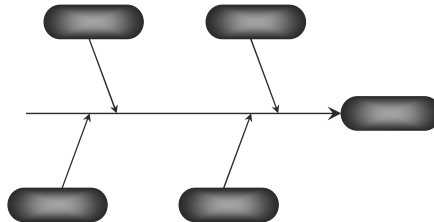




Cause & Effect Tools (Green Belt)

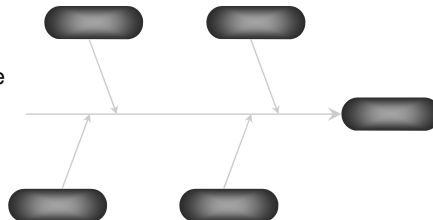


One Method: Fishbone Diagrams



❑ Fishbone diagram:

- A method of systematically identifying all of the potential causes that **may be** contributing to a problem (effect)



❑ Method for construction of a fishbone diagram:

1. State the problem, place it in a box on the right side
2. Draw a horizontal arrow to the problem box
3. Write the traditional main categories of factors* or suspected categories above and below the line, and connect them to the main line
4. Within each of the main categories, brainstorm and list all of the detailed factors that may be causing the problem
5. Further refining: list all of the inputs in each of the detailed factors



A detailed process map is the primary input to the fishbone.

Cause-and-Effect Diagram



❑ Method for construction of a fishbone diagram:

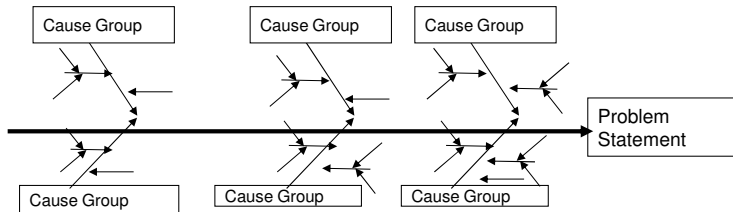
1. State the problem, place it in a box on the right side.
2. Draw a horizontal arrow to the problem box.
3. Brainstorm and list all of the detailed factors that may be causing the problem.
4. Combine the ideas which have logical affinity, Else write the traditional main categories of factors* or suspected categories above and below the line. Connect them to the main line.
5. Further refining: list all of the inputs in each of the detailed factors.
6. Prioritize the causes to arrive at probable causes of problem

LOW HIGH
IMPACT

3	1
4	2

Hard Easy
CONTROL

*6 m's -- man, machine, method, measurement, materials, mother nature (environment)



Brain Stormed Ideas

- Person not trained
- Procedure not documented
- Instrument not calibrated
- Method not followed
- Material non conforming
- Etc. Etc.

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Brain Stormed Ideas: Sample



Management is unhappy that No of Suggestions received in their recently introduced Suggestion Scheme is quite less. Ideas compiled after brain storming session are:

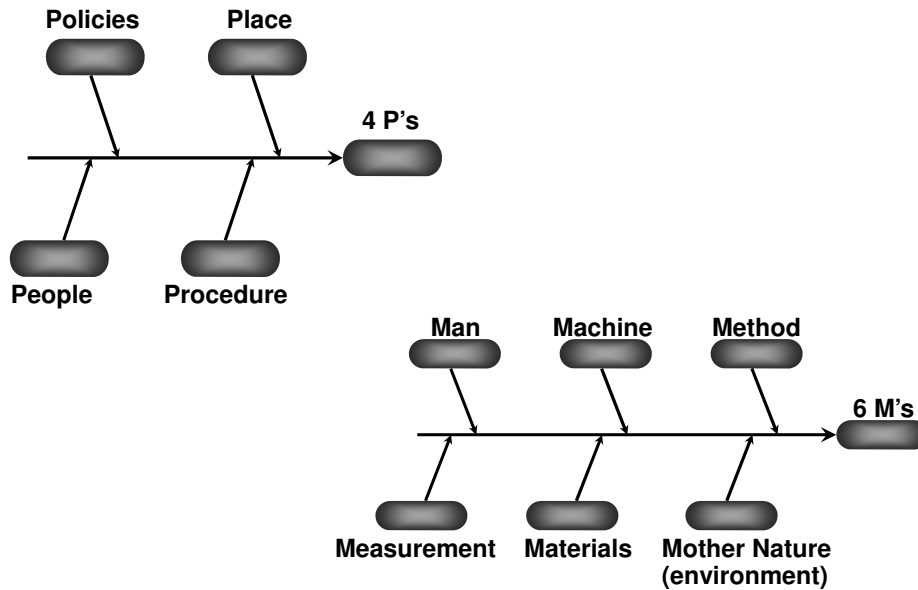
1. Amount not compatible with improvement
2. Token gift no longer motivating factor
3. Amount Less
4. Facilitators not guiding employees properly
5. SS unable to create interest among Sr. Executives
6. Employee being illiterate not able to write
7. Savings from Suggestion
8. Technical specification
9. Lack of publicity about SS
10. Calculation Problem

