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Industry's Feedback of New Diploma Program in Industrial Engineering

[1]Nordiana Mukahar, [1]Nurbaiti Wahid, [1]Zairi Ismael Rizman, [1]Mohd Aldrin Ali, [1]Mohd Aziz Aris, [1]Ermeey Abd. Kadir and [2]Gopala Krishnan Sekharan Nair

[1]Faculty of Electrical Engineering
[2]Academy of Language Studies,Universiti Teknologi MARA Terengganu,
23000 Dungun, Terengganu, Malaysia

Abstract: This paper highlights significant findings of end industrial survey conducted by Faculty of Electrical Engineering, Universiti Teknologi MARA (UiTM) Terengganu Dungun branch to assess a new diploma program which focuses on industrial engineering. The aim of the survey is to reveal how adequately the new program meets the skill training needs of the next generation of electrical engineers, so as to fulfil the industry requirements. The findings showed that the industries were very receptive to components of the new program such as the industry related engineering topics, hands on experience and industrial training. The industry perceived that the new program creates viable engineering graduates who have the potential to fulfill the needs of the increasingly advanced technology labour market. In conclusion, by the university-industry collaboration, it is not just about the adaptations of the technology, but also involves significant technical knowledge and skills development activities that will escalate the innovations.

Key words: Industry Survey · New Program · Practical Training · Industrial Engineering and Electrical Engineer

INTRODUCTION

Today's engineering sector is continuously experiencing major changes in knowledge, equipment, tools, systems and managements. Most companies demand engineering graduates who have a strong theoretical background and are equipped with employability skills [1]. The future role of engineers in society is becoming more challenging due to globalization in the industrial and engineering fields [2]. There are many complaints of graduates unemployment due to lack of relevant skills [3]. One of the main reason is that the graduates are not yet ready for the workforce. Many graduates have an insufficient grasp of fundamental theories. Their knowledge and training is inadequate for meeting current industrial needs. The engineering education system should be broad-based engineering programs where capable of adapting to the changing of technologies and environment [4].

The effort to align university-industry needs is very important, so that students can match their competencies with the industrys' expectations [5]. It has been a practice by many reputable and prestigious Australian universities to engage industry in the development, delivery and evaluation of their curriculum [6-7]. Therefore, a dynamic curriculum for engineering education is required to embed graduate skills [8]. Recent surveys of industry perception and needs by a group of researchers in Malaysia shows a significant gap between skills of employees and the skills considered by the employer [9]. A study among local graduates and industry employees [10] found that, employability skills are considered extremely important by both the graduates and the employees concerned.

The Employability Skill Framework listed 13 of the most important generic skills acquired by engineering graduates [11]. The skills emphasized professional skills criteria based on Accrediting Engineering Programs as approved by the Accreditation Board for Engineering and Technology (ABET) [12]. The study done by [13] showed that there is an urgent need for the engineering program to improve in all areas, technical and non technical aspects of the engineering education. Continuously updating and improving the technical engineering skill and knowledge is very important for changes in the growth of technologies [14].

Corresponding Author: Nordiana Mukahar, Faculty of Electrical Engineering, Universiti Teknologi, MARA (UiTM), 23000 Dungun, Terengganu, Malaysia.

In the United States (US), a great focus has been placed on having graduates with broad knowledge of industrial engineering education specifically pertaining to the industry engineering. For example, Georgia Institute of Technology, has been recognized as offering the best Industrial Engineering program in the US consecutively for the last twenty-two years. It is according to survey done by US News and World`s Report on 2010. The program has a unique features track system which specializes in areas such as Economic and Financial Systems, Operations Research, Quality and Statistics, Supply Chain Engineering and General Industrial Engineering. Therefore, it trains students who have the versatility needed in the industrial and systems engineering field. As a result, its graduates have a wide array of career options [15].

Concerning this matter, the Faculty of Electrical Engineering in UiTM Terengganu is inspired to propose a new electrical engineering diploma program, which emphasizes on the importance of industry knowledge and technical skill. The suggested new program is a comprehensive program which will expose students and enable them to get an understanding of the tools, methods and practices required by the industry. It will be very practical orientated, with a goal of providing an education that is directly applicable to a career in the relevant industry. The student's intake requirement for this new program is suggested to be the Malaysian Certificate of Education (SPM being the Malay acronym) and holders of the Malaysian Higher Certificate of Education (Malay acronym; STPM). Matriculation students who also be eligible.

In order to ensure that this new program meets the industries needs and requirements, an industry survey was conducted to obtain a constructive and necessary feedback. The results of the survey will assist the faculty to get a lucid understanding on the industry's needs and also to create industry-driven courses.

Methodology

Respondent Profile: The main objective of this survey is to solicit comments and feedback from industrial players on the new diploma program in industrial engineering. Thus, the stakeholders were selected from different sectors. Questionnaires were distributed to 30 employers from electrical engineering departments of various sectors of the engineering industry. However the sample is limited to engineering employers in a limited geographical area in Malaysia. The respondents chosen mainly posses the following responsibilities and abilities: (a) Autonomy to hire new engineers for the organization; (b) Familiar about projects and know what kind of employability skills are required; (c) knowledgeable of the skills needed for engineers to successfully operate equipment that produce the organization's products. The surveys were mostly directed at senior industry members, such as engineering director, chief engineer, senior engineer, engineering manager and engineering supervisors. The stakeholders were interviewed during the industrial visits in order to collect pertinent variables for further decisions to be made by the faculty's management team.

