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'We hereby declare that we have read this thesis and in our opinion this thesis is sufficient in terms of scope and quality'

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TECHNICAL STUDENT AWARENESS TOWARD INDUSTRIAL REVOLUTION 4.0 WORKFORCE IN UNIVERSITY AT SOUTHERN MALAYSIA

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BTEC

FINAL YEAR PROJECT

FYP REPORT

This Report for Final Year Project in partial fulfilment for Bachelor of Technology Management (Technopreneurship) (BTEC)

Faculty of Technology Management and Technopreneurship (FPTT)

Technical University of Malaysia Malacca (UTeM)

JUNE 2018

DECLARATION

"I declare that thesis entitle Technical Student Awareness toward Industrial Revolution 4.0 workforce in University at Southern Malaysia"

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Date :

DEDICATION

This research paper is special dedicated to my parents, En. Shukri Bin Awang and Puan Asmara Binti Mohd Jamil, who has been my main source of inspiration and encouragement during my studies. Thank you for giving me the opportunity and a new experience in my life to complete the meaningful research. To all my family thank you for allowed and always give full support to me for further study.

ACKNOWLEDGEMENTS

Assalamualaikum, first of all I would like to express my gratitude towards Allah S.W.T. because of his blessing I able to finish up my final year project. Secondly, I would like to thank both of my parents because they were the reason for me to still stood up and they were the one who always be my inside through thick and thin and during ups and down of me.

Next, I am so grateful to the Faculty of Technology Management & Technopreneurship at UTeM for making it possible for me to study here. A very great thanks to my supervisor Dr Murzidah Binti Ahmad Murad for bearing up with my lack of knowledge and experience regarding to the completed Final Year Project and for her excellent guidance, caring, patience, and providing me with an excellent atmosphere for doing the research. Thank also my future husband who always supported and help me in Final Year Project. I also would like to thank to all the friend in BTEC class because of their cooperation in the University. Besides, I would like to thank my panel, IR Budiono Hardjono for to give guidance and advices throughout this presentation. Sincere thanks to all my fellow friends for their helps and moral support during this Final Year Project. Thank you.

ABSTRACT

Today, we are at the beginning of a Fourth Industrial Revolution. There are a lot of development in manufacturing Industry in artificial intelligence, Internet of Thing, 3D Printing, Biotechnology, Big Data, Smart system, Smart Factories and a lot of advance technology. While the impending change always happen in Malaysia, it can give an impact also to the world especially in the workforce and employment. Besides that, it will created major challenges requiring proactive adaptation by corporations, government and individual. Thus, the focus on the individual who is technical student to adapting the Industrial Revolution 4.0 in workforce need to emphasis. Therefore, the purpose of conducting this study focus on factor that influencing technical student awareness toward Industrial Revolution 4.0 workforce in University at Southern Malaysia. There are four factor that influence level awareness toward Industrial Revolution 4.0 workforce that used in this study which are education system, subjective norm, digital behaviour and knowledge. Furthermore, the critical factor that determine contribute the influencing the technical student level awareness toward Industrial Revolution 4.0 workforce also has been determined in this study. To achieve all this objective, 400 respondents has been answered questionnaire and the collected data has been analysed by using the multiple regression analysis to determine both the relationship between factors influencing the level awareness of technical student toward Industrial Revolution 4.0 workforce.