11. Discouraged by others while giving suggestions
12. Employee overloaded with job
13. Suggestion rejected earlier hence not willing
14. Employee does not perceive himself creative
15. Shying away in giving suggestion
16. Lack of awareness about SS
17. No new improvement in area of work
18. Employee not giving value to the significance of suggestion
19. No culture of giving suggestion in department

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C& E Diagram: Some Logical Groups



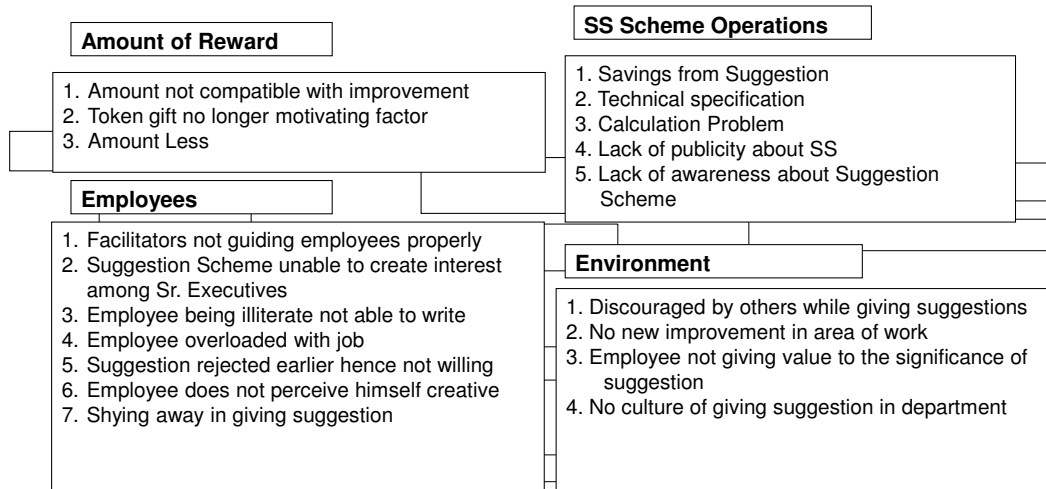
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Affinity of different ideas