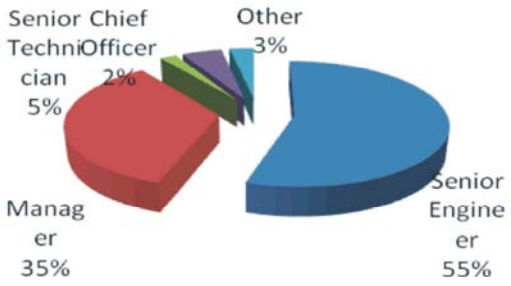

Fig. 1: Respondent's designation in the company

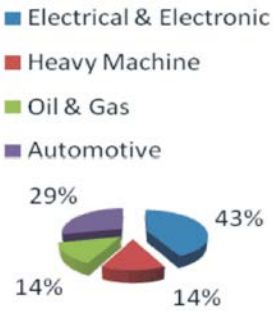

Fig. 2: Percentage of industries based on sector groups

Figure 1 provides a pictorial depiction of the respondent's designation in the company while Figure 2 shows the percentage of industries of the different sectors.

Survey Content: The survey consists of three categories of questions. The first part focused on constructive comments from the industry about the contents of the program and its relevance in fulfiling the needs of the industry. The second part was designed to assess the needs of the engineering workforce and the third focused on the program benefits. Data collection was carried out through snow ball sampling and in person to person interviews using a set of questionnaires. The questionnaires addressed the following issues:

Part 1: Contents of the program and its relevance in fulfiling the needs of the industry

- Does the program encompass the basic theories required in the related discipline?
- Are the theories used relevant to the current situation?
- Do the courses contribute to the strength of the program?
- Does the proposed program cover all relevant subjects?
- Is there any subject in the program that is not relevant to the sector needs?
- Is the program sufficient in terms of length of study and duration of practical training?

Part 2: Career Opportunities

- Do you think that graduates of this program are suitable to work in your organisation? If yes, please indicate the areas.
- Please indicate relevant jobs for the graduates of this program in your organisation.
- State the number of posts in your organisation that can be filled by graduates of this program.

Part 3: Program Benefits

- Will this program be able to produce the right graduates for the relevant labour market?
- Will this program enhance job opportunities for Electrical Engineering graduates?

RESULTS AND DISCUSSION

The findings from the survey are summarized in this section are as follows:

Diploma in Industrial Engineering Assessment

Subject Contribution to the Program's Strength: The respondents were also asked their opinion regarding the subjects which contributed to the strength of the program.

From the results of the survey as shown in Figure 3, the majority of them, about 90%, replied that the subjects do contribute to the strength of the proposed program. It appears that the subjects designed and offered are capable of giving added value and strength to the new program.

Core Subject Relevance to the Industry: The program introduces industrial engineering topics as its core subjects such as: Industrial Maintenance, Industrial Safety, Computer Control and Basic Networking, Hydraulic and Pneumatic, Industrial Manufacturing and

Fig. 3: Subject contribution to the strength of the program

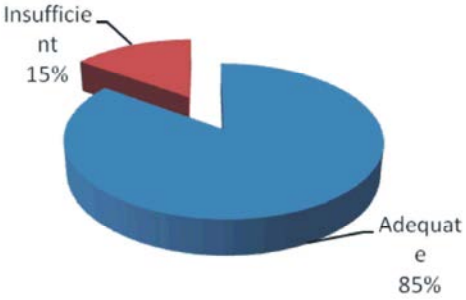

Fig. 4: Adequacy of the Diploma in Industrial Engineering core topics

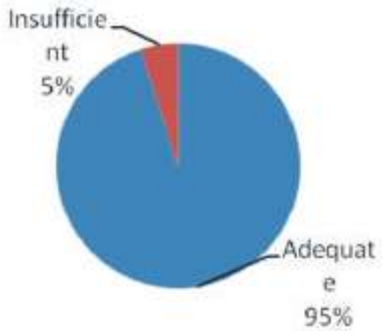

Fig. 5: Adequacy of length of study of new program

Introduction to Programmable Logic Controller (PLC). In order to reinforce the learning, this new program has strong hands-on components where each course will have a lab project to provide hands-on experience.

Of the survey respondents, 8% replied that the proposed program covers all the subjects relevant to the industry and that this new proposed program encompasses the basic theories in the related discipline as indicated in Figure 4. Respondents suggested that faculty of electrical engineering consider adding courses on Industrial Engineering, Safety, Microcontroller, PLC, exposure to Computer-Aided Design (CAD) tools, Electrical Machines, Maintenance and Troubleshooting.

