UNIVERSITI TEKNIKAL MALAYSIA MELAKA

WORK STUDY ANALYSIS TO IMPROVE PRODUCTIVITY AT MANUFACTURING PROCESS COMPANY

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Manufacturing Engineering Technology (Process and Technology) (Hons.)

by

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TAJUK: **Work Study Analysis to Improve Productivity at Manufacturing Process Company**

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This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology Bachelor Degree of Engineering Technology (Manufacturing Process and Technology) (Hons.). The member of the supervisory is as follow:

……

(Project Supervisor)

ABSTRAK

Kajian kerja adalah kajian saintifik yang melibatkan teknik-teknik kerja dengan objektif untuk mengenal pasti cara terbaik untuk melakukan sesuatu kerja. Produktiviti adalah hasil untuk menentukan tahap syarikat sama ada prestasi syarikat itu baik atau sebaliknya. Tanpa pengukuran produktiviti akan memberi kesukaran untuk menentukan prestasi syarikat. Dalam kajian ini, masa dan kaedah kajian diberi penekanan yang kerja pengukuran telah dilakukan untuk mendapatkan kaedah masa piawai yang berpotensi, secara tidak langsung dapat meningkatkan produktiviti yang terlibat dalam proses operasi. Masa Piawai boleh menghapuskan proses yang tidak perlu dalam menghasilkan sesuatu produk. Tujuan utama kajian ini adalah untuk mengenal pasti kaedah berpotensi dalam pengeluaran proses pemasangan akhir semasa kajian masa. Kaedah yang digunakan adalah analisis kajian masa dan analisis kajian gerakan serta jig baru telah direka bentuk untuk stesen kerja pemasangan atau proses yang mempunyai masa piawai yang tinggi. Dari kajian kerja ini, pengeluaran produk meningkat setelah masa piawai dan kaedah berpotensi dicadangkan kepada syarikat tersebut. Selain daripada itu, hasil yang diperolehi boleh digunakan untuk meningkatkan target produktiviti. Kesimpulannya, kajian ini memberi manfaat yang tidak ternilai kepada pelajar dan juga pihak syarikat.

ABSTRACT

Work study is the scientific research involving work techniques with the objective of identifying the best way of doing a work. Productivity is an outcome to determine the level of company either the performance of the company is good or conversely. Without productivity measurement will lead to hard to determine the performance of a company. In this study, time and method study was emphasize which work measurement was done to get the potential standard time method, indirectly can improve the productivity that involved during operation process. Standard Time could be eliminated unnecessary process in producing the product. The main purpose for this study is to identify the potential method in production final assembly process during the time study. The method that used is this project is time and motion study analysis as well as potential new jig was designed for workstation or assembly process that have high standard time. From this work study, the product output has increased since standard time and potential method have been proposed to the company. Other than that, the result gain could be used for increase the productivity target. As a conclusion, this research gives an invaluable benefit to student as well as to the company.

DEDICATION

To my beloved parents

ACKNOWLEDGEMENT

First of all, I am thankful to Allah S.W.T. for bless me along the way that I have been through, for enabling me to undertake the Bachelor of Manufacturing Technology (Process & Technology) and for granting me strength and wisdom to face and overcome challenges during accomplish this project. I would like to take this opportunity to express my sincere acknowledgement to my supervisor Engr. Mohd Soufhwee Bin Abd Rahman from the Faculty of Engineering Technology, Universiti Teknikal Malaysia Melaka (UTeM) for the essential supervision, support and encouragement towards the completion this Projek Sarjana Muda (PSM). Special thanks to UTeM grant funding for the financial support throughout this project. Special thanks to all my peers, my beloved mother and father, and siblings for their moral support in completing this degree. Lastly, thank you to everyone who had been the crucial parts of realization of this project.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

BSI	-	British Standards Institute
NT	-	Normal Time
OT	-	Observed Time
PTS	-	Predetermined Time Standard
PFD	-	Personal, Fatigue, Delay
ST	-	Standard Time
SOP	-	Standard Operation Procedure
ILO	-	International Labour Organization

