Why We Are Producing Unemployable Engineers? – A Case of Rural Engineering Colleges in India

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***Abstract*—This is an attempt to investigate issues in low Employability of Indian Engineers specifically in the context of Rural Engineering Colleges. Research draws sample from five Engineering colleges in Ahmednagar District of State of Maharashtra, India. Role of factors like Curricula, Practical Exposure, Career Matching, Exam Pattern, Faculty, Senior Management, and Training in development of Employability of Engineers was studied. Sample included 90 Engineers, Faculty & Senior Management from five Engineering colleges. Secondary data from various sources is also utilized for this research work. Research concludes that Involvement of Industry in development of curricula, recognizing importance of soft skills, Practical Exposure plays a major role in improving Employability of Engineers.**

Key words: Employability, Engineers, Skills, Training, India.

I. INTRODUCTION

World Economy is going through a slowdown and two of the largest Engines of World Economy i.e. US & China have slowed down. Indian scenario is also not very different; Campus Placements in engineering colleges are taking a dip. There are thousands of Engineering colleges producing lakhs of Engineers across length & Breadth of India. However, what percentage of them are Employable remains a matter of concern. As per Hon.Mrs.Smritiji Irani ,H.R.D. Minister of India ,India is going to provide workforce for the world by 2020.However, as per aspiring minds, Engineers National Employability Report 2015,there are a large no of colleges with alarmingly low employability: 1% for bottom 32% colleges and no Engineers employable in bottom 20% colleges for IT Product Role.41% Candidates for IT Services Companies and 18% Candidates for IT Product Companies belong to colleges other than top 750 colleges, forming substantial invisible pool for employers. Quality of education falls substantially as one goes down the list of so-called top colleges, with close peers having substantial difference in Quality. Report mentions that rise in no of Engineering colleges is also affecting Quality of Engineers. High negative correlation of -0.834 is found between number of Engineering colleges and % service employability of Engineers. As a result now colleges are showing deep interest in improving Employability of Engineers and are also adopting idea of Employability assessment exercise. This report is based on AMCAT Test based on English communication, Quantitative aptitude, Problem-solving skills, knowledge of domain areas such as Computer Science and Programming, Mechanical Engineering, Electrical Engineering etc. for determining employability in the IT/ITeS & other core engineering roles.

Status of Employability in India:

IT Roles				
	Software Engineer IT Products	**Software Engineer IT Services**	**Associate ITeS Operation**	
Employability %				
Top100 Colleges	20.23	40.98	52.68	
Rest	3.34	17.40	36.72	
Engineering Roles				
	Design Engineer Non IT	**Sales Engineer Non IT**		
Employability %				
Top100 Colleges	25.41	38.85		
Rest	6.08	18.64		
NonTech Roles				
	Business Anal-	**Associate ITeS/B**	**Technical Content Developer**	**Creative Con-**

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Employ-ability %				
Top100 Colleges	31.12	54.1	34.92	40.75
Rest	10.42	40.27	11.14	16.19

Source: ENGINEER'S NATIONAL EMPLOYABILITY REPORT (ENGINEERS Annual Report 2015)

As Per My Interaction with Hon.Vinodji Tawade, Higher & Technical Education Minister of State Of Maharashtra, In India. He opined higher order thinking skills are more important than just exam oriented approach of memorizing and writing. Declaration of proposed implementation of 20% Professional Qualified in addition to 80% Educationally Qualified faculties in Engineering & Medical Education in Maharashtra State of India is a welcome move.

In Employability and Skill Sets of newly graduated Engineers in India by Andreas Blom and Hiroshi Saeki, World Bank e-library report mentions that skill shortage is the major constraint for the growth of Indian Economy. In this backdrop, I feel that, Government of India's Skill Development programme will go a long way in overhauling the status –quo [1]. Initiatives of National Skill Development Corporations Skill Development Initiative to improve sector wise employability skills are laudable.

Hacker Earth feels that there is something horribly wrong with our Technology Education, chasm between Theory & Practice; very little of what is learnt at college can be put into practice in everyday life coupled with *Outdated learning* remains root cause of the problem. *Exam culture* – Unfortunately, the CGPA or grade of a graduate is the first filter for employment, and hence students lay emphasis on only the exam and not on learning the subject. This results in weak fundamentals, and hence, industry irrelevance.

Lack Of Exposure – Given that the end goal of technical education is a placement in a college, the amount of exposure given to students about the industry is also very little. It is not until the final year of their college that they begin to understand what the industry really wants. An early exposure to industry can give students an idea of what is relevant in the industry, which they can learn in their own time.

