ISSN : 1978-774X

IMPLEMENTATION OF POKA YOKE ON ADMINISTRATION OF THE PALM OIL MILL

M. Hudori

Department of Logistic Management, Citra Widya Edukasi Polytechnic of Palm Oil, Bekasi, Indonesia
m.hudori@cwe.ac.id

ABSTRACT

The process of measurement until calculation result of sounding stock CPO and PK take up to 2 hours (7:00 to 9:00 pm). Especially calculation result takes up 1 hour. While HO provide maximum reporting limit at 9:30 pm. Counting process which is going on for too long because it is done manually. In addition, an error in the calculation is often the case. As a result, PDR often times have to be revised after it was reported, so assessment to performance of the POM administration is the worse. Poka Yoke is needed to facilitate the work and anticipate the occurrence of error, one of them as a tool to calculate the result of sounding stock in POM which initially takes 1 hour to 5 minutes with no error, so PDR can be delivered more quickly than before it.
***Keywords**: Poka Yoke, Palm Oil Mill, Quality Control.*

1. INTRODUCTION

1.1. Background

PT Sinarlika Portibijaya Plantation (PT SPP) is a palm oil company, which is located in the District of North Padang Lawas, Province of North Sumatra. PT SPP has a unit of palm oil mill (POM) with a capacity of 60 tons of FFB per hour.

Some indicators that is used to see how the mill performance is by looking at the oil extraction rate (OER), the kernel extraction rate (KER) and mill throughput. These parameters are obtained from the sounding stock of products, namely crude palm oil (CPO) and palm kernel (PK), which are conducted every morning at 7:00 am. The results are reported in an integrated manner with the Production Daily Report (PDR) to the Head Office in Medan.

The process of measurement until calculation result of sounding stock take up to 2 hours (7:00 to 9:00 pm). Especially calculation result takes up 1 hour. While the Head Office provide maximum reporting limit at 9:30 pm. Counting process which is going on for too long because it is done manually. In addition, an error in the calculation is often the case. As a result, the Production Daily Report (PDR) often times have to be revised after it was reported, so the assessment of the performance of the POM administration is the worse.

1.2. Problem Statement

From these conditions, we need to be examined why the sounding stock and calculation results are too long? How to cope?

1.3. Discuss Purpose

The purpose of this paper is to analyze the causes of the stock sounding too long, devise a system or a method or a tool that can shorten the time, eliminate error that occur in the PDR and restore the image of the POM was considered bad by Head Office (HO).

1.4. Limitation of Problem

Problem solving is only done on the calculation result of the sounding stock at products (CPO and PK) to get the numbers OER, KER and mill throughput.

2. THEORETICAL BACKGROUND

2.1. Sounding Stock

Sounding stock is a term used in the palm oil mill to perform physical inventory measurements by measuring the position of a material level in a storage room. The objective of sounding stock is to determine

how the volume of the material so that it can be seen the flow of materials in and out of the every day, which is one of the functions of the internal control system, so it can be known whether the accounting records in stock right or not (b).
Sounding stock is usually held every day. Sounding stock inventory conducted to measure the position of CPO and PK, which would then be used to measure the OER and KER which is a measure of performance parameters of a palm oil mill.
OER is calculated based on the production of CPO ready to post that has been in the Bulk Storage Tank. Each Bulk Storage Tank at the time construction is completed and prior to calibrated by the Bureau of Metrology to know the contents of the cone, fill up the measuring table limits and contents of each centimetre high (tank calibration tables). Tools used to measure the oil level in the tank is metered roll of metal (stainless steel) in the metric, the tank is also equipped with a steering pipe (sounding pipe) mounted on a table perpendicular to the aperture of the measuring gauge (sounding hole) above the tank . KER calculated based on kernel production has been in the Bulk Storage Kernel (c).

2.2. Poka Yoke

What is Poka Yoke?

Poka Yoke is a quality management concept developed by a Toyota and Matsushita engineer named *Shigeo Shingo* to prevent human error from occurring in the production line. Poka Yoke (pronounced "*poh-kah yoh-kay*") comes from two Japanese words – "*yokeru*" which means "to avoid", and "*poka*" which means "inadvertent error." Thus, Poka Yoke more or less translates to "avoiding inadvertent error".
Poka yoke is sometimes referred to in English by some people as "fool-proofing". However, this doesn't sound politically correct if applied to employees, so the English equivalent used by Shingo was "error avoidance." Other variants like "mistake proofing" or "fail-safe operation" have likewise become popular.
The main objective of poke yoke is to achieve zero defects. In fact, it is just one of the many components of Shingo's Zero Quality Control (ZQC) system, the goal of which is to eliminate defective products (d).
The simplest example of Poka Yoke is a USB port on your computer that has a pin so that people can not be reversed direction striking because existing local PREVENT pin striking the inverted, as shown in Figure 1.

