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Analysis Management System is Applied By Wartsila Group in Two Central Diesel Engines Power Plants in Timor Leste

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Abstract

Observing the management applied by the Wartsila group, to manage the two central diesel engine power plants in Hera and Betano. Brief research conducted with keen analysis, the existence of the effectiveness and efficiency, management method, and decision to gain feedback. Because according to sharp observations and in both locations, there are obstacles that are very detrimental to the state of Timor Leste. According to the researcher, the management method used is the method of safety running management. The method of safety running management has the system, the decision-maker, which benefits the management operator, and harms the client extraordinarily. In other words, the safety running management method does not think about how much operational costs must be incurred. In terms of efficiency, the efficiency running management method is very suitable to be applied to the two diesel engine power plants in Hera and Betano. In my opinion, use management RCM, as the basis for quality management, to support operating running efficient management methods and reduce high operational costs applied by system safety running management methods.

Keywords: Safety running management method, efficiency running management method, Reliability Centered Maintenance Management, Maintenance Management, Decision Management, Maintenance Management

I. INTRODUCTION

Researchers conducted a study to make sharp observations of the management system implemented at two diesel engine power plant (DEPP) centers, in Hera and Betano. The diesel engine power plant at Hera is located in the north of Timor Leste, near the capital city of Timor Leste, while the diesel engine power plant at Betano is located in the southern part of Timor Leste, far from the capital city of Timor Leste. In this part, the research background, observing and analysis phenomena, and to formulated applied management in the central Hera and Betano diesel engines power plants [1], and research objective will be shown as follows.

1.1. Research Background

The availability of electricity supply [2] and [3], in central Hera and Betano diesel engine power plant area vital energy in the state of Timor Leste. This is will be ensuring the availability of electrical energy supply to is needed by the whole country including serving like local households, offices, hotels, and industries, as well as the country's port and airport. The capacity of energy electricity more than the is energy necessities. The maximum capacity of the whole of electrical energy necessities on the night is 60 MW, and capacity electricity necessities at the days 65 MW. But to prevent the outage of electrical energy, electrical Diesel Timor Leste (EDTL) produces more than needed. So, every day, from two central diesel

engines power plant producing 72 MW. There are operated from six engines and synchronized the output made the distribution to subcentral, to coverages all Timor Leste territories.

1.2. Research Objective

According to the research objective, to implement operational management of power plant engines, in two location centers, in Hera and Betano, with effective and efficient management methods. With the formulation of a simple management method, it can save operational costs. Simple management is management that is not complicated, easy to implement, easy to follow by many people, and easy to make decisions that are fast, precise, and have a high accuracy value.

According to research and discussion analysis on the formulation [4] and [5] of the phenomenon to the application of management methods and maintenance methods, we found several non-conformities were detected. Therefore, it is recommended that this discrepancy should be reviewed and corrected immediately [6], so that it does not become a culture, in the management of power plant engine operations in two very vital centers, to produce electrical energy, for the fulfillment of the people in this country of Timor Leste. Thus, as a researcher, I suggest using Reliability Centered Maintenance (RCM) management, [7] in order to minimize the operational costs of power plant machines in two vital locations and are highly expected by the community and the country.

1.3. Research Benefit.

With this research, it can be a reference to review the Wartsila group contract with the application of operational management with the safety running management method. In order to optimize local workers, in order to reduce operational costs at the two central diesel engine power plants, at Hera da in Betano. As users, we must improve the management of simple, precise and fast operation, using the efficient running management method.

1.4. Material and methods

The research methodology [8] is based on the deductive method and the induction method. The results of the study can be formulated, that the decisions of the two main [9] management is compatible with each other. The safety running management method prioritizes security, and does not prioritize budget savings, it is management unexpectable [10]. Meanwhile, the running efficiency method which emphasizes [11] on safety and cost savings is not applied. As a result of [12] management policy decisions, to managerial the two central diesel engines power plant, there was a lot of wasted costs in the operation of the two central diesel engine power plants in Hera and Betano.

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1.5.1 Formulated Phenomena of the Management and Maintenance.

