Research Paper　　　　　　　　　　　　　　　　　　　　**Engineering**

Gap analysis on the basis of employability of engineering colleges using Lean philosophy

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ABSTRACT

Employability is the most required dimension to assess the engineering colleges. In this study an assessment has been done on the basis of Lean philosophies using Coefficient of Variation (CV%) statistical method. We choose Jadavpur University, Kolkata and Kharagpur, IIT to assess their employability of undergraduate students. Total 300 Students/Staffs/Faculties from each of the colleges 150 peoples have surveyed. There are 10 questions. A three-point scale has been designed for each question asking 'Yes', 'No comments', 'No'. The overall Coefficient of Variation (CV%) has measured and that identify the Gap between the two colleges. To identify the weak areas, the vital few questions correspond 'No' answer have found.

Keywords :

Introduction:

In the present societal system in India, employability is the most required criteria, now-a-days. There are several sources to get job like Govt. competitive examination, campus interview of Engineering colleges, self-employment etc. The trend of the present generation is to attend engineering degree, which gives the most of the employment, in India, as there are demands from industry. By industrial growth , number of engineering colleges enhanced in India after independence. But, the status of employability changes from one institute to another due to different reasons like the teaching potentiality, industry-institute relationship, level of the students etc.

Here, we choose the two top-most engineering colleges in West Bengal state like Jadavpur University, Kolkata and IIT, Kharagpur (Indian Institute of Technology, Kharagpur). We assessed the two colleges on the basis of Lean management philosophies. The assessment has been done as per survey questionnaire having 10 questions asking 'Yes', 'No comments', 'No'. If the answer is 'Yes', the institute is already using lean philosophies. If the answer is mix one then it is needed to pay attention to some of the areas. If the answer is 'No', then the institute is not attending the lean philosophies.

The current employability level of the college has been assessed on the basis of Coefficient of Variation (CV%) through quantification of survey questionnaire consisting 10 questions. To identify the weak areas for a college, the vital few questions that correspond to 'No' answer have been found.

Needs of Industry:

Industry is interested for their target enhancement of their economic growth as per the socio-economic need.

Large scale industry[2] has such capacity to launch new technology compatible to the global need, though they sometimes tries to depend on the imported technologies. Not only technology, academic intervention is also needed by joint collaboration to the professional degree colleges. But, for the medium and small scale industry, the primary need is their problem solving of day-to-day activities.

Academic challenges:

The main challenges of academic college is to develop the intellectuality [9]. The technology development initiatives are the considerable interest. In the academic environment main ambition is to create of knowledge in specified domains.

Mismatching of the needs:

From the above discussion we learned that the need of industry and academic aspirations have huge-gap. The employability[11] can only enhance by minimizing the Gap. There are some obstacles to minimize the Gap are:

1. Creation of enabling environments.
2. Facilitating right skilling.
3. Creation of new interface structures between industry and academic institute.
4. Enhancing mobility of the technocrats.
5. Promote the movement of the technology from research to production in industry.

Lean for Gap minimization:

Lean emphasizes [14] on waste minimization. From the above discussion, it is clear that the operational movement can only solve the problem. As lean emphasizes on operational activity, it is better choice to implement lean philosophies [15] for the problem. Lean Management is undergone the following principles to make waste free the organization.

Principle 1: Specify what add value from the customer's perspective.

Principle 2: Identify all the steps.

Principle 3: Create a continuous flow of work.

Principle 4: Only make what customer pulls.

Principle 5: Strive for perfection by continuously removing waste.

In the Table 1, a set of 10 questions has been prescribed to assess the adoption of Lean philosophies as per the employability of the engineering colleges.

Table 1:Questionnaire for student/staffs/faculties for the engineering colleges

Serial	Questionnaire
1	Does the industry drive everything you do, or does your institute drive everything that employers are allowed to do?
2	Have you segmented your employer base by their needs, wants & requirements?
3	Do you know how each segment assesses the value your institute and its products deliver to them?

4	Do you know how industry really uses your human resources?	
5	Do you know which touch points along the end-to-end relationship add value to industry?	
6	Do you know which business processes deliver or support each touch point?	
7	Do you know what causes "waste" in your processes?	
8	Do you actively search for and remove waste in your processes?	
9	Do you identify the employer events that trigger processes to immediately kick into action?	
10	Do you know which processes drive revenues for your system, which ones drive costs and which ones drive risk?	

Survey method:

A questionnaire has been designed (Table 1) to survey the perceptions of different stakeholders (like faculties, students, administrators and other supporting staffs) .

For each question, there are a 3-point scale has been developed ranging from 'Yes','No comments' and 'No' in light of Likert-scale.

Total 300 persons have been surveyed from 2 colleges each of 150 persons. The two colleges are Jadavpur University, Kolkata and IIT, Kharagpur.

Measuring Coefficient of Variation (CV%) :
The CV% is defined as
$$CV\% = \left(\frac{\sigma}{\mu}\right) \times 100$$

where, s is the population standard deviation and m is mean of the distribution, when the standard deviation and the average are estimated from the sample observations.

Lower is the CV% better is the measure.

Analysis and result:
It has been found that CV% level of the two colleges range between10.49 to 10.83. The departments range form 8.62 to 17.82. Based on the CV% attaining different departments in the two colleges, a ranking of the departments have been made in Table 2.

Table 2: College and department wise ranking of the two colleges

Institution	Institutional CV% level	Department	Departmental CV% level
Kharagpur IIT	10.49	Computer Sc.	8.62
		Information Tech.	8.63
		Electronics & Comm.	8.70
		Chemical	8.84
		Electrical	8.85
		Mechanical	8.89
		Civil	8.90
		Administration	10.49
		Bio Technology	13.06

Faculty of Engineering & Technology, Jadavpur University, Kolkata	10.83	Mechanical	9.56
		Metallurgy	9.84
		Computer Sc.	10.50
		Electronics & Comm.	10.53
		Civil	10.79
		Electrical	11.26
		Chemical	14.07
		Administration	17.82

In order to identify the root causes for the weak areas irrespective of any department (Pareto analysis) has been carried out for the corresponding questions. Based on the pareto analysis, the vital few 'questions', which are common of all departments are found.

Table 3: Weak areas or vital few questions of the departments of the colleges

Rank	College	Weak areas/ questions	Corresponding questions
1.	Kharagpur IIT	2	1.Have you segmented your employer base by their needs, wants & requirements?
2.	Jadavpur University, Kolkata	2,3	1.Have you segmented your employer base by their needs, wants & requirements? 2. Do you know how each segment assesses the value your institute and its products deliver to them?

Conclusion:
The overall ratings (Coefficient of Variation levels) of engineering colleges in West Bengal range from 10.49 to 10.83. It can be seen from Table 2 that the IIT Kharagpur by and large outperforms its counterpart's i.e. Jadavpur University, Kolkata as per the employability is concern. Besides that there are also a huge Gap in the departmental ranking of the two colleges. Like Computer Science department IIT Kharagpur has CV% level 8.62 where as level of same department of Jadavpur University, Kolkata is 10.50. We also identify the causes (Table 3) for the Gap. By proper remedial measurement this Gap can be minimize.

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