Bad Career Matching – Over the years, the lucrative opportunities that a professional life in the technology industry has provided, has made engineering sciences the de-facto choice for graduate studies. Whether or not the student has the aptitude for the stream is not taken into account, resulting in uninterested engineering candidates, who haven't taken to their subjects as much as they should have, making them irrelevant to the industry[2].

The Economic Times report that poor spoken English may be keeping a large number of India's engineers from landing some of the best paid jobs in the country. A study has found that an overwhelming 97 per cent of engineers in the country cannot speak English, required for high-end jobs in corporate sales and business consulting. Moreover, as per the report based on the study, about 67 per cent of engineers graduating from India's colleges do not possess spoken English skills required for any job in knowledge economy [3].

The study, 'The National Spoken English Skills of Engineers Report', conducted by Aspiring Minds, surveyed English skills of Engineering Graduates, study of 30,000 engineers across 500 engineering colleges, highlights the grim situation in spoken English. Although the problem is far more pronounced in tier 2 and tier 3 colleges, instilling spoken English skills is a big challenge in Indian Institutes of Technology and National Institutes of Technology as well.

Employability

Robinson (2000) defined employability skills as "those basic skills necessary for getting, keeping, and doing well on a job." Lorraine (2007) described employability skills as the skills that can be teachable and Yorke (2006) considers employability as the transferable skills.

In nutshell Language, Cognitive, Domain Knowledge and Personality are the crux of the matter.

About 600,000 engineers graduate annually in India Skill set development as a process involves students, faculties, corporate and support from the government (NASSCOM, 2009).FICCI's Higher Education in India: Vision 2030 also suggests a multi-pronged approach: research-focused institutions for high quality research and innovation; career-focused institutions offering technical and professional courses that produce industry-ready graduates; and foundation institutions that offer a wide range of courses providing well-rounded education and skills relevant to local industry and communities. Maharashtra Ranks 3rd as an Engineering education hub in India after Uttar Pradesh and Karnataka states of India. Employability of Engineers in Rural Engineering College remains matter of grave concern, there is need to study a specific sample of Engineers from Rural Engineering colleges in India regarding their perception of Employability and dwell on perception gap between Industry and Engineers and finally to give policy recommendations for bridging the gap. We have explored a sample of 90 Engineers from five Rural Engineering Colleges in Ahmednagar District of State of Maharashtra, India. Ahmednagar District has in total seven Engineering Colleges churning out more than 7000+ Engineers annually. Perception of these Engineers about Employability and gap between their and Industry perception of employability, their present status and Industry Expectations remains to be explored as matter of concern.

II. LITERATURE REVIEW

Engineering Employability Skills suggested by Ministry of Higher Education Malaysia are

1. Communicate effectively; the ability to present ideas with confident and effective through aural, oral and written modes, not only with engineers but also with the community at large

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2. Competency in application and practice ;the ability to use the techniques, skills, and modern engineering tools
3. Interpersonal or team working skills; the ability to function effectively as an individual and in a group with the capacity to be a leader or manager as well as an effective team member
4. Engineering problem solving and decision making skills; the ability to undertake problem identification, apply problem solving , formulation and solutions
5. Apply knowledge of science and engineering principles; the ability to acquire and apply knowledge of engineering fundamentals
6. Competency in specific engineering discipline; the ability to acquire in-depth technical competence in a specific engineering discipline
7. Understand professional , social and ethical responsibilities; the ability to understand the social , cultural, global and environmental responsibilities of a professional engineer, and
8. commitment to professional and ethical responsibilities
9. Lifelong learning ;the ability to recognize the need to undertake lifelong learning, and possessing / acquiring the capacity to do so
10. Engineering system approach; the ability to utilize a systems approach to design and evaluate operational performance
11. Knowledge of contemporary issues; the ability to continue learning independently in the acquisition of new knowledge, skills and technologies. Nowadays, the use of information, communication and computing technologies are very essential in the knowledge-based era. (*Sources: "The Future of Engineering Education In Malaysia"(2007); EAC Manual (2003); ABET, USA(1998))*

Raghu Mohan, Hacker Earth, Mentions That LinkedIn recently launched a report of 25 hottest tech skills that got people hired in 2014 and topping the list, were Statistical Analysis and Data Mining and Middleware and integration software engineer. If you go through the list in a little more detail, you'll find things like Business Intelligence, IC specialist, Game Development and Algorithm Design [4].

