Fundamental General Skills And Engineering Skills As An Important Skills For Engineering Graduates Employability: A Fundamental Study

Hasan Saleh, Hendrik Lamsali

Abstract: The purpose of this study is to investigate the employers' satisfaction regard to the skill of engineering graduates for employability. This study use 195 survey questionnaire distributed to the manufacturing senior manager at Melaka, Negeri Sembilan and Pulau Pinang only. This study have highlight five independence variable for skill namely Fundamental general skills, engineering skills, interpersonal skills, behavioral skills, adaptive skills and self-emotional intelligence skills. The result from this study have reveal that fundamental general skills and Engineering Skills are the most important skill for engineering graduate employability. It is found 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 skills for engineering graduates employability. Hopefully the results from this study offer an important practical implication for engineering graduates to be success in employability with the necessary skill equip to engineering graduates. It is hope with this data also, it can be an essential reference for engineering graduates to prepare them self to enter the working environment at today challenging economic and situation. This study have use Statistical Package for Social Science (SPSS) software version 22.0 to extract the data needed for this study.

Index Terms: General skills, engineering skill, Graduate employability, graduate skill, employer satisfaction, engineering graduate employability, skill preparation, employer perception, employer evaluation.

1 INTRODUCTION

Currently, fresh graduates face more challenges to be employed compared to previous graduates. Employers demand for engineers with competencies and capabilities besides excellent academic knowledge to face the stiff global competition. This statement clearly indicates that engineers must equip themselves accordingly before entering the work environment. Without proper preparation, engineers will not be able to cope with the demands of the industry. "[3]" also confirm from his finding that employers today a focus more on engineer whose been equip and ready to enter the tough world of work with the changing economic situation globally and domestically. In addition, with the technology today changing rapidly without any sense to be slowly down, "[2]" "[1]" indicated that engineers must have the necessary skills to sustain in the working world and graduates who enter working world with knowledge gained from HEIs per se cannot meet the demands of the industry. In this case, its is clear that education and learning have always been the key to engineers being successful in their job, "[4]". "[9]" pointed out that in 2010, 10 out of 13 attributes received high scores from employers, who were satisfied with the graduates' performance compared to the data that was obtained from their study in 2006. In 2010, they discovered that employers' satisfaction with the performance of graduates in communicating effectively with the fellow workers and community, and this attribute received the highest score of 67%. In 2006, they found that this attribute only received a score of 49.5% from employers.

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The potential to utilize a system approach to evaluate and design operations; function as an individual and a team member effectively and to act as a manager or leader; and possess knowledge on current issues are the attributes that score low points for employers' satisfaction in 2010 compared to 2006. Therefore, 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. Usually, the productivity of product output is depend to the productivity of the workers outcome, "[5]". Most companies in Malaysia are facing problems with lack of customers and communication, less training and inappropriate skills, less responsibility, a non-stable workforce and poor allocation of time and resources. Generally, this shows that Malaysia is still lacking in skilled persons that graduates still cannot be integrated properly with a readiness to work, and who are equipped with the required skills.

2. STUDY OBJECTIVE

Taking into account employers' expectation of the skills demanded is essential in preparing graduates for workforce,"[10]". Industry needs well-equipped graduates with skills required by industry. Furthermore, competent engineers are highly needed in the emerging challenges in economy and globalization "[9]". Hence, the most crucial skill for engineers are engineering skills in order to be employed. Basic engineering skills, like operating a computer, reading data, using engineering software and knowledge about basic engineering tools, are necessary. Currently, profession of engineering profession is rapidly changing in terms of input, tools, process and systems. Consequently, engineers must possess a strong theoretical background with the required skills, '[11]". Furthermore, "[6]" have found that employer a not impress with the engineering skills and interpersonal skill at th manufacturing industry level. In addition, new engineers must continuously upgrade and adapt to the new challenges, chances and changing environment through applying skills like problem solving, self-learning, and others "[11]". A degree scroll today a no longer ensures a graduate entry-level job; it

is the skills that the graduate possesses that will determine the graduate's performance in the labor market. The engineering skill is very important and crucial to be hired by employer because its will determine the pathway of the organization and also the engineer career forward, "[7]". 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. LITERATURE REVIEW

