

A REVIEW ON EMPLOYER'S EXPECTATION AND PERCEPTIONS TOWARDS EDUCATION AND CHANGING SKILLS REQUIREMENT AMONG ENGINEERING GRADUATES

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Abstract: The current study aims to comprehend the employer's expectations and perceptions towards education and changing skill requirements among engineering graduates. Furthermore, the study analyzes the different aspects of the current education system and explores the gap between current employability skills and required skills among engineering graduates. For this purpose, a critical literature review has been conducted that involved assessing only the recent studies pertaining to this domain. The study results indicated that there existed significant gaps between the employer's expectations and the skills possessed by the engineering graduates. Furthermore, the study indicated an immediate need to reform and develop an engineering education curriculum in order to align the skills of the engineer graduates with the current industry demands.

Keywords: Employer's expectations, perceptions, education, changing skills, Engineering Graduates

1. Introduction

Speedy and dramatic global growth developments today create higher demands on the talents of employees. The labor market is increasingly dynamic and relies on the consistency of experience and expertise as globalization finds its way into all industries. Employers want new engineers to succeed as soon as they are employed in their organization. Consequently, engineering skills in employability are needed to stay competitive in the world market [1].

In the 21st century, the development of careers and higher education is based on the ability, skills, and knowledge of the graduates to meet the expectations of the labor market. Higher education involves the development of a standard curriculum for the scholars to enhance the student's knowledge and particular skill set. Presently, competitive, social, economic and business revolutions affect industry expectations, and the labor market demands [2]. In today's world, most of the graduates' face unemployability issues due to the lack of appropriate skills and knowledge among the young graduates. Although some of the students possess strong technical abilities, most of the graduates do not have impressive soft skills which makes them less suitable for employment. The employability of graduates is one of the most vehemently discussed problems in today's economic world. Rapid economic developments put pressure on employers to find graduates with essential skills related to current demands and to hire them to work. Although basic learning and technological abilities are two principal qualifications for learners, they must also develop non-technical and intangible skills [3]. In order to enter the workplace, industrial transformation and globalization require graduates to be skilled and well prepared. Engineers, however, also find it difficult to find employment because of their shortcomings in skills and their poor self-confidence. In reality, at the entry stage of the profession, the problems graduates encounter impact their confidence levels adversely [4].

A paradigm change has been observed in the social life, economy, lifestyle, education, skills development, and employment due to the industrial revolution 4.0. This is because of the advancement of new technologies to substitute robotics and automation for employers. Several academic organizations believe that advances in technology will lead to tremendous job losses [5]; [6]; [7]. This would lead to lower employment prospects in many industries and a shift in job-related activities [8]. All these aspects have urged the need to conduct the study pertaining to the gap within the employer's expectations and the changing skills requirement among Engineering Graduates. Therefore, the current study aims to review the employer's expectations and perceptions towards education and changing skills requirements among Engineering Graduates through a critical analysis of previous studies done by different research scholars.

2. Literature Review :

2.1 Employer's expectations and perceptions towards Engineering Graduates

Due to globalization, employers and researchers assert that engineers of the 21st-century must-have capabilities that have not been stressed previously (for instance; management, communication, and teamwork). Consequently, several higher institutes have

begun to introduce curriculum reforms to ensure the development of highly qualified engineers [9]. The Waikato University has made major alterations pertaining to redesigning and reviewing the curriculum making it mandatory for all undergraduate students to complete one work-integrated learning course in order to enhance employability and develop workplace skills. Khoo et. all conducted a study to analyze the lecturer's and employer's viewpoints regarding the imperative graduate competencies necessary for employment [10]. The study employed a mixed approach for the purpose of analysis. The findings of the study revealed that employers believed that skills like written communication, teamwork, oral communication, interpersonal relationships, self-management, and problem-solving were essential in order to survive in today's labor markets. On the other hand, the lecturers' believed that skills like written communication, problem-solving, conceptual thinking, oral communication, and critical thinking are essential for the newly graduated students in order to compete in the labor market. Moreover, both of the groups suggested that the largest gaps between the expectations and the skills that the engineering graduates possessed were critical thinking, written communication, self-management, and problem-solving abilities.

