

Literature Review on the Factors Affecting Employability of Engineering Graduates

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Abstract

Graduate Employability (EM) is a major issue for Institutions of Higher Learning (IHL). In a challenging economy, the role of IHL is not only to produce graduates with specific areas of specialization, but more importantly, to develop EM skills that are most demanding in the 21st Century. This literature review aims to identify the determinant factors influencing the employability of engineering graduates. The Narrative Literature Review method was used to search for relevant articles. The literature review indicates that researchers have identified soft skills, problem solving skills, functional (knowledge) skills and academic reputation as the primary factors influencing the employability of engineering graduates.

Keywords: Employability, soft skills, functional skills, academic reputation and problem solving skills.

Introduction

In recent years, there has been a global trend towards enhancing graduate employability (EM) through Institutions of Higher Learning (IHL) (Griffiths et al., 2017; Milburn-Shaw & Walker, 2017; Donald et al., 2018; Alemu, 2019; Sin et al., 2019; Zahavi & Friedman, 2019; Cheng et al, 2021; Mistry, 2021). Employability represents the potential to secure, maintain, and grow in a particular job at the workplace. Employability means that students and graduates can discern, acquire, adapt and continually enhance the skills, understandings and personal attributes that make them more likely to find and create meaningful paid and unpaid work that benefits themselves, the workforce, the community and the economy (Oliver, 2015). Gedye and Beaumont (2018) conceptualizes employability as the capability of obtaining work, functioning effectively within work; moving between jobs; and having the skills, knowledge and attributes that make this possible.

The Malaysian Ministry of Higher Education (MOHE) defines employment as the potential to secure a job at a workplace while employability is defined as the potential to secure, maintain, and grow in a particular job at the workplace (The National Graduate Employability Blueprint, 2012-2017). Kubler & Forbes (2004) defined Engineering as a profession directed towards the skilled application of a distinctive body of knowledge based on mathematics, science and technology, integrated with business and management, which is acquired through education and professional formation in a particular engineering discipline. Engineering is directed to developing, providing and

maintaining infrastructure, goods and services for industry and the community.

The two greatest concerns of employers are finding good workers and training them. One problem in some countries is unemployment among engineering graduates. Employers complain that the graduate-level job applicants are lacking in generic skills. New engineering graduates have good basic engineering knowledge and are not actually lacking in technical competency (Kamsah, 2004). However, engineering graduates are required to possess the employability skills to help them use their technical skills and their knowledge effectively.

Globally, employers agree that graduates are lacking in generic skills and they want higher education provider to emphasis more on developing these skills to students (Lankard, 1990; Gregson, 1992; Kamsah, 2004).

The main issues in the economic development of a country are the employment and unemployment rates. A country is said to have sustained growth if unemployment is low. On the other hand, a high rate of unemployment means a waste of human resources. Unemployment continues to be one of the most important economic problems and must be addressed in the labour market. The causes of unemployment are varied and complex. One of the main factors which causes unemployment is lack of employability skills (Surya, 2012). In order to address this issue, studies need to be conducted in order to determine the specific factors of graduate employability (EM). Once graduates understand the skills and characteristics that employers seek, they can tailor the requirement of the employer.

India faces a massive skill gap problem with hundreds of engineers graduating every year but only a few possess the skills required by the employer in the industry. There were not more than 50% of fresh engineers from All India Council for Technical Education (AICTE) approved colleges who secured employment between 2017 to 2018. According to a survey by Aspiring Minds, out of more than 1.5 million engineers who graduated in India, 80% were unemployed in 2019 (Mahadevan, 2019). Vijay (2021) claims that the core problem lies in the education modules that most of India's technical universities follow, emphasising technical writing skills and memorisation abilities of the students instead of deploying innovative methods that may improve their technical competence and skills.

