IMPLEMENTATION OF LEAN PRACTICES IN SMALL AND MEDIUM ENTERPRISE

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ABSTRACT

This thesis deals with the wastes in a SME company which is PJ Foods Industries Sdn. Bhd. The objective of this study is to apply the lean manufacturing concept, principles and tools to eliminate and reduce the occurred wastes in PJ Foods Industries Sdn. Bhd. Movement waste, waiting waste and motion waste were subject that being studied in this thesis. Several visits have been done and the data were collected through interview, observation, pictures and calculating the current total production time of 7kg fried chicken flour product. Materials flow in the original layout, process maps and simulation on the original layout using Witness Software were used to determine the section or process that has highest idle percentage or wastes. Witness Software was also used to simulate the improvement layout and it was found that the improvements on layout managed to eliminate the movement waste and reducing other existing waste as well as reduce the total production time by 2.31% for every 20 packets. For the inventories of finished products, 5S is the best method to improve and establish better workplace and housekeeping conditions. It is recommended that the suggestions in this thesis be applied in actual condition at PJ Foods Industries Sdn. Bhd in the next stage of the study.

ABSTRAK

Tesis ini berkaitan dengan pembaziran yang berlaku di sebuah syarikat perusahaan kecil dan sederhana iaitu PJ Foods Industries Sdn. Bhd. Objektif kajian ini adalah untuk mengaplikasikan konsep pembuatan condong, prinsip dan kaedah untuk menghapus dan mengurangkan pembaziran yang berlaku di PJ Foods Industries Sdn. Bhd. Pembaziran dalam pemindahan semasa menunggu dan pergerakan adalah pembaziran yang dikaji dalam tesis ini. Beberapa lawatan telah diadakan dan semua data telah dikumpulkan melalui temubual, pemerhatian, gambar dan juga pengiraan jumlah masa pengeluaran semasa bagi produk 7kg tepung ayam goreng. Pergerakan bahan dalam susun atur asal, peta proses dan penyerupaan bagi susun atur asal menggunakan perisian Witness telah digunakan untuk mengenalpasti seksyen atau proses yang mengandungi peratus sia-sia atau pembaziran paling tinggi. Perisian Witness juga digunakan untuk membuat penyerupaan bagi penambahbaikan susus atur dan telah dijumpai bahawa penambahbaikan terhadap susun atur berjaya menghapuskan pembaziran mengalih dan mengurangkan pembaziran yang lain termasuk juga mengurangkan jumlah masa pengeluaran sebanyak 2.31% bagi setiap 20 peket. Bagi tempat simpanan produk yang siap, 5S adalah kaedah terbaik untuk menambahbaikan dan mewujudkan tempat kerja dan keadaan pengurusan dalaman yang lebih baik. Adalah disyorkan supaya cadangan dalam tesis ini diaplikasikan dalam keadaan sebenar di PJ Foods Industries Sdn. Bhd.

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LIST OF ABBREVIATIONS

SME	Small and Medium Enterprise
SMIDEC	Small and Medium Industries Development Corporation
BNM	Bank Negara Malaysia
GDP	Gross Domestic Product
MIT	Massachusetts Institute of Technology
TPM	Total Productive Maintenance
OEE	Overall Equipment Effectiveness
VSM	Value Stream Mapping
MRO	Maintenance/ Repair/ Operating
RM	Ringgit Malaysia
GAA	Great American Appetizers
MBU	Manufacturing Business Unit
NSDC	National SME Development Council

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter provides the description of the project background, problem statements, objective and scopes of study.

1.2 Background of Study

The study was to identify the problems that normally occur at a SME company which is PJ Foods Industries Sdn. Bhd. based on the lean manufacturing perception and provide the suitable methods or tools that can be applied with less cost and time to overcome them. A small and medium enterprise company was chosen as most of them are generally still use the traditional method of processing due to lack of technical information, expertise and also finance. So, with the identification of problems and the solutions that were provided in this study, they will benefit the company to improve their production system and processing.

1.2.1 Company's Background

PJ Foods Industries Sdn. Bhd. is a small scale food processing company that concentrates on the production of fried chicken flour, curry powder and herbs. It has 18 full time employees and the company's annual sales for year 2006 was RM1,401,132.87 and the best-sellers product was the fried chicken flour which covered 32.12% of the

total annual sales. For year 2007, the company's annual sales was RM1, 186,836.37 and the fried chicken flour was still the best-sellers product with 29.49% of the total annual sales.

