

THE ROLE OF FPTT IN UTEM TEACHING FACTORY PROJECT

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THE ROLE OF FPTT IN UTEM TEACHING FACTORY PROJECT

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DECLARATION OF ORIGINAL WORK

“I hereby declare this report is the result of my own, expert certain explanations and passage where every of it is cited with the source clearly.”

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DEDICATION

I would like to express the sincere appreciate to my beloved family members who supported me in terms of spiritual and financial while conducting the research. Besides, I would like to give thanks to my adored supervisor and panel who give guidance and teach patiently. Lastly, I would also like to thanks my fellow course mates for assisting through the journey of the research.

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ABSTRAK

Industri 4.0 ialah pemacu aliran pengeluaran untuk digitalisasi dalam system perkilangan. Ini menyebabkan perubahn permintaan ke atas produk dan SMEs menghadapi kesukaran di mana pekerja tidak mempunyai kemahiran yang cukup untuk menguruskan teknologi. Kini, kadar pengangguran semakin meningkat kerana graduan tidak memenuhi keperluan industry. Pekerja dengan kemahiran yang rendah akan menjejaskan prestasi perniagaan. Kerjasama antara industry dan universiti adalah pasukan gabungan baru. “Teaching Factory” adalah salah satu pembelajaran yang mengintegrasikan antara persekitaran pendidikan dan perindustrian. Ini membawa persekitaran industri kini ke dalam kurikulum sukatan pelajaran. The matlamatnya ialah berkongsi pengetahuan dan kemahiran dari industry kepada pelajar. UTeM adalah universiti awam teknikal pertama di Malaysia. Oleh itu, ini adalah sesuai untuk menjadi universiti pertama yang menawarkan “Teaching Factory” yang baik and bernilai kepada industry. Tujuan penyelidikan ini adalah untuk mengenal pasti keperluan kilang pengajaran dan menggunakan BMC untuk mencadangkan scenario kilang pengajaran di FPTT UTeM dan pentingnya “Teaching Factory’. Kajian ini dijalankan di kawasan Melaka melalui temuduga. Empat responden yang telah ditemuduga termasuk tiga kategori SMEs dan salah satu pensyarah yang mengambil bahagian dalam itu di UTeM. Responden-responden dipilih dan menjwab soalan yang berkaitan dengan model BMC. Berdasarkan temu bual, ini menunjukkan SMEs memerlukan program latihan untuk meningkatkan prestasi perniagaan dan FPTT dapat menyediakan beberapa program mengikut keperluan pasaran kini. Kesimpulannya, “teaching factory” adalah project yang bernilai dan memberikan manfaat kepada siapa yang terlibat dan termasuk univerisiti.

ABSTRACT

Industry 4.0 defines the production flow drives to digitalization in the manufacturing system. However, it causes the changes of demand towards products and SMEs facing difficulties where the employees are lack of skills to manage the technologies. Recently, the unemployment rate is increasing as graduates do not meet the requirements of industries. Employees with low skills will affect the efficiency of the business performance. The collaboration between industry and university is a new combination team. Teaching factory is a learning approach which integrates between educational and industrial environment. It brings the real industry environment into the classroom which shares the knowledge and skills to the students. UTeM is the first technical public university in Malaysia. Thus, it is appropriate for UTeM to be the first university to offer a valuable teaching factory. The purpose of this research is to identify the requirements of the teaching factory and use BMC to propose the teaching factory scenario in FPTT UTeM and the significance of the teaching factory. The research is conducted in the area of Melaka through interviews. The total four respondents were interviewed includes three different categories of SMEs and one lecturer in UTeM who takes part in the teaching factory. The result shows SMEs need training programs to improve their business performance and the FPTT can provide several programs according to current market needs. In conclusion, the teaching factory is a valuable project which provides benefits to those involved in and includes the university.

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LIST OF ABBREVIATIONS

3D	: Three (3)-Dimensional
AI	: Artificial Intelligence
AR	: Augmented Reality
BMC	: Business Model Canvas
C-TeD	: Centre for Technopreneurship Development
CBT	: Competency Based Training
CREATE	: Centre for Enterprise and Technopreneurship Development
CRM	: Customers Relationship Management
ERP	: Enterprise Resource Planning
FPTT	: Faculty of Technology Management and Technopreneurship
GE	: Graduate Employability
GDP	: Gross Domestic Product
IBL	: Industry-Based Learning
IP	: Intellectual Property
IoT	: Internet of Things
MDEC	: Malaysia Digital Economy Corporation
MOA	: Memorandum of Agreement
NIST	: National Institute of Standards and Technology

OEE	: Overall Equipment Effectiveness
PBT	: Production Based Training
RFID	: Radio Frequency Identification
RIMA	: Research and Innovation Management Advancement
SCM	: Supply Chain Management
SME	: Small and Medium-sized Enterprise
SuITE	: Sustainable IT-economics, Information Systems, Technology Management & Technopreneurship
S-iCOMM	: Sustainable Industrial Community
TeMAN	: Technology Management Association
TTO	: Technology Transfer Office
TVET	: Technical and Vocational Education and Training
UKM	: Universiti Kebangsaan Malaysia
UMP	: Universiti Malaysia Pahang
UMS	: Universiti Malaysia Sabah
UniKL	: Universiti Kuala Lumpur
UTeM	: Universiti Teknikal Malaysia Melaka
UTHM	: Universiti Tun Hussein Onn Malaysia
UIC	: University-Industry Collaboration
UIL	: University-Industry Linkages
UIP	: University-Industry Partnership
UIR	: University-Industry Relationship
VET	: Vocational Education and Training

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter will give an overview of the meaning of the teaching factory and how it applies to become a teaching factory for university with proposing a teaching factory model. The implication of proposing the teaching factory concept to the university is discussed.