Keyword: Industrial Revolution 4.0, Awareness, Workforce

ABSTRAK

Hari ini, kita berada pada permulaan Revolusi Perindustrian Keempat. Terdapat banyak pembangunan di dalam industri antaranya adalah “artificial intelligence”, “Internet of Thing”, “3D Printing”, “Biotechnology”, “Big Data”, “Smart System”, “Smart Factories” dan pelbagai teknologi yang lebih maju. Walaupun perubahan yang akan berlaku adalah sesuatu yang biasa dilakukan di Malaysia, ia juga akan memberi impak yang besar kepada dunia terutamanya tenaga kerja dan pekerjaan yang dicipta. Selain itu, ia juga akan menimbulkan cabaran utama yang memerlukan penyesuaian proaktif oleh perbadanan, kerajaan dan individu. Oleh itu, tumpuan kepada individu yang merupakan pelajar teknikal untuk menyesuaikan Revolusi Perindustrian 4.0 dalam tenaga kerja perlu dititikberatkan. Dengan ini, tujuan menjalankan kajian ini adalah menumpukan kepada faktor yang mempengaruhi kesedaran pelajar terhadap tenaga kerja Revolusi Perindutrian 4.0 di Universiti Selatan Malaysia. Terdapat empat faktor kesedaran terhadap Revolusi Perindustrian 4.0 yang digunakan dalam kajian ini iaitu sistem pendidikan, norma subjektif, tingkah laku digital dan pengetahuan. Selain itu, faktor kritikal yang menentukan untuk menyumbang mempengaruhi keupayaan kesedaran pelajar teknikal terhadap tenaga kerja Revolusi Perindustrian 4.0 juga telah ditentukan dalam kajian ini. Untuk mencapai semua objektif ini, 400 responden telah dijawab soal selidik dan data yang dikumpulkan telah dianalisis dengan menggunakan analisis regresi berganda untuk menentukan hubungan antara faktor-faktor yang mempengaruhi tahap kesedaran di kalangan pelajar teknikal ke arah tenaga kerja Revolusi Industri 4.0.

Kata Kunci: Revolasi Industri 4.0, Kesedaran, Tenaga Kerja

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LIST OF SYMBOL

IR =Industrial Revolution

IR4 =Industrial Revolution 4.0

H =Hypothesis

R =Correlation of Coefficient

R2 = Coefficient of Determination

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter explains a brief summary of the study presented by the researcher. This chapter includes the background of study, problem statement, research question, research objective, and significant of study. The researcher also explicate the definition term of this research.

1.2 Background of Study

Digital transformation was developed by the tools and technology to assist in the pursuit of our goal (Halloran, 2015). It refers to the changes comrade with the application of digital technologies in all aspects of human life. There are a lot of technologies that brought the change in human society such as mobile devices, apps, private robots, e-commerce, smart home, wearable, cloud data and home robotics by using that application into self-learning robots, predictive maintenance, self-optimizing and smart handbooks (Berger, 2016). From the change in digital technologies brought to the biggest impact which is Industrial Revolution, besides affect the large-scale changes to our social-economic structures and the kinds of work people did (Halloran, 2015).

We currently carried out the process and work by human and now, technological advances are rapidly making it possible to automate and we are living in a time of over-the-top change. This applies to both collar jobs, through individual, business, industry and government is being affected by come through in computer power, connectivity, artificial intelligence (AI), biotechnology and other innovative technologies in the era

Fourth Industrial. We can see the transformative and disruptive changes brought by the Fourth Industrial Revolution when the merger of technologies blurring the lines between the physical, smart technological utilisation, digital and biological spheres (Marc Benioff, Chairman and CEO, Salesforce, 2015).

Potential chances that could result from the implementation of Industrial Revolution 4.0 in an industrial location such as Germany that already apply Industrial Revolution 4.0 are for example and increasing international competitiveness, and flexibility of production, a better adaption to customers' needs, new business models and the consideration of demographic change (Informationswirtschaft, 2015). From the Germany, there are most important for survival in the future because we need to survive with adaptation of Industrial Revolution.

1.3 Problem Statement

The 'Fourth Industrial Revolution' and 'Industry 4.0' are the latest news featured conspicuously in the media. It refer to the technological revolution that has been predicted to "fundamentally alter the way we live, work and relate to one another" presented by Professor Klaus Schwab, founder and Executive Chairman of the World Economic Forum (WEF), 2016. The arrival of Industrial Revolution 4.0 will brought the effect to the students' which is lack of jobs in the fields for which they are studying, or may lack skills and knowledge necessary for areas where there will be jobs growth (Shamsuddin. 2017). In the West, there is increasing discourse of policies such as a "universal basic income" to address the possibility that robots may eliminate many of the basic jobs that are currently performed by humans (Ruban, 2017).

