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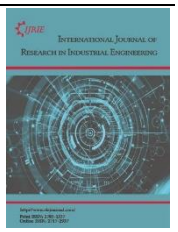

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Industrial Engineering is a Mindset, not a Methodology

Prabhakar Deshpande*

Sant Ramdas Road, Mulund East, Mumbai 400081, India; prabdesh@gmail.com.

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Abstract

Mindset means mental attitude. Methodology means a system of methods used in particular area of study. If one studies any textbook in Industrial Engineering, one reads about various methods of optimisation. Hence it is natural to assume that Industrial Engineering is a methodology. However, this paper argues that Industrial Engineering is a mindset, geared for optimisation and methodology is just manifestation of that mindset.

Keywords: Industrial engineering, mindset, Methodology, Method, procedure.

1 | Introduction

For deeper scholars, it becomes apparent that engineering is a mindset. Of course this mindset is manifested through methodology. However, methodology is just symptom of mindset. And indeed, what an engineering education gives an engineer is not so much the methodology, but a mindset that views the world differently, not necessarily in a better manner or worse manner. It is in order that one understands the concept of mindset and methodology in a greater depth than just an understanding of meaning of these two words permits.

Mindset is an established set of attitudes, regarded as typical of group's values, frame of mind, disposition. A mindset causes one to adopt prior behaviour, choices or tools, a cognitive inertia of sorts, which makes it difficult to counteract its effect on analysis and decision making. Mindset represents mental processes activated in response to a task.

Methodology is frame work for research, a coherent, logical scheme, based on views, values that guides choices that researcher makes. Methodology is theoretical analysis of methods and principles associated with branch of knowledge.

In general methodology is same as method and proposes to provide solutions. Methodology provides a theoretical perspective for understanding which methods can be applied to question or a problem. Methodology can be viewed as a spectrum from quantitative approach to qualitative approach.

Corresponding Author: prabdesh@gmail.com

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Methodology may be understood to be:

I. Description of methods.
II. Study of methods.
III. Analysis of methods.

Method is a procedure, technique or manner of doing something. Essentially method is way of doing something in a systematic manner. Now let us understand what is engineering and what Industrial Engineering is by study of their definitions. Engineering is application of science and mathematical models to the innovation, design, construction and maintenance of structures, machines, materials, devices, systems, processes and organisations [1], [2].

Industrial Engineering is optimisation of complex processes, systems and organisations by developing, improving and implementing systems of people, money, knowledge, information and equipment [1], [2]. Basically, industrial engineering seems to be some sort of specialisation in engineering with focus on optimisation. Industrial Engineering is thus a set of mathematical and scientific methods geared for optimisation through improving and implementing money, machine and material. And optimisation means making best use of something. Let us just focus on specific case of Industrial Engineering rather than general case of engineering.

2 | Analysis

So industrial engineering we study methodology of optimisation, which is perhaps same as method, which again means a systematic procedure, technique or manner.

For instance here are some of the methods that an Introductory Textbook on Industrial Engineering may cover.

I. Economic order quantity: without getting into formulae or graphs, roughly economic rder quantity is calculated based on usage rate per year, cost of ordering, cost per commodity, inventory carrying costs etc.
II. Utilisation and capacity: capacity refers to maximum possible production, whereas utilisation means percentage use of capacity.
III. Quality control chart: these charts are used to calculate upper control limit, lower control limit, average, standard deviations and so on.

Of course, these examples of methods can be multiplied manifold times. And specialised text books on Industrial Engineering have more detailed and specific methods in various sub disciplines of industrial engineering such as supply chain management, production planning, work design, quality management, operation research and so on.

Nowhere in Industrial Engineering curriculum is a mindset imparted directly. Hence the argument that Industrial Engineering is a mindset and not a methodology will seem heretical, blasphemous and sacrilegious. However, here is what will give a reality check. After examinations, most people, including engineers, forget substantial amount of what was expected in exams. Hence while Industrial Engineering education does seem to focus on methods it would be safe to argue that some of methods, if not all of methods could face a degree, partial perhaps, of memory loss.

Nobel Laureate, Albert Einstein said “education is that which remains when one has forgotten everything one has learnt in school.” Indeed Albert Einstein, the great genius, also said that “education is not learning of facts, but training of mind to think.”

