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Brain Storming Industrial Engineering Which Is Creative, Out of Box and Lateral

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Abstract: Brain Storming is a creativity technique by which efforts are made to find conclusion to a problem by gathering list of ideas spontaneously contributed by each of members. Industrial Engineering is optimisation of complex processes, systems and organisations by developing, improving and implementing systems of people, money, knowledge, information and equipment. Essentially Industrial Engineering is all about Optimisation. Can Brain Storming be used for Optimisation? Brain Storming is a group creativity technique by which efforts are made to find conclusion to a problem by gathering a list of ideas spontaneously contributed to by members. Brainstorming is a situation where a group of people meet to generate ideas and solution around a specific domain by removing inhibitions. People are allowed to think freely and suggest as many new ideas as possible. These ideas are noted without criticism and after brain storming ideas are evaluated. There are several techniques that complement, supplement and are perhaps congruent in overlapping sort of way. These techniques must be used to enhance brainstorming techniques to make them more effective. Some of these techniques are discussed here – Out of Box Thinking, Lateral Thinking, Right Brain Thinking, Creative Thinking, Divergent Thinking and so on. Industrial Engineering is focused on optimisation through predetermined procedures and that leads to one solution for a problem. No doubt this has a place in optimisation panaroma. But Optimisation is too wide a field. Hence you need Brain Storming Industrial Engineering.

Keywords: Industrial Engineering, Brain Storming, Lateral Thinking, Out of Box Thinking, Right Brain Thinking, Creative Thinking, Alex Osborne

1. Introduction

Here is definition of Engineering.

Engineering is application of science and mathematical models to the innovation, design, construction and maintenance of structures, machines, materials, devices, systems, processes and organisations.

And here is definition of Industrial Engineering.

Industrial Engineering is optimisation of complex processes, systems and organisations by developing, improving and implementing systems of people, money, knowledge, information and equipment. [1-7]

Basically, industrial engineering seems to be some sort of specialisation in engineering with focus on OPTIMISATION. And OPTIMISATION means making best use of something.

Industrial Engineering is thus a set of mathematical and scientific methods geared for Optimisation through improving and implementing money, machine and material. [8-15]

2. Brain Storming

Brain Storming is a group creativity technique by which efforts are made to find conclusion to a problem by gathering a list of ideas spontaneously contributed to by members. Brainstorming is a situation where a group of people meet to generate ideas and solution around a specific domain by removing inhibitions. People are allowed to think freely and suggest as many new ideas as possible. These ideas are noted without criticism and after brain storming ideas are evaluated.

The terms was popularized by Alex Osborne in 1953 book, Imaginative thinking. Osborne started his process of creative problem solving in 1939.

2.1. Osborne Had Two Principles

1) Defer Judgement.
2) Go for Quality.

2.2. Osborne Established 4 Rules for Brain Storming

1) Go for Quantity and not Quality.
2) Withhold Criticism.
3) Welcome Wild Ideas.
4) Combine and Improve Ideas.

2.3. Osborne Gives Many Ideas to Improve Brainstorming

1) Avoid Face to Face Groups.
2) Stick to Rules.
3) Pay attention to everyone's ideas.
4) Individual and Group Approach.
5) Take Breaks.
6) Do not Rush.
7) Stay Persistent.
8) Facilitate Session.

3. Techniques of Brain Storming

There are several techniques of brain storming such as:

3.1. Brain Writing

In this the leader shares the topic and each individual member writes down ideas separately. The advantage with this approach is that those diffident members who are shy to express also get opportunity. This method also eliminates anchoring bias.

The advantage with this approach is that one can generate ideas free from distractions.

3.2. Figuring Storming

Here one tries to generate idea assuming that one is somebody else.

For instance how would Abraham Lincoln deal with this.

Putting yourself in new shoes can give an entire different perspective and help in solving the problem.

3.3. Online Brain Storming

In this ideas are communicated by people over Internet on a blog or message board, or some sort of communication tool. There are lots of brain storming tools.

3.4. Rapid Ideation

The team leader provides context and people are supposed to generate as many ideas as possible within a given time. Several different methods are used to generate as many ideas as possible - sticky notes, white boards, pen and paper etc. getting silly helps. Those who shared embarassing story about themselves were 25% more effective in this technique.

3.5. Round Robin Brainstorming

In this technique team members sit around in a circle. Each person gets an opportunity to give one idea and then the baton moves to person next. The advantage is that quiet people get as much chance as voluble people and some sort of democracy is enforced.

3.6. Starbursting

In this everybody has to generate questions about a matter. An easy way is to start with questions like when, why, what, how, who and so on. This questioning technique generates information that was not known before beginning the questioning.

3.7. Stepladder

In this two people stay in team and generate ideas when everyone else is asked to leave. After that one person is added and he contributes to idea. Then another person comes to the room. Similarly people are added one after another. This gives each person chance to generate ideas.

4. Tips for Effective Brainstorming

Here are some tips for making brainstorming more effective.

4.1. Clarify the Goal

Before you begin brainstorming it is important to clarify the goal. Preparation can be done so that every one is one same wave length. Setting the focus on session is simple, as simple as writing a simple brief. Using a good facilitator for brainstorming helps. Look for someone who has experience in conducting brain storming sessions.

4.2. Loosen Up

Staying in your comfort zone can be hurdle to brainstorming. In order to effectively brainstorm every one has to loosen up. An embarassing situation can be a real ice breaker. A little uneasiness at the start of situation can help people loosen up and contribute to brain storming.

4.3. Embrace Collaboration

It has been found that groups that generate ideas together are about 40% more effective then groups that generate ideas individually. Or ideas could be generated individually and then discussed collectively. But the research is clear that collaboration contributes to quality of brain storming.