A similar study was conducted by Saad et. all which aimed to examine the perceptions of the employers regarding the most essential employability skills that must be possessed by the graduates in order to make them suitable for the current job markets [11]. In order to assess the perceptions of the employers, a thirteen-item scale regarding the employability capabilities of the engineers was adopted as an instrument. The study findings displayed that the competency of tool handling, problem-solving, team working and presentation skills were perceived as essential skills among the students by the employers. Furthermore, it was suggested that the students must also be competent regarding the utilization of modern tools, skills, and techniques in the area of their expertise. The researchers suggested that these findings prove to be essential in enhancing the understanding of the Malaysian university regarding the necessity of employment skills and permitting them to better equip their graduates with the skills necessary as per the industry requirements.

Jeswani analyzed the testing and development of the model for assessing the employability skills pertaining to the fresh graduates in the domain of engineering [12]. For this purpose, techniques like Structural Equation Modeling, Confirmatory Factor Analysis, and Exploratory Factor Analysis were used in order to statistically comprehend the data collected from approximately 300 employers involved in campus recruitment drives and employment drives of fresh engineering graduates pertaining to the Chhattisgarh region in India. The study findings indicated that the most essential skills are management skills which are followed by communication skills and technical skills. Moreover, the employers suggested that they were satisfied by the communication skills held by the graduates and there was no skill gap pertaining to the same, however, significant skill gaps were found regarding the management and technical skills.

Universities have recently received industry concerns about engineering students' inability to accomplish the expectations of their new careers. The incapacity of engineering graduates to transition to the industry is a major concern for the universities. This is because of the lack of proximity to the university's industrial training era. Many new engineering graduates, therefore, lack sufficient industry experience which the industry requires. Furthermore, in the course of industrial training, there is a mismatch of expertise. This challenge leads to the problem of unemployment of new graduates in the field of engineering [13]. Another study was conducted by Azmi et. all to assess and review the competencies of the engineers on a global level. The study findings suggested that the criteria expected by the employers in almost all the developed nations were similar. It was asserted that in order to become successful engineers, both the non-technical and technical skills must be possessed by the young graduates. The study recommended that the higher education institutions must enhance both non-technical and technical skills among the young engineering graduates [14].

All the studies discussed in this segment of the review paper suggested that employers have huge expectations from the engineering graduates in the modern world, however, the graduates often fail to cope with the industrial job demands. Furthermore, the employers indicated that there is a lack of industrial training provided to the young graduates in their initial years of learning which has often detrimentally impacted the engineering graduates to develop their employability skills. The employers asserted that the higher education institutions must work on reforming and improving the curriculum to ensure that the fresh engineering graduates possess skills to compete and survive in the present job market scenario.

2.2 Identifying aspects of the current education system and employer's expectations from Engineering Graduates

As per Copley, creativity occupies a central position in the problem-solving pertaining to the domain of engineering. The researcher suggested that without the use of creativity, no new technological solutions can be developed to the issues faced within the society and the solutions provided are only limited to the replication of the older solutions [15]. Although, several issues that are faced in the modern world are attributed to novelty, which means that new needs require the formulation of new solutions, and they cannot be solved simply by replication. For instance, the problem of climate change requires a new solution to address the needs of the world's energy consumption and an old solution like burning coal is irrelevant. Thus, to solve new problems, new solutions are needed which in turn requires creativity. It is indeed troubling that engineering education has not addressed this need to a significant extent. Engineers are mostly trained to resolve analytical, convergent, and well-defined challenges and engineering programs provide little emphasis on innovative abilities, attitudes, and complementary skills, which are essential for the development of effective and new solutions.

Although engineering training has grown in ways that strengthen graduates' preparation to face the demands of the 21st century, domestic and foreign organizations still continue demanding reform. Future improvement in engineering training should be driven by knowledge research and development-enhancing the learning processes. Litzinger et. all conducted research to

comprehend the findings of the studies related to engineering education expertise development, the consistency of the instructional practices associated with the findings, and to analyze the challenges associated with the implementation of the engineering programs learning experiences [16]. The existing competence awareness and learning mechanisms that establish it suggested that the educational curriculum of engineers should provide a range of learning experiences that enable students to build up profound intellectual knowledge, to build their capacity to use key professional and technical skills, and to participate in credible engineering projects. The curricula of engineering and approaches in technology do not always match themselves well with these priorities. Furthermore, the study asserted that the instructional planning methods at the curriculum level need to be used for the design and implementation of alignment improvements.

