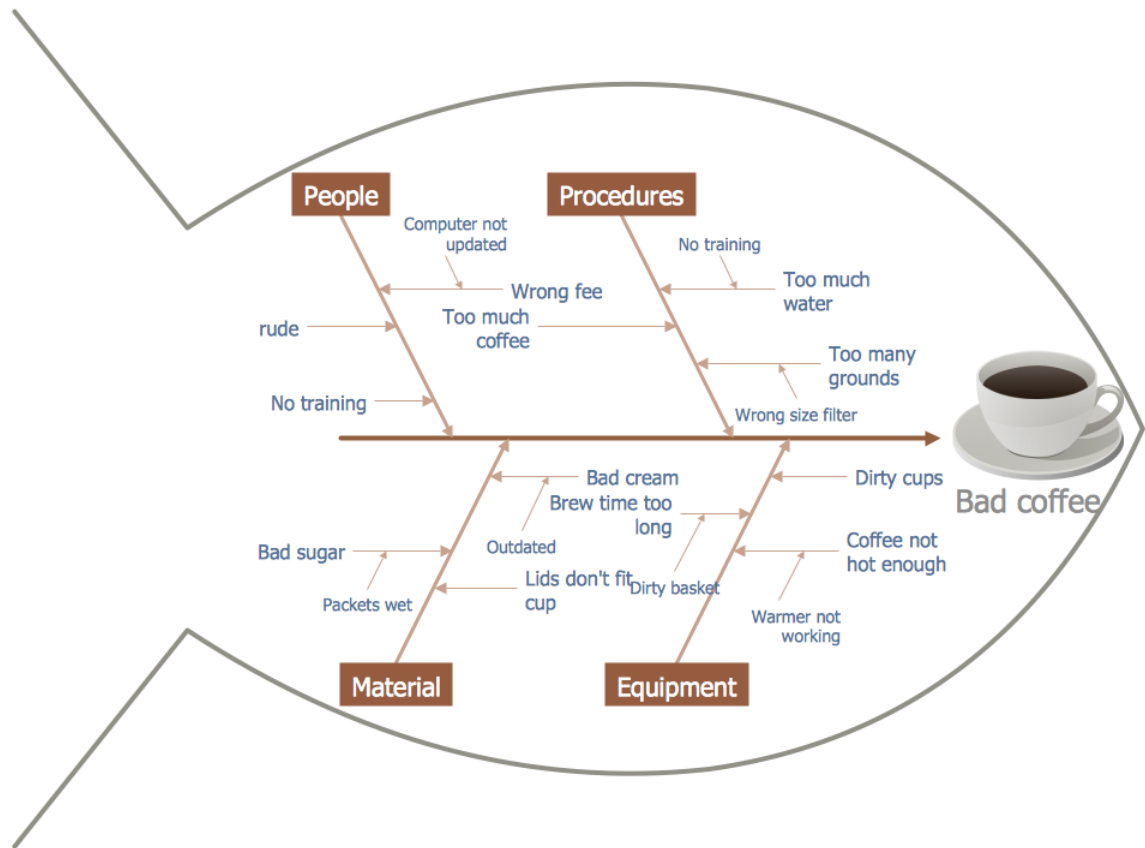
### **The 6 Ms (used in manufacturing industry)**

- Machine (technology)
  - Method (process)
  - Material (Includes Raw Material, Consumables and Information.)
  - Man Power (physical work)/Mind Power (brain work): Kaizens, Suggestions
  - Measurement (Inspection)
  - Milieu/Mother Nature (Environment)
- 
- **Ishikawa (Fishbone) Diagram** -This diagram effectively identifies “cause and effect” in a brainstorming style session that can be easily understood.
  - The main points of influence are the “Ms” and “Es” (manpower, machines, methods, materials and environment).
  - It is often used as a team "brainstorming" tool that can trigger and ease out important issues. It is laid out with the contributing causes documented hierarchically with the most pressing problems being at the spine.
  - The use of the Ms and Es help start it off and ensure logical control. The most effective method of doing this is to select a scribe (the one who documents) and then encourage the rest of the team to contribute. Seeing the ideas on paper often triggers more ideas.
  - A cause and effect diagram is an analysis tool to display possible causes of a specific problem or condition. Its major benefit is that it pushes you to consider all possible causes of the problem, rather than just the ones that are most obvious. This diagram is also known as the fishbone diagram. This is

because it was drawn to resemble the skeleton of a fish, with the main causal categories drawn as “bones” attached to the spine of the fish



**Example - (Please explain while answering)**



**Uses of Cause and Effect Diagram-**

- i) Identifying the potential causes of a problem or issue in an orderly way. For example, why has membership in the band decreased, why is not the phone being answered on time, why is the production process suddenly producing so many defects? ii) Summarizing major causes under four categories, e.g., people, machines, methods and materials, or policies, procedures, people and plant).