In Malaysia, MOHE stated that the economy is an open economy driven primarily by foreign direct investment and export growth. The future workforce has to be able to cope with the changing nature and demands of the works. Future workforce must have the employability skills required by industries. Thus, the education system must recognize the changing demand conditions in terms of the needs of multinational and large corporations. This is important to ensure a country is able to produce adequately and appropriately trained human resource and does not face a skill-shortage problem. Currently, deficiencies are seen in the areas of communication, Information and Communications Technology (ICT) knowledge, and professional and technical skills which have resulted in an insufficient supply of employable graduates. This situation is further aggravated by university students not pursuing fields of study that are relevant to industry and not acquiring the skills demanded by the employers.

In the global economy today, the world is rapidly becoming one interdependent marketplace. This economic reality and challenges require engineering graduates to equip themselves not only with paper qualifications but also with other related skills to enhance their prospects of employment. In such a challenging economy, the role of IHL is not only to produce graduates with specific areas of specialization, but more importantly, to develop graduate employability skills that are most demanding in the 21st Century (Lee & Tan, 2003). MOHE's objective on EM was to produce competent graduates to fulfill national and international manpower needs with 75% of graduates employed in their relevant fields within six months of their graduation (The National Graduate Employability Blueprint, 2012-2017). MOHE's objective shows the government's serious concern on EM and marketability. The unemployment rate of technical graduates for the period of four years (2008-2011) improved from 46% to 24% (Strategic Action Plan for Engineering Education in Malaysia, 2013-2018). However, it is a challenge now to ensure the steady rate of employment of engineering graduates.

MOHE aspires to increase the EM rate to more than 80% by 2025 (MOE, 2015).

Employable graduates must possess the pertinent attributes, skills and knowledge which ensure they have the capability of being effective in the workplace to benefit themselves, their employers in the industry and society. What are the significant factors of engineering graduate's employability? This literature review aims to identify the important characteristics or skills of engineering graduates as required by employers.

Literature Review

This research was conducted using the Narrative Literature Review (NLR) method as classified by Cook et al. (1997) and Rother (2007). We had selected over 300 articles for review of what constituted significant factors to industry over the past two decades considered as a requirement to employ new engineering graduates.

A lot of terminology of graduate employability (EM) is used in researching the basic skills needed by graduates (Brochado, 2009; Hall et al., 2010; Surya, 2012). EM skills are those basic skills necessary for getting, keeping and doing well on a job. EM skills are also known as job readiness skills. EM are also defined as a set of achievements, understandings and personal attributes that makes individuals more likely to gain employment and be successful in their chosen occupations. Employability is defined as a set of attributes, skills and knowledge that all labour market participants should possess to ensure they have the capability of being effective in the workplace – to the benefit of themselves, their employer and the wider economy (Andrews & Russell, 2012). There are a number of interpretations of 'employability' in the literature, which can be reduced to three overarching constructs: (i) Employability as demonstrated by the graduate actually obtaining a job, (ii) Employability as the student being developed by their experience of higher education (i.e., it is a curricular and perhaps extracurricular process), (iii) Employability in terms of personal achievements (implicitly and potentially). Employability implies something about the capacity of the graduate to function in a job, and is not to be confused with the acquisition of a job, whether a 'graduate job' or otherwise. A review of literature suggests that employability is about the work and ability of being marketable in the industry or in other word, employability is about being adept at getting and keeping a job (MOHE, 2012).

In addition to being well-grounded in technical courses, engineers should be well-shaped in broader knowledge-base and diverse personal/interpersonal key-skills. Such attributes and skills include teamwork, communication, inter/multidisciplinary knowledge, analytical thinking, ingenuity, creativity, technological innovation, business skills, management skills, leadership, ethics, professionalism, and understanding

work strategies. Employability of graduates is not just determined as the outcome of discipline specific study programme or professional studies, but also the graduate's ability to promote wider skills like communicative, problem solving, interactive skills, showing initiative and efficiency (Yusof & Jamaluddin, 2015). Employability also includes the aspect of attitude and personal attributes of loyalty, commitment, honesty, punctuality and integrity.