In the present scenario, of a knowledge-based economy with immense globalization, the human factor is considered as a prominent differential aspect regarding entrepreneurial competitiveness. Thus it is imperative for the educational framework to fulfill the workplace requirements. This implies that the engineering education framework must be flexible in order to fulfill the requirements of the present era [17]. There is great interest in widening the engineering education, including more liberal material of the arts and including additional topics, such as law, business, and economics, which the engineers are expected to know in the modern era. Moreover, there are compelling arguments to balance the quantitative nature of the curriculum and add further elements relating to the current engineering practice and improve the structuring of engineering education so as to provide more informed career choices and attract the engineering industry to greater diversity. Many have even tried to shift the standards of vocational engineering, from the bachelor's level to the graduate level which technically and certainly inevitably follow these reforms. Yet progress in these improvements is found to be marginal, mainly because micro and meso benefits do not balance those on the macro-scale [18].

The study conducted by Chithra revealed that there existed an imperative need to enhance the awareness pertaining to young engineering graduates to comprehend the employability capabilities expected by the talent markets globally. The researcher suggested that the graduates are not at fault regarding the lack of their knowledge concerning the employability skills required [19]. It is important to reform the curriculum on a regular basis in order to cope up with the needs and wants of the industry. Also, there must be a strong and sustainable plan in order to train the engineering graduates to hone their skills so as to become eligible to compete for employability in the global markets. The researcher further suggests that it is essential to enhance the industry-academia linkages which will further ensure that there is a regular supply of talented engineers to the workforce. The study asserts that the graduates that have work experience perform better and are more aware of the employability skills requirements than those who do not have any. Improving and developing skills and knowledge application through intense training can assist the engineer graduates to perform their jobs appropriately.

2.3 Exploring the gap between current employability skills and required among Engineering Graduates

Ramadi et. all analyzed the existing gaps between the perceptions regarding skill sets among the engineering students and the expectations of the industry in the MENA countries [20]. This research assessed the value of 36 skills applicable to engineers which were perceived as essential by the engineering managers. The study further aimed to identify the satisfaction levels of the managers with the skill sets of the engineering students. The averages of skill gaps, satisfaction, and importance were ranked in order to ensure the aspects where the graduates needed to improve. The study findings depicted major gaps between the manager's satisfaction and expectations regarding the skill sets. Moreover, the areas where the managers suggested that maximum improvements were needed included the aspects of continuous learning, time management, and communication. Managers indicated that recent graduates in engineering showed poor overall job preparedness and suggested alterations pertaining to the engineering education curriculum.

While engineering educators frequently perform the excellent task to prepare their students for industrial and further education careers, there are still several areas in which these students lack the expertise or knowledge required as per the academic demands and the employer's demands. These discrepancies between student skills and those expected or required often discourage the students from effectively succeeding in their professional lives. The study conducted by Radermacher et. all demonstrated the findings of a comprehensive literature review to analyze the areas of gaps between the skills of the graduates and the industry demands [21]. The findings of this study show that graduate students lack personal skills (i.e. teamwork and communication); professional attributes (like ethics); and technical skills (configuration, testing, and designing of management tools). By increasing awareness in these areas, instructors may learn about areas in which students most often do not meet standards and make improvements to the curriculum and fix it accordingly.

Overall, software development professional jobs entail several diverse activities and have strong expectations both at the team and personal levels for productivity and output quality that rely on employees' skills. The study conducted by Akman et. all examined the expectations of employers about academic, educational, and personal skills among information technology graduates to compare the work settings between the individuals and the teams [22]. The methodology involved the use of a survey technique in order to examine multiple regression. The findings of the study asserted that there existed a remarkable diversity between the teamwork and individual settings pertaining to the employer's expectations regarding the freshly passed graduate's skills in terms of conforming to the new software development approaches and techniques, using the experience gained and time efficiency learned within the undergraduate projects.

