



# Revolution Needed in Industrial Engineering to Make It More Effective

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**To cite this article:**

Prabhakar Deshpande. Revolution Needed in Industrial Engineering to Make It More Effective. *Industrial Engineering*. Vol. 6, No. 2, 2022, pp. 19-22. doi: 10.11648/j.ie.20220602.11

**Received:** September 9, 2022; **Accepted:** October 31, 2022; **Published:** November 10, 2022

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**Abstract:** The objective is to make Industrial Engineering more effective. Industrial Engineering needs a Revolution. Industrial Engineering is about Optimisation. However presently this optimization is only applied to factory set up. Optimisation is needed everywhere. And Optimisation must be applied in a creative way and not by predetermined procedures. Finally Optimisation needs to be seen as a mindset and not as a methodology. Basically Industrial Engineering needs drastic changes in 3 different directions. Firstly Industrial Engineering needs to get applied everywhere. Secondly Industrial Engineering needs to be understood as a Mindset, not as a Methodology. Finally Industrial Engineering needs to become more creative, with lots of ideas. And this change has to happen fast and quickly. Hence it can only be termed as a revolution. Academicians in Industrial Engineering must shed their inhibitions and embrace the fact that Optimisation is needed everywhere. Secondly Optimisation can be done in a creative manner. Finally, Optimisation is a Mindset and cannot be reduced to a Methodology. Of course there could be resistance to change. But change is progress. After all even Industrial Engineering invention and discovery was a change. Hence this break from past in Industrial Engineering is a change that needs to be embraced and welcomed. It requires unshackled mind and free spirit to incite and instigate a Revolution in Industrial Engineering.

**Keywords:** Industrial Engineering, Revolution, Creative, Common Sense, Comfort Zone

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## 1. Introduction

The promise of Industrial Engineering is not being fulfilled. Industrial Engineering is about Optimisation. And Optimisation is needed everywhere. This paper tries to explore if Optimisation can be applied everywhere. Again this paper questions if Industrial Engineering can be done in a creative manner. Finally this paper seeks for Industrial Engineering to be viewed as a mindset and not a methodology.

Revolution means fundamental and sudden change. Basically three things:

- a) There is a Change.
- b) The Change is Rapid.
- c) Change is Major.

Revolution happens because things can be better due to a change. Sometimes the environment permits a revolution and sometimes environment makes revolution necessary.

Cases when environment permitted revolution is Industrial Revolution in 18th and 19th century, when due to advances in science and technology there were fundamental mechanisation of production in clothing, agriculture, housing, transportation, entertainment, education etc. That is certainly a revolution in terms of change, rapidity and fundamentalness of it all. Information Technology Revolution in second part of 20th Century is almost exactly same as Industrial Revolution of 19th century in its extent.

Sometimes Revolution happen in Political Space. Such as French Revolution of Liberty, Equality and Fraternity. Or more recently Russian Revolution that saw rise of Communism and fall of Feudalism and Capitalism. Indian Independence Movement could also be called a revolution with overthrow of British Imperialism.

Revolution happen in religion and society. For instance birth of Christianity of rise of Islam. Revolutions happen

within religion. The challenge to casteism in Hinduism in 20th Century. Or the Feminist Revolution in Society which saw women occupying greater space in wealth and power.

Revolutions are made to make things better than they are in a big way.

Industrial Engineering is in dire need for a Revolution. That, Of course means Industrial Engineering needs to change in a big way, fast and greatly.

We need to first understand what Industrial Engineering is, before we discuss the need for change.

Now let us understand what is Engineering and what is Industrial Engineering by study of their definitions.

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]

Industrial Engineering is in desperate need for a Revolution.

And that means Industrial Engineering needs to change fundamentally and rapidly.

Here are the three areas in which Industrial Engineering needs to change.

## 2. Area of Application

Industrial Engineering is currently applied in factory, office or retail setting. Now the limited application of industrial engineering is baffling. After all Industrial Engineering is about Optimisation. And one would rightly presume, that there is no area of life which does not need optimisation or could do without optimisation.

