



**PRODUCTIVITY IMPROVEMENT IN MANUFACTURING  
INDUSTRY USING TIME STUDY METHOD AND WORK  
MEASUREMENT ANALYSIS**

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

by

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I hereby, declared this report entitled “Productivity Improvement  
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result of my own research except as cited in references.

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## APPROVAL

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## ABSTRAK

Peningkatan produktiviti adalah aspek penting bagi industri pembuatan yang terus berkembang. Syarikat dapat menyelaraskan barisan pengeluaran untuk memenuhi keperluan industri. Terdapat dua alat diguna pakai dalam industri pembuatan untuk mencapai perkembangan pengeluaran. Kaedah kajian masa dan pengukuran kerja yang dikenali sebagai alat yang mendorong peningkatan produktiviti. Tajuk kajian adalah peningkatan produktiviti menggunakan kaedah kajian masa dan analisis pengukuran kerja yang dilakukan di Biskut Tongkat Production Sdn.Bhd. Kaedah pemerhatian langsung dan rakaman video telah digunakan untuk mengenalpasti proses pembuatan biskut rusk panjang. Keseluruhan barisan pengeluaran semasa terdiri daripada tujuh langkah proses utama untuk menghasilkan biskut rusk panjang. Setiap proses utama dibahagikan kepada elemen pekerjaan yang diinginkan. Tujuan seterusnya adalah untuk menerapkan kaedah kajian waktu dan analisis pengukuran kerja di barisan pengeluaran untuk menentukan punca utama yang menyumbang kepada ketidakcekapan aliran proses. Punca utama yang diperoleh dalam kajian ini adalah stesen kerja yang tidak tersusun, gerakan kerja tidak seimbang yang dilakukan oleh pekerja dan tidak ada masa piawai yang ditetapkan untuk proses utama dalam barisan pengeluaran. Pemerhatian dilakukan pada tujuh proses utama dengan mengambil kira masa kitaran dan pergerakan setiap pekerjaan yang dilakukan oleh pekerja. Masa piawai tujuh proses utama telah dihasilkan dengan mempertimbangkan elaun dan penilaian prestasi. Matlamat kajian ini adalah untuk mencadangkan solusi untuk memperbaiki barisan pengeluaran dan membuang aktiviti sia-sia. Aliran proses yang menyebabkan pembaziran proses pengeluaran dikenalpasti iatu daripada dua proses utama dan satu elemen. Untuk menghilangkan pembaziran dan mengurangi waktu, tiga solusi telah diusulkan iatu penggunaan strategi 5s, penerapan perangkat pintar dan strategi kerja baru. Penyelesaian yang dicadangkan dapat membuat barisan pengeluaran teratur, prosedur kerja menjadi lebih mudah dilakukan dan mengimbangkan gerakan tenaga kerja untuk menangani tugas tertentu.

## ABSTRACT

Productivity improvement is an essential aspect for the growing manufacturing industry. Industrial sector competes each other in order to grow and well established in the striving market. The company able to streamlining the production line in order to meet the industrial need. There are two tools that can be adopted in the manufacturing industry to achieve the development of production. Time study method and work measurement known as the tools that leads improvement of the productivity. The title of the study is productivity improvement using time study method and work measurement analysis that has mainly carried out in the Biskut Tongkat Production Sdn.Bhd. The direct observation and video recording method has been utilized in order to identify the current process flow of the long rusk biscuit. Overall the current production line consists of seven main process step in order to produce the long rusk biscuit. Each main process step was divided into desired job elements. The goal of the study is to implement the time study method and work measurement analysis in the production line in order to determine the major root that contributes to inefficiency of process flow. The root cause obtained in this study is unorganized workstation, unbalanced work motion performed by the worker and no standard time established for the main processes in production line. The observation has been carried out on the seven main process step by take account the cycle time and motion of each job performed by the worker. The standard time of seven process step has been generated by considering the allowances and performance rating. The another goal of this study is to suggest solution to improve the production line and eliminate the waste. The process flow that brings lengthy of production line has been figure out, there two main process and one elements that causes consumption of time to make the long rusk biscuit. In order to eliminate the waste and reduce the cycle time there are three possible solutions has been proposed which is utilization of 5s strategy, adoption of smart device and new working strategy. This suggested solution able to make the production line organised, the work procedure become simpler to be performed and balanced the labour motion to handle the specific task.