Gokuldas, V.K. (2010) Finds That the Employability is the of measure students' success in campus recruitment drives by information technology companies, that is, whether they received an offer of employment. The study consisting of a sample of two cohorts having more than 500 undergraduate engineers in total, sourced from one of the leading engineering colleges in South India. Independent variables comprised of marks scored at the higher education admission stage, grades in engineering at graduation and performance in non-technical education. Additional parameters were verbal reasoning, logical reasoning and soft skills. The dependent variable was whether or not they were offered employment. The results, obtained through correlation and ordinal regression, revealed that the performance of students in non-technical education was a stronger predictor of employability than was grade obtained in technical education [5].

*The University of Sydney Careers Centre (2010***)** declared two types of skills as necessary for building employability skills; they are technical skills and generic skills. Technical skills comprise communication skills, teamwork skills, problem solving skills, initiative and enterprise skills, planning and organizing skills, learning skills, and technology skill .ASTD emphasized on six skill sets across all job families: (1) Basic Competency Skills: reading, writing and computation; (2) Communication Skills: speaking and listening; (3) Adaptability Skills: problem solving and thinking creatively; (4) Developmental Skills: self-esteem, motivation and goal-setting, and career planning; (5) Group Effectiveness Skills: interpersonal skills, teamwork and negotiation; and (6) Influencing Skills: understanding organizational culture and sharing leadership.

*American Society for Training and Development (ASTD) by ASTD (Carnevale et al., 1990) [6]. As per As per Employability and Skill Sets of newly graduated Engineers in India Andreas Blom, And Hiroshi Saeki, World Bank,November 1, 2010, below mentioned initiatives will go a long way in improving the status-quo:i)*Address the three skill factors i.e.Core Employability Skills, Professional Skills, and Communication Skills when reforming assessment, teaching, and curricula i)Seek to improve Skill set of Graduates ii)Recognize the importance of Soft Skills iii)Refocus the assessment ,teaching learning process, curricula away from lower order thinking skills , such as remembering and understanding , towards higher-order skills , such as analysing and solving Engineering problems, as well as creativity; and(iv)Interact more with employers to understand the real demands for skills in that region and sector[7]

*Employability Skills Initiatives in Higher Education: What Effects Do They Have On Graduate Labour Market Outcomes? Geoff Mason * Gareth Williams ** Sue Cranmer ** * National Institute of Economic and Social Research, London ** Institute of Education, University of London, September 2006,* This paper makes use of detailed information gathered at university department level, combined with graduate survey data, to assess the impact of different kinds of employability skills initiative on graduate labour market performance. They have found that structured work experience has clear positive effects on the ability of graduates, firstly, to find employment within six months of graduation and, secondly, to secure employment in 'graduate-level' jobs. The latter job quality measure is also positively associated with employer involvement in degree course design and delivery. However, a measure of departmental involvement in explicit teaching and assessment of employability skills is not significantly related to labour market outcomes.

Divya Shukla (2012) in her study entitled "EMPLOYABILITY SKILL AMONG PROFESSIONALS– CHAGRIN OF HR EXECUTIVES IN INDIAN LABOR MARKET:A STUDY ON ENGINEERING GRADUATES OF BHOPAL" The objective of this study was, to identify the level

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of employability skill among students. Its differences based on the respondents' demography details and to facilitate suggestive measure in this regard. Tools such as used t-test. The study concluded that, the redesigning of the university curriculum with more apprenticeship and live industry projects will facilitate the pre job training which will surely enhance the employability among graduates.

Employability of Engineering Graduates in IT Sector– (A Case Study of COEP) Bymeshram S. A And Devesh Dubey, 2015. Report mentions that it is difficult to derive full economic benefit from this talent base because of the mismatch between industry needs and university output. The purpose of this study was to know the skill sets required by young graduates to enter the IT industry for their sustainability and to assess how there can be a value creation for better chances of survival in the tough global job market. The case study of College of Engineering, Pune (COEP) is also discussed as a sample case for Employability. The present day, engineering education and the engineering institutes have to play a crucial role in preparing a ecosystem where students develop self awareness and is made are of the transition from college to corporate with the equal participation of the industries which will help to ease the process of transition. More industry – academia interactions, sponsorship of laboratories, joint research and consultancies and student projects will generate more employable graduates and give higher opportunities of employability in the line of industry expectations.