4.4. Use Limitations

This is rather a contradiction. Brain storming is supposed to be without constraints. However, setting a limit on time for instance can greatly contribute to the creative process.

4.5. Value Diversity

People with different backgrounds, experience and world view bring different perspectives and that adds to the value of brainstorming. Fresh ideas from different outlooks, different personalities and different speciality can contribute to quality

of brainstorming.

4.6. Use Mindmapping

Visually communicating information can contribute to effectiveness of brainstorming. Once data is in conveyable form it can lead to decision making. A strategy called data visualization helps link ideas in a big way.

5. Besides Brainstorming

There are several techniques that complement, supplement and are perhaps congruent in overlapping sort of way. These techniques must be used to enhance brainstorming techniques to make them more effective. Some of these techniques are discussed here.

5.1. Out of Box Thinking

Thinking out of box means to think differently, from a new perspective and unconventionally. Industrial engineering should adopt creative thinking approach and step out of the box, or the edges to be able to think differently.

Usually humans are trained within what they assume to be constraints and boundaries. However it is possible that a more optimum solution to a problem exists outside the boundaries.

Einstein said that "Insanity means doing same thing over and over again expecting different results." That is starting point of out of box thinking. Instead of doing same thing why not step outside the familiar and view the problem in different light.

Industrial Engineering must adopt Out of Box Thinking.

5.2. Lateral Thinking

Linear thinking means thinking where designers approach the problem by using reasoning that is disruptive and not immediately obvious. Lateral thinking is also called horizontal thinking. Most problems are approach through Linear thinking also called vertical thinking through mathematical and analytical and scientific and structured step by step approach.

Industrial Engineering as it exists today operates from linear thinking or vertical thinking, which is mathematical, scientific and analytical. Indsutrial Engineering has to think in a lateral fashion in a way that is creative, innovative and disruptive, which is also described as horizontal thinking.

5.3. Right Brain Thinking

There is a thought process that believes that Right Brain is creative, intuitive, artistic, imaginative, musical and emotional. Whereas left brain is logical, analytical, mathematical, verbal, sequential and factual. This comes from work of Roger Sperry who was awarded Nobel Prize.

Now conventional Industrial Engineering it should be obvious operates out of Left Brain, in that it is full of logical attitudes and mathematical procedures. However Industrial Engineering must start to be more right brained and have intuitive, imaginative, artistic component to it.

5.4. Divergent Thinking

Divergent thinking is a method used to generate creative ideas by exploring many solutions. It occurs in a free flowing, spontaneous and non linear manner. Convergent thinking occurs where there is single solution arrived at by established procedure.

Industrial Engineering as it stands today operates out of convergent thinking. There is need to explore if Industrial engineering can operate out of divergent thinking by generating many possible solutions.

5.5. Creative Thinking

Creative Thinking is intentionally generating new ideas from existing information. Creative thinking involves thinking in a different way and examining information from different points of view. Industrial Engineering needs to explore creative thinking for it to become more effective and applicable to wider variety of situations.

Thus Industrial Engineering needs to explore divergent thinking, out of box thinking, creative thinking, lateral thinking and right brain thinking for it to become more effective and comprehensive.

6. Examples of Brain Storming in Industrial Engineering

What if one were to apply Brain Storming method to essential idea of OPTIMISATION which is at core of Industrial Engineering.

Let us examine some instances of Brain Storming INDUSTRIAL ENGINEERING.

Take the case of Crowded Trains in Mumbai. How do we optimise the crowd in trains so that journey becomes comfortable.

Here are some ideas on how to apply optimization:

1) Move Offices to Other Side of Town.
2) Make Peak Hour Travel Expensive.
3) Redesign Seating Spaces in Trains.
4) Work from Home.
5) Rotate Holidays.
6) Flexible Timings.
7) Double Decker Trains.

This is one application of Brain Storming industrial engineering.

Let us now apply Brain Storming industrial engineering to academics.

How does one optimise stress levels in academic system. How does one reduce learning hours in an academic year. How does one maximize learning?

Many ideas from Brain Storming INDUSTRIAL ENGINEERING come to mind:

1) Have 4 days holidays before each exam. So that stress moves to 1 month of exams rather than entire semester.
2) Do no have Mid Semester exams. Instead have a quiz at

end of every lecture. So that you can have continuous evaluation without associated stress.

3) Require students to summarize a text book. This will add to learning without adding to exam stress.

This is good example of Brain Storming industrial engineering applied to Academics.

Such approach can be applied to Political Campaigning too.

Can we make Political Campaigning more efficient and optimium. Here are some ideas:

1) Don't have political speeches. Anyway they reach barely 1% of population.
2) Have press conferences. Newspapers are read by 100% of audience.
3) Use Whatsapp and Social Media.
4) Have Honest Politicians for a Change.
5) Use reduced election expenditure as a proof of Honesty and Goodness.

That is Brain Storming Industrial Engineering.

7. Conclusion

Industrial Engineering is focused on optimisation through predetermined procedures and that leads to one solution for a problem. No doubt this has a place in optimisation panaroma. But Optimisation is too wide a field. Hence you need Brain Storming Industrial Engineering.

Of Course such a discipline as Brain Storming Industrial Engineering has many tentacles such as Right Brain Thinking, Lateral Thinking, Creative Thinking, Divergent Thinking and Out of Box Thinking.

This requires courage to overcome resistance to change and go ahead. Indeed this would require something of a Revolution in Industrial Engineering. But all academic disciplines and discoveries and inventions and innovations have come out of overcoming resistance to change and paving path to the new.

There is more need for research and publications in area of BRAIN STORMING INDUSTRIAL ENGINEERING. This paper is just first of the paper in area of brain storming industrial engineering. The author invites other researchers to carry out experiments in area of brain storming industrial engineering and share results.

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