Fundamental general skill

Fundamental general skills mean the basic skills of engineers, such as reading, writing, calculating and communicating. This basic skill also encompass the ability to communicate fluently not only in the mother tongue, but also other languages, such as English. It also includes basic computer application skills, such word, interpreting graphs, excel, PowerPoint and managing and using information technologies. "[12]" found that organizational skill and management skill are essential to successful engineering practice, and practitioners strongly emphasize that at entry level. "[13]" found that fluency in writing in another language (academic view), logic in thinking to solve problems and dedication in work are fundamental general skills needed by organization. "[14]" found that graduates of engineering should have a set off soft skills like interpersonal, problem solving, and communication. Meanwhile, "[15]' viewed basic skills are needed to acquire and keep the job as well as perform well on it. "[16]" found that communication skills, presentation skills, personality traits, taking initiatives and having flexibility are rated poorly by engineering graduates when these are the quality sought by employers. "[14]' to added values for them are to integrative ways about engineering and think broadly in fundamental skills

Engineering skills

An engineer is a craftsman who has been trained with the required skills and techniques in relation to a specific field of engineering and possesses a practical understanding and fundamental knowledge about engineering concepts. Engineering often aids the engineer and technologists in projects, research and development. Engineering work involves the solving of technical problems. Engineers design, set up or build tools, conduct experiments and collect the data needed to calculate results. They also might make a model for new equipment. In manufacturing, the engineer helps to design and develop products. There are multiple fields in engineering, such as software design, technical drawing or engineering drawing. "[11]" defined engineering skills as a capacity to execute engineering-related skills, knowledge and personal traits to secure and retain employment and flourish in the engineering field. Today, engineering graduates are definitely required to demonstrate a higher level of confidence in their ability and skills than their predecessors, "[17]". Abilities and knowledge are needed to solve mathematical, scientific, and engineering problems or computer-related tasks and other specific duties. People with technical skills are often referred to as technicians in their related fields, such as audio-technicians, electronic technicians and engineering technicians. Due to the current challenges and globalization, competent engineers are sought by employers in the engineering sector, "[9]". In other words, today's engineering graduates should have required skills needed by industry, "[9]".

4. DISCUSSION

Correlation analysis

Table I 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 correlationship between each dimension. Table I 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 I *:*
Correlation between skills ability and Employers' Satisfaction

	a)	b)	c)	d)	e)	f)	g)	h)
a)Fundamental General Skills	1							
b)Engineering Skills	0.269***	1						
c)Interpersonal Skills	0.335***	0.178*	1					
d)Behavioural Skills	0.480***	0.423***	0.519***	1				
e)Adaptive Skills	0.124	0.202**	0.101	0.251***	1			
f)Self-Emotional Intelligence Skills	0.189**	0.266***	0.242**	0.401***	0.201**	1		
g)Employers' Satisfaction	0.370***	0.345***	0.229**	0.173*	0.169*	0.227**	1	
h)Employers' Impression	0.414***	0.674***	0.264***	0.427***	0.266***	0.295***	0.712***	1

**** 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).*

Regression Analysis

The multiple regressions analysis results in Table II showed skills factors have a significant relationship with skills of engineering graduates' employability with R = 0.509. The adjusted R2 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 II *:*
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
	B	B	
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
R		0.509	
Adjusted R2		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 eemployers' 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 a not supported. Interpersonal skills, behavioural skills and self-emotional intelligence skills have significant relationships with eemployers' satisfaction. The results show that those skills of graduates are not only need 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 II.

Equation in text

Employer satisfaction = 0.318 (fundamental general skills) + 0.278 (engineering skills) + 0.176 (interpersonal skills) + 0.417 (behavioural skills) + 0.091 (adaptive skills) + 0.175 (self-emotional intelligence skills) + 1.380.

5. CONCLUSION

As a conclusion, the analyses demonstrate 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 their own self with the necessary skill needed according to the recent technologies demand from the manufacturing sector. However, it is essential and important for engineering graduate to master the basic skills with is fundamental general skill and engineering skill. It also found that the most important skill within fundamental general skills is communication in English. This finding is consistent with "[8]" that have found that overall employer was impress with the skills of engineering skill especially under the supervisor focus. With that, the engineering graduate opportunity to be hire by the manufacturing sector a higher and most welcome from the industry player. However this finding is still open for debate from others researcher.

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