OPPORTUNITIES AND CHALLENGES FOR IMPLEMENTING AUTOMATION AMONG SELECTED SMEs OF FOOD MANUFACTURING INDUSTRY

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APPROVAL

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The thesis is submitted in partial fulfilment of the requirement for the award of Bachelor of Technoprenuership with Honour

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DECLARATION OF ORIGINAL WORK

‘‘I hereby declare that this project is the result of my own research except as cited in the references’’

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DEDICATION

This thesis is dedicated to:

My parents, Mr Tong Swee Ving and Mrs Lim Beng Hua whom has always been there supporting me through my ups and downs and giving me the extra boost that I always needed to finish up my thesis.

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ABSTRACT

The key objective of automation is to minimise human intervention in the workplace. Automation improve not only production productivity but also strengthen company competitiveness. This research presents an empirical study that uses qualitative research methods for investigating the automation level among the SMEs in the food manufacturing industry. This research investigates the opportunities of applying automation and identifying the challenges confronted the SMEs in realising automation in the food manufacturing process. Semi-structured interviews were conducted to examine the level of opportunities and challenges of implementing automation among selected food manufacturing SMEs. The findings show that automation enhances productivity, improve product quality and increase manufacturing process efficiency. However, this research also reveals that costing, training and lack of flexibility were the impeding factors for the studied SMEs to implement a fully automated process in food production. Despite the constraints, the companies strive to automate parts of their food production processes by using second-hand automation machines instead of investing in brand new automation equipment, hiring expert technicians and implementing the lean principle. This research presents several innovative recommendations for food manufacturing SMEs to automate their production process in order to increase competitiveness in the industry.

Keywords: Opportunities; Challenges; Automation; SMEs

ABSTRAK

Automasi meningkatkan bukan sahaja produktiviti pengeluaran tetapi juga mengukuhkan daya saing syarikat. Penyelidikan ini membentangkan kajian empirikal yang menggunakan kaedah penyelidikan kualitatif untuk mengenal pasti tahap automasi di kalangan SMEs dalam industri pembuatan makanan. Penyelidikan ini mengenal pasti peluang menggunakan automasi dan cabaran yang dihadapi SMEs dalam merealisasikan automasi dalam proses pembuatan makanan. Wawancara yang berstruktur telah dijalankan untuk mengkaji tahap peluang dan cabaran pelaksanaan automasi di kalangan SMEs pembuatan makanan terpilih. Pendapat kajian menunjukkan bahawa automasi meningkatkan produktiviti, meningkatkan kualiti produk dan meningkatkan kecekapan proses perkilangan. Walau bagaimanapun, kajian ini juga mendedahkan bahawa kos, latihan dan kekurangan fleksibiliti adalah faktor menghalang bagi SMEs yang dikaji untuk melaksanakan proses automatik sepenuhnya dalam pengeluaran makanan. Walaupun terdapat kekangan, syarikat-syarikat berusaha untuk mengautomasikan sebahagian daripada proses pengeluaran makanan mereka dengan menggunakan mesin automasi terpakai bukannya melabur dalam peralatan automasi baru, menyewa juruteknik pakar dan melaksanakan prinsip kurus. Penyelidikan ini membentangkan beberapa cadangan inovatif bagi pembuatan SMEs untuk mengautomasikan proses pengeluaran mereka untuk meningkatkan daya saing dalam industri.

***Kata kunci**: Peluang, Cabaran, Automasi, SMEs*

TABLE OF CONTENT

LIST OF TABLE

LIST OF FIGURE

LIST OF ABBREVIATION

ABBREVIATION	MEANING
SMEs	Small and Medium Enterprise
GDP	Gross Domestic Product
RPA	Robotic Process Automation
AI	Artificial Intelligence
SOP	Standard Operating Procedure
UTeM	Universiti Teknikal Malaysia Melaka

LIST OF APPENDIX

CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter contained the information about the background study of the researcher topic which was the implementing of automation. At the same time, the researcher discussed SMEs position in Malaysia. The researcher believed that this chapter was a beginning of the discussion to bring successful research. Further, the researcher discussed the problem statement, research problem, research objectives, scope, limitation and key assumption of study and the importance of the study.

1.1 Background of study

In this rapidly changing environment, Industrial Automation was one of the biggest step changes in the manufacturing industry. According to Xu et al. (2018), Industry 4.0 represents the recent trends of automation technologies in the manufacturing industry. Although the use of automation technologies was begun since Industry 3.0 it continued to expand until industry 4.0. Xu et al. (2018) claimed that the differences are industry 3.0 focus on the automation of the machines and processes whereas industry 4.0 tend to focuses more on the digitization, automation and data collection.