Figure 1. USB port on Computer is a Example of Poka Yoke (e)

The principle of Poka Yoke is to prevent the occurrence of error due to human nature is forgotten, do not know, and not accidentally. So we not only spend the energy to remind and blame to prevent recurrence of error, but should focus on how to improve the process so that the same mistakes are not repeated. An example is the operator who runs the process for baking products must at certain time limit.
Error generally occur because the operator lost track of time and become a product defect for baking too long. Poka Yoke approach here is not centered to ensure that the operator always remember and check time, but instead focuses on how to facilitate the use of the operator by means of a timer that is set at a certain time to give the alarm or turn off the oven automatically. So that error do not bake too long may occur (e).

Why is it that important?

The objective of Poka Yoke is to prevent the occurrence of defects. Anti-wrong principle will prevent the occurrence of defects, which means savings on operation of the company, making quality products is always

in the best condition, and make the output of the process became predictable.
There are two models of Poka Yoke system approach is the approach warning system which will give a signal (warning) lights or sound a certain moment the system detects the occurrence of an error in the input process, process parameters, or the output of the process. Another term for this approach is warning Poka Yoke.
While the second approach is a system approach to prevention, which prevents error occur and not allow the error occurred because the system is prevented. An example of this system is the use of jigs and pin your template. Another term for this approach is control Poka Yoke (d).
Anybody can and should practice Poka Yoke in the workplace. Poke yoke does not entail any rocket science - sometimes it just needs common sense and the appropriate Poka Yoke device. Poka Yoke devices should have the following characteristics: 1) useable by all workers; 2) simple to install; 3) does not require continuous attention from the operator (ideally, it should work even if the operator is not aware of it); 4) low-cost; 5) provides instantaneous feedback, prevention, or correction (d).

3. METHODOLOGY

The problem of delay delivery of PDR is a condition that often occurs in the company, particularly in POM. These conditions can not be left alone because it will degrade the performance of the company, especially regarding the renewal of the stock inventory status, namely CPO and PK. Therefore, any solution must be done quickly and realistically.

Analysis of the root cause of this problem is done by using cause-effect diagram, by analyzing man, machine, material, method and environment. From the results of the analysis will determine the easiest factor to be realized. This factor will be the focus of solving the problem (e).

Furthermore, we will design a system using Poka Yoke. The system must meet Poka Yoke principle, that can anticipate mistakes repeatedly (a). This system will be applied to improve conditions delay PDR generation (g).

4. ANALYSIS AND DISCUSSION

4.1. Root Cause of Problem Analysis

We can perform a search of root cause of problem of sounding stock process and calculation result time is too long using cause-effect diagram, as shown in Figure 2.
From Figure 2, it appears that one of the causes of the problem that occurs is the result of the calculation method of sounding stock, which is still done manually. Factor causing this problem that we will find a solution.

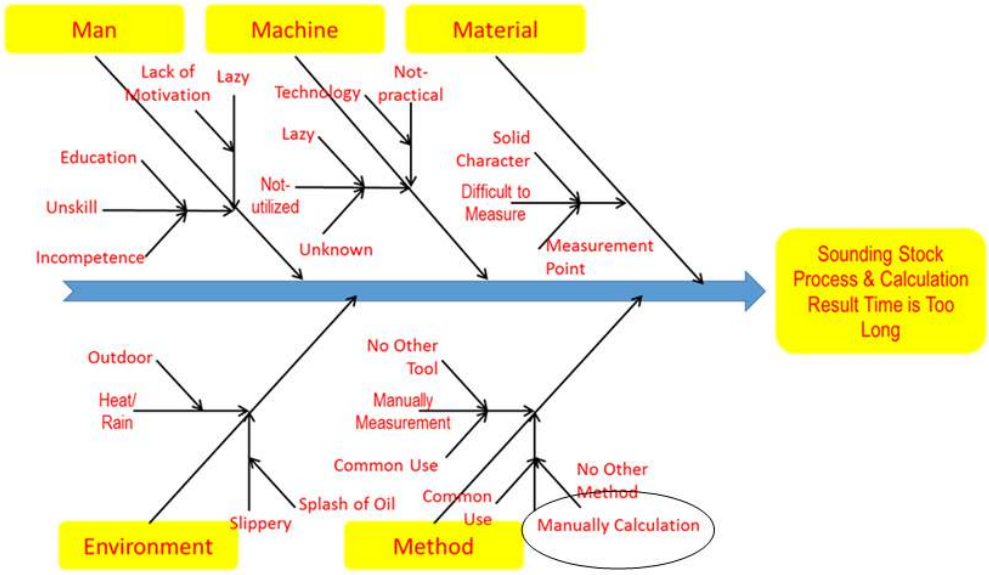

Figure 2. Cause and Effect Diagram

SOUNDING OIL & KERNEL EXTRACTION

(ISIKAN DATA HANYA PADA CELL YANG BERWARNA BIRU)