The purpose of education is not knowledge but imagination. Why is this hair splitting difference between facts and thinking so important? Because facts represents methods or methodology and thinking represents attitude or mindset. Thus at least as per Albert Einstein and many others one would presume, education

is training in mindset and not methodology. Because it should be obvious that methodology experiences memory oblivion within certain duration. However a mindset is ingrained for longer duration. Thus while Industrial Engineering is training in methodology however Industrial Engineering shapes up a Mindset.

The definition of Industrial Engineering is optimisation of systems, processes and organisations, through development of men, material and machines. Now optimisation means making best use of something. Now this optimisation can be thought of as a methodology or optimisation can be thought of as a mindset. In education, optimisation is clearly taught in terms of methodology. However, as we have just discussed, most of this methodology quickly becomes vicitim of memory loss. However, as einstein said, education is what remains after facts have been forgotten and education is not learning of facts but training mind to think. Thus, it should be obvious that since methodology is forgotten, what remains is mindset. Thus, study of economics is not about methodology but a mindset.

Similarly study of psychology is as much about mindset as much as methodology. When people question the fallacy of business administration and management education, they forget that an MBA does not give you a methodolgy as much as it gives you a mindset. Hence it is safe to argue that Industrial Engineering is also about mindset rather than methodology. Why is this hair splitting, difference between methodology and mindset so important? Because by having a Mindset instead of methodology of optimisation, an Industrial Engineer is freed from boundaries, procedures and appropriateness in application of optimisation. Thus, an Industrial Engineer is free to apply optimisation, everywhere, everytime and everything, in any manner, any fashion, any way. Because though Industrial Engineers may forget methods, they are stuck with mindset. And Mindset is the thinking process triggered in response to a task. Thus, an Industrial Engineer will start thinking in terms of optimisation whenever and wherever and whatever situation one finds oneself in. That opens a pandora's box of optimisation where sky is the limit as far as optimisation is concerned. Hence Industrial Engineers mindset of optimisation can be applied in situations where Industrial Engineers were not meant to contribute.

3 | Examples

Let us consider some examples where mindset orientation of Industrial Engineering pays great dividends even as methodology orientation of Industrial Engineering comes up a cropper.

Consider crowded trains in Mumbai. The methodology orientation of Industrial Engineering has no solution for this. But a mindset orientation will quickly find various methods of optimisation such as:

I. Move offices to other side of town.
II. Make peak hour travel expensive.
III. Redesign seating spaces.
IV. Work from home.
V. Rotate holidays.
VI. Flexible timings.
VII. Double decker trains.

Honestly this sort of thing does not come from any methodology in Industrial Engineering education; however, the training in methods in Industrial Engineering education creates a mindset, inadvertently perhaps, which enables solutions without recourse to any method.

Similarly there is nothing in methodology of Industrial Engineering that trains students in political campaigning effectiveness. But the mindset of optimisation that is perfected through the methodology training can make it impossible for an Industrial Engineer not to see a more sane way of political campaigning.

A person with an Industrial Engineering mindset will quickly see that speeches and rallies are useless since they barely reach 1% of audience. Hence the optimisation mindset will compel an Industrial Engineer, to suggest press conferences instead of rallies, as newspapers are read by nearly 100% audience as opposed to 1% audience affected by speeches and rallies.

Similarly there is nothing in Industrial Engineering methodology that seeks to optimise stress level in academic system. However a person with Industrial Engineering mindset will quickly see that if students are given say 5 days holiday before exams, the stress levels are reduced to 1 month of exams rather than 4 months of semester without increasing semester duration substantially.

4 | Conclusions

There is need for greater discussion on mindset versus methodology orientation of education in general and in context of this journal, of Industrial Engineering in particular. Essentially it should be accepted that education and profession are largely about mindset not methodology, though it is through the alleys and grooves of methodology that mindset gets honed and shaped. Education is meant to create a mind set and not train in methodologies. After all it is obvious that what one crams and mugs for exams are forgotten immediately after exams. But what stays is a mind set. A Business and Management education creates a mind set for commerce. An engineering education create mindset for technology career. An education in liberal arts, helps in social work, politics, and other people professions. But these are not methodologies learnt in education that are put in practice. It is the mind set acquired in education that is useful in career.

Coming back to Industrial engineering. If Industrial Engineering is viewed as methodology then it will have limited application and utility. However if Industrial Engineering is viewed as a mindset, then its application areas get more broad. By limiting Industrial Engineering to methodology we are seriously constraining what Industrial Engineering is capable of. To unleash Industrial Engineering we need to free Industrial Engineering from the chains of Methodology and allow Industrial Engineering to blossom as a flower of Mindset.

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