Fawcett (2017) introduced that, Industry 4.0 and the rapid rise of automation is leading the ever-changing landscape of manufacturing industry and bringing to new future trends. For example, it was difficult to imagine the world with start introduce internet, but it was only 1991's the internet went live. Presently, there were very few companies without internet or a website. Therefore, the researcher believed that in the future, the use of automation or Industry 4.0 will be very common in most of the manufacturing industry just like the case of the internet nowadays. According to Ong (2017), young people in the past was encouraged to study business, law, and medicine, but now they were going into robotics and engineering to be a robotics engineer or material science engineer. Therefore, it was proven that the current automation trend was more intensive than the past decade.

Emerging of automation in manufacturing companies had occasioned from economic reasons and technological evolution. Arntz et al (2016) defined that automation is substitutability of humans by machines. Automation always regarded as a competitive advantage to the company which has the potential to improve efficiency in the short period while lowering cost in the long-term goal. Following by the fourth industrial revolution conception, automation became a current trend in monitoring the production and delivery of products and services by reducing or without human intervention. In their case study, Winroth et al. (2007) claim that when business owner or director initiates automation, they frequently with the objective of lowering production cost and the decision of implementing automation tends to be the only consideration.

SMEs act as an integral part of the economy in terms of manufacturing, job creation and generating equitable distribution of income. Under the Eleventh Malaysia Plan, Malaysia Government will continue to focus on the growth of SMEs with the aims of increasing Gross Domestic Product (GDP) contribution from 37.1% in 2017 to 41% in 2020. However, higher cost and economic downturn make it did not achieve the target that expected like Kang (2018) mentioned that he expected the market to remain slow this year. Therefore, a lot of initiatives that given by Malaysia government in order to help SMEs in increasing their productivity, empower human capital, increase the use of technology and innovation. One of the ways to help companies to adopt technology trends, increase productivity and empower human capital was by

implementing automation in their business organization. Industrial Automation was a solution for the manufacturing company which plays a key role in solving the problems and requirements of companies.

1.2 Problem Statement

Presently, the influx of foreign worker was a national issue in Malaysia. Ong (2017) mentioned that Malaysia is having so many foreign workers because most of the company were reluctant to implement automation. Eleventh Malaysia Plan, Industries were largely dependent on semi-and low-skilled workers and foreign labour. Semi-and low-skilled workers made up 72.5% of total employment in 2017 whereas foreign workers made up 15.5%. The overdependence on low-skilled foreign labour, has perpetuated a labour-intensive economy and bring to increase labour cost due to labour shortage while higher demand in the market. According to Brei (2013), industrial automation is defined as the use of control systems, such as computers or robots, and information technologies for handling different processes and machinery in industry to replace human labour. Hence, the alternative way was to replace the worker with the automation system. In the Pillar IV in the Six Policy Pillars of Eleventh Malaysia Plan also mentioned that by promoting greater automation can reduce dependency on foreign workers.

Other than that, there were numerous of large organization in Malaysia were adopting automation in their manufacturing process for many years while the SMEs still did not have a direction and the ability to grab the opportunities of these different automation technologies (Vale, 2018; Kang, 2018). Government agencies and trade organisations have been actively urging the businesses and manufacturers of SMEs focus and follow with the automation technology trends in order to boost efficiency, increase productivity and increase the sales profit. For example, the Human Resource Development Fund (HRDF) will collaborate with the industry to equip future workers with relevant skills to meet industry demand especially the digitalization, automation, and mechanization training programmes.

Compare to the large companies, SMEs had competitive advantages in producing a customized product. It made SMEs can undergo a flexible manufacturing production with low volume production and a wide variety of the product. In contrary, due to resource were finite and low volume with a wide variety of the product, SMEs faced the largest barrier in implementing automation. Generally, most of the company will implement automation in order to maximize their productivity and profit but it was also a SME's weak point. Hence, SMEs need to put more effort in choosing and implementing right automation concept.

1.3 Research Question

In this study, there were three research questions have formatted from the problem statement.

1. What are the opportunities by implementing automation that benefit to SMEs in the food manufacturing industry?
2. What are the challenges faced by SMEs in the food manufacturing industry to implement automation?
3. What are the innovative suggestions to conquer the challenges that faced by SMEs in the food manufacturing industry?