Industrial Engineering must step out of comfort zone. For far too long Industrial Engineering has been staying with safe and secure, even as there is a demand and as importantly an ability to explore areas out of comfort zone. But industrial engineering to stay within comfort zone and thus jeopardized its grown and progress.

Comfort Zone is a psychological state where things are familiar to person and they are at ease and in control of their environment experiencing low level of anxiety and stress. However within comfort zone there cannot be growth and progress. It is only when an entity - person, nation, business - step out of their comfort zone that growth is possible.

Of course, stepping out of comfort zone is scary. It takes guts and ability to take risks to venture out of comfort zone. But that is the risk that must be taken. Industrial engineering must step out of comfort zone and apply itself to OPTIMISATION of everything, everywhere and everytime.

Here are several areas for optimisation that comes to mind effortlessly.

- 1) Can Education be optimised - less stress, more effective, less painful;
- 2) Can Transportation be Optimised - less crowd, pleasant, faster;
- 3) Can Interior Decoration be Optimised - More Space, Cheaper, Multi Use;
- 4) Can Delivery Services of Online Sales Be Optimised - Less Duplication;
- 5) Can Political Campaigning Be Optimised - Cheaper and Effective.

As you see the principle of Optimisation can be applied almost everywhere and there is almost nowhere, where principle of Optimisation is inapplicable.

And yet Industrial Engineering, which is in essence Optimisation, is rather intriguingly and paradoxically restricted to factory and office and at best retail.

Why no unleash Industrial Engineering everywhere, everytime and everything. This is Industrial Engineering on Steroids, so to speak, where Industrial Engineering is applied in every situation and there is no situation where industrial engineering is not applied.

Thus Industrial Engineering becomes DOWN TO EARTH and full of COMMON SENSE.

But somehow Academics is training to be confined to the IVORY TOWER and not step DOWN to EARTH. But shouldn't academics be about solving the problems of real world.

Why should academics not be about real rather than abstract. Why do Economists for instance obsess themselves with mathematical equations while shutting their eyes to shanty towns with poor nutrition and absent sanitation.

Industrial Engineering has a lot to offer in OPTIMISATION. Just that this idea of OPTIMISATION is now confined to factory, offices and supermarkets. It is time that Industrial Engineering comes down to earth and applies itself everywhere, everytime and in everything.

Again sometimes academics can smack of lack of common sense. Case in point being a scientist suggesting that two holes be dug in the wall to let both big cat and small cat escape. Common sense would dictate that one digs only one big hole for both cats to escape.

Industrial engineering should also boast of common sense. An example that comes to mind is 100s of websites having their own delivery person, instead of handing over the goods to government postal system. If Industrial Engineering becomes more common sensical, than it will have greater applicability.

### 3. Way of Life, Not a Procedure of a Ritual

If you pick up any Industrial Engineering text book, or book in its specialisation - supply chain, quality management, etc you will find that Industrial Engineering is about methods and equation.

1) Equation for finding Economic Order Quantity for instance.

2) Equation for finding Inventory Level.

3) Equation for minimising cost of quality.

Or Industrial Engineering could be about a Procedure.

1) Procedure for Production Planning.

2) Procedure for Materials Management.

3) Procedure for Work System Design.

But shouldn't Industrial Engineering be about a Way of Life, where you are geared to Optimise, trained to Optimise and groomed to Optimise, rather than conversant with methodologies and procedures of Optimisation.

Thus Industrial Engineering becomes Mindset not a Methodology.

Mindset is set of belief that shape how you make sense of the world and yourself. Mindset influences the way you think, feel or behave in any situation. In Psychology, Mindset represents cognitive processes triggered in response to a task. Methodology on the other hand means system of methods in a particular field of study. A method is structured procedure for bringing about a particular goal.

So Industrial Engineering has to be a Mindset, which means way one thinks, geared for Optimisation, rather than methodology or collection of methods, which are structured procedures, which is what Industrial Engineering has become.

