

Engineering Skills: Employer Satisfaction Among Malaysian Graduate Engineer

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Abstract –The purpose of this study is to investigate the employers' satisfaction in regard to the skill of engineering graduates. This study use 195 survey questionnaire distributed to the manufacturing senior manager at Melaka, Negeri Sembilan and Pulau Pinang only. Statistical Package for Social Science (SPSS) software version 22.0 have been used to extract the data needed from the survey. From this study, the finding indicates that employer are satisfy with the skill equipped to the engineering graduates and show that fundamental general skill (FGS)($B=0.330$, $p=0.000$) and engineering skills (EgS)($B=0.286$, $p=0.000$) are the most important and essential to employer satisfaction. The results from this study offer an important practical implication for engineering graduates to be successful in employability. Proper skills are needed to get employer satisfaction for employability with the necessary skill equipped to the engineering graduates. It is hope with this data it can be an essential reference for engineering graduates to prepare themselves to enter the working environment in today's challenging economic situation.

Keywords: Employer satisfaction, engineering skills, graduate employability

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I. Introduction

Advancements in technology and continuous innovations, have make the competition for employability become a significant challenge, and sustaining appears to be difficult, given the current scenario, without an adequate and proper learning process [1]. At the same time, leaders from industrial and government sectors, have been calling on fresh graduates to master the employability skills, especially problem solving, communication decision-making and teamwork skills, [2].

Furthermore, it is crucial that highly skilled graduates to be produced who can adapt and match to the fast changes in technology today, [3]. Educators also have to leverage on their strategies especially highlight recruitment to the technological industries to meet the rapidly challenging requirement of student recruitment and technological industries, [3]. Those involved in advanced manufacturing industries agree with the importance of higher education institutions (HEIs) as sources of recruitment and training [7].

Due to the continuous changes in the workplace, basic

and traditional skills have less value and hardly help individuals to find suitable jobs or employers to improve their business. With the technology evolves rapidly, it is important to innovate and align ourselves to the current situation exactly, [4]. On one hand, employer expectations must be aligned via a supply of graduates who are equipped with applicable and up-to-date competencies. It is obvious that to gain a competitive edge or to be ahead of competitors, employees must acquire relevant skills to ease them to keep their jobs, build positive relationships and perform effectively with their customers and colleagues [8].

II. Problem Statement

Today, the environment of engineering work is changing rapidly according to the changing of technology, [4]. Manufacturing companies are among the main players in this country to achieve developed nation status by 2020. To this end, manufacturing companies need engineering workers to be equipped with the skills needed by them, [9].

Skills are very crucial for ensuring the success and progress of a company or industry, [10]. The issue is whether the engineers are equipped with the skills required by the manufacturing companies, [23]. A clearer understanding on the expectation of the “must have skills” and the “good to have skills” in the engineering field in the 21st century [11] is a must for manufacturing companies today to achieve their goals and mission.

The skills required by the manufacturing industry must be aligned with the nature of the company and skill is the ticket for engineers to be promoted. Hence, skill is important for helping people adapt to changes and improve career opportunities in the workplace, [21].

III. Research Question

This study attempts to investigate and answers specific questions as follows:

1. What is the employers’ satisfaction level with entry-level engineers’ skills?
2. What is the relationship between engineers’ skills ability and employers’ satisfaction?

IV. Research Objectives

The primary objective of this study is to determine skills that are most needed for engineering graduates’ employability, by determining employers’ satisfaction level with entry-level engineers’ skills. The details of the objectives are as given below:

1. To determine employers’ satisfaction level with entry level engineers’ skills.
2. To identify the relationship between entry-level engineers’ skills ability and employers’ satisfaction.

This study aims to provide empirical data about the satisfaction among the manufacturing employers with young engineering graduates.