After observing the two central diesel power plants and doing the research, and analysing all activities on the surrounding of two central diesel power plants, [13] characteristic formulated the results of discussion, we found some gaps on the application the management method and maintenance method for two central diesel power plants, situated in different place Hera and Betano, of Timor Leste. The gaps we have formulated as hypothesis on the application decision management method based on Management safety running method applied in

operation the two vital central engines power plant in Hera and Betano. That it must be solved to minimized overrun engines, and overused fuel and over changing and replaced spare parts for components maintenance engines.

1.6. Online submission

Online submission is required; thus, authors should be registered in the OJS publishing system.

II. THEORY/CALCULATION

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2.1. Research Hypothesis Formulation.

In this research doing the general keen observation method [14] about application management method and maintenance method applied by Wartsila Group (WG) in two central diesel power plants in Hera and Betano. The management implemented by Wartsila in the two power plants is categorized as safety running management. This can be seen in management applications and operational decisions, in carrying out their duties. Due to the gaps found in research with keen observation, a lot of wastage either directly or indirectly.

2.2. The directly gaps as following:

1. Eliminated capacities of engines power plants, from capacities 17 MW to 12 MW. Where were 5 MW of capacities is eliminated [15]
2. Overused number of engines power plants in daily operation [16]
3. Overused fuel in daily operation [17]
4. Wasted cost in daily operation engines power plants [16].

2.3. Indirectly is some other unpredictable:

Like lubrication oil cost, spare parts cost, maintenance cost, training cost, Overhauling cost, payment of expertise salaries, food allowance, accommodation cost, work uniform cost, etc. if we calculate all the costs one by one, then the contract management maintenance costs are extraordinarily wasteful.

2.4. Equation

To find out the percentage loss value can be calculated with the following percentage equation [18] and [19]:

$$A - B = C \quad (1)$$

A is the actual generator capacity, B is the used generator capacity, and C is the difference between the eliminated generator capacity.

$$Percentage\ (\%) = \frac{C}{A} x100\% \quad (2)$$

By using equation (2), which is simple, we can calculate, the percentage, the loss experienced by the company.

III. RESEARCH HYPOTHESIS VERIFICATION.

In the following, the results of the research findings are presented, which [20] are formulated to be very detrimental to the state of Timor Leste.

3.1. The first is management's decision to eliminate 5 MW [21] and [22] from each engine power plant. This is because each power plant in the two locations in Hera and Betano has a capacity of 17 MW per machine. If we calculate: ((17-12) MW / 17 MW) x 100% = 29.4%. So, we lose 29.4% of wasted electrical energy.

3.2. The second is the overused number of diesel engines power plant. In normal operation diesel engine power plant [23], we only need 4 power generating machines that can be operated, to produce the electrical energy

needed to serve consumer needs. Because each power generating machine has a capacity of 17MW x 4 engines = 68 MW. If 17 MW x 6 engines = 102 MW. The country's total demand is 60 MW at night and 65 MW during the day. If we calculate then: ((102 - 68) MW/102 MW) x 100 % = 33.33%, wasted electrical energy. This is an extraordinary waste of electrical energy, because it is above 25%.

3.3. The third is about overused fuel. We know that in 1 hour, one engine can consume 200 liters of fuel. If we compare 6 engines in one hour, then 6 engines x 200 liters of fuel/engine = 1200 liters. Meanwhile, if we use: 4 engines x 200 liters / engine = 800 liters of fuel. If we calculate the percentage, the result is: ((1200 - 800) liters / 1200 liter) x 100 % = 33.33% of wasted fuel.

3.4. Fourth, if we convert the amount of fuel for 6 engines in 24 hours, into Americana dollars, we will find the following results:

1. 6 engines x 1200 liters/engine, hour x 24 hours x $1.25/liter = $216,000.00/day
2. 4 engines x 1200 liters/ engine, hour x 24 hours x $ 1.25/ liter = $144,000.00/day
3. Results $216,000.00/day - $144,000.00/day = $ 72,000.00
4. The percentages of that is: (($216,000.00/day - $144,000.00)/ $ 216,000.00/day) x 100 % = 33.33 %.

