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Unemployment factors in the field of Mechatronics

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***Abstract* — This research discusses the issues contributing to unemployment factors in the field of mechatronics. The skills required by employers are given emphasis in the context, which varies depending on the type of job-roles to be implemented in an organization. The employability of graduates focuses on their career services to assist in areas such as completing the application, interview technique, evaluation, and personal development. The findings reveal that several factors contribute to unemployment. These factors can be used as a guide for researchers and institutions to meet industry or employer needs. This will ensure that students are competent to be employed.**

Keywords — ***Employability, Competence***

I. Introduction

Through the announcement of the Sixth Malaysia Plan in 1991, the previous Prime Minister, Tun Dr Mahathir Mohamad, introduced Vision 2020. This is the vision of achieving self-sufficient industrialized country status by 2020, to encompass all aspects of life; including economic prosperity [1]. Countries that have succeeded in transforming their economy and life from agricultural to industrial have attained developed nation status. Vision 2020, which requires Malaysians to continue the transformation process that was started after independence, is still considered to be in the middle of the road as far as accomplishments are concerned. This is because the process not only involves the transformation of industrial farming life, but also involves changes in technology, economics, and social and cultural rights.

Community developed countries i.e., those supported by skills and expertise in science and technology, cannot only scoop or modify technology, but must be able to create, add, and update. To achieve rapid economic growth through industrialization is very important. This is related to the contribution of business and commercial sectors that are directly involved with the questions of capital, investment, competitiveness, quality of work, independence, and consistency of challenges. At this stage, the role of the private sector is huge; because it will be the engine of growth [1].

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Transition towards globalization and the knowledge economy and rapidly changing in the labor market now means that hard work can no longer guarantee jobs for young people [2]. Industry has identified the need for engineers with knowledge integration [3].

Under the impact of globalization and the knowledge economy, and the influence of rapidly changing in the labor market, hard work is no longer a guarantee as a way for youth to get jobs early. Limit the need to continue working for youth has increased annually year and, starting from the 1990s, developed countries in Europe and America have considered efficiency improvement youngsters as an important policy in encouraging their core competencies so that they can adapt to career development various and flexible modes [4]

II. Background

Industry has been growing rapidly for several decades. To enable Malaysia to continue being competitive on the world market, the Ninth Malaysia Plan was compiled in response to current global needs [5]. Therefore, in pursuing rapid technological advances and the current growing needs of industry, the Department of Polytechnic Education (DPE) continues to work with key industries in the country to develop their own curriculum. A qualified and talented workforce is one of the most important factors to drive productivity growth, so that industry can develop and maintain competitiveness worldwide. Clearly, an industry where the workforce is increasingly competent and technically wise is important. The activities of many industries require increasingly competent technicians in the engineering field, particularly in mechatronic engineering.

In response to these issues, the Curriculum Development and Evaluation Division of the Department of Polytechnic Education has developed and introduced a Diploma in Mechatronic Engineering. This programme aims to prepare students with the knowledge, skills, and abilities necessary for mechatronic engineering industries. To ensure that the curriculum's content fulfils industrial requirements, several key players from related industries have been involved in the curriculum's development process.

Polytechnics have developed a Diploma in Mechatronics Engineering to give balanced emphasis to the theoretical and practical aspects in curriculum. Six semesters are required to complete the program, with three academic semesters at Polytechnic and one semester of industrial training (in related industries) during the fourth semester. Students are then required to return to their respective institutions for the

completion of the program during the fifth and sixth semesters.

The field of Mechatronics integration of basic components of mechanical, electrical, engineering, and information systems, is to form a powerful approach, be adaptable, and disciplined to solve practical problems. A comprehensive approach towards learning involves projects that build the student to inspire creativity and enthusiasm for the subject of [6].

