Perceptions and Expectation Toward Engineering Graduates by Employers : A Malaysian Study Case

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Abstract:- Rapid and drastic changes in economic growth nowadays are creating higher demands for employability skills in the workforce. Labour market becoming more competitive and depends on quality of knowledge and skills as the globalisation come across in all industry. Employers have high expectations on fresh engineering graduates to perform in their organisation as soon as they are hired. Engineering employability skills are therefore necessary for Malaysia industry to remain competitive in global market. The study investigates the perception of the level of satisfactory on skills owned by engineering graduates in work place, and the expectation of employers on the level of important for each skills required in engineering graduates for future employment. The finding indicates that the majority of those companies employing graduates have been satisfy with the knowledge and skills of the graduates they hired. They expected for new engineers are very important to be equipped with relevant employability skills and abilities. Employers' perception and expectation play an important role in determining the employability skills needed. Besides, the results provide valuable insight of as they effort towards getting employed with competitive company.

Key-words: - Engineering graduates, perception, expectation, employers, and employability skills.

1 Introduction

The Malaysia Economy In Brief 2008, Department of Statistics, Malaysia, reported in Macro Economic Indicators that the unemployment rate in first quarter of 2008 is 3.6% (398,000) which is 0.4% increased from 2007 (3.2% unemployment rate). The unemployment rate increased including graduate of the tertiary level. To put a stop on this, several studies have been conducted to find the factors of this increment and to find the solution to this problem. One of the factor is the graduates are not ready to enter the workforce. They are lack of employability skills needed by employers [4], lack of competencies or

capabilities [7] and not equipped with the relevant skills [5].

The current economic challenges and globalisation are forcing employers in engineering sector to seek for competent engineers. Consequently, the graduates have to prepare themselves with skills desired by their future employers. Above and beyond good academic qualifications, employers also required their new engineers to be equipped with relevant capabilities, skills, abilities and personal qualities. According to Nurita report, the representatives in a workshop organized by the Economic Planning Unit in July 2004, had agreed that the graduates are "…well equipped with the technical skills such as in ICT, management, engineering and marketing but they lack in certain aspects such as ability to communicate, skills to solve problems and poor interpersonal skill"[9]. Furthermore, several researches in engineering education basically found out that the current educational system and practices in Malaysia unable to deliver the graduates fully equipped with employability or generic skills required by employers nowadays or in the near future [5; 7; 9].

Therefore, the aim of this study is to investigate employers' perception on the level of satisfactory for skills owned by engineering graduates in their work place and the expectation of employers on the set of employability skills related to engineering sector for the future recruitment. This study will also compare the differences of level of satisfactory of employers and the level of important of the set of engineering employability skills as expectation by employers. It is a hope that this study will provide the relevant information for engineering graduates to build the awareness on employability skills and prepare themselves to enter the workforce. Hopefully, the finding will help the students to enhance the skills, capabilities, abilities and personal qualities before they graduated and go for the job interview.

2 Literature Review

Malaysia is projecting to produce more than 77,000 engineering graduates in the next five years and 222,000 engineering graduates in the next ten years [3]. Malaysia needs an adequate number of engineers to ensure the developments are carried out as planned. The questions are, "Are the Malaysian's universities able to achieve the target to produce adequate engineers?" and "Can Malaysia's universities produced a high skilled engineers? Are the engineering graduates having sufficient skills to enter workforce?

According to Mohammad [7], new and fresh engineering graduates these days confront with more "challenges and competitions" in getting employed compared to previous graduates. Beginning of globalisation, many fields such as engineering industry, business education, social and cultural life demand high quality in presentation skills [13]. All job has a set of requirements and characteristics, "… any person are acquires the knowledge, abilities and attitudes necessary to fulfil the requirements of the job position" [11]. Mastering the skills is a necessity for most activities in workplace [13]. Since globalisation demands the companies to be more competitive in management system, employers required their potential engineers for "competencies and capabilities" in softskills in addition to excellent academic degrees [7].

Economic recession and the trend towards globalisation have influenced the Malaysian employment system. In some other countries, for a quite some time, the lack of specialist in engineering have cause a problem to its' economic development [12]. In order to survive in the global market, employers began new approach to recruit new engineers. Most companies demand engineering graduates to owned sufficient skills and abilities to work immediately. This can be seen in their advertisement for vacancies. Only those who fulfil the requirement and high skilled graduates

will succeed. As a result of these demanding requests from employers, the number of unemployed graduates increased. Engineering graduates are required to possess the employability skills to help them practising their knowledge and technical skills effectively [7] and become competitive among them.

