

LEAN MANUFACTURING IMPLEMENTATION FOR
REDUCTION OF PRODUCTION TIMES AND QUALITY
ISSUES IN INDUSTRY



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UNIVERSITI TEKNIKAL MALAYSIA MELAKA



LEAN MANUFACTURING IMPLEMENTATION FOR THE REDUCTION OF PRODUCTION TIMES AND QUALITY ISSUES IN INDUSTRY

This report is submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for Bachelor Degree of Manufacturing Engineering (Hons.)



NURHANISAH BINTI MAHYUDDIN

B051710211

980715-10-5540

FACULTY OF MANUFACTURING ENGINEERING

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BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

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Disahkan oleh:



Alamat Tetap:
No 5 Jalan RP 8/8, Taman Rawang Perdana,
48000 Rawang Selangor
Tarikh: 9 September 2021

Cop Rasmi:
NOR AKRAMIN BIN MOHAMAD
Senior Lecturer
Faculty of Manufacturing Engineering
Universiti Teknikal Malaysia Melaka
Tarikh: 10.9.2021

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:

Author's Name

: NURHANISAH BINTI MAHYUDDIN

Date

: 9 SEPTEMBER 2021



APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of Universiti Teknikal Malaysia Melaka as a partial fulfilment of the requirement for Degree of Manufacturing Engineering (Hons). The member of the supervisory committee is as follow:



ABSTRAK

Kajian ini telah dilakukan di kilang proses pengeluaran ayam untuk mengenal pasti sumber masalah yang menyebabkan kelewatan pengeluaran dan masalah kualiti di industri. Kajian ini telah melaksanakan teknik kajian masa langsung untuk mengenal pasti masa yang dihabiskan untuk setiap proses dan Peta Aliran Semasa (CSM) dibina untuk menunjukkan aliran semasa proses di kilang pengeluaran. Aktiviti tanpa nilai tambah telah dikenal pasti menggunakan rajah Ishikawa dan Analisis Kegagalan Mod dan Kesan (FMEA) dalam setiap elemen proses dan lima jenis pembaziran telah dijumpai iaitu menunggu, bergerak, pengangkutan, kecacatan dan sisa inventori. Oleh kerana tidak ada peralatan yang tepat untuk proses penyembelihan dan pengendalian mesin secara salah di kilang proses pengeluaran ayam maka ia meningkatkan masa pengeluaran dan menyebabkan masalah kualiti. Rancangan penambahbaikan yang terdiri daripada Penyangkut Unggas Automatik, 5S teknik, susun atur kemudahan ruang kerja baru dan Prosedur Operasi Piawaian (SOP) telah diusulkan kepada industri untuk mengurangkan pembaziran, memperbaiki kaedah pengeluaran semasa dan membuang unsur-unsur yang tidak perlu. Peta Aliran Masa Depan (FSM) untuk penggunaan waktu yang disemak semula dari proses yang dipulihkan telah menunjukkan peningkatan penggunaan waktu sebanyak 21%.

ABSTRACT

This study has been carried out at a chicken production process factory to identify the source of problem that caused production delays and quality issues in the industry. This study has conducted a direct time study to identify the time spent for each process and a Current Stream Map (CSM) was developed to show the flows of the process in current production plant. The non-value-added activities have been identified using Ishikawa diagram and Failure Modes and Effects Analysis (FMEA) in each element of the process and five types of waste has been found which are waiting, motion, transportation, defects, and inventory waste. As there are no proper equipment for slaughtering process and handling machine wrongly in chicken production process factory increased the production time and led to quality issues. An improvement plan which consists of Automatic Poultry Hanger, 5S pillars, new facility layout and Standard Operating Procedure (SOP) has been proposed to the industry to reduce the waste, improve the current production method, and remove the unnecessary elements. A Future State Map (FSM) of the revised time utilization of the process were developed which shows an improvement of time utilization by 21%.

DEDICATION

To my beloved family, who always giving me a moral support and encouragement.

To my supervisor, who always give me support, guidance, and motivation in completing my final year project (FYP).

To all my friends, who always lending your hands and support me whenever I need it.

Lastly, to myself since you are a tough one.

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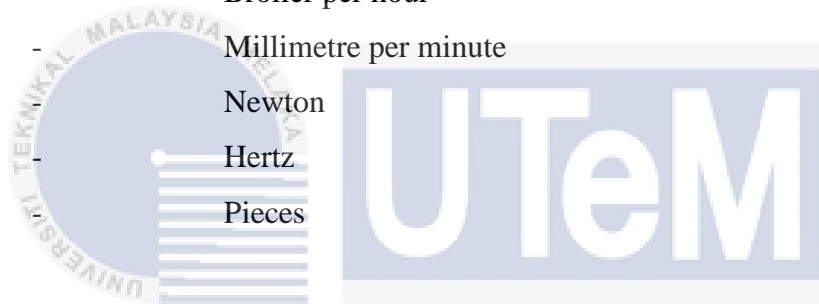
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LIST OF ABBREVIATIONS