III. Methodology

The aim of this study is to seek the factors that cause unemployment in the field of mechatronics. This study uses a document analysis approach, with reference to previous researches. This will provide a literature review of previous studies that can be used as a guide for researchers to determine the factors that cause unemployment in the field of mechatronics. In order to achieve the objective, a qualitative research method, namely a document review, was performed by referring to several previous studies as a literature review.

This technique was used, because it is an organized method of reviewing and evaluating paper documents and electronic resources. Literature studies from journals, reports, and working papers were used as materials and resources for our document analysis.

IV. Factors that cause unemployment

Analysis, by occupational sector, found that ICT showed 3,945 (19.5%) unemployed graduates looking for work. This was followed by Business Administration with 2,714 (13.4%), Accountancy 1,923 (9.5%), Electric/Electronic and Telecommunication engineers 1,229 (6.1%), Human Resources Management 1,022 (5.1%), Civil Engineers 983 (4.9%), **Mechanical/Mechatronic Engineers 884 (4.4%),** Financial/banking/insurance/investment/property 613 (3%), Office technology Management/Information management/Library Management 552 (2.7%), Architecture/Building/Quantity Surveying/land surveying 540 (2.7%), Applied Science 533 (2.6%), Economy 440 (2.2%), Agriculture/Forestry, Fisheries/Environment 401 (2%), and others 2,828 (13.9%) [7].

The survey's result, of 4.4% mechatronics unemployment in Malaysia, suggests the possibility of discrepancy in some of the factors that affect the situation. Referring to previous studies, four factors that can affect unemployment in the area of mechatronics, are student, institutions, curriculum, teaching and learning, and facilities.

A. *Student or Graduation*

In the world of globalization, employability skills are one of the most important skills required. Employability skills necessary for each individual will be able to effectively and efficiently. Employers will typically outline several criteria for staff, such as communication skills, technology skills, problem solving skills, confidence and responsibility skills. However, today's graduates lack the skills required by employers. This causes employers to be less interested in hiring them.

The mismatch between the skills required by employers and the skills possessed by the graduates is one of the causes of unemployment [8] [9]. A skill gap report in 2005 found that nearly half of the employers surveyed expressed that existing employees lacked work ethics and self-management skills, such as attendance and punctuality. In addition, 46% of employers reported that their employees lacked problem solving skills [10].

Graduates that dominate technical skills are not the main driver of the unemployment problem. Employers evaluate prospective employees, not only on technical skills, but also on their non-technical skills [11]. Graduates are not exposed to the concept of good theory at school or tertiary institutions. As a result, graduates lack the skill to think, analyse, communicate in different languages, and to interact with society. Raybould & Sheedy [12] state that an employer generally requires employees who are able to work under pressure, have the ability to make decisions, communicate, teamwork, are self-confident, and have self-management and learning skills.

B. *Institutions.*

In a study conducted by Ram [7] involving 20 institutions, of 250 unemployed graduate respondents, 70% were graduates from public universities and other institutions of higher learning in Malaysia, 26% were graduates from private institutions of higher learning, and 4% were graduates from foreign education institutions. This shows that most of the unemployed graduates on the Malaysian labour market are products of public universities and other tertiary educational institutions. Although there are more public education institutions in the country than private education institutions, the resulting rate of the graduates' unemployment is not commensurate with the difference in the number of graduates being chunked out by the two groups of education institutions [13].

In an effort to place Polytechnic Institute of Higher Education facilities in the public eye, and continue to be sought by students, an improved learning system has been implemented. Making polytechnics a "key player" in the provision of human capital, thus becoming a platform for ensuring that young people obtain high-quality sources of knowledge, trainers were summoned by the Deputy Director (Operations) of the Department of Polytechnic Education,

Ministry of Higher Education, to improve the quality of teaching and learning (Daily News, June 9, 2011).

C. Curriculum , Teaching and Learning

According to Muhyiddin [14], the education system in Malaysia is through the process of transformation, and should be renewed from time to time, in line with the times. She also added the ability to transform and reform of the education system, while maintaining the original goal to produce good human beings, is a prerequisite to the success of the people. The adoption of the concept of teaching and learning outcomes (OBE) in higher education institutions (especially in engineering) in Malaysia today, could provide an opportunity for the authorities to ensure that the future of graduates is consistent with the wants and needs of the country [15].