In Malaysia, employers complained on the graduate-level job applicants who are lacking in generic skills [9], conversely they satisfied with engineering knowledge [8] and technical competency [9] possessed by Malaysian engineering graduates. Employers and leading engineers agreed that local engineering graduates are lack of oral and written communication skills [3]. The study done by Hassan et al.[3] shows that there is an urgent need for engineering programmes to improve in all areas, especially in non-technical aspects of engineering education. Continuously updating and improving the technical engineering skills and knowledge are very important for changes in the technologies growth [12]. Thus, the education programmes are recommended to enhance employability skills by emphasizing on improvements in the non-technical skills aspects amongst undergraduates [3].

The Employability Skills Framework developed by Hassan et al (2007) listed thirteen (13) most important generic skills acquired by the engineering graduates [3]. The skills are based on criteria emphasized for professional skills from Criteria for Accrediting Engineering Programs as approved by ABET. The finding on engineering employability skills is summarised in Table 1 according to the **importance** of employability skills expected by employers.

Table 1
Engineering Employability Skills Developed by Ministry of Higher Education

No	Skills	Description
1	Communication 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
2	Competent 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	Competent 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 commitment to professional and ethical responsibilities
8	Lifelong learning	The ability to recognize the need to undertake life long learning, and possessing / acquiring the capacity to do so
9	Engineering system approach	The ability to utilize a systems approach to design and evaluate operational performance

No	Skills	Description
10	Design and conduct experiments	The ability to design and conduct experiments, as well as to analyse and interpret data.
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.
12	Competency in theoretical and research	Having the competency in theoretical and research engineering.
13	Entrepreneurial skills	Having basic entrepreneurial skills.

Sources: "The Future of Engineering Education In Malaysia"(2007); EAC Manual (2003); ABET, USA(2009)

3 Methodology

The study began with a review of literature and published reports on skills expected by employers to find in new employees, particularly engineers. Engineering programmes in Malaysia are advised to fulfil all qualifying requirements for accreditation. Assessment for accreditation is submitted to Engineering Accreditation Council (EAC). Skills listed in a questionnaire are based on EAC Criteria [2]. The survey investigates the level of satisfactory of employers toward engineering graduates in their work place, and the level of important of skills and abilities in engineering graduates in future graduate recruits. The employers were asked to indicate their satisfactory on knowledge, skills and experience owned by engineering graduates in their work place and how important they thought each of the knowledge, skills and experience that would be needed for future employment. Each item was measured using a five-point Likert scale representing different levels of satisfactory: range from 1 – "Not satisfactory at all" to 5 – "Most satisfactory" and levels of important: range from 1– Not Important at all' to 5 – " Most Important" respectively. For the purposes of the survey 'employability skills' was taken to mean the non-technical skills and abilities.

Questionnaires were distributed to thirsty (30) employers at various engineering industry in the Klang Valley area of Malaysia. However, the sample is limited to engineering employers in a limited geographical area of Malaysia. Data collection was carried out through 'snow ball sampling', online and in person interviews using a set of questionnaires. The respondents were mainly possessed the following responsibilities and abilities:(a) Autonomy to hire new engineer for the organization; (b) Familiar to project and know what kind of employability skills will be needed in the future for the organization; and (c) Knowledgeable of the skills needed for engineers to successfully operate equipment that produces organization's products.

The breakdown of respondents according to type of industry as illustrated in Figure 1 and category of company shown in Table 2.