Based on the Laura Oliver in the World Economic Forum (2017), more than 30% of activities are technically automatable and it result in six out of 10 occupations. The World Economic Forum's Future of Jobs (2016) study the effect 5 million jobs will be lost before 2020 because of the artificial intelligence (AI), robotics and other socio-economic factors will replace the need for human workers. In addition, Industrial Revolution 4.0 will create disruptions in the labour market, elimination low skilled or repetitive jobs because an unpredictable and unprecedented technological change is

looming with the advent of the Industrial Revolution 4.0 (NST, 2018). So, its impact on the workforce of the need of labour will change and in how flexible our nation skills base is going to be in responding to the challenge (The manufacture, 2017). This issue focus on the technical student because after their graduation, they need to find a job and when the Industrial 4.0 fully implement the job requirement will be different. So, the student must aware with their workforce because it will make them more competitive advantage and ready with new era.

By referring Wawasan Open University (2017), the revolution has necessitated transformation of higher education, as universities rise to the occasion, adapting and reinventing in order to equip society to take on future roles relevant to the era. It is reasonable to expect that this fourth industrial revolution will see many existing jobs disappear just as many more new jobs are created as a result of the new technology drivers and emerging innovation. Besides that, Malaysia is transitioning from a labor-driven economy to a knowledge-driven society. So, according to Warren, who is director of InvestKL (2017), the problem in the future for Malaysia is not lack of employment, but the shortage of skills that the new jobs will demand. That why, student for the future need to be competitive by requires high skilled talent; and formerly requiring control for the new economy demands compare to the traditional and old economy (Rozaini, 2017).

Then, based on Human Resources Development Fund (HRDF) chief executive Datuk CM Vignaesvaran Jeyandran (2017), nearly 50% of subjected knowledge in university that are acquired by a student in the first year of a four-year technical degree will be outdated by the time the student graduates. This show that technological trends are bringing about the change at an unprecedented rate especially in Industrial Revolution 4.0 will make university degree will be far less important because personal skills becoming more critical. Based on the Higher Education Minister Datuk Seri Idris Jusoh (2017) said universities have to change their education to make sure higher education to remain relevant to Malaysians and the world as we move along and to ensure that the student have jobs. That why, Malaysia education must upgrade into this new industrial age well-prepared.

Technology were undeniably effect the evolution of industry across the globe. The improvement that it bring had revolutionize most of the economies of industrialize country. And with unlimited potential for technologies to expand, it will surely effect how industrialization will grow for many years to come. With the emerging of Industry 4.0, the way of doing things and the outcome will surely change accordingly and indirectly impact the majority industrial companies (Schmitt, 2013). It is undeniably effect the whole globe as the process of manufacturing up until packaging and distributing will be forever changed (Deloitte, 2014).

In reality however implementing the Industry 4.0 were proven more difficult than expected. Modernization and mechanization of any system will consume time and huge chunk of money and even if it sound too good to be true, did not promise profits all the time. It is important to reach out and show the industry sector what positive impact should the Industry 4.0 being implemented by them (Andrews, 2017). On top of that, a continuous supply of workers that capable to work on that level are crucial thus producing a new genes of scholars that understood and familiar with the Industry 4.0 essence will be a mounting challenge (Andrews, 2017). This start from the educational level and it need to be sorted as soon as possible in making sure that the scholars will not left behind (OECD, 2008).

In response with these claim, this study will investigate several opinions that will prove to help in making better decision regarding on how to implement the Industry 4.0 in term of making a policy, approving new law or creating new syllabus as the effort to make the transition smoother. All the data will be obtain by carrying thorough survey that mainly aim on the students to know what are their current knowledges on the topic and what do they expect in future regarding the Industry 4.0. It also will show what is the current standing and policy of the nation toward this topic and what they actually planned for the nation in order to tackle this technology revolution.

The purpose of this research is to examine what the action that student do when Malaysia change to the Industrial Revolution 4.0. Is it the student will be ready for that because it can give biggest impact for the whole transformation especially in the job requirement for the future. In the Industrial Revolution 4.0 “we need radically different thinking and platforms to focus on capabilities instead of qualifications- an approach

similar to the dating app Tinder for the new job market place," says Alexander Sperman, the former director of German labor policy at the Cologne Institute for the study of labor (2016).

1.4 Research Question

There are two research question that have been gained from problem statement by the research as per below:

1.4.1 Does education system influencing technical student level awareness toward Industrial Revolution 4.0 workforce in University at Southern Malaysia?