A common recommendation is that the pertinent attributes, skills and knowledge are all characteristics or qualities that can be learnt and therefore should be taught within the education programme. Employability skills are teachable and transferable skills. Newport and Elms (1997) stated that the employable qualities are learnable, and that therefore they are teachable within an education programme. Some 'knowledge' areas were identified in their study which they concluded should be incorporated into an education programme. The categories they used were based on Carter's (1985) 'A Taxonomy of objectives for professional education'. Categorizing the distinguishing effective engineer qualities by type of learning experience reveals a large number of 'skill' qualities. If these qualities are developed among the students through academic programmes, it would surely enhance their chances of employability. Better teaching outcome should also improve the chances of EM (Sahudin et al., 2019).

Determinant Factors affecting Graduate Employability (EM)

Changes are the norms at the workplace. Globalization and development of technology demand employees to be highly skilled. Every employer is looking for a specific set of skills for job seekers that match the skills necessary to perform a particular job. The need to establish employability skills among university graduates is imperative. It is important for graduates to improve their skills through training, professional development, from someone who understand these skills.

To keep pace with global competition, fresh graduates need to adapt to the new business environment and workplace demands (Bhagwath & Pal, 2013). The key element to enable graduates to keep up with those demands seems to be the employability skills and traits that are imparted during tertiary education. It has also become a common belief in industry that IHL should equip graduates with the proper skills necessary to achieve success in the workplace. The on-going changes in the workplace, the work itself and the development of advance technology will require workforce to have advance knowledge in the areas of works, high skills and positive attitudes (Surya, 2012). The advancement of new technologies changes the way work are done and brings about a shift of workforce requirement from low skills to the workforce being well informed and highly skilled.

There are various definitions of graduate employability (EM) and a number of different terms are used. Generic skill is the term used for employability skills in most countries, but what is meant by this term varies between countries. Employability skills are the general skills which play an important role in contributing to employees' successful performance at their workplaces. The UK Commission for Employment and Skills report 'The Employability Challenge' (2009) has drawn on the most commonly used definitions of employability: "We take employability skills to be the skills almost everyone needs to do almost any job. They are the skills that must be present to enable an individual to use the more specific knowledge and technical skills that their particular workplaces will require".

Some studies suggest that a person's success is not solely determined by knowledge and technical skills which are hard skills, but also by the ability to manage oneself and others employability skills (Surya, 2012). A study by Rosenberg et al. (2012) suggest that basic graduate employability skills are transferable core proficiencies that represent essential functional and enabling knowledge skills and abilities required to succeed at all levels of employment in the 21st century workplace. Graduate employability (EM) was also categorized in the following competency areas: personal values, problem solving, decision making skills, relation with other people, communication skills, task-related skills, maturity, health and safety habits, and commitment to job. Management skills are also included under graduate employability (Rosenberg et al., 2012).

Skill is the ability to perform specific tasks (Yusoff et al., 2012). Employability skills are those basic skills necessary for getting, keeping, and doing well on a job. These are the skills, attitudes and actions that enable workers to get along with their fellow workers and supervisors and to make sound, critical decisions. Unlike occupational or technical skills, employability skills are generic in nature rather than job specific and cut across all industry types, business sizes, and job levels from the entry-level worker to the senior-most position. Employability skills, while categorized in many different ways, are generally divided into three skill sets: (i) basic academic skills, (ii) higher-order thinking skills and (iii) personal qualities. The excellent academic degrees alone are inadequate as the employers today look in fresh engineering graduates for competencies or capabilities in generic skills. Majority of studies continue to emphasize that technical content knowledge and competencies are essential for any engineer. Statistics indicating a high percentage of employed engineering graduates does not imply they are effective engineers. An engineer may be employed simply because they were considered adequate.

It has traditionally been regarded that a remarkably outstanding cumulative grade point average (CGPA) obtained by graduates through

laboriousness in university has been a passport to seeking for a qualification suited, if not highly rewarded employment (National Graduate Employability in Malaysia, 2012). It has therefore prompted undergraduates to be devoted to concentrating solely on their studies for academic excellence while compromising co-curricular activity participation, through which employment related soft skills are accumulated. Consequently, hard skills learnt from and emphasized through courses of study in university are virtually not complemented by the possession of personal qualities and soft skills among undergraduates. A perfect blend of personal qualities, soft skills and hard skills will contribute to enhancing graduate employability, a term where its definition can be connoted from various angles. The next section discusses the four primary determinant factors and the relationship with graduate employability (EM).