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# CHAPTER 1

## INTRODUCTION

### 1.1 Background of Study

In today's competitive and globalized markets, companies majorly focus on to improve the productivity of labours at the same time reducing the cycle time of production. Production and trade growth prospects carried by globalization and increased competition, productivity growth requires in business. Productivity is an indicator for a small or big manufacturing industry. Productivity can be defined as the relationship between output and input. The definition of productivity applies in production line to assess or measure the extent at which certain output can be extracted from given input. With a rising demand decoupling between the capitals and world economic development, accelerating the companies to fight against themselves to bring their product to the target market within a short period with high quality goods or services. The productivity of the production could be enhance using the fundamental of time study technique.

One of the most effective tools used by process engineer in the production line to do work measurement analysis is time study technique which is done by using stopwatch. Time study method designed by Frederick W. Taylor using stopwatch and 2 clock method. This method once was used to establish performance –based wages rates and their capability. In 1885, Gilberth has enhanced the method by using cameras to look at how body motion were used in completing a product. This concept creates a smooth and easy motion and to improve the capability workers. According to Al Saleh, over 89 percent of the industry that complete work measurement by utilizing time study method. The technologies are promptly rising everyday but there are no significant tools that able replace the advantageous time study method. They researcher only able to inventing the tools user friendly. According to



Pichupen, computers produce standards from essential motion data up to 50 percent quicker than manual systems. These methods majorly suitable for the company that still handling the production line with manual basis, where the work is visible. Even though there are lots of technique to analyse the work measurement but the concept is still same with the time study method.

In manufacturing industry, especially for the growing companies the time study survey is very essential to be carried out. Every industry need manufacturing management as a basic requirement to produce a quality goods and services. Manufacturing management comprises of standard time, number of workers to hire, number of machine, cost of product and raw material. Time study method helps to decrease and regulate the costs, improve working conditions and environment and encourage society.

## **1.2 Introduction**

The final year project was focused on productivity improvement in manufacturing industry using time study method and work measurement analysis. This project mainly taken from the industrial base in order to enhance the production rate and worker efficiency. In today's issue, time study become an essential tool for the work measurement. An excellent industry will consume a shorter period to produce a product with greater quality rate. Generally, the project mostly concentrated on the increment of productivity conducted using time study method and work measurement analysis that would be applied on the industry base.

Basically this method well suited for a production area that use manual and repetitive process but need to undergone a huge process due to obtain data for the cycle time of the processes and doing analysis on working method of the labourers. In a company that still using manual approaches, it will be difficult to concentrate the study on the whole manufacturing process which from the raw material transformed into final product, because it will have undergone a few stages.

### 1.3 Problem statement

The significant issue in the long rusk biscuit production, the labourers having problem in handling their excellence of time. The scheduled process flow of the production is not effective and it devours lots of time to fulfil the customers prerequisite and gratifications. The work movement performed in the tabling the dough elements is in unbalanced motion and it became a main reason the industry couldn't contribute a superior outstanding output. The raw material preparation zone environment is unorganized which contributes the lengthy of time to prepare the raw material for making the biscuit. There is no standard time that have been established in the for seven main process step in the long rusk biscuit production. Besides that, to perform the cutting and weighing process there is no appropriate tools has been adopted to simplify the manufacturing job. These are the factors largely affect the productivity of the long rusk biscuit production. According to the Figure 1.1 clearly states the observed time of the long rusk biscuit production. The bar chat depicts the process step that consume higher average time in order to manufacture the long rusk biscuit.