V. Literature Review

[9] mentioned that the industry and trade would welcome effective ways to close the gap in the skills of graduates. According to the National Graduate Blueprint (2012), in general, several major predicaments are being faced by employers with regard to job mismatches, shortage of technical and science graduates, graduates who are not qualified and not equipped with necessary engineering skills and the number of jobs needed in the nation today. Even though sometimes employee itself have problem to manage their own work or personalities responsibilities, [6].

[12] discovered that the skilled graduates’ shortage is

among the major hindrances to the Indian economic growth. They also confirmed the widespread dissatisfaction of firms with the soft skills of current graduates, as the firms consider soft skills to be a core employability skill together with communication skills. [12] concluded that they did not have a specific explanation as to why the core employability skills, especially reliability and self-motivation, remain the factors with the largest skills gap.

Malaysia, a rapidly developing country in the Asian region is also one of the fastest growing countries, with an emphasis on the industrial sector as the backbone of its economic development, which encompasses the development of industries and organizations. The establishment of industrial zones for the commercialization of industries has also opened up job opportunities in several geographical areas instead. At the same time, it will enhance the output of product from the manufacturing company around that area, [5].

Furthermore, engineers today are posed with new demands and challenges in the work environment, which in turn, produce fundamental and rapid changes to the environment, [13]. Hence, employers today insist on a high level of skills among graduates, [14]. [20], asserted that engineering is a career focusing on the application of skills of an integrated knowledge in terms of science, mathematics and technology, blended with business and management, obtained through a particular discipline in engineering education and professional training.

In addition, engineering work is about problem solving and its effect on the world, for example, altering processes or procedures or introducing new products, technologies or knowledge. Engineers, unlike scientists, engineer are responsible for being change agents, [15].

Furthermore, from the researcher’s view, engineering is the ability to acquire in- depth and specific engineering knowledge and to utilize a system to design, operate and use technologies, such as computer technologies, machine and software and engineering tools. It also includes engineers’ ability to learn, gain new knowledge in the engineering field and their willingness to upgrade themselves to be aligned with the evolving technologies, [3].

Moreover, in determining new employees’ skills, there are certainly some specific technical skills that are required in any given job, [16]. Employability for a fresh graduate student, they not only confined to knowledge and technological/technical skills, but also other skills/attributes and attitude (for example, behavioural attribute), [17].

VI. Research Methodology and Research Instrument

The method used in this study is a quantitative method where questionnaire forms distribute to the company representatives. The study been conduct at Melaka, Negeri Sembilan and Pulau Pinang, Malaysia. The data collected from the survey has been analyzed using Statistical Package Social Science (SPSS) software version 22. The population for this research is 477 senior management of the company and the sample is 195. The questionnaire is designed using Likert-scale rating where respondents are asked how strongly they agree or disagree with the statements

VII. Response Rate

The sample of this study consists of 210 responses received from 477 manufacturing companies located in Pulau Pinang, Melaka and Negeri Sembilan, according to the FMM book 2015 directory. The questionnaire was distributed only to the senior managers of the company. Fifteen questionnaires were rejected due to incomplete answers and a few respondents gave excuses that they were too busy to participate in this study. Some senior managers returned blank questionnaires. Sadly, some companies did not even want to participate in this survey. Due to these circumstances, only 195 questionnaires were acceptable for the purpose of this study for further investigation.

Based on the large-scale data collection, the response rate for this study is 41%. According to [22], the response rate for self-data collection, which is more than 40%, considered as good; therefore, it is considered adequate for this study purpose.

Table I illustrates the total distribution and collection of questionnaires from all participating companies in Pulau Pinang, Melaka and Negeri Sembilan. During the data collection process, the representatives have been told that the respondent's identity would not be revealed in any report of the results.