**Pareto Analysis**

A Pareto diagram is a simple bar chart that ranks related measures in decreasing order of occurrence from left to right. The principle was developed by Vilfredo Pareto, an Italian economist and sociologist .



The Pareto chart gets its name from Vilfredo Pareto, an Italian Economist. In 1906, Pareto noted that 20% of the population in Italy owned 80% of the property. He proposed that this ratio could be found many places in the physical world and theorized it might be a natural law, where 80% of the outcomes are determined by 20% of the inputs.

The Pareto diagram is a graphical overview of the process problems, in ranking order of the most frequent, down to the least frequent, in descending order from left to right. Thus, the Pareto diagram illustrates the frequency of fault types. Using a Pareto, you can decide which fault is the most serious or most frequent offender.

The basic underlying rule behind Pareto's law is that in almost every case, 80% of the total problems incurred are caused by 20% of the problem cause types; such as people, machines, parts, processes, and other factors related to the production of the product. Therefore, by concentrating on the major problems first, you can eliminate the majority of your problems. The few items that have the largest amount of occurrence is your more frequent problem, than are the many items that only happen once in a while. This is called the "vital few over the trivial many" rule. Quite often, once you cure several of the "big hitters" you also eliminate some of the smaller problems at the same time.

The Pareto prioritizes problem areas. Sometimes a quality problem is so cluttered with so many smaller problems, it is difficult to know just where to begin the solving process.

Dr. Juran further studied it and called it as **VITAL FEW AND USEFUL MANY**.

### **Ways to analyze Pareto data-**

- Counts Pareto: Use this type of Pareto analysis to learn which category occurs most often, you will need to do a counts Pareto diagram. To create a counts Pareto, you will need to know the categories and how often each occurred.
- Cost Pareto: Use this type of Pareto analysis if you want to know which category of problem is the most expensive in terms of some cost. A cost Pareto provides more details about the impact of a specific category, than a count Pareto can.

### **Construction of a Pareto Diagram-**

**Step 1**-Determine the method of classifying the data. eg. By problem, cause, nonconformity etc.

**2**-Decide for the count pareto, cost pareto or both to be used to rank the characteristics

**3**-Decide on the time interval or use historical data to record your information. One week, a month, etc. It is best to be consistent so that you have a standard to compare to if the data collection exercise is to be repeated again.

**4**-Summarize data and rank order categories from largest to smallest.

Use following steps-

a. From the Check Sheet, total the occurrence of each item for the period measured. Each total will be represented by the length of a vertical bar.

b. Draw horizontal and vertical axes on graph paper; - Make your scale units at even multiples, such as 10, 20, etc. so as to have an even scale system (see figure 3 below). - Draw in the bars that correspond to the total numbers collected from your Check Sheet, starting on the far left, with the most frequent (highest number recorded) defective item. It is recommended that you leave a gap between each item

c. Under the horizontal axis (line), label each of the bars so that you know which defect is represented by which bar.

d. Draw another vertical line and label the percentage scale in the same manner that you did on the left side .

e - Plot a dot for each item on the graph, starting from the left side, on or above the bar corresponding to the related percentage of defectives for each item.

**5**-Construct the diagram & find the vital few.

### **A Simple Example-**

A Pareto chart can be used to quickly identify what business issues need attention. By using hard data instead of intuition, there can be no question about what

problems are influencing the outcome most. In the example below, XYZ Clothing Store was seeing a steady decline in business. Before the manager did a customer survey, he assumed the decline was due to customer dissatisfaction with the clothing line he was selling and he blamed his supply chain for his problems. After charting the frequency of the answers in his customer survey, however, it was very clear that the real reasons for the decline of his business had nothing to do with his supply chain. By collecting data and displaying it in a Pareto chart, the manager could see which variables were having the most influence. In this example, parking difficulties, rude sales people and poor lighting were hurting his business most. Following the Pareto Principle, those are the areas where he should focus his attention to build his business back up.