1.3 Problem Statements

Poor layout in the production of fried chicken flour section had caused wastes such as movement waste while poor housekeeping in the inventories of finished products had caused wastes such as motion and inventory waste. There were many unneeded items and the workers need some time to search for the products. So, these are the problems that were discussed and need to be improved in this study.

1.4 Objective

To propose improvement step for reducing wastes in PJ Foods Industries Sdn. Bhd. by using Lean Manufacturing.

1.5 Scopes of the Study

This project will be done at PJ Foods Industries Sdn. Bhd. and the scopes will be focus on the inventories of the raw materials and finished products at the warehouse and also on the disorganize layout at the labeling and packaging section. In the labeling and packaging section, there is a process and packaging for fried chicken flour product. Other than improvement on the inventories, some methods will be identifying to make improvements on the productivity of 1 pack of 7kg fried chicken flour product.

CHAPTER 2

LITERATURE REVIEW

2.1 Lean Manufacturing Concept

Lean manufacturing is a manufacturing philosophy that aims is to eliminate and reduce wastes in every area of production including customer relations, product design, supplier networks and factory management. It can be implemented by a company to stay competitive by serving its customers better and continuously reducing costs.

Lean manufacturing concepts can be organized into three levels consist of lean manufacturing objectives and basic principles, primary management and production strategies used to achieve the objectives and instill basic principles and the implementation techniques which are the practices and procedures for implementing and maintaining the strategies.(ReVelle, 2002)

The systematic elimination of waste will reduce the cost of operating the extended enterprises and fulfills the customer's desire for maximum value at the lower cost. In lean production or process, mistakes always be made but these mistakes are not usually repeated because this is one of the form of waste that the lean philosophy and its methods aim to eliminate.

2.2 Type of Wastes in Lean Manufacturing

There are eight types of waste that are normally be considered in the lean manufacturing. There are: (ReVelle, 2002)

a) Overproduction

Overproduction happens when the company produce products more than demanded or before it is needed.

b) Inventory

Inventory is an accumulation for finished products or raw materials at any stages of production process. Inventory waste also can affect the other production process and increases the lead time and response time.

c) Waiting

This happens when equipment, people or material waiting for each other or waiting for a machine to process before proceed to the next process.

d) Movement

This waste happens when there is any material, information or people movement which is not value added contribution for the customer.

e) Overprocessing

Process or efforts that add no value to the product or service can lead to overproceesing waste.

f) Motion

This waste happens when there is any motion of people or machines that does not add value to the product or service of customer.

g) Correction

This waste will add unnecessary costs because additional labor hours and materials are needed to correct or repair the defects that occur in parts or materials.

h) Underutilizing workers or people

This waste can be happens when the capabilities of the workers or people were not fully utilized.

2.3 Lean Manufacturing Tools

2.3.1 5S Techniques

Poor workplace conditions may lead to rising of wastes such as accidents, time spent in searching for needed items or motion to avoid obstacles. The lean journey can be started by establishing good workplace and housekeeping conditions. 5S is a system of workplace organization and it is fundamental to the implementation of other lean strategies. 5S is a reference to five Japanese words which described standardized clean up. The 5S are: (ReVelle, 2002)

a) Seiri (Sort)

This is a process where every non essential item is removing from the workplace and keeping only the essential items. Examples of non essential items that need to be sorted are extra cabinets, benches, tables, rags and tools. This will lead to fewer hazards in the workplace.

b) Seiton (Set In Order)

Set in order is a process of organizing the remaining items after the 'sort' process is completed. It focuses on the need for an orderly workplace. There should be a place for everything and everything should always be in its place unless it is being used.

c) Seiso (Shine)

Seiso or shine is a process of cleaning the work area and any equipment or machinery in it. It indicates the need to keep the work area always clean. One of the examples is at the end of each shift, the work area is cleaned up and everything is restored to its place.

d) Seiketsu (Standardize)

This process allows for control and consistency. Basic housekeeping standards are applied in the facility and duties are part of the regular work routines. Everyone should know their responsibilities.

e) Shitsuke (Sustain)

Sustain is a process of sustaining discipline. Standards need to be maintained and the facility or work area must always be in safe and efficient condition every time.