The trouble is when Industrial Engineering is a methodology, the discipline stretches itself to the known problem within familiar field. But if Industrial Engineering becomes a mindset, then Industrial Engineering can unleash itself on all sorts of problems that demand OPTIMISATION, thus making SKY THE LIMIT as far as OPTIMISATION is concerned.

The trouble is academic training confines one to methodology and perhaps prevents from viewing education as a mindset. Einstein said that education is what remains after you have forgotten all you knew in exams. That Einsteinian thinking is what characterizes mindset rather than methodology.

Industrial Engineering to truly be a gift to the world must become a Mindset rather than a methodology. And by that one means Industrial Engineering must be thinking rooted in OPTIMISATION rather than procedures remembered and mastered.

### 4. Creative Rather Than Structured

The third area of change that Industrial Engineering needs is that Industrial Engineering needs to be Creative rather than Structured. Which means Industrial Engineering needs to move through Divergent Thinking rather than stuck in

Convergent Thinking.

Industrial Engineering needs to move through brainstorming by generating many ideas of optimisation, rather than going linearly in set pattern of procedure or methodology of optimisation.

Thus Industrial Engineering has to generate many ideas in wild fashion for optimisation rather than arrive at one solution for optimisation through set procedures and formulae and equations and methods.

There are several strand here:

#### 4.1. 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.

#### 4.2. 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. Industrial Engineering has to think in a lateral fashion in a way that is creative, innovative and disruptive, which is also described as horizontal thinking.

#### 4.3. 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.

#### 4.4. 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.

#### 4.5. 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.

### 5. Conclusion

These are roughly three areas of radical and rapid changes needed in Industrial Engineering. And since these changes are radical and rapid, they would qualify as revolutions.

Hence it would not be out of place to call for a revolution in industrial engineering so that not only industrial engineering is more efficient, it is also more effective.

Revolution in Industrial Engineering along these three lines is the dire need of hour:

- 1) Unleashing Industrial Engineering Everywhere, Everytime, Everything.
- 2) Industrial Engineering as a Mindset and Way of Life instead of Method and Procedure.
- 3) Industrial Engineering that is Creative rather than Structured.

In unleashing these three changes Industrial Engineering will multiply its effectiveness manifold times and that would be a revolution.

These changes are rapid and major and hence can be classified as revolution. The world needs OPTIMISATION in a big way. And only Industrial engineering can deliver that

OPTIMISATION. Except Industrial Engineering would need to undergo a revolution for that to be possible.

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### References

- [1] Deshpande Prabhakar, Common Sense Industrial Engineering, International Journal for Advances in Engineering and Management Volume 4 Issue 7 July 2022 [www.ijaem.net](http://www.ijaem.net)
- [2] Deshpande Prabhakar, Down to Earth Industrial Engineering, Proceedings of SARC International Conference, New Delhi, India, 22nd July 2022.
- [3] Khan M I (2004), Industrial Engineering, New Age International Publishers, 2nd edition.
- [4] Telsang Martand (2006), Industrial Engineering and Production Management, S Chand Publishings.
- [5] Bhatia Anmol (2014), Industrial Engineering and Operations Management, S K Kataria and Sons.
- [6] Sharma S C, Banga T R (2017), Industrial Engineering and Management, Khanna Publishing.
- [7] Khanna O P (2018), Industrial Engineering and Management, Dhanpat Rai Publications.
- [8] Reddy C Nadha Muni (2002), Industrial Engineering and Management, New Age International Publishers.
- [9] Viswanath Arun (2015), Industrial Engineering and Management, Scitech Publications.
- [10] Simant, Kumar, Prashant (2012), Industrial Engineering, New Age International.
- [11] Navale Vijay (2020), Industrial Engineering and Management, Tech Neo Publications.
- [12] Khan M I, Siddaqui (2018), Industrial Engineering and Management, New Age International Publishers.
- [13] Sarkar Prasanta (2021), Industrial Engineering Digest, Online Clothing Study.
- [14] Chatterjee Abhijit (2012), Industrial Engineering and Management, Vayu Education of India.
- [15] Gadhave Subhash (2021), Industrial Engineering, Technical Publications.