3.5. Fifth, about the others unpredictable purchased, it is confidential between government and contractor management and maintenance. Because they use safety running management method and time base maintenance method. Both methods are the most wasteful and inefficient management methods. The cost prediction above confiscates only the smallest part. The largest use of costs is in the purchase of diesel engine components.

IV. RESEARCH DISCUSSION RESULTS.

According to [24] calculation of the use of efficiency costs, there are several calculations that can be categorized as a percentage level of waste as follows:

1. from the rate of 1% - 5% is very good.
2. From 6%-10% rate, the rate is bad
3. from the rate of 11% -15% is more than bad
4. From the 16%-20% rate, the rate is very bad
5. From high 21% -25%, Worst
6. From 26% and above extraordinarily worst. And vice versa if for the category of definition of waste, then in this case, the average waste is above 25%, indicating extraordinary waste. So that the safety running management method (SRMM) is not relevant to applied in these two central diesel engines power plant, in Hera and Betano.

4.1. Results

Table 1: *It is showing the capacities of power eliminated and overused engines and fuel*

No	Topic	Percentage	Categorize Wasted
1	Eliminated 5 MW	29.4 %	Extraordinary wasted
2	Overused number of diesel engines	33,33 %	Extraordinary wasted
3	Overused fuel	33.33 %	Extraordinary wasted
4	Fuel converted to money ($)	33.33 %	Extraordinary wasted

Table 2 shows the Wasted amount money, a day, a year and ten years ago.

No	Topic	USD Amount	Categorize Wasted
1	Every day wasted money ($)	$ 72,000.00	Extraordinary wasted
2	A year 365 x $ 72,000.00	$ 26,280,000.00	Extraordinary wasted
3	If has operated: 10 years x $ 26,280,000.00	$ 262,800,000,.00	Extraordinary wasted
4	It is just only for fuel, not including other unknow prices	More than above	

4.2. Discussion

After discussion, there are several views as follows:

4.2.1. Safety Running Management Method (SRMM)

Safety running management method for operated power plants, it is not necessaries. Because it is

made the wasted times, wasted number of power plants, wasted capacities of energies, wasted fuel, wasted spare parts, wasted money for all activity maintenances average 33.33% is categorized extraordinarily worst.

4.2.2. Efficiency Running Management Method (ERMM)

Efficiency running management method, for operation power plants, it is very suggested, because to minimized wasted times, and operational cost of power plants.

4.2.3. Implication of Both Methods

The implications of both methods are possible consequences, in theorical and practical are not balanced each other. Because safety running management method is very abstracted and are possible consequence cannot predicable in order to minimized operational cost [25] and [26]. The other hand efficiency running management method it is explicitly are possibility to maximized efficiency and ensure performance of live time cycle of power plant, and minimized cost operation.

V. CONCLUSIONS

Safety running management method (SRMM), is the most wasteful management. Moreover, the safety running management method is collaborated with Time Base Maintenance (TBM), it will be an extraordinary waste.

5.1. Suggestion.

The suggestion that to avoid waste in the safety running management method (SRMM) should be replaced with an efficiency running management method (ERMM). For maintenance, use Reliability Centered Maintenance (RCM) which is based on seven questions.

5.2. Expectation Motivation

It is hoped that if this research is recognized internationally, it will become a reference that will be used as the basis for consideration, management, and maintenance at the two-power plant centers in Timor Leste, and at the same time for the development of the management of economic savings for the people of Timor Leste.

5.3. Abbreviations and acronyms

EDTL = Electrical Diesel Timor Leste
ERMM = Efficiency Running Management Metthod
FECT = Faculdade de Engenharia e Ciencias da Tecnologia
ITB = Institut Teknologi Bandung
MW = Mega Watt
RCM = Reliability Centered Maintenance
SRMM = Safety Running Management Method
TBM = Time Base Maintenance
UFC = Universidade Federal do Ceara
UGM = Universitas Gajah Mada
UNTL = Universidade Nacional Timor Lorosae
UNUD = Universitas Udayana
WG = Wartsila Group

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