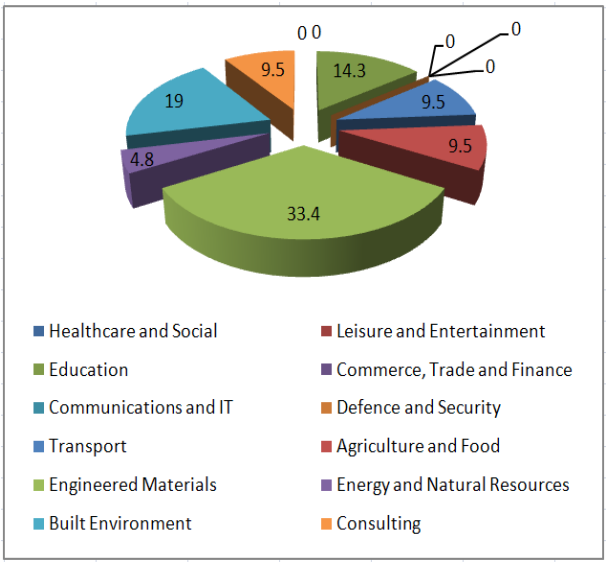

Figure 1 Nature of Industry

Table 2
Category of Company

Category of Company	Number	%
Local company with annual sales turnover not exceeding RM10 million.	0	0
Local company with annual sales turnover exceeding RM10 million to RM25 million.	7	23.3
Local company with annual sales turnover RM25 million to RM100 million.	9	30.0
Local companies with annual sales turnover exceeding RM100 million and multinational company.	14	46.7

Finally, the collated data was analysed quantitatively using means and percentage analysis. Table 3 present the result according to the level of satisfactory of employers toward engineering graduates. Briefly, the result indicating that employers are satisfied with the technical competence in a specific engineering discipline owned by graduates and the ability of graduates to work as individual as well as a team member. However, employers are quite satisfied with the entrepreneurial skills and knowledge of contemporary issues possessed by graduates.

Table 4 present the result according to the level of important of the knowledge, skills and experience should be owned by engineering graduates as expected by employers. As expected, work individually and as a team member, good communication skills and problem solving skills are listed as among first important skills. Its shows that the employers are very much required the graduates to own ability to function effectively as an individual and as team member. Employers also put on the important of having ability to communicate effectively, undertake problem identification, formulation and solution and acquire and apply knowledge of engineering fundamentals. However, having basic entrepreneurial skill is not considered important for graduates to have it.

Table 3
Level of Satisfactory on Skills as Perceived by Employers.

No	Skill	Mean	Level of Satisfactory
a)	Having in-depth technical competence in a specific engineering discipline.	4.27	Satisfactory
b)	Ability to function effectively as an individual and in a group with the capacity to be a leader or manager as well as an	4.23	Satisfactory

No	Skill	Mean	Level of Satisfactory
	effective team member.		
c)	Ability to acquire and apply knowledge of engineering fundamentals	4.03	Satisfactory
d)	Having competency in engineering application and orientation.	3.97	Satisfactory
e)	Ability to communicate effectively, not only with engineers but also with the community at large.	3.97	Satisfactory
f)	Ability to undertake problem identification, formulation and solution.	3.97	Satisfactory
g)	Having the competency in theoretical and research engineering.	3.90	Satisfactory
h)	Having social awareness, cultural, global and environmental responsibilities and ethics of a professional engineer and the need for sustainable development.	3.57	Satisfactory
i)	Ability to utilise a systems approach to design and evaluate operational performance.	3.57	Satisfactory
j)	Recognising the need to undertake lifelong learning, and possessing/acquiring the capacity to do so.	3.53	Satisfactory
k)	Ability to design and conduct experiments, as well as to analyse and interpret data.	3.47	Quite Satisfactory
l)	Having the knowledge of contemporary issues.	3.29	Quite Satisfactory
m)	Having basic entrepreneurial skills.	2.97	Quite Satisfactory

Table 4
Level of Important On Skills as Expectations by Employers

No	Skill	Mean	Level of Important
a)	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.	4.40	Important
b)	Ability to communicate effectively, not only with engineers but also with the community at large	4.23	Important
c)	Ability to undertake problem identification, formulation and solution	4.23	Important

No	Skill	Mean	Level of Important
d)	Ability to acquire and apply knowledge of engineering fundamentals.	4.23	Important
e)	Having competency in engineering application and orientation.	4.07	Important
f)	Ability to utilise a systems approach to design and evaluate operational performance.	3.93	Important
g)	Recognising the need to undertake lifelong learning, and possessing/acquiring the capacity to do so.	3.93	Important
h)	Ability to design and conduct experiments, as well as to analyse and interpret data.	3.90	Important
i)	Having the competency in theoretical and research engineering.	3.70	Important
j)	Having in-depth technical competence in a specific engineering discipline.	3.70	Important
k)	Having social awareness, cultural, global and environmental responsibilities and ethics of a professional engineer and the need for sustainable development.	3.70	Important
l)	Having the knowledge of contemporary issues.	3.53	Important
m)	Having basic entrepreneurial skills.	3.23	Quite Important