1.4 Research Objective

There were many opportunities that can bring advantages to the company. However, there were also a lot of challenges exist when implementing automation in the company. Therefore, the researcher decided to give some innovative suggestion to conquer the challenges. The research objectives were as below:

1. To investigate the opportunities by implementing automation that benefit to SMEs in the food manufacturing industry.
2. To identify the challenges faced by SMEs in the food manufacturing industry to implement automation.
3. To propose the innovative suggestions to conquer the challenges that faced by SMEs in the food manufacturing industry.

1.5 Scope, Limitation and Key Assumption of the study

This study was to examine the opportunities and challenges by implementing automation towards SMEs in the food manufacturing industry and propose an innovative suggestion to conquer the challenges. The scope of this study was focused on opportunities and challenges by implementing automation towards SMEs in the food manufacturing industry and also the innovation suggestion to conquer the challenges that will be faced. The limitation of this study was the limited coverage of the state which only covered the SMEs in the food manufacturing industry at Negeri Sembilan and Melaka. Thus, the results of the study cannot be represented to every single state in Malaysia. The key assumption was the researcher assumed that the all the respondents were honest and have adequate knowledge on the research topic.

1.6 Importance of the study

The importance of this research was to get to identify with the opportunities and challenges of implementing automation towards SMEs in the food manufacturing industry. Besides that, the researcher also proposed the innovative suggestion in order to conquer the challenges when implementing automation. Therefore, this study will be beneficial for SMEs in the food manufacturing industry to generate awareness and prepared to grab the opportunities and conquer the challenges of implementing automation in the company.

Besides that, this study was useful for SMEs organization and company because the researcher provided the information regarding opportunities and challenges while implementing automation. This study will become as a future reference for the researcher to conduct on the related topic of opportunities and challenges of implementing automation towards SMEs in the food manufacturing industry.

1.7 Summary

In this chapter, the researcher discussed the background of the study and problem statement. The purpose of this study was to examine the opportunities and challenges of implementing automation and proposed the innovative suggestion to conquer the challenges for SMEs. The reason for selecting SMEs was because SMEs contributed about one-third to the country's GDP and the researcher believed that it will increase year by year. Besides that, most of the SMEs did not take the advantages of industrial automation due to its challenges and did not aware of its opportunities. Hence, the research objectives in the study were (i) to investigate the opportunities by implementing automation that benefits SMEs and (ii) to identify the challenges faced by SMEs to implement automation was the key in this study. The researcher found that the problem statement enabled to determine both research questions and research objectives. Besides, the researcher also revealed the scope of the study, limitation of this study, key assumption of the study and importance of this study.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

In this chapter, the researcher focused on the definition of automation. Besides that, the researcher described the opportunities by implementing automation that benefits the company. After that, the challenges of implementing automation was also one of the discussion topics in this chapter. Finally, the researcher also came out a theoretical framework to relate the independent variable. Throughout the review of the literature, it helped to develop a clear mind-set and direction with a better understanding of vision from the previous work that related to the research questions and research objectives.

2.1 Definition of Automation

According to Parasuraman & Riley (1997), automation was interpreted as a machine agent carry out the activities with a computer function that was previously done by a human labour. In 2018, automation was defined as a process that operates automatically or without constant human intervention (Yip, 2018). Even though the meaning of automation was transforming from a machine agent to workflow but the meaning of automation was almost the same even after 20 years.

The main objective of the use of automation was to minimize the human intervention or replace workforce as mentioned by Arntz et al (2016), automation is the substitutability of humans by machines. Moreover, Taylor et al (2013) argued that implementing automation will decrease the operator's cognitive demand and maximise performance. According to Yip (2018), a business that did not implement automation will lose their competitive advantage in the coming year. For example, there was an approximation of 25 percent will drop in customer retention in 2019 for those who do not implementation automation in their business. It had been proved that automation not only was an achievement in high productivity but also an increased in company competitiveness in the market.

2.1.1 Lean Automation

Lean philosophy was an important element in implementing automation which known as lean automation. In his introduction to lean principle, Crawford (2016) identified lean as creating more value for customers while minimize waste. The principle that always highlighted continuous improvement and minimize waste will bring the benefits such as high-quality production, minimise inventory levels and short customer response time (Fullerton & McWatters, 2001). Therefore, lean automation principle had risen nowadays in the manufacturing industry. Nowadays, many organizations started to employ lean automation to ensure gain competitive advantages through continuous innovations and improvement while minimized waste (Delkhosh, 2012).

In the case study of Parizi et al. (2014) stated that SMEs usually need support in Lean automation when talking about manufacturing. The majority of SMEs had heard of Lean principles, but when it came to implementing it was challenging for them. With Lean in mind, some can avoided automating processes that never should have been created in the first place.