2.3.2 Layout Improvement

Several productivity metrics such as production and lead time are affected by how the materials flow and the location of the production resources in the factories. Factory layout improvements can be occurring more than one time during a factory's life. Some of the reasons that need for a change to the layout are the factory having problems with the materials flow, location change or purchase of new equipment. The analysis and improvements on materials flow in a new layout is able to save cost and time instead of buying new machine or equipment. (Meyers et. all, 2002)

2.3.3 Other Tools

There are other lean manufacturing tools such as pull system, kaizen, value stream mapping, inventory management and total productive maintenance. Most of these

tools are normally applied at the big company or factories that normally have their own vendors or chain system.

The pull-system strategy aims to provide the flexibility to rapidly respond to customer demands and eliminate the waste that occurs when upstream processes produce more than needed by the downstream customers. Kaizen is a constant elimination of waste through bettering product quality, improving worker safety and reducing costs. Value Stream Mapping (VSM) enables seeing where the long lead times come from when the value added time is often a few minutes or hours. (ReVelle, 2002)

Total Productive Maintenance (TPM) is an approach to reduce equipment-related losses due to speed reduction, downtime or defects by stabilizing and improving equipment conditions. Overall Equipment Effectiveness (OEE) is a key measure in Total Productive Maintenance. OEE takes into account downtime due to breakdown and setup, reduced operating speed, idling, and lost time due to defects or reworks.

2.3.3.1 Overall Equipment Effectiveness

OEE = Avaibility x Performance (Speed) x Quality Rate (ReVelle, 2002)

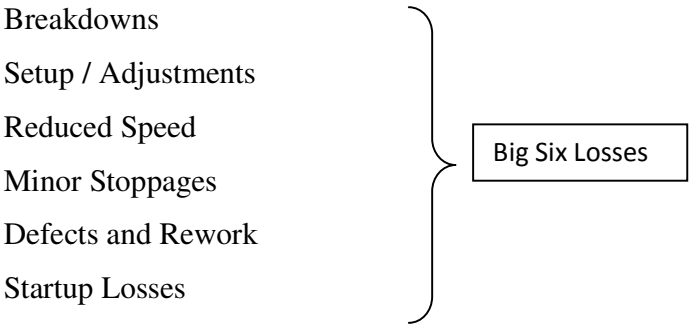

Figure 2.1: Overall Equipment Effectiveness

2.4 Definition of SME in Malaysia

In Malaysia, an enterprise is considered an SME in each of the respective sectors based on the Annual Sales Turnover or Number of Full-Time Employees. Malaysian SMEs can be grouped into three categories which are micro, small and medium.

2.4.1 Number of Full-Time Employees

The Table 2.1 shown the definition of SME based on the number of full- time employees.

Table 2.1: Definition of SME based on number of full-time employees

	Manufacturing, Manufacturing related services and agro based	**Service Sector including ICT**	**Primary Agriculture**
Micro	Less than 5 employees	Less than 5 employees	Less than 5 employees
Small	Between 5 to 50 employees	Between 5 to 19 employees	Between 5 to 19 employees
Medium	Between 51 to 150 employees	Between 20 to 50 employees	Between 20 to 50 employees

Source: NSDC, 2006

2.4.2 Annual Sales Turnover

The Table 2.2 shown the definition of SME based on the annual sales turnover.

Table 2.2: Definition of SME based on annual sales turnover

	Manufacturing, Manufacturing related services and agro based	**Service Sector including ICT**	**Primary Agriculture**
Micro	Less than RM250,000	Less than RM200,000	Less than RM200,000
Small	Between RM250,000 to less than RM10 million	Between RM200,000 to less than RM1 million	Between RM200,000 to less than RM1 million
Medium	Between RM10 million to RM25 million	Between RM1 million to RM5 million	Between RM1 million to RM5 million

Source: NSDC, 2006

2.4.3 Gross Domestic Product of SME In 2005

Based on the 2005 Census of Establishment and Enterprise, 80% of the SMEs are micro enterprises. 86.5% of the SMEs are in services sector, 7.3% are in the manufacturing sector and 6.2% are in agriculture sector. SMEs contributed only 32% of gross domestic product and 19% of the total export value. The Table 2.3 shown the 2005 data estimated based on the Census 2005's profiles compared to 2003.

Table 2.3: 2005 data estimated based on the Census 2005's profiles

	2003 (%)	**2005 (%)**
SMEs' contribution to GDP	31.9	32.0
SMEs' contribution to employment (exclude Government)	55.8	56.4
SMEs' share of total exports	18.9	19.0

Source: NSDC, 2006

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter provides the flow chart for Final Year Project, description about the data collections, method of analysis, simulation, layout, housekeeping and results analysis of the project.