1. Soft Skills

Recently, educational researchers and employers have placed increasing attention on the importance of soft-skills (Yusoff et al., 2012; Williams, 2015; de Villiers Scheepers et al., 2018; Teng et al., 2019; de Campos et al., 2020; Pitan & Muller, 2020; Hirudayaraj et al., 2021; Sarker et al., 2021).

While functional (knowledge) skill or discipline-specific knowledge is typically content specific, soft-skills are non-academic skills (communication and interpersonal adaptability skills) that are presumed to be useful in a range of working environments. The term soft skills, used interchangeably with nontechnical skills, is defined as the interpersonal, human, people or behavioural skills needed to apply technical skills and knowledge in the workplace. Soft skills are categorized as being related to human issues, such as communication, teamwork, leadership, conflict management, negotiation, professionalism, and ethics (Williams, 2015).

Evidence suggests that soft-skills are an important predictor of employability (Finch et al., 2012; Lievens & Sackett, 2012; Nickson et al., 2012; Williams, 2015; Abd Majid et al., 2020). Specific soft-skills that may affect employability include the following types of communication skills: written communication skills; verbal communication skills; and listening skills. Workplace communication skills encompass competent oral and writing skills, the ability to work in teams with ample team-spirit and cooperation, mingling with those from diverse backgrounds, cultures and regions, and in crisis and adversities, passing through them with courage and acumen of mind (Das, 2018). Professionalism has been identified as contributing to employability (Ashton, 2011). Soft skills such as human relations skills, communication skills, ethical behaviour skills and cognitive skills are the attributes that employers consider when reviewing job applicants (Kenayathulla et al., 2019). Lastly, scholars have identified interpersonal skills – such as

the ability to work effectively in teams – as an important employability factor (Wellman, 2010). In sum, research conducted from a range of disciplines and occupations converges on the finding that soft-skills influence employability.

The ability to communicate effectively worldwide, understanding of business issues, concern about societal and ethical issues, and global sustainability have also become necessary attributes for engineers to face the challenges of globalization; in addition, graduates are expected to contribute towards the socio-economic development of the country and assist in national unity. Language proficiency, especially in narrative skills, is required for engineers to effectively convey their ideas and solutions to the community in a comprehensible and appropriate manner.

Rasul et al. (2013) investigated the importance of employability skills as perceived by 107 employers from manufacturing industries. The findings of the study revealed employers place great importance on interpersonal skills, thinking skills and personal qualities that students need to emphasize to be employed in manufacturing industries. Indicators such as work safety, integrity, customer service, creative/innovative thinking and problem solving, and exercise leadership showed the highest mean score. Overall employers from manufacturing industries placed employability skills as must be owned by all graduates to enable them to compete in the global market. Results support a growing body of research that identifies soft-skills as one of the most important competencies employers look for when hiring new graduates (Finch et al., 2012). A recent study by the Australian Employment Agency found that 85% of the desirable skills for employability are related to soft skills, while 15% are technical skills, highlighting the importance of the need to teach and highlight soft skills during the academic period (de Campos et al., 2020). MOHE (Wan Muda et al., 2021) developed seven constructs under soft-skills and Hanapi (2015) asserted that graduates should focus on the dominant soft skills to enhance their marketability. The individual employability factors that are measured most are from the category of soft-skills. This suggests that new engineering graduates who demonstrate soft-skills (e.g., effective communication and interpersonal skills) will be more competitive in the marketplace than those who do not. It is important for IHL to embed soft skills into the curriculum in order to develop graduate work readiness (Teng et al., 2019).

In summary, the literature review indicates that researchers have identified soft skills as an important factor influencing EM (Finch et al., 2012; Lievens & Sackett, 2012; Nickson et al., 2012; Yusoff et al., 2012; de Villiers Scheepers et al., 2018; Teng et al., 2019; de Campos et al., 2020; Hirudayaraj et al., 2021; Sarker et al., 2021; Wan Muda et al., 2021).