TABLE I
DISTRIBUTION AND COLLECTION OF QUESTIONNAIRES

States	Distribution (S=477)	Collection	Percentage %
Melaka	108	55	23
Negeri Sembilan	81	40	17
Pulau Pinang	288	143	60
	477	238	100 %

VIII. Finding and Discussion

A. Correlation Analysis

Table II illustrates the correlation between the skills factors and employers' satisfaction from senior manager of manufacturing employers. The dimensions of skills factors are fundamental general skills, engineering skills, interpersonal skills, behavioural skills, adaptive skills and self-emotional intelligence skills as independent variables and employers' satisfaction as the dependent variable. It seen that there are positive correlations between all dimensions of the skills factors and employers' satisfaction. The positive linear relationship means an increase in one variable will cause the other variable to also increase. Most of the correlation results indicate a low correlation between each dimension.

Table II shows zero-order correlations among the constructs and provides a general picture of their interrelationships. The confidence interval around the correlation estimate between any two constructs should not be 1.0, indicating that discriminant validity does not exist in the factor-based scales.

TABLE II
CORRELATION BETWEEN SKILLS ABILITY AND EMPLOYERS' SATISFACTION

	a)	b)	c)	d)	e)	f)	g)
a) Fundamental General Skills	1						
b) Engineering Skills	0.26	1					
	9***						
c) Interpersonal Skills	0.33	0.17	1				
	5***	8*					
d) Behavioural Skills	0.48	0.42	0.51	1			
	0***	3***	9***				
e) Adaptive Skills	0.12	0.20	0.10	0.25	1		
	4	2**	1	1***			
f) Self-Emotional Intelligence Skills	0.18	0.26	0.24	0.40	0.2	1	
	9**	6***	2**	1***	01*		
					*		
g) Employers' Satisfaction	0.370	0.3	0.22	0.17	0.1	0.2	1
	***	45*	9**	3*	69*	27*	
		**				*	

*** Correlation is significant at the 0.000 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

B. Regression Analysis

The multiple regressions analysis results in Table III show that skills factors have a significant relationship with skills of engineering graduates' employability with $R = 0.509$. The adjusted R^2 of the model is 0.235, which indicates 23.5 percent of the variation in engineering graduates' employability among manufacturing employers explained by the graduates' skills.

TABLE III
MULTIPLE REGRESSION ANALYSIS FOR DETERMINING THE RELATIONSHIPS BETWEEN THE SKILLS FACTORS AND EMPLOYERS' SATISFACTION

Variables (Skills Factors)	Regression Model (Employers' satisfaction)		
	Unstandardized Coefficients	Standardized Coefficients	Sig
	<i>B</i>	<i>B</i>	
Constant	1.380		
(H1) Fundamental general skills	0.318	0.330	0.000
(H2) Engineering skills	0.278	0.286	0.000
(H3) Interpersonal skills	0.176	0.166	0.027
(H4) Behavioural skills	0.417	0.271	0.002
(H5) Adaptive skills	0.091	0.093	0.157
(H6) Self-emotional intelligence skills	0.175	0.138	0.048
<i>R</i>		0.509	
Adjusted R^2		0.235	

Fundamental general skills ($B=0.330, p=0.000$) has a significant relationship with employers' satisfaction. Thus, H1 is supported. Engineering skills ($B=0.286, p=0.000$) has a significant relationship with employers' satisfaction. Thus, H2 is also supported. Two skills factors have positive relationships with employers' satisfaction, i.e., fundamental general skills and engineering skills. These two skills are essential in organizations for successful engineering practices to achieve a career expectation. These skills expected by Malaysian manufacturing organizations of engineering graduates.

Interpersonal skills ($B=0.166, p=0.027$), behavioural skills ($B=0.271, p=0.002$) and self-emotional intelligence skills ($B=0.138, p=0.048$) have a significant relationship with employers' satisfaction. Therefore, H3, H4 and H6 are supported; while adaptive skills ($B=0.093, p=0.157$) has an insignificant relationship with employers' satisfaction. Thus, H5 is not supported.