3.2 Flow Chart for Final Year Project

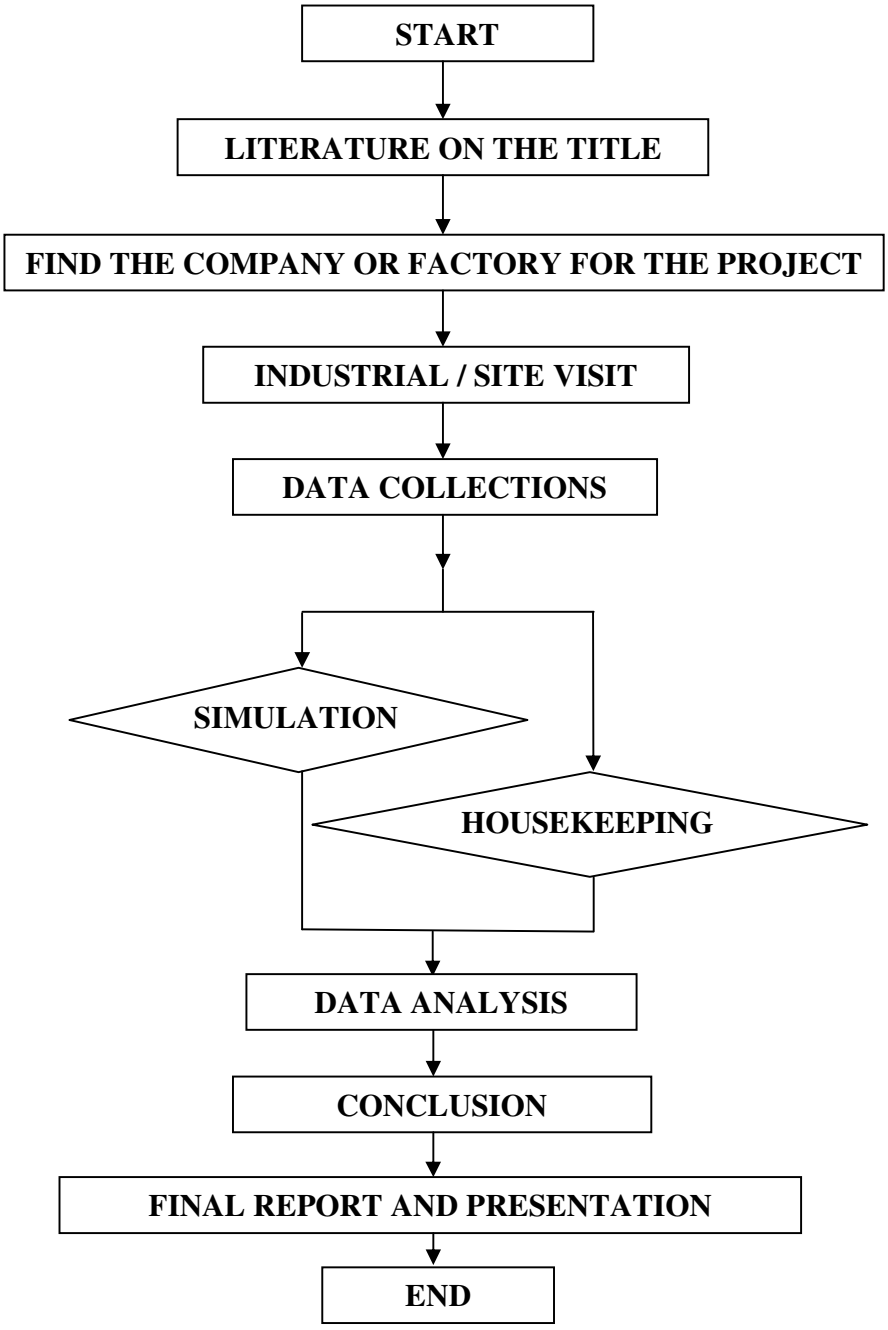

Figure 3.1: Flow Chart for Final Year Project

3.3 Data collections

Some visits to the selected company which was PJ Foods Industries Sdn. Bhd. had been done for the process of data collections. The data collections were made through observation, interview with the supervisor and workers and pictures that being taken at the factory.

The data collections that had been made include sales revenue of the company for 2006 and 2007, background of the company, the number of workers, the layout of the production of 7kg fried chicken flour section, the total time to produce 20 packets of 7kg fried chicken flour, cycle time for each process involves in the production of fried chicken flour, pictures of the inventories and the prices of the products.