2. Problem Solving Skills

Researchers have identified that problem-solving skills are core to employability (Reid & Anderson, 2012; Yusoff et al., 2012; Asonitou, 2015; Ito & Kawazoe, 2015; Azmi et al., 2018; de Villiers Scheepers et al., 2018; Scott et al., 2019; de Campos et al., 2020; Fajaryati et al., 2020; Liew et al., 2020; Saleh & Lamsali, 2020; Zapalska et al., 2020; Idkhan et al., 2021). Similar to soft-skills, problem-solving skills are important across disciplines (e.g., engineering, marketing) and employer type (Wellman, 2010). Problem solving skills term have been explicitly mentioned in a wide variety of literature. Problem-solving skills are higher-order cognitive skills that are complex, requiring “judgment, analysis, and synthesis; and are not applied in a rote or mechanical manner”. Problem solving is a competency closely related to intelligence or general mental ability (Scherbaum et al., 2012), which is the best predictor of job performance across a variety of occupations. Problem solving incorporates a range of competencies including critical thinking skills (Reid & Anderson, 2012; Zapalska et al., 2020), creativity, leadership skills (Conrad & Newberry, 2012), and adaptability (Jabr, 2011).

Problem solving skills also include the creativity of manpower. It refers to applying creative thinking to develop appropriate solutions; ability to come up with new ideas, solutions and envision of original ideas and concepts, inventing new products and solutions, and apply ‘lateral thinking. Analytical ability is also an important dimension of problem solving skills. Analytical ability means strong analytical skills. Engineers should be critical thinkers so that they can be able to apply a systematic and critical assessment of complex problems and issues (Hounsell, 2011). Critical thinkers use critical, conceptual, reflective, and rational thinking in drawing and evidence-based assessing systematic conclusions and finding underlying relationships for solutions. They should also be innovative in nature in designing new products and business polices also giving innovative solutions to existing problems (Rabl & Hillmer, 2012). Innovative employees add values through introducing novel ideas, methods, directions, opportunities, and solutions that meet new requirements, through more effective products, processes, services, and technologies that are readily available to stakeholders.

Consistent with past research (Reid & Anderson, 2012; MOHE, 2015) employers identify problem-solving skills (critical thinking skills) as an important factor when assessing new graduates’ employability. Second only to soft-skills, problem solving was considered a key skill employers assess when hiring new graduates. A number of research findings provide additional support for the notion that problem-solving skills are important across disciplines (Wellman, 2010), due to their strong predictive validity when it comes to job performance. Organizations seek candidates that can perform at consistently high levels,

be trained to perform new tasks and possess the skill sets required to solve fundamental and complex problems (Bhatnagar, 2021).

In summary, the literature review indicates that researchers have identified problem solving skills as an important factor influencing EM (Reid & Anderson, 2012; Yusoff et al., 2012; Asonitou, 2015; Ito & Kawazoe, 2015; Azmi et al., 2018; de Villiers Scheepers et al., 2018; Scott et al., 2019; de Campos et al., 2020; Fajaryati et al., 2020; Liew et al., 2020; Saleh & Lamsali, 2020; Zapalska et al., 2020; Idkhan et al., 2021).

3. Functional (Knowledge) Skills

Functional engineering knowledge skills are unique core specialized competencies that are required for each engineering discipline's respective work settings. Functional engineering skills encompass communication, information management, organization management, investigation, research, design, planning and technical skills unique to each engineering discipline (Lithgow, 2010). Job-specific Functional Skills or Industry skills are Job-specific functional skills, including job-specific competencies, job-specific technical skills (Rosenberg et al., 2012; Low et al., 2016; Uddin, 2021), and knowledge of software are essential when considering an individual’s employability (Smith, 2008; Laker & Powell, 2011). Engineering graduate competencies of IHL accredited by organizations that are members of the International Engineering Alliance (IEA) are listed in the IEA Graduate Attributes & Professional Competencies (IEA, 2021).

Generally speaking, these skills send a signal to employers that a new graduate has mastered the specific proficiencies needed to perform highly on a particular job (Bhaerman & Spill, 1988). Job-specific functional skills are more context specific than soft-skills and problem-solving skills. For instance, the technical skills required by a software engineer will differ from those required by a business analyst.