Interpersonal skills, behavioural skills and self-emotional intelligence skills have significant relationships

with employers' satisfaction. The results show that those skills of graduates are not only needed to acquire good academic results, but also to give a positive attitude towards the job. The skills are very important for ensuring the productivity and output of the company. Without the proper skills, employers will face problems in dealing with work and the workers in the company. Equation in text below shows the regression analysis results based on the results from Table III.

$$\text{Employer satisfaction} = 0.318 (\text{fundamental general skills}) + 0.278 (\text{engineering skills}) + 0.176 (\text{interpersonal skills}) + 0.417 (\text{behavioural skills}) + 0.091 (\text{adaptive skills}) + 0.175 (\text{self-emotional intelligence skills}) + 1.380. \tag{1}$$

C. ANNOVA

Table IV shows Analysis of Variance (ANOVA) for ascertaining the relationship between the skills factors and employers' satisfaction ($F=10.954, p=0.000$), indicating that the regression model results could occur by chance. Nevertheless, the significance of ANOVA and p -value of coefficients must indicate $p<0.05$. Thus, the model is significant with 0.000 significance value.

TABLE IV
ANNOVA^b FOR DETERMINING THE RELATIONSHIPS BETWEEN THE SKILLS FACTORS AND EMPLOYERS' SATISFACTION

Model	Sum of Squares	Df	Mean Square	F	Sig.
1. Regression	16.257	6	2.709	10.954	.000 ^a
Residual	46.502	188	0.247		
Total	62.759	194			

a. Predictors: (Constant) Self-Emotional Intelligence Skills, Fundamental General Skills, Adaptive Skills, Engineering Skills, Interpersonal Skills, Behavioural Skills

b. Dependent Variable: Employers' Satisfaction

D. Answering Research Question

- What is the employers' satisfaction level with entry-level engineers' skills?
- What is the relationship between engineers' skills ability and employers' satisfaction?

Regarding the first and second research questions, concerning the evaluation of manufacturing employers' satisfaction with graduates' skills, the results indicate that all skills are important. [18] also confirmed that in today's fast changing and demanding environment, employers regard all skills as important when they have to train and retain efficient workers to achieve competitive advantage.

At the same time, descriptive statistics reveal that although skills ability is assessed for all the emerging skills factors, the evaluation results is somehow higher in fundamental general skill, interpersonal skills, behavioural skills and Self Emotional Intelligence Skill.

[19] also concluded that Malaysian manufacturing employers evaluate highly all the employability skills gathered through employers' satisfaction, with ability and willingness to learn, energy and passion, teamwork and cooperation and communication being rated higher than others. Interestingly, [19] reported that the level to which employers perceive that engineering graduates possess these specific skills does not match the level of importance in employability. Most importantly, while there is a general agreement between graduates and employers on the importance of the specific skills used in the survey, there is much less agreement on the possession of these skills. In general, this study confirms that manufacturing employers assess an important wide range of skills and competencies when seeking, and especially, when retaining their employees.

A multiple regression analysis was conducted to ascertain factors that might affect the graduate's skills ability and the employers' satisfaction needed for success. The data reveals that only fundamental general skills and engineering skills affect employability. Those graduates who indicate to enter the workforce directly upon graduation are more positive in their skills of basic communication, listening, using the computer and other technologies. This is expected given that fresh graduates entering the workforce are expected to master the technical literacy to succeed in the workplace. None of the factors, including engineering skills, interpersonal skills, behavioral skills, self-emotional intelligence skills and adaptive skills, affects a graduate student's achievement of the skill areas needed for employment success. Thus, the basic skills for graduates, such as communication, listening and personal skills, is priority for employability.

IX. Conclusion

As a conclusion, the analysis demonstrates the skills factors (fundamental general skills, engineering skills, interpersonal skills, behavioural skills, adaptive skills and self-emotional intelligence skills) an important and essential for employers' satisfaction. That means, engineering graduates must equip themselves with the necessary skills needed according to the recent technologies demand from the manufacturing sector. With that, the engineering graduate opportunity to be hired by the manufacturing sector is higher and most welcomed by the industry players.

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