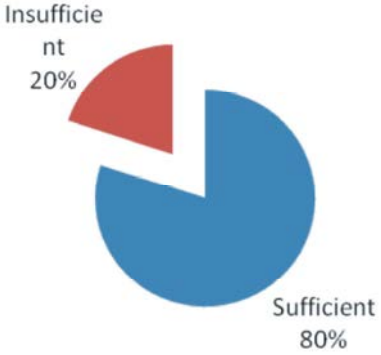

Fig. 6: Sufficiency of the duration of practical training

Table 1: Job suitability of graduates of the new program in industry

Opinion	Percentage (%)
Wiring	25
Maintenance and troubleshooting	75
Total	100

Table 2: Job enhancing potential of the program for electrical engineering graduates

Opinion	Percentage (%)
Yes	97
No	3
Total	100

Length of Study and Duration of Practical Training: Figure 5 shows that the majority of the respondents, 95%, agreed that the duration of the study is sufficient, while the rest did not agree.

One of the novel components of the Diploma in Industrial Engineering program is the integration of industrial training into the program. As shown in Figure 6, for practical training, 80% agreed that the duration of practical training of 4 months (1 semester) is sufficient, while the rest did not agree. During the interview with employers while on the industrial visit, several of them suggested that the practical training period should be for at least 6 months.

Career Opportunities

Number of Relevant Jobs in Industry: Table 1 indicates the proportion of the relevant jobs for the graduates of this program as discerned by the management. The majority of the respondents (management), about 7%, felt that the graduates of this program are suitable for maintenance and troubleshooting, including handling equipment and machines. While 2% believed that wiring work is the most suitable for graduates of this program.

Fig. 7: Number of posts that can be filled by the graduates

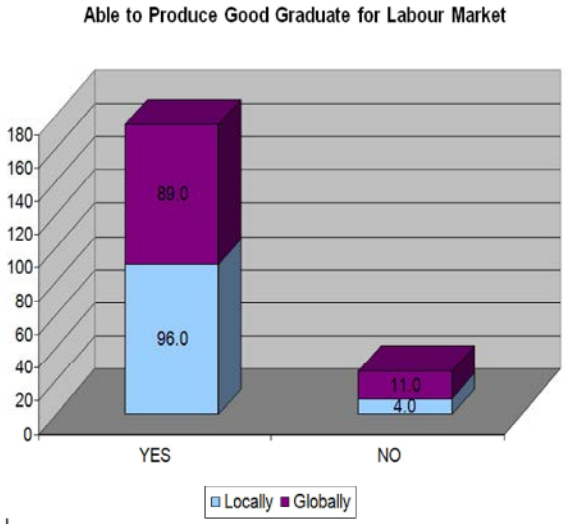

Fig. 8: The ability of this new proposed program in producing viable graduates

Hiring Expectation: One of the objectives of this survey was to find out how successful this new program is in meeting the industry's needs.

More than 8% agreed that there are 7-9 relevant posts for the graduates of this new program, while 10% stated that there are only 4-6 relevant posts and the rest, 5%, stated that there are only 1-3 relevant posts as depicted in Figure 7.

Program Benefit

Enhancing Job Opportunities: Answers to further questions revealed that the majority of the survey respondents perceived that the program offers several benefits to the graduating students which can enhance job opportunities. Table 2 indicates that most of the respondents, 97%, felt that answered the program enhances job opportunities with only 3% differing.

Overall, it is clear that the majority of the industrial people agreed that this new proposed program will enhance job opportunities in various disciplines within the sector.

Ability to Produce Viable Graduates for the Labour Market: The respondents were also asked their opinion on the ability of this new program to produce good quality graduates who can fulfil the needs and challenges of the industry locally and globally.

Figure 8 shows the responses pertaining to the ability of this new proposed program in producing good quality graduates who can fulfil the needs and challenges of the electrical industry on the local and global fronts.

The majority of respondents (more than 80%) agreed that this new program has the ability and capacity to generate graduates who can fulfil the needs and face the challenges and difficulties of the local and global labour market industry. The opinion of the respondents were also asked regarding other important skills and knowledge that should be possessed by graduate students to increase their employability. Throughout the survey, respondents have stated four mains criteria; technical and troubleshooting skills, generic [16-21], communication and team working skills [22].

CONCLUSION

In conclusion, the survey of the industries is to assess the viability of the new diploma program in industrial engineering was conducted to gain a lucid understanding of the industry's demand. The findings would no doubt guide the Faculty of Electrical Engineering UiTM Terengganu in ascertaining the right direction pertaining to the new diploma program in industrial engineering to ensure that the program would address the industry's needs. The respondents were all willing to share their experience and much valuable feedback was obtained.

The collaboration transfers tangible technical results and knowledge between two parties. In the process, the universities and academic institutes are the main body of knowledge innovation, whereas the industry is the main body of technology innovation. It is jointly innovated and turn technological achievements to products. It leads to the improvement of the innovation effectively with ideal mode and mechanism for university-industry collaboration [23]. The survey, as a vital evaluation tool provides information about the quality of the program. It is utilized in developmental planning and policy management to provide a better quality of graduate level education for the future [24].

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