3.4 Method of Analysis

After the data collections process, the collected data about the process and layout at production of fried chicken flour section had been used to make a process map and materials flow. From the process map, the unnecessary process and wastes can be detected. From the materials flow in the layout, any problems that related to the materials flow can be detected and improvements on the layout and can be made. In this task, the suggestions to improve the layout were applied in the simulation using Witness software.

3.5 Current Process Maps

The Figure 3.2 showed the current process maps for 20 packets of 7kg fried chicken flour.

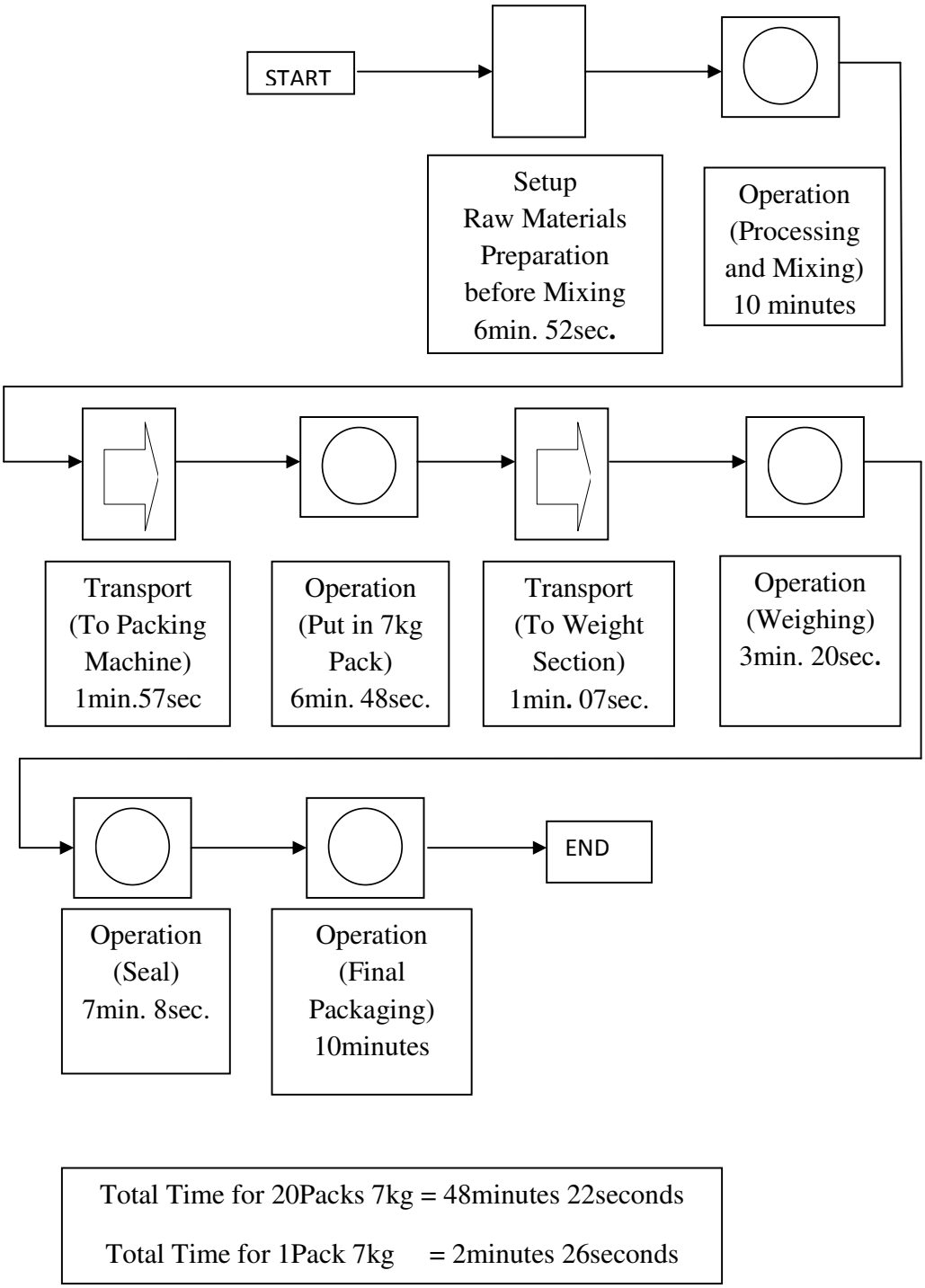

Figure 3.2: Current process maps for 20 packets 7kg fried chicken flour