In the present context, professional education plays a major role, since the firms look for aspirants who are technically sound and can reform themselves in the evolving market scenario. Educational system reform is essential to solve the disparity pertaining to the level of competence required and the current employability expertise. The research conducted by Bansal et. all [23] assessed the employees' and employers' viewpoints regarding the requirement of employability skills within the MNC software firms for

engineering graduates designated on the executive positions [23]. The study findings suggested that there existed huge gaps pertaining to the aspirations of the employers and the skills possessed by the learners. More specifically, significant importance was given to the interpersonal skills by the companies although learners prioritized the technical skills. As per the fresh graduates, the highest-rated skills were technical knowledge, integrity, and accuracy, however, these skills were not considered a priority by the firms. This disparity led to a wrong understanding of the skills among the individuals which further reduced their probability of getting into a well-placed job. The research indicated that an ambitious and prolonged strategy must be provided to educate the engineering graduates. Also, there exists a need to enhance the interaction between academia and the industry to meet industrial expectations. Additionally, the findings asserted that the graduates having work experience had a better comprehension of employability abilities than those lacking employability experience.

A similar study was conducted by Rizwan et. al to analyze the gap in the perceptions of employers and the newly graduated engineering employees regarding the necessary skills for getting a job in Pakistan [24]. For this purpose, data was gathered from 812 engineering graduates and 129 employers residing in Pakistan. The analysis of the collected data suggested that there existed a significant gap between the perceptions of both groups. The study results were similar to the research conducted by Bansal et. al, as the findings indicated that the graduates believed that technical skills play an imperative role in being employed, whereas the employers tend to give more consideration to capabilities like problem-solving, decision making, interpersonal and communication skills, and creativity [23].

3. Research Gap

Previous research on the employability of graduates has emphasized the efforts on the supply side in developing generic expertise like the creation and implementation processes of tertiary curriculums, identification of employer expectations, and the gap between the current employability skills and the required skills among Engineering Graduates. Although the role and the obligation of employers to provide future learners training and to collaborate with universities to improve generic skills of the young graduates have not been discussed in great detail. As per the researchers, knowledge, not many studies have been dedicated to comprehending the role of the employers in developing skills among the engineering freshers to make them compatible with the job roles. Thus, future studies can address this research gap and can add new literature to the existing studies in this domain.

4. Conclusion

The current study aims to review the employer's expectations and perceptions towards education and changing skills requirements among Engineering Graduates. Additionally, the study comprehends the different aspects of the current education system and explores the gap between current employability skills and required skills among engineering graduates. From the study findings, it was revealed that there existed several significant gaps pertaining to the perceptions and expectations of the employers and the skills possessed by the engineering graduates. The employers suggested that the engineering graduates lacked personal skills like teamwork and communication; professional attributes like ethics; and technical skills like configuration, testing, and designing of management tools. Moreover, it was found that the employers tend to give more consideration to capabilities like problem-solving, decision making, interpersonal and communication skills, and creativity; while the graduates believed that technical skills play an imperative role in being employed. The studies further indicated that the engineering graduates must also be competent regarding the utilization of modern tools, skills, and techniques in the area of their expertise in order to cope with the demands of the job markets. The study displayed that there existed enormous literature pertaining to employer's expectations and perceptions towards education and changing skills requirements among Engineering Graduates and the need for the higher educational institutions to reform the curriculum on a regular basis to make the engineering graduates successful in gaining employability skills.

However, as per the researcher's knowledge, the role and the obligation of employers to provide future learners training and to collaborate with universities to improve generic skills of the young graduates have not been discussed in great detail. Thus, future studies can acknowledge this research gap and can provide useful insights within the current study domain. The present literature review will provide a significant foundation to influence the research of similar kinds that need to be pursued to make progress and address various issues and challenges associated with gaps pertaining to the engineering students' skills and employer's expectations. Future scholars can suggest alternative practices that can be used to enhance the awareness of the young graduates regarding skill development on the basis of the current study. The review will offer new insights within the current field of study and will also open new avenues for research in this domain.

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