1.4.2 Does subjective norm influencing technical student level awareness toward Industrial Revolution 4.0 workforce in University at Southern Malaysia?

1.4.3 Does digital behavior influencing technical student level awareness toward Industrial Revolution 4.0 workforce in University at Southern Malaysia?

1.4.4 Does knowledge influencing technical student level awareness toward Industrial Revolution 4.0 workforce in University at Southern Malaysia?

1.5 Research Objective

The objective of the study are stated as below:

1.5.1 To study education system influencing technical student level awareness toward Industrial Revolution 4.0 workforce.

1.5.2 To study subjective norm influencing technical student level awareness toward Industrial Revolution 4.0 workforce.

1.5.3 To study digital behavior influencing technical student level awareness toward Industrial Revolution 4.0 workforce.

1.5.4 To study knowledge influencing technical student level awareness toward Industrial Revolution 4.0 workforce.

1.6 Scope Of Study

The purpose of this study is to identify the factor that influencing level awareness of Industrial Revolution 4.0 among technical student in University Southern Malaysia include University Teknikal Malaysia Melaka (UTeM), University Teknologi Malaysia, Skudai Johor (UTM), University Teknologi MARA (UITM), Pasir Gudang, Johor, and lastly, University Tun Hussein Onn Malaysia (UTHM), Batu Pahat, Johor. Technical student has been chosen as the respondent to conduct this study because Industrial Revolution 4.0 focus on manufacturing industries as the core skill in workforce. Therefore, the respondent of this study would be 400 student who be chosen to answering the survey question.

1.7 Significant of Study

This study analysed the factor that influence level awareness toward Industrial Revolution 4.0 workforce in University at Southern Malaysia. This research gibe benefit in preparing the industry as learning organisations for radical change will become an increasingly urgent priority (Schlaepfer & Koch, 2014). According to the researcher, this study is important because to identify for the technical student aware and get ready to the transformation and change in the whole workforce to face the Industrial Revolution 4.0.

1.8 Summary

The aim of the research is to identify the factor that influencing level awareness of the Industrial Revolution 4.0 among technical student in University at Southern Malaysia. Therefore, the researcher also want to describe the education system, subjective norm, digital behaviour and knowledge of technical student toward Industrial Revolution 4.0 in term of the changing the future of work.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

We stand on the brink of a technology revolution that will fundamentally alter the way we live, work and relate to one another (Schwab, 2015). This is because of the technology revolution will make it complexity in the all aspect such as scale, scope and system. However, the transformation needed in our life because the technology become more advance and will be important to the life from the start of the day until end of the day. With all these at hand, we start to wonder where Malaysia's present position is. And now at Malaysia's currently in Industrial Revolution 2.0 where the labor intensive phase is very common. Overall, the unstoppable shift from simple digitization (the Third Industrial Revolution) to innovation based on combinations of technologies (the Fourth Industrial Revolution) (Schawrb, 2015).

Since the beginning of the 21st century, we have been expecting a digital transformation-changes associated with innovation in the field of digital technology in all aspect of society and economy. This trend will affecting the way goods are manufactured and services are offered. Besides that, with this change for the new era will effect for the future education especially student. From the buzzword about the Industrial Revolution 4.0, my Foresight and MIGHT provide input how Industrial Revolution 4.0 will be affect industry, government and education. Before that, we need to find out actually the Industrial Revolution.

2.2 Industrial Revolution

2.2.1 History Industrial Revolution

This Industrial Revolution has been introduced by three other Industrial Revolutions on the history of mankind. For the First Industrial Revolution is the shift from human or animal power to machines run by water and steam to power to mechanize manufacturing process in the late 18th century and more compounded the entire 19th century (Drath and Horc, 2014). According to the website History (2009), In the late 1700s, before to the Industrial Revolution which began in Britain, this period during which mainly agrarian, rural societies in Europe and America became industrial and urban.

Second Industrial Revolution from the 1870s based on the electrification and the division of labor (Drath and Horc, 2014). The drivers for the second industrial in the electricity mass production in the 1900s (Rojko, 2017). In terms of basic materials, modern industry began to exploit many natural and synthetic resources not hitherto utilized as a new sources. To become automatic factory, it combines with these development in machines, tools and computers it's as distinct from the assembly line (Anon, 2017).