C/O	-	Changeover Time
C/T	-	Cycle Time
CSM	-	Current State Map
CTQ	-	Critical to Quality
ESTRN	-	Equivalent Strain
FEA	-	Finite Element Analysis
FMEA	-	Failure Modes and Effects Analysis
FSM	-	Future State Map
JIT	-	Just in Time
LM	-	Lean Manufacturing
NVA	-	Non-Value Added
QFD	-	Quality Function Deployment
SMEs	-	Small and Medium Enterprise
SOP	-	Standard Operating Procedure
TPS	-	Toyota Production System
U/T	-	Uptime
URES	-	Resultant Displacement
VA	-	Value Added
VOC	-	Voice of Customer
VSM	-	Value stream mapping
WIP	-	Work in Progress

LIST OF SYMBOLS

mm	-	Millimetre
kg	-	Kilograms
%	-	Percent
MPa	-	Mega Pascal
GPa	-	Giga Pascal
°C	-	Degree Celsius
s	-	Seconds
BPH	-	Broiler per hour
g	-	Millimetre per minute
N	-	Newton
Hz	-	Hertz
pcs	-	Pieces



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CHAPTER 1

INTRODUCTION

This chapter consists of the overall research analysis, including the background of the study, the statement of problems and objectives. The scope and significance of the research are also explained in this chapter.

1.1 Research Background

Manufacturing industries company must be ready to face challenges and competition in marketplace to be able to meet the market needs. The examples of the challenges are to operate with high productivity and produce high quality of products. An improvement plan must be construct so that industries company able to provide solutions to the problems. Other than that, manufacturers should be more creative and innovative to apply advanced manufacturing technique and skills to plan a better system of production. One of the methods is to merge the improvement activities with the quality. In order to obtain a competitive advantage for most manufacturing industries, productivity and quality improvement are combined intentionally (Soufhwee et al., 2017).

A Japanese automotive company, Toyota, proposed the idea of Lean Manufacturing (LM) during the 1950s, which was well known before as the Toyota Production System (TPS) (Jafri and Seyed. 2015). Lean manufacturing tools is a good approach to solve the problems by the industry practitioner since it provides tools and strategies that can review and identify the problem and reach the objectives of the manufacturing industries company. Since customer always require fast production with the best quality so to response to these requirements, LM has been applied because it reduces waste without additional resource requirements (Jaiprakash and Kuldip, 2014). Waste is an activity along the value stream

that does not provide value added in the process. One of the most important requirements for obtaining maximum outputs with minimum inputs in all processes is to remove waste elements.

There are 7 types of waste in lean manufacturing listed by Toyota which are overproduction, inventory, transport, defects, processing, motion, and waiting (Seher and Hatice, 2015). This waste has been reviewed as the problems that usually donate to high time usage in production and quality issues. According to Soufhwhee et al. (2017) by implementing a lean manufacturing tool, we can identify the root problems and plan a solution. Therefore, by implementing LM tools, it helps to reduce the production times and quality issues experienced by the industry. Industry will become more reliable since the productivity and quality issue has been resolved.

1.2 Problem Statement

The manufacturer practitioner in industrial sector is required to be more innovative, effective, and adaptive. Standardization is important to overcome the gap between competitors in terms of production speed or efficiency, improve product quality and lowering the average failure. To fulfil the customer demand, industry must be able to commit and complete the customer order on time. Study by Rekha et al. (2017) and Lopes et al. (2015) has identified issues such as unnecessary movements of man and material on work area, less time utilization and non- value-added activities that somehow slowed down the production rate. Any excess beyond the requirement for equipment, materials, parts, and working time is generally referred as the waste (Prakash and Mothilal, 2018). Hence, waste production time to manufacture the product must be reduced to increase productivity. Another essential goal of the manufacturing process is to produce product with good quality but to be efficient in speed for production may cause lots of quality issues. A case study by Jimenez et al. (2019) experienced increase index on the products returned in the year 2015. Non-conforming products has been identified to not meeting the required specifications caused by lack quality controls. Another study of quality by Soufhwhee et al. (2017) has also identify lack of training and not following the instructions. This measure reflects the company's high costs and the key triggers of returns, as it is related with non-compliance with consumer specifications and product quality issues.

This study has been conducted at Mohamed Akbar Enterprise which is a chicken processing factory that mainly process and distributes chicken in Rawang area. The company also known as a Small and Medium Enterprise (SMEs) company. Based on internal and external customer's complaints, there are several problems the company faces in producing the good products to satisfy their customers in the production process. A highly demand of chicken that need to be distributes give the problem to the company as they cannot provide the required number of chickens needed due to the slower production process. In addition, some of the chicken feather appear on the skin of the chicken. The inconsistency on the appearance lead to customer complaints. Issues that arise can be categorized as waste, therefore the suitable solution to remove the waste need to be identify in order to solve the problems. A systematic approach such as production line analysis, data collection, and using technical approach need to be consider in solving the problems.

1.3 Objectives

The objectives of this study are:

1. To apply direct time study technique on the production line of the chicken production process.
2. To develop Current State Map (CSM) for the chicken production process
3. To evaluate the waste in current chicken production process using root cause analysis
4. To develop Future State Map (FSM) with proposal solution for the chicken production process

1.4 Research Scope

This project will focus on doing an analysis on the production line using direct time study for all six processes in chicken production process. This study also will concentrate on conducting waste analysis only on the first three processes. Lastly, this study will focus on reducing the production times and quality issues using lean tools by proposing a solution.