CHAPTER 1
INTRODUCTION

Work study is the systematic examination of the activities by use of human and other material resources. This study can provide the discipline needed to adopt the internal customer approach as an organized way of life. In particular, method study can serve the organization in measuring progress in terms of reduced lead times, lower cost and faster responses to delivery where all of which are important factors in providing customer satisfaction and quality. Through work study, the improvement can be achieved in term of productivity, which is value added and non-value added activities. Value added work is the work that is actually valuable. Furthermore, value added work is utilizing resources that add value to the finished product, whether it is actually building a product. The capacity, information and material are mostly the factor that for work to be considered value added. Non value added work, also called waste is the work that does not add value to or is unnecessary for the overall project. The waste can be such as overproduction, transportation handling more than once, high inventory, over processing, waiting, defective and unnecessary motion. Time study technique basically used in order to find the standard time that is a direct observation of work with a time standard for the work being derived by converting the observed time through the performance rating of the worker carrying out the work.

1.1 Background of Study

Productivity is the way to obtain organization performance. The good productivity reflects the company has a standard system that functioned to compute their organizational performance. Generally, higher productivity is about the ability to produce greater quantities with less effort and fewer resources. Hence, this study will focuses on productivity improvement through the process of manufacturing process company by using work study analysis. This study will emphasis to time study implementation and utilization for improving productivity.

1.1 Problem statement

Bottlenecking and excessive workers are a common problems increase in production line. These are the major problems that encounter and yet need to be overcome. Operators are often encounters this problem and if this happens, it will be decreased the line productivity and the targeted run rate. One way to do so is using work study. This aim is to minimize workloads and workers on the production line while meeting a required output. Due to the competitiveness, meeting a required demand and provide continuous product are becoming important matters. In order to achieve this target, production line should be designed to make sure the flow is smooth. Operators on the production line are specialized person in a particular area. Most of them have been exposed to various tasks and skilled have been developed. A new method is proposed to make sure the production line achieved required run rate. Therefore the study regarding the productivity improvement will conduct by a work study term that divided by two elements, that is method study and work measurement. One of the imperative part that must be emphasized for this company is time standard. The proper time standard will lead to standardization work. Other than that, the working condition should be stressed as well and not expected to layout design thus for ergonomically aspect. The circumstances that involve should attract the performance each level of the organization to perform. By emphasizing this all above factor, the consideration to improving the productivity as well as organizational performance could be achieved.

1.3 Objective

Each of the project must have an objective. The objective is to ensure the goals of this project is accomplished. There are two objectives that need to be achieved to complete this project which are:

(a) To establish a potential method of an operation at manufacturing process company through work study.

(b) To improve the productivity by analyse and improve the existing Standard Time.

1.4 Scope

The scopes of this project are:

(a) Productivity improvement of manufacturing process company is using work study.

(b) Data analysis only be conducted in production line.

CHAPTER 2
LITERATURE REVIEW

A literature review is a description of the literature relevant to a particular field or topic. This is often written as part of an undergraduate thesis proposal, or at the commencement of a thesis. This literature review, including work study (time study and motion study), standard, standard time, and allowances.

2.2 Overview of Work Study

Work study is the study of work, of work in the broad meaning of what has to be done. It is a general term for those techniques, particularly method study and work measurement, which are used in the review of human work in all contexts and which lead systematically to the investigation of all the factors which affect the efficiency and economy of the existing situation, in order to affect the environment. (K.S Young, 1994).

Work study also defines as to measure the performance of work consist of two elements which are method study and work measurement. To use an approach work should be adequately routine and repetitive to make it easier to obtain an average time from a sample of operators and operations. It must be possible for the operator or worker to vary their rate of work of volunteers in a measurement. Hence, it can be applied quite easy to routine manual it lends itself poorly to indirect work such as maintenance of non-repetitive work such as professional and managerial duties.

According to (K.S Young, 1994), the objective of work study is to assist management to obtain the optimum use of the human and material resources available to an organization for achievement of the work involved. Essentially, this objective has three aspects:

(a) The most effective use of plant and equipment.

(b) The most effective use of human effort.

(c) The evaluation of human work.

The function of work study is to obtain facts, and then to utilize those facts as a method of improvement. Therefore, work study may be considered principally as a procedure for determining the truth about the activities of existing people, plant and equipment as methods to the improvement of those activities. It will provide the methods of achieving higher production efficiency under prevailing circumstances.