4 Results

The result shows some significant gap exists between the skills actually possessed by employee and the skills are thought to be important by employer. The most important skills are work as an individual as well as a teamwork, communication, and problem-solving. In addition to these are skills in lifelong learning, applying basic knowledge, understand professional, social and ethical responsibilities and etc. Figure 2 shows the comparison between level of satisfaction and level of important for each skill indicated by the employers (respondent).

Figure 2 shows the skills that are important for graduates to own it are still below employers' satisfactory. Employers only satisfied to "*Having in-depth technical competence in a specific engineering discipline*" and "*Having the competency in theoretical and research engineering*" compare to the rest of skills. Meaning that, the graduates are not lacking in technical skills. However, employers found that graduates, who work with them, are lacking of other eleven skills and they are less satisfied with it.

Among the skills required, the most important skill is "*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*" which is considered second highest satisfactory to employers. Second most important skill is "*Ability to communicate effectively, not only with engineers but also with the community at large"* which is considered the fifth level of satisfactory. "*Ability to undertake problem identification, formulation and solution*" and "*Ability to acquire and apply knowledge of engineering fundamentals*" are another important skills but

under satisfactory for employers. "*Having basic entrepreneurial skills*" is not considered important by employers and graduates also do not doing well of this skill.

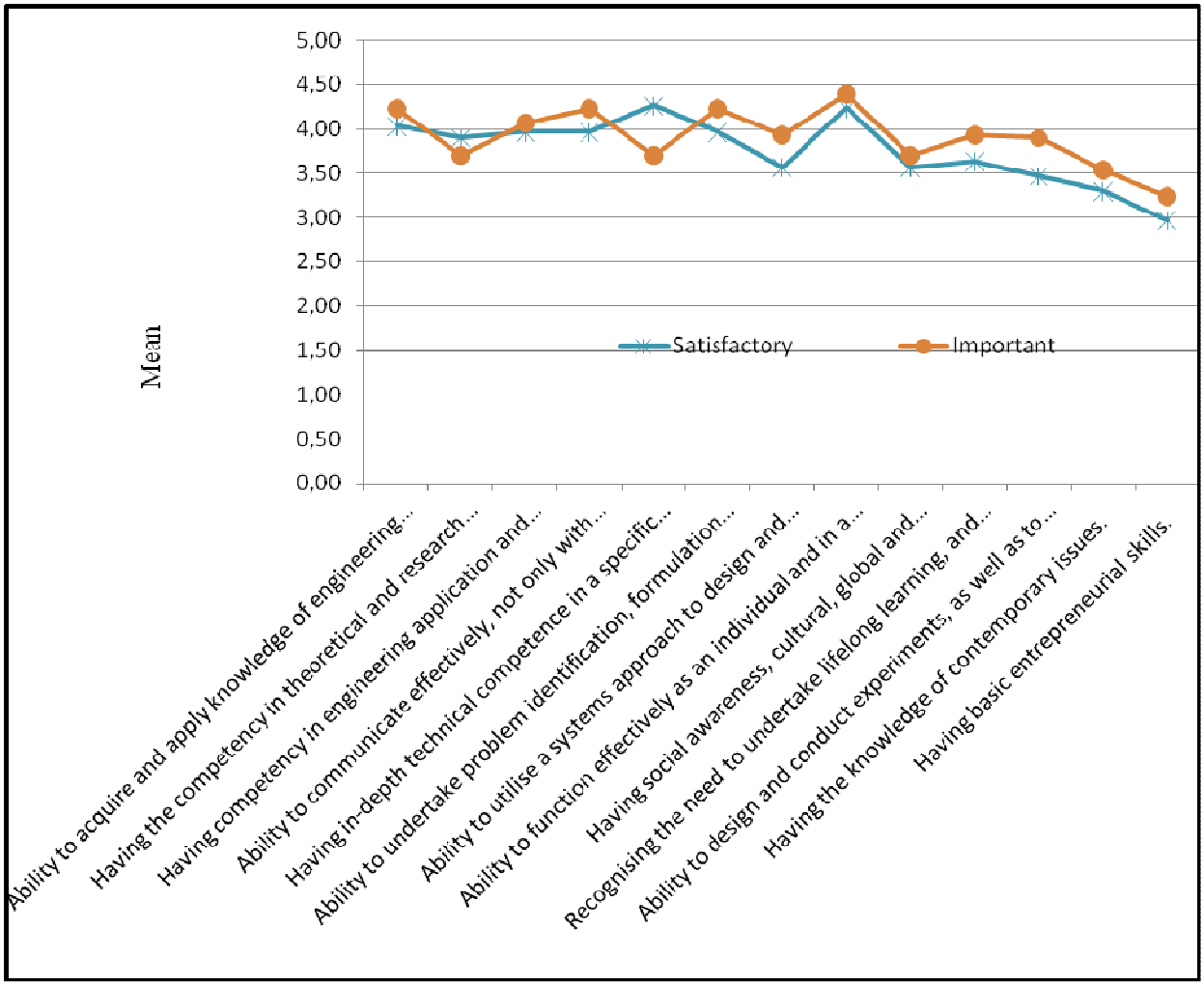

Figure 2 Level of Satisfactory and Important of Employability Skills.

4.1 Employers' Perception Towards Engineering Graduates

The general perceptions of the public towards graduates have become a main concern to higher education provider, government and some other interested parties. Graduates were seen did not meet the market demand and expectation where they were seen as lacking of creativity, not innovative and creative, not competitive, dependent and poor in communication skills. For the reasons, this study tried to investigate the interested parties, employers on their perception of the graduate who enter their workforce. The assessment of employers on knowledge, skills and experience owned by engineering graduates in their workplace indicate that 77% were satisfied with skills of their organisation's graduate employees – i.e. the knowledge and skills associated with engineering skills. 23% were dissatisfied.