1.2 Background of the study

Technologies are changing fast nowadays. Many big industries plan to shift business structure by involving automated technologies (Hughes, 2017). Industries are emerging the latest technologies to get closer to the current technology trends. Industries adopt advanced technology can create new opportunities for businesses to improve productivity. It also brings an impact on the internal and external of an organization by transforming the business structure. General Motor's example affects the internal organization structure which to divide into several production lines for the model of Cadillac, Oldsmobile, and Chevrolet. It gives autonomy for each model and improves the agility of production. However, the external impact is the networks of the organization. It enables to improve communication and relationship with customers (Day & Schoemaker, 2016).

Industry 4.0 means all the production flow goes with the digitalization of the manufacturing system. It is a revolution from the third generation. Most industries are starting to invest in the smart factory that provides benefits in efficiency and productivity. The visibility, connectivity, and autonomy are the characteristics of the smart factory. It can be said that all operation flow run automatically and without a human to operate. Industry 4.0 can affect the overall production with produce high-quality products and improve productivity (Zhong, Xu, Klotz, & Newman, 2017). The products can be produced in shorten the time and high volume with better quality. The advanced technology will affect the demand and supply curve (Woodruff, 2019). The changes in the demand due to the pricing, consumer preference or expectations, income, and population. There are challenges for SMEs where the employees do not have enough skills to handle certain technologies (Kang , 2016).

Universiti Teknikal Malaysia Melaka (UTeM) is the first Technical Public University in Malaysia (UTeM, 2018). The university offers several technical skills and knowledge which capable of the graduates to fulfill the requirement of current industries. The most fundamental goal of the university is to provides graduates have well-prepared when in the working field. The teaching factory is one of the success paths for a university to achieve its goals.

The teaching factory concept offers both bits of knowledge in theoretical and practical for students. It aims is to meet the requirement of the current industry's needs. The concept helps students have experience in technical things rather than learning the concept. The advantages of teaching factory concepts are enabled students to have well-prepared with the skills that can meet the industry's requirements after graduates (Alptekin , Pouraghabagher, McQuaid, & Waldorf, 2001). It can affect the rate of unemployment reduce due to graduates know how to manage the latest technologies.

Collaboration between university and industry is a new combination team. The linkages between these two institutions can offer different sources to produce a better outcome. The concept of collaboration is a complement each other on what they are lacking. This collaboration helps students increase the competency to manage in their future careers (Mustafa, 2019). The effect of the collaboration is both institutions sharing and exchange their resources to each other for fulfilling its requirements.

In Malaysia, some universities already take their moves towards teaching factories such as Universiti Malaysia Sabah (UMS), Universiti Malaysia Pahang (UMP), Universiti Kuala Lumpur (UniKL), and other countries also applied like Nanyang Polytechnic International in Singapore. There are 82% of Universiti Kuala Lumpur graduates get a job after the students attend the HVET program (Bernama, 2019). It shows the high percentage of graduates get employed because the teaching factory offered an opportunity to utilize the knowledge for applying to a real working environment.

A business model is an organization's business strategy plan of how the organization create, offer, and deliver the values to the customers. Every company is starting moving forward to the current era which meets the current needs. The business model of the university should be evolved that can suit to the factory's element (Schrager, 2018). The teaching factory model should include the elements of the factory and the elements of the university. These two different elements from different institutions can form another new model for achieving the current industrial era.

1.3 Problem Statement

The country has many institutions that are offering the technical-based program. However, the unemployment rate for these graduates is getting high. According to the statistic, it shows the unemployment rate has increased from 2017 (4.0%) to 2018 (4.3%) for graduates (Pillai, 2019). The percentage has increased by 0.3% from 2017 to 2018 which affects the status of the economy of its country. Many employers are complaining about people ranging from degree to Ph.D. due to a lack of skills that fulfill the requirements of the current industries. The ecosystems of the business model are shifting from manual to semi-auto, and now to fully automated or digitalize. All of the industries are starting to apply and implement auto-machines, and other technologies in the production line. According to Ahmad (2019), there are 73.2% of companies reveal that graduates have insufficient skills and knowledge for solving current problems faced by the companies and industries.

In the year 2017, most job vacancies offer in a low and semi-skilled job so graduates have less interest and preference in these jobs. It shows 86.9% out of 1.4 million jobs are required low-skilled, and 8.4% for semi-skilled. It causes the mismatch of skills in working fields may lead the percentage of graduates unemployed to increase (Economy, 2018). The characteristics of the manufacturing and agriculture sectors are offer tough and complicated job scope with low payment which many graduates do not apply for the job.

The number of applicants for searching the jobs is increasing and all compete for a limited number of jobs. The youth or fresh graduates will be involved in this competition with other applicants. Those youths have low probabilities or opportunities for getting the job due to a lack of experience in searching for a job and analyze job market information (Dass & Chief Economist , 2018). Most of the fresh graduates do not know how to utilize knowledge to apply to jobs. The graduates are unable to fulfill the requirement of high-skilled jobs. The high-skilled job requires professional skills and knowledge for solving and manage the business process with their expertise. The graduates are lacking some employability characteristics such as communication, critical thinking, problem-solving, technical, and multi-tasking.

In the era of Industry 4.0, the university could not keep up with the dynamic trend in the industry. There are a few reasons of the university could not catch up with the technology trend. University thinks it will be informal learning. It shows an irregular model of learning which is not traditional classroom models like giving a lecture. Besides, the university is resisting change because the university is comfortable with the current condition.

Other than unemployment matters, many universities are starting to implement the teaching factory concept in education. It explains most of the universities involved the teaching factory components into higher education' teaching system. The core technical subjects include Industry 4.0 requirements which to convey the knowledge and information of particular skills for students.