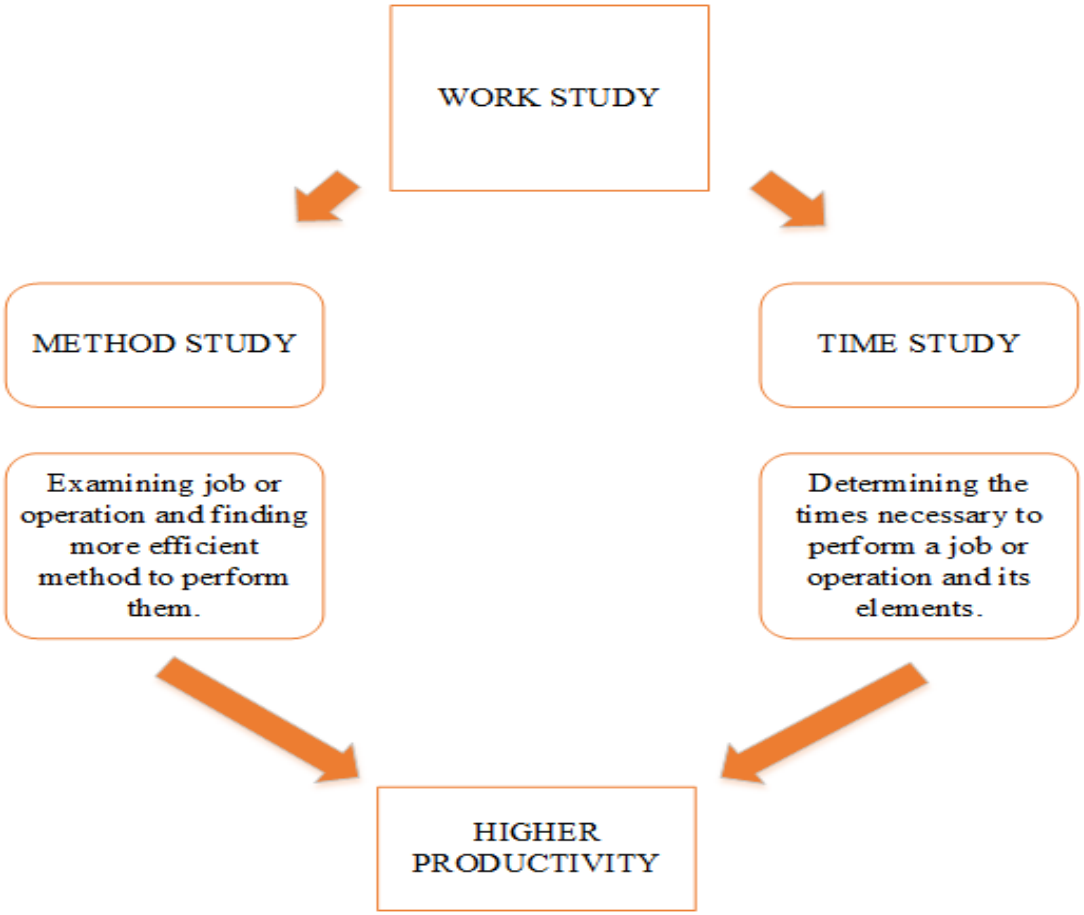


Figure 2.1: Method study and work measurement (K.S Young, 1994)

The term work study is used to relate two interdependent groups of techniques which are method study and work measurement respectively as shown in Figure 2.1. The technique concerned with the method in which is work is done and on the other with

the value or work content itself. The work measurement techniques have a purpose is the evaluation of human effectiveness of work plan, as well in the operation of manufacturing company, and for based financial incentive schemes.

The techniques of work study are particularly meant of recording convenience from the use of an organization's resources or may be put in the providing of goods and services. Then, these records are analysed along production lines to ensure where wastes occur. Based on the analysis, the steps can be taken with an aim to eliminating waste.