Based on the data analysis, the mean scores of the skills owned by new engineer in relation to the employer's level of satisfactory were above 3.5, indicating that they were satisfied with the skills possessed by engineering graduates. The result denied the publics' perception on graduates. Table 3 presents results of the mean scores for employers' level of satisfactory on skills owned by their new engineers. There are three (3) skills that fall under the 'Quite Satisfactory' levels of satisfactory: i) ability to design and conduct experiments, as well as to analyse and interpret data, ii) having the knowledge of contemporary issues, and iii) having basic entrepreneurial skills. Meanwhile, employers were satisfied of the other ten skills. Overall, the mean scores suggest that only 77% of the engineering graduates were practicing skills as needed and satisfied by employers.

4.2 Employers' Expectations Towards Engineering Graduates

On the other hand, Table 4 represents the mean scores of the employers' expectations towards engineering graduates were above 3.5 except 'having basic entrepreneurial skills'. This indicates that employers thought the knowledge, skills and experience were important for future employment to hire new engineers. They expected 92% of relevant employability skills and abilities listed are important for graduated to be equipped with. Top priority was given to "*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*" followed by "*Ability to communicate effectively, not only with engineers but also with the community at large*". The result was agreed to previous researches [1; 3; 5; 8; 10]. Thus skills are thought to be important for graduates to possess it because the ability were seen as important for working within a project team and keeping the project keep on going as scheduled. Whilst communication are necessary for an engineer to negotiate, to work in team, to serve and meet customers, to interact and work well with people, and to solve problems. The third important skill is "*Ability to undertake problem identification, formulation and solution*".

5 Discussion And Conclusion

The survey invited views on the perception and expectation of 13 different employability skills based on EAC Manual. The statistical results indicate that employer's perception on level of satisfactory and expectation on level of important of the skill owned by graduates is moderate. At the same time, the results discussed in this paper are substantial for engineering graduates since employers' expectation are very essential since they are the one select the new employees. An important point to note is that employers' expectation should be taken into account as part of the graduates' decision-making process, so that it has an impact on their "job-hunting" performance. Outstanding graduate not only required to have excellent academic grade but also need to have positive attitude towards job. Of course, engineering graduates possessing a high skill in both technical and soft skills competencies are definitely better prepared to enter the work life [14].

The results provided graduates with valuable insight as they effort towards getting employed with competitive company. The study represents a useful source of information for undergraduate students planning to find a job, and for higher-education managing undergraduate programs to produce high skilled graduate.

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