For the time being, job-specific functional skills have become an important employability factor. Within this category, three individual factors were identified: job-specific competencies, job-specific technical skills, and knowledge of software. To be a successful job applicant as a new graduate, technical skills are important but ranked intermediate to the other categories (Smith, 2008; Laker & Powell, 2011). Employers who have technical requirements understand that they may have unique software and/or technical processes that graduates may not have been exposed to in their studies. However, by selecting graduates with strong problem-solving skills, employers can ensure that it will be easy for their employees to learn these job-specific functional skills through training or on-the-job experience. This functional skill requires graduates to apply knowledge and skills, essential for effective professional practices, into real-world settings (Gowsalya & Kumar, 2017).

In summary, the literature review indicates that researchers have identified functional (knowledge) skills as an important factor influencing EM (Laker & Powell, 2011; Low et al., 2016; Gowsalya & Kumar, 2017; Fajaryati et al., 2020; Idkhan et al., 2021; Uddin, 2021).

4. Academic Reputation

Reputation is a social construct that is defined as the generalized level of esteem for an organization held by a stakeholder (Fombrun & Shanley, 1990; Dalton & Croft, 2003; Deephouse & Carter, 2005). Academic reputation has a significant impact on a variety of outcomes of interest to employers (Mihut, 2015), policy makers, and academics alike. Reputation is an intangible asset that has been recognized as an essential part of an organization's management, which provides great strategic value for creating long-term competitive advantages (Taeuscher, 2019; Miotto et al., 2020). Reputation synthesizes information about the organization, its product, its relationship with customers, competitors and suppliers, as well as providing information on the reliability and credibility of the organization, determining the public's favorable response towards it (Lappeman et al., 2018). Reputation is built over time, is nonnegotiable, and is one of the most important determinants of the prevalence of any organization (Martín-Miguel et al., 2020).

For instance, researchers have examined how student retention and perceptions are affected by: institutional image; institutional branding; institutional ranking; and programme structure (Bano & Vasantha, 2019). Comparatively, few studies have explored the relationship between academic reputation and employability. The academic reputation of a specific school (e.g., Harvard) or a category of schools (e.g., Ivy League) may enhance EM from IHL (Nogales et al., 2020; Shanmugam & Bano, 2020).

Evidence suggests that academic reputation and its relationship to employability should be considered at three levels. The first level considers institutional-level reputation. Institutions and the ranking systems that have emerged in the past two decades (e.g., Maclean's University Rankings, Forbes Top Universities List) influence the employability of new graduates (Maclean, 2017; Strauss, 2017). Second, scholars have identified that programme-level reputation also can influence the perception of employability skills. For example, the Financial Times (2018) releases an annual ranking of MBA programmes which may influence the employability of graduates from these programmes. Lastly, individual academic performance (grade-point average) contributes to the employability of a new graduate and is frequently used in selection systems for entry-level positions.

Finch et al. (2012) conducted a study where they tried to relate academic reputation with employability.

The results illustrate that, compared to other categories; employers place the least importance on academic reputation when hiring new graduates. The academic reputation issues were ranked above the mid-point on the scale, suggesting that employers do place some importance on them. These findings contribute to the relatively small body of literature on the relationship between academic reputation and employability. Interestingly, it appears that there may be a disconnect between the importance students place on academic reputation when choosing their post-secondary institution and the relative lack of importance employers place on academic reputation when hiring graduates.

In summary, the literature review indicates that researchers have identified academic reputation as an important factor influencing EM (Mihut, 2015; Maclean, 2017; Strauss, 2017; Bano & Vasantha, 2019; Nogales et al., 2020; Shanmugam & Bano, 2020; Aviso et al., 2021).