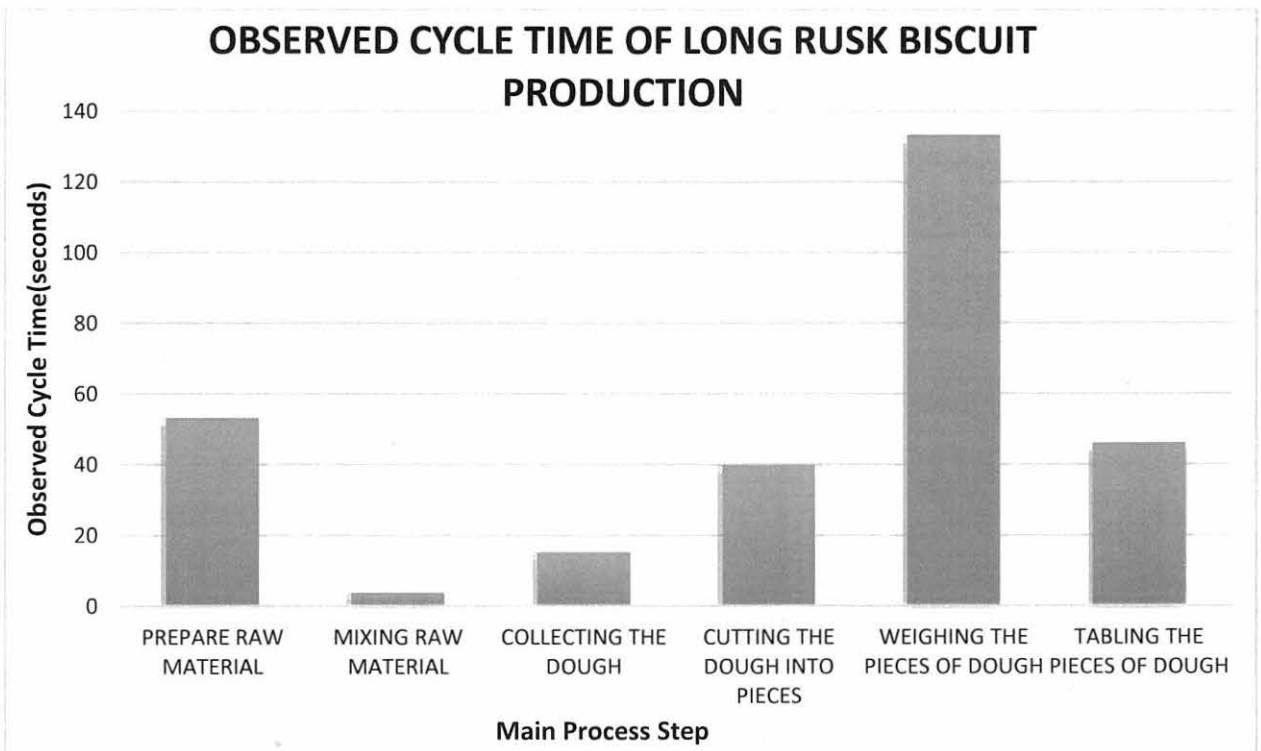


Figure 1. 1: Observed cycle time of long rusk biscuit production

## **1.4 Objective**

1. To identify the current process flow of the log rusk biscuit production.
2. To implement the time study method and work measurement analysis in the production line
3. To propose a solution to improve the process flow and eliminate waste.

## **1.5 Scope**

The research mainly conducted in the Biscuit Tongkat Production Sdn.Bhd. The execution of time study method and work measurement analysis mainly focused on the seven main process step which is Preparing raw material Process 1, Mixing raw material Process 2, Collecting the dough Process 3, Cutting the dough into pieces Process 4, Weighing the pieces of dough Process 5, Tabling the dough pieces Process 6 and Arranging the dough in tray Process 7. The standard time has mainly established on the seven main process step. The video recording method was utilized in order to determine the process flow of the production line and to record the time taken by the worker to complete manufacture the long rusk biscuit. All the data collection will be recorded using the simple software, Microsoft Excel. The computation of the average value, standard deviation, number of cycle and standard time has been done by inserting the formula in the Microsoft excel to obtained the values. The questionnaire for the adoption of the devices has been distributed only for ten workers that works in the production line.

## **1.6 Significant of study**

Time study method and work measurement analysis is very important to be implemented in manufacturing industry both is known as fundamental tools to develop the productivity. It is a stimulus to retain company moving forward and growth in profit. This method will be utilized using wide diversity of procedure to define the standard time and standardize work method in aim to eliminate the non-value added activity in production line.

The quality control tools will be utilized order to eliminate the non-value added activities in the long rusk biscuit production.

### 1.7 Organization of report

The segment shows the organization of report which has been divided into five chapter. The report consists of Introduction, Literature review, Methodology, Result and Discussion and Conclusion. The Table 1.1 briefly explain and show the structure of the report.

**Table 1. 1:** Organization of Report

Topic	Description
Chapter1: Introduction	The chapter 1 briefly explain on the background of the research and elaborate on the issue arrived in the production line. The purposes of the study will be outlined in the research and the research scope has been briefly point out.
Chapter2:Literature Review	The chapter 2 mainly emphasis on the review of the previous studies regarding the time study and work measurement analysis. The information of the previous journal will be cited for supporting the stated description. It also helps in enhance the better understanding of the study.
Chapter3: Methodology	The chapter states the overall method that has been utilized in order to conduct the research. It consist the methodology of the beginning of the research until the end of the research.
Chapter4: Result and Discussion	This chapter mainly emphasis on the data collection process. After implement the time study method, the time value will be gathered, analysed and discussed. From the related analysis, the possible solution will be given to improve the production line of long rusk biscuit.
Chapter5: Conclusion and Recommendation	Elaborate on the overall of the studies and briefly recommend several method for the continuous improvement.