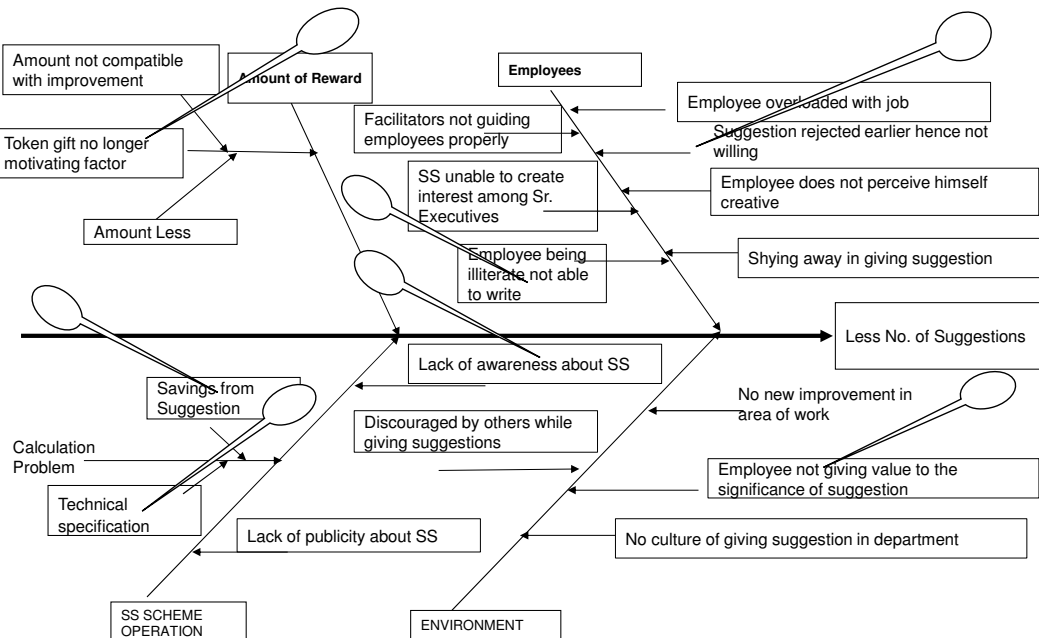
Logical headings be given to brain stormed ideas based on affinity of Ideas:



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Cause & Effect Diagram: Identify significant



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Prioritization -- Cause & Effects Matrix



❑ C&E Matrix

- A spreadsheet that numerically relates inputs (X's) to customer outputs (Y's)
- A detailed process map serves as the main input
- The members of the process mapping team are the authors.
- The outputs are ranked by the customer's priorities.
(Maybe the customer should be invited to participate?)

❑ Benefits

- The team agrees on the project priorities.
- The C&E matrix priorities are customer driven.



How does your organization set priorities?

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[illegible]

	Customer Priority	1	2	3	4	5	Total
		Taste	Price	Delivery Time	Aroma	Ambience	
	Customer Priority Rating	10	7	9	9	8	
Process Step	Process Input	Rating Matrix					
Ordering	Service Staff						
	Pen & Pad						
Coffee Making	Water & Boiling						
	Coffee Flavour						
	Coffee Quantity						
	Brew Time						
	Coffee creamer						
	Machine temperature						
	Filter						
	Beans freshness						

Example: SMDs and PCBs



4. Rank the inputs according to their effect on each output.

Process Step	Customer Priority	1	2	3	4	5	Total
		Taste	Price	Delivery Time	Aroma	Ambience	
	Customer Priority Rating	10	7	9	9	8	
Process Step	Process Input	Rating Matrix					
Ordering	Service Staff	0	0	9	0	3	
	Pen & Pad	0	0	1	0	1	
Coffee Making	Water & Boiling	1	0	0	1	0	
	Coffee Flavour	9	3	3	9	1	
	Coffee Quantity	1	3	3	3	1	
	Brew Time	3	0	9	1	1	
	Coffee creamer	9	3	0	9	0	
	Machine temperature	1	1	9	1	0	
	Filter	1	0	0	1	0	
	Beans freshness	9	1	1	9	1	

9	Strong relation
3	Moderate relation
1	Weak relation
0	No relation

Example: SMDs and PCBs



5. Identify the critical inputs from the Totals column.

Process Step	Customer Priority	1	2	3	4	5	Total
		Taste	Price	Delivery Time	Aroma	Ambience	
	Customer Priority Rating	10	7	9	9	8	
Process Step	Process Input	Rating Matrix					
Ordering	Service Staff	0	0	9	0	3	105
	Pen & Pad	0	0	1	0	1	17
Coffee Making	Water & Boiling	1	0	0	1	0	19
	Coffee Flavour	9	3	3	9	1	227
	Coffee Quantity	1	3	3	3	1	93
	Brew Time	3	0	9	1	1	128
	Coffee creamer	9	3	0	9	0	192
	Machine temperature	1	1	9	1	0	107
	Filter	1	0	0	1	0	19
	Beans freshness	9	1	1	9	1	195