As an overall summary, the literature review indicates that researchers have identified soft skills (Finch et al., 2012; Lievens & Sackett, 2012; Nickson et al., 2012; Yusoff et al., 2012; de Villiers Scheepers et al., 2018; Teng et al., 2019; de Campos et al., 2020; Hirudayaraj et al., 2021; Sarker et al., 2021), problem solving skills (Reid & Anderson, 2012; Yusoff et al., 2012; Asonitou, 2015; Ito & Kawazoe, 2015; Azmi et al., 2018; ; de Villiers Scheepers et al., 2018; Scott et al., 2019; de Campos et al., 2020; Fajaryati et al., 2020; Liew et al., 2020; Saleh & Lamsali, 2020; Zapalska et al., 2020; Idkhan et al., 2021), functional (knowledge) skills (Laker & Powell, 2011; Gowsalya & Kumar, 2017; Fajaryati et al., 2020; Idkhan et al., 2021; Uddin, 2021) and academic reputation (Mihut, 2015; Maclean, 2017; Strauss, 2017; Bano & Vasantha, 2019; Nogales et al., 2020; Shanmugam & Bano, 2020; Aviso et al., 2021) as factors influencing EM.

Discussion and Conclusion

Research on graduate employability (EM) has gained much attention as employers are now more concerned about finding good workers who not only have basic academic skills but also higher order thinking skills like learning, reasoning, thinking creatively, decision making and problem solving. Quality engineering education leads to quality engineering graduates that the employer will be satisfied with. IHL should design courses and curriculum in a way so that students can achieve the required skills necessary for the competitive job market (Rowe & Zegwaard, 2017; Sahudin et al., 2021). Quality education should also guarantee the employability of the graduates (Abiodun-Oyebanji & Omojola, 2018; Sahudin et al., 2019). Research opportunities include conducting Systematic Literature Review (SLR) applying quantitative synthesis using statistical methods as classified by Cook et al. (1997) and Rother (2007). Future studies

could also be recommended to determine which among the identified factors are the most pertinent factors influencing graduate employability (EM).

The literature review indicates that soft-skills are an important predictor of employability. Employers give importance on some specific soft skills like the communication skills including written communication skills, verbal communication skills and listening skills; similarly, professionalism and interpersonal skills – such as the ability to work effectively in teams as contributing to employability. Therefore, graduates should not only focus on the academic issues or job specific skills; rather they should also develop good communication skills, professionalism and interpersonal skills to survive in the competitive job market. Future studies could be recommended to survey employers to determine EM relationship with Program Learning Outcome (PLO) related to soft-skills.

The literature review indicate problem solving skills as an important predictor of graduate employability. Problem solving is a competency closely related to intelligence, which is the best predictor of job performance across a variety of occupations. Among the different types of skills explored through the literature review, problem solving skills was found to have a significant predictor of EM from the employers' point of view. Employers want engineering graduates to have problem solving skills as it includes the creativity of manpower. It refers to applying creative thinking to develop appropriate solutions; ability to come up with new ideas, solutions and envision original ideas and concepts, inventing new products and solutions, and apply lateral thinking. Analytical ability is also an important dimension of problem solving skills. Therefore, engineering graduates should develop these skills to secure a job position in the competitive job market. Future studies could be recommended to determine whether engineering education should focus on students solving more engineering problems or solving complex engineering problems.

The literature review indicates functional (knowledge) skills as an important factor of graduate employability. To be a successful job applicant as a new graduate, technical skills are important. Employers who have technical requirements understand that they may have unique software and/or technical processes that graduates may not have been exposed to in their studies. However, by selecting graduates with strong problem-solving skills, employers can ensure that it will be easy for their employees to learn these job-specific functional (knowledge) skills through training or on-the-job experience. This functional (knowledge) skills require graduates to apply engineering knowledge and skills, essential for effective professional practices, into real-world settings. Future studies could be recommended to determine how engineering education can improve student's learning knowledge skills.

Finally, the literature review indicates that academic reputation of graduates is related to graduate employability. The academic reputation of a specific institution may enhance employability of graduates from these institutions. Though few studies concluded that academic reputation has a significant influence on a variety of outcomes of interest to employers and policy makers, the literature review indicates that it is correlated to graduate employability. Employers give importance to the institutional image or academic results of the candidates. Future studies could be recommended to survey employers in the relevant industry to examine EM relationship to academic reputation.

In summary, the literature review indicated that researchers have identified soft skills, problem solving skills, functional (knowledge) skills and academic reputation as factors influencing engineering graduate's employability.

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