2.3 Method Study

According to Gilberth (1911), dividing and analysing a work is called as method study. The method takes a systematic approach to reducing waste and less important effort. The approach can be analysed by six-step procedure:

1. Select – Task most will probably be repetitive. The tasks require skilled labour input and can be critical to overall performance.
2. Record – This involves observation and documentation of the correct data of performing the selected tasks. Process charts are often used to represent sequence events graphically. They are intended to highlight unnecessary material movements and unnecessary delay periods.
3. Examine – This involves examination of the current method looking for ways in which tasks can be eliminated, combined, rearranged and simplified. This can be achieved by looking at the process chart and redesigning the sequence of tasks necessary to perform the activity.
4. Developing – Developing the best method and obtaining approval for this method. This means choosing the best alternative, taking into account the constraints of the system such as performance of the firm equipment. The new method will require adequate documentations in order that procedures can be followed. Specification may include tooling, operator skill level and working conditions.
5. Install – Implement the new method.
6. Maintain – routinely verify that the new method is being followed correctly.

Method study commonly used recording techniques which is:

(a) Operation process chart
(b) Flow process chart
(c) Left hand, right hand chart
(d) Multiple activity charts

2.3.1 Technique of Method Study

2.3.1.1 Operation Chart

The operation chart is a graphic representation to produce a product or providing a service that shown the operation involved with sequential relationship and material used. This chart showed the sequence operation for each product, and it is simple that can be understood easily. Basically, the major process is located on the right hand side and the next step process on the left hand side. In this process, it is not using the entire symbol, but normally used only operation and sometimes the inspection symbol. Some part of the production not needed the fabrication step and it is called buyout (Meyers and Stephens, 2005). This part will introduce at the bottom at which they will be used.

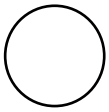
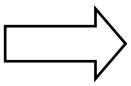
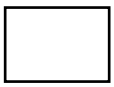
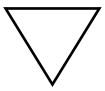
2.3.1.2 Flow Process Chart

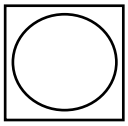
The process flow chart is the combination between operation chart and process chart. In operation chart, it uses only one symbol (operation symbol and sometimes inspection symbol). While, the flow process chart uses all five process chart symbols. There are three types of flow process chart, which is material, man, machine or equipment. The distinction is buyout part treated like manufactured parts (Meyers and Stephens, 2005).

Process flow chart shows a graphical for each process that involves. It is a simple half-text and half picture of showing the steps in a process. As stated by Meyers and Stephens (2005), this chart usually starts with the raw material and follows it by transportation to storage until it becomes either a finished unit itself or a part of the subassembly.

To visualize the sequence of method study technique, recording technique symbol are used, as shown in Table 2.1. This standard symbol used for charting the operation process chart, flow process chart, flow diagram, left hand right hand chart and so on. It used to represent the sequence process by graphically and not needed the written explanation. The recording technique symbols are:

Table 2.1**:** Symbols of process chart (Meyers and Stephens, 2005)

Symbol	Method	Description
	Operation	Is a main step in the process and takes place when something is being created, changed, add to, or prepared for another step. The operation also occurs when information is given or received.
	Transportation	An auxiliary step that occurs when something is moved from one place to another, except when such movement is part of an operation or inspection.
	Inspection	An auxiliary step that occurs when items are checked, verified, reviewed, or examined for quality or quantity. However, the items inspected are not changed at this point.
	Delay	An auxiliary step that occurs when condition do not permit or require an immediate performance of the next step.
	Storage	Functioned when something remains in one place and is not being worked on in a regular process, or is awaiting further action at a later date.

	Overlapping	It represents the simultaneous activity that combination between operation and inspection.

By using the symbol, the process chart will create. The purposed of the process chart mentioned by Meyers and Stephens (2005) is to record the activity that occurs in that part from the time it arrives in the plant until it joins the other parts. Next, the line should be drawn to connect the symbol to determine the step that involves.

2.3.1.3 Right and Left Hand Chart

Left hand, right hand chart is a symbol that represents a graphic motion from left and right hand. It is beneficial to evaluate and improve the motion sequence of operators. Basically, to record this chart, someone should understand clearly the process that is done by operators, because the motion will determine by the two hand progress. This chart is useful to get known the time that used by right and left hand.

2.3.2.4 Multiple Activity Chart

Multiple activity charts is a chart that involves the two or more activities (shown in the column heading) can be people or machine. This chart purposed to improve the utilization of multiple related activities describe by Salvendy, G. (2001). It is similar with right and left hand chart that is simultaneous activities in evaluates two or more people or object and used to show the exact relationship between idle and operating times of both workers and machines.