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## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

Improvement of productivity is an unending manufacturing activity. Industries need to develop the ability to fulfill consumer requirements in order to deliver quality goods on time. The term for improvement of productivity in company strongly can be done by implementing the time study and work measurement method. Time study method is an oldest fundamental method ever need to be implemented in the production to increase the operational efficiency of manufacturing area. Time study is an organized process of directly observing and measuring human work using a stopwatch to enhance the time required for the completion of the work by a qualified engineer when working at a defined level perform. Since the research is based on the time study method implementation and work measurement, thus the history and the development of the time study method should be reconsider in order to have a better understanding on the usage of the method. Most of the source used for the research comes from a reliable and trustworthy source. The sources include articles, journals and books. There is chronology of involvement of gurus who invented and develop this time study method. Time study method conveys some fundamental concepts and guidelines to be followed to carry out the time study method.

Generally, time study is correlated with work measurement. It is widely used for work measurement technique that employs a decimal minute stopwatch to record and determine the time required by a qualified and well-trained person working at a normal pace to do a specific task under specified conditions. The correlation of time study method and work is the most effective method which could enhance the efficiency of work and gives a major worth for the workers who will acquired to put a little effort to performing a task.

Accurately time study and the involvement additional quality tools such as control chart, pareto chart and poke yoke method which could help to reduce the cycle time and zero defect product at shorter period. At mean time it also helps to improve the productivity of manufacturing site. These method is a general measure of quality in production. These methods will be performed at each stage of processes, mainly to avoid the human error.

## 2.2 Definition of Time Study Method

Time study method outlined for measuring work and analysis of specific job by a skilled worker in an effort to find the most efficient time and effort (Chandra, 2013; Mr. Satish Keru Raut, 2014). Nevertheless, time studies also conduct variety of studies to evaluate the performance of human which is relatively synchronize with rate of normal process and operating pace (A, 2006; Duran et al., 2015a). This studies can also be executed on the specific operation in manufacturing process (Seifermann,2014). Time study established in variety branches. (Al-Saleh, 2011; Duran et al., 2015). Time study can be conducted using two methods such as method studies and work measurement, (M Yani Syaifei, 2018; Carlos Ochoa1, 2016). The application of time studies approached to record predetermined process time and level of job performed using stated condition (1) Qualified and well trained operator (2) perform at standard speed (3) consistent job (4) Ideal system (Duran et al., 2015a; Permata & Hartanti, 2016)

### a) Qualified and well trained operator

Fully trained and qualified operator often describes as a person who acquires a specific skill and is capable of dealing with any type of problem in the manufacturing industry-based work. These qualified operators have a strong connection with the person's experience in the field specified. Time plays an important role in enabling people to be professional in any scope of work. The evaluation of the method of time study will be unreliable if the method of time study is used by the new worker who has just started their work. Most of this time study will start with a fully trained and qualified operator so that can easily standardize the job

### b) Perform at standard speed

Each process will be performed by the operator at the different pace in the manufacturing field. In the manufacturing process, which is the usual speed where it suited for all the operator's range, only one-time standard should be allowed. Operators are mostly comfortable with performing tasks at normal pace.

c) Consistent job

To carry out the specific operation, a brief description such as manual material handling, preventive maintenance plan, material specification and tools to be used should have been provided for each process. In order to improve the performance of the task, it is better to label each item with colour in order to allow the worker to identify the material. At mean time it would help to reduce the time taken to search the material to be used in the defined process.

d) Ideal system

Ideal system is the combination of low cost and improved worked method. These systems majorly implanted to ease the labour to adapt with the new designed work method or production line. The current system of operation majorly been developed to shortened the cycle time and brings same or greater output (Senthil & Haripriya, 2016).

## 2.3 Time Study

The execution of time study method in manufacturing industry emphasis a fair day work due to this method practice a standardized work setting plan (Abdul Talib Bon, 2010). The engineering method can be used to review and optimize the cycle time of the operation to increase productivity (Akansel & Emel, 2017; Kayar, 2017; Perumal et al., 2019). Through this principle the congestion in a production system can be avoided. The Table 2.1 concisely describes the objective of the method (Al-saleh, 2011; Mishan, 2015; Reddy et al., 2016)