III. OBJECTIVES

- To study issue Employability of Engineers in India specifically in the context of Rural Engineering Colleges in India,
- To identify factors responsible for lower Employability % of Engineers in India,
- To suggest policy guidelines for improving Employability of Engineers in India,

IV METHODOLOGY

Primary data received from survey of Sample of 90 Engineers, Faculties & Representatives of Senior Management from five Engineering Colleges in Ahmednagar District of Maharashtra, India, and Secondary data from various National &International Research Reports, Journals, Magazines, on Employability of Engineers is the mainstay of this research. Structured Questionnaire was developed to understand perception of Engineers from these campuses. Unstructured Interviews of Faculties & Representatives of Senior Management from five Engineering Colleges in Ahmednagar District of Maharashtra, India, were conducted.

IV. DATA ANALYSIS

Perception Analysis of Engineers about Their Employability Status:

- 22.22% of Engineers feel that Employability is the measure of Getting a Job,
- 75.55% of Engineers feel that Employability is the measure of able to do a job with competency,
- Only 3.33% Engineers have accepted that they are not aware of meaning of Employability,
- 14.44% Engineers feel that Employability is the result of Training,
- 96.66% of Engineers feel that they are Employable,
- 3.33% feel that they are not aware whether they are Employable,

Perception Analysis of Engineers about Curriculum in providing adequate Knowledge

- 86.67% Engineers feel that their Curriculum provides adequate knowledge to be Employable,
- 11.11% Engineers feel that their Curriculum doesn't provide them adequate knowledge to be Employable,

Perception of Engineers about Factors affecting Employability

- 51.11% Engineers feel that Curriculum Updated or Outdated affects their Employability,
- 18.88 % Engineers feel that Improper Career Matching results in lower Employability of Engineers,
- 20% Engineer feel that lack of Industrial Exposure of their Faculties affects their Employability,
- 16.67% of Engineers feel that Exam Pattern affect their Employability,
- Whopping 62.22% Engineers feel that lack of Practical Exposure is the measure impediment in their Employability Status improvement.

IV. CONCLUSION & RECOMMENDATIONS

Slogging for getting Accreditation of various Councils although necessary but will not be a sufficient condition for improving Employability of Engineers. As recently released Book titled *"Education Icons of Maharashtra"* mentions many colleges are just doing MOU's with Foreign University & Industry to just meet the NAAC (National Assessment & Accreditation Council) requirements, however, actual implementation is not happening. Irony is that Students & Faculties are not aware of this so called exchange of resources as per these MOU's. Employability is the perfect blend of Hard and Soft Skills[8]. However , management of Engineering colleges although understand the importance of Soft Skills ,are still not serious about implementation of soft skill development programme .There is no adequate budget allocation for the implementation of soft skill development programme, and even if allocation is there disbursement comes very reluctantly. Language ability remains a major barrier in the Employability of Engineers; almost 99% students find it difficult to communicate in English. 95% of faculties themselves are

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inarticulate as far as English communication is concerned. 90% faculty lack Industrial Experience which again acts as barrier in development of students. Lack of adequate and timely compensation and AICTE (All India Council of Technical Education) norms of ME/Ph.D. requirement acts as a deterrent for Industry Professionals to join Engineering Colleges, which consequently affects the quality of Engineers. 62.22% Engineers from the sample express that lack of Practical Exposure is the root cause of the problem. Quality of students when they join the Institute and Education in colleges both play role in final Quality. Senior Management of Engineering colleges express that opening more Engineering colleges has affected the quality. Opening more number of Engineering colleges can't be a solution for improving employability of Engineers, however, AICTE opines, it is the survival of fittest game, inefficient colleges will close down. How to improve Standards of Engineering Colleges? Remains a million dollar question. Outdated syllabi, lack of involvement of Industry in framing syllabi remain major concerns. More initiatives in line with MCCIA (Maratha Chamber of Commerce, Industry & Agriculture) Pune, India, in association with Industry to promote faculty development through Internship in Industry are the need of the hour. Improving Teaching, Learning, & Assessment process by stressing in place of lower order skills of memorizing and understanding to higher order skills like analysing & solving Engineering problems will be the need of the hour. .More interaction with employer to understand the particular demand for skills in that region and sector. Improving language skills, Career counselling facilities recognizing importance of Soft Skill will be a panacea for this problem. More attention should be given to skill development of Engineers and make them Industry ready from the day first. State Government has also got a role to play in this scenario as many Engineering Colleges have got sizeable amounts of Financial Assistance (Under reimbursement for Socially & Economically Backward Students Admissions) stuck with Government Social Welfare Department. *If you are disheartened after knowing national statistics about Employability of Engineers and status-quo, let me tell you all that still future for Indian Engineers remains bright!*

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