Next, Third Industrial Revolution is characterized by the digitalization with introducing of microelectronics and automation. In manufacturing facilitate flexible production, there are variety of production is manufactured on flexible production lines with programmable machines (Rojko, 2017). Thus, the technology revolution from the first until three and now the fourth Industrial Revolution become faster, more widespread and with greater impact than before and it has potential to transform production systems globally. This trend is also affecting the way goods are manufactured and services are offered.

2.3 Industrial Revolution 4.0

According to Henning Kagerman (2005), the first three Industrial Revolution of the past were elicit by technical innovation in mechanism, electricity and IT. Next is the upcoming Industrial Revolution the introduction of the Internet of Thing, Big Data or Machine-to-Machine, which allows to communication between humans as well as machines in Cyber-Physical-System (CPS) (Henning, 2005; Bramley, 2015; Brettel et al., 2014). Currently, participant and academia in the German-speaking area discussed topic about the confluence of industrial production and information and communication technologies, called Industrial Revolution 4.0 (Drath and Horch, 2014). After, German launched a project under the name 'Industrie 4.0' to digitalize manufacturing at the Hannover Messe in 2011, however at that time the government official, industry leaders and academics who were working on the project probably had no idea that Industrial Revolution 4.0 and specifically that fourth industrial revolution would become such a widely used concept (i-scoop, 2017).

Industrial Revolution 4.0 is a technology merges physical and digital worlds throughout the manufacturer's entire value chain- from the customer to R&D and the ecosystem of suppliers and it one of the transformational journey (Gutman et al., 2017). Start from the first process in the manufacturing industries takes the automation of manufacturing processes to a new level by introducing customized and flexible mass production technologies (Martin, 2017). In Malaysia, there are industries leads already in the process of moving towards Industrial Revolution 4.0 or becoming Industrial Revolution 4.0 compliant on their own (Xing & Marwala, 2017). This is because of Industry still be in its infancy in term of Industrial Revolution 4.0 but Malaysia stands to benefit significantly in the long run if its decision-makers begin shifting in that direction (Yee, 2015). And now Malaysia's will move to the next step is Industrial Revolution 4.0. The adoption Industrial Revolution 4.0 not only give benefit to the industries and business but will have a profound impact on the manufacturing workforce (Fig, 2017).

According to Yee in the Digital News Asia (2015), there are three advantage of Industrial Revolution 4.0. Firstly, increasing manufacturing productivity will be an achievable goal as illustrated in the case of Germany, a notable frontrunner in the technological advancement race. By leveraging the principles of Industrial Revolution 4.0 and its enabling technologies to automate, integrate and optimize manufacturing processes to be shorten time, improve their operation and implement efficiency in the operation (Gutman et al., 2017). Secondly, unemployment will be relieved with the creation of higher wage jobs because it will create opportunities in manufacturing industries. Thirdly, growing consumer demand can be met in light of optimized factory operations. From the significant of the Industrial Revolution 4.0, overall of the processing in term of all aspect will transform. To make it will be success, Malaysia need to change who will manage Industrial Revolution 4.0 for being it reality. In order to bring about the shift from industrial production to Industrial Revolution 4.0, Malaysia need to adopt the technology transformation.

There are nine pillars of technological advancement to Industrial Revolution 4.0-autonomous robot, big data analytics, supply chain, cloud computing, Internet of Things (IoT), additive manufacturing, horizontal and vertical integration, simulation and augmented reality and cybersecurity (Rubmann et al., 2015; Kristel & Williams, 2017). The improvement can see all aspect of the manufacturing industries if industries in Malaysia moving toward Industrial Revolution 4.0 based on the pillars of technological advancement. This is because Industrial Revolution 4.0 will play the role by covers the entire value chain, including suppliers, procurement, design, logistics and even sales, resulting in higher productivity and flexibility (Pandiyan, 2017). Based on the term “Industrial Revolution 4.0” symbolizes new forms of technology and artificial intelligence within production technologies (Richer, 2016). There the technology advancement in the Industrial Revolution 4.0, almost overall of the industrial system in manufacturing will be disrupting. These change bring viewed to the transformation of entire systems of production, management and governance (Schawb, 2016). The disrupting will be see in the nine pillar Industrial Revolution 4.0.