1. Tanggal Sounding	Jum'at	01 Okt 2011		Press No.1	-	
2. Tanggal Produksi	Kamis	30 Sep 2011		Press No.2	19,85	
				Press No.3	18,83	
3. Restan TBS Kemarin (Kg)	188.900			Press No.4	8,40	
4. TBS Masuk Hari Ini (Kg)	798.320					
5. Total TBS (Kg)	987.220	106	Lori	9.313	Kg/Lori	
6. TBS Olah (Kg)	847.520	91	Lori	42,70	TPH	
7. Restan TBS Hari Ini (Kg)	139.700	15	Lori	THROUGHPUT RENDAH		
	AWAS PENUH	AWAS PENUH				
	Storage No. 1	Storage No. 2	Storage No. 3			
8. Tinggi Stick (cm)	961,00	957,40	950,00			
9. Temperatur Rata-rata (°C)	55	56	51			
10. Massa (Kg)	2.001.194	2.019.908	2.035.031			
11. Total Stock (Kg)	6.056.747					
12. Stock Kemarin (Kg)	6.036.676					
13. Pengiriman (Kg)	175.490					
14. Produksi (Kg)	194.947		OER	23,00	%	
	AWAS PENUH		AWAS PENUH			
	Bulk Silo No. 1	Bulk Silo No. 2	Gudang			
15. Tinggi Sisi (cm)	210	280				
16. Tinggi Tengah (cm)	30	260				
17. Massa (Kg)	213.273	178.814	864.531			
18. Total Stock (Kg)	1.256.618					
19. Stock Kemarin (Kg)	1.249.447					
20. Pengiriman (Kg)	31.550					
21. Produksi (Kg)	38.721		KER	4,57	%	

Figure 3. Design of Poka Yoke

4.2. Problem Solving

To solve the problem, then we will design a method of calculating the result of sounding stock, where previous methods have characteristics: 1) manually, complicated and long; 2) high error rate (human error); and 3) using tools such as calculator and tank calibration tables.

The new method will be designed, are expected to have the following characteristics: 1) practically, rapid, precise and accurate; 2) small error rate; and 3) use of computer/smartphones.

To meet these characteristics, then the resulting design Poka Yoke as follows: 1) spredsheet software application/Microsoft Excel; 2) protect *the formula sheet*; 3) make application programs with *read-only* status so that the formula is not broke; and 4) training for operator/officer.

Poka Yoke design can be seen in Figure 3.

4.3. Evaluation of Poka Yoke

From the result of Poka Yoke implementation, obtained by comparison of the performance as shown in Table 1.

5. CONCLUSION

From the discussion above, we can conclude that the Poka Yoke is needed to facilitate the work and anticipate the occurrence of error, one of them as a tool to calculate the result of sounding stock in Palm Oil Mill which initially takes from 1 hour to 5 minutes without error, so the production daily report can be delivered more quickly than before it.

6. REFERENCES

(a) Burlikowska, M.D., Szewieczek, D. 2009. The Poka-Yoke Method as an Improving Quality Tool of Operations in The Process. *Journal of Achievements in Materials and Manufacturing Engineering*, Vol. 36(1), 95-102.

(b) http://www.akuntansi.web.id/2012/01/stock-opname.html. Accessed on November 27th, 2014.

(c) http://pakinyo46.files.wordpress.com/2012/09/buku-pintar.pdf. Accessed on November 27th, 2014.
(d) http://www.siliconfareast.com/pokayoke.htm. Accessed on November 27th, 2014.
(e) http://www.leanindonesia.com/tag/poka-yoke.html. Accessed on November 27th, 2014.
(f) Russel, R.S., Taylor, B.W. 2011. *Operations Management*. 7th Ed. USA: John Wiley & Sons, Inc.
(g) Shahin, A., Ghasemaghaei, M. 2010. Service Poka Yoke. *International Journal of Marketing Studies*, Vol. 2(2), 190-201.

AUTHOR BIOGRAPHIES

M. Hudori is a lecturer in Department of Logistic Management, Citra Widya Edukasi Polytechnic of Palm Oil, Bekasi. He received his Bachelor of Industrial Engineering from Sumatera Utara University in 2001 and Master of Industrial Engineering from Mercu Buana University in 2015. His research interests are in the area of Production Planning & Control and Quality Control. His email address is m.hudori@cwe.ac.id