An outcome-based curriculum emp/hasizes that the teaching and learning environment focuses on student assessment. In the long run centered learning environment students are able to produce graduates with lifelong learning skills and develop graduates who are independent, creative, and innovative. This has been achieved through the teaching and learning methods using the student OBE approach, in terms of being cognitive (knowledge), psychomotor (practical), and affective (soft). In an OBE era, the department should be alert and monitor the quality of education systematically. This process starts from the identification of results (outcome) or level of ability, innovation in courses, until rule compiler syllabus and curriculum evaluation processes appropriate to achieve "outcomes" are [16].

Previous teaching and learning processes, implemented at the Polytechnic Ministry of Higher Education Malaysia, used traditional methods. Through these teaching patterns, the graduates produced were too passive and waited for feeds from their trainers (i.e., they were spoon-fed). According to a study by [17], traditional methods practiced by lecturers limit the ability of students to learn and gain a lot of knowledge. Therefore, the teaching and learning processes used should be varied, in order to have wide implications to the development of the country.

With great expectations, polytechnic staff undertook the very challenging task of improving the quality of polytechnic education. Consequently, lecturers were always alert and responsive to current demands. To produce quality polytechnic graduates, that are relevant to the needs of industry, lecturers need to be able to offer effective teaching and learning. Noorhidayah [18] found that teacher-cantered teaching strategies were more frequently practiced and carried out by polytechnic lecturers. Such teaching does not encourage students to actively learn ([19] and sometimes, does not help the objectives of critical thinking, creativity, or the mastery of cognitive psychomotor skills [20].

To ensure that effective teaching and learning can be implemented, the implementation of OBE in the Ministry of Higher Education Malaysia Polytechnics began in 2010. The OBE approach requires a shift from teaching by the lecturer, to student-cantered learning. Based on learning outcomes, (OBE) emphasizes learning outcomes; where knowledge, technical skills, and other generic skills are obtained by students during study in any field [21]. According to [22], the OBE curriculum (as a competence-based curriculum) can stimulate the competing spirit of students to achieve the goals outlined.

D. Facilities

In order to further establish polytechnics as a premier educational institution, customer satisfaction of quality education, facilities, and services provided by polytechnics, should be in good condition. For this is the catalyst for a positive and effective environment to produce quality students that are competitive and in line with the aspirations of the polytechnic's vision and mission. In this context, students and teachers are defined as customers (or stakeholders) involved directly and indirectly in the use of infrastructure and the services provided by an educational institution.

According to [23], the quality of education is difficult to measure and is defined including the revenue received by students learning from educators and institutional environment itself. Therefore, assessment of the quality of higher education clients is comprehensive in institutional organizations, and not concentrated in certain parts .

Student achievement in academics and non-academics is an important element in an indicator of the effectiveness and quality of infrastructure and the services provided to the polytechnic students. Therefore, in order to make polytechnics an institution of higher technical education, and produce graduates with high employability, in line with the National Education Philosophy and Vision 2020, the institution's education should provide infrastructure and the best service to achieve a satisfactory level of education.

According to [24], Customer Satisfaction is a business term mean, used to measure the extent to which a product or service (provided by an organization) meets the expectations of customers. In other words, customer satisfaction shows the wants, needs, and expectations of customers achieved or met, in order to create customer loyalty to a product or service offered.

v. Conclusion

The results from this study are able to serve as a guide for researchers to identify the factors that cause unemployment in the field of mechatronics. Competence (or competency), which is the ability of an individual to do a job properly, is a set of defined behaviours that provide a structured guide to enable the identification, evaluation, and development in individual employees. Competence is important in the working world, because workers cannot be considered complete or competent; if they only have good technical ability, without knowledge of employability skills.

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