

# Effectiveness Comparison of Overtime Hours with Technical and Economical Employment on 10165 Ton Gwt Tanker Ship Repairation

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## Abstract

Aspects of ship repair planning must be considered, especially during the ship repair process. This component is closely related to what is needed by professionals in specific fields. Project completion time can also be estimated using the number of workers involved in the production process. The salary paid by the company also correlates with the number of employees. One of the techniques to speed up work on a tanker repair project by increasing working hours which is often referred to as overtime hours with two approaches to speeding up work on a project evaluated technically and economically compared by researchers. Researchers evaluate project work and calculate the workforce involved in tanker repair. Researchers perform calculations for each part of the workforce in the ship repairment process, and also analyze the scheduling of each part of the workers that have been prepared by the company. Working on the project experienced a shortage of manpower and more often used the overtime system. and it can be seen from the results of the study that adding labor is more efficient from an economic point of view because the costs incurred are less and the processing time does not exceed the specified duration.

**Keywords:** Tanker Ships; Labor; Duration; Cost

## 1. Introduction

In ship repair, there are obstacles in the ship repair process and construction progress that are not following the expected time. Ship repair requires efficient and effective production control to minimize losses. Therefore, companies must pay attention to production workers' management so that projects can be completed effectively and efficiently (Shipping et al. 2013). About construction project planning, cost and time efficiency Planning is essential. in the case of repairs with cost and time efficiency, it is usually closely related to human hours.

Increasing the number of workers has drawbacks, and the advantage of increasing the number of employees is that it can save time to work on projects, but the disadvantage is that there are limits to securing human resources. The addition of working hours (overtime) has advantages and disadvantages. The advantage is the shorter repair time, and the drawback is the higher cost. An example of a case study conducted at a shipyard in Lamongan is that it is sometimes late to supply materials, which results in delays in ship repairs (Yoni, Warsika, and Sudipta 2013). For the ship repair process to be completed promptly without any problems, the shipyard must have good management so that the ship repair process can run effectively and efficiently. The authors compare the effectiveness of overtime hours with technical and economical personnel in tanker repairs.

### *Shipyard definition and varieties*

A shipyard or shipyard is a building site specifically for ship repair or for the manufacture of new ships equipped with supporting facilities such as heavy equipment and material materials so that they can run smoothly without any obstacles. At the shipyard, there are also several ships waiting for their turn for the docking process, and the repair methods include ivory repair and plate repair, feasibility surveys, and for the ivory repair process, there are hull repairs and engine

checking plugging parts. In the shipyard, the workers are also provided with facilities such as building berth building dock, slipway, and graving dock so that they can work on projects optimally

The various shipyards are divided into 2. Building Dock Shipyard is a shipbuilding type shipyard, namely the location for completing shipbuilding tasks from the first stage to the final stage, with the initial stages of work in the form of inspection of tools and installation, while Repair dock shipyard (shipyard repair type) is a place used to repair ships until they are finished, and the work process is assisted with the help of heavy equipment such as excavators by testing the results of hull checking work. (Amiruddin et al. 2013).

### ***Types of Shipyard Docks and Ship Survey***

There are 3 types of shipyard docks, namely Slipway Dock (Dock Pull), which is a docking facility by operating it. It requires a crane and ropes made of steel to pull ships in the sea that have been installed with airbags so that they go ashore. The procedure for a tow-docked berthing vessel required placing hoods on a trolley train and towing the vessel from the water surface, which had airbags in place, using a winch and steel ropes through rails jutting out into the water at an angle to allow the vessel to rise to the water's edge where it is possible to repair. (Amiruddin et al. 2013). As for oil mines, they are not always on land. Even in Indonesian waters, tankers are a type of ship designed to transport various types of oil and chemical liquids. As we know, oil mines are not always on land, including the well-known Indonesian waters. Having a lot of oil mines in the ocean that use oil takers to bring the oil to land so it can be processed again. (Amiruddin et al. 2013)

### ***Ship Repairing Stages***

According to (Marsetio, 2013) The stages of making a ship repair list (repair list) are by referring to this list of repairs, invoices, and the work that will be carried out from start to finish the following stages of ship repair are as follows:

#### ***1. Phase I (Preparation).***

The preparation stage is the first stage in making a repair list and being able to create and complete a repair list.

#### ***2. Stage II (Arrival Meeting)***

The arrival stage of the meeting is the stage of working on a list of improvements and preparing a detailed work plan.

Basically can add or remove orders from the fix list to get compiled a list of fixes

#### ***3 docking***

where the shipyard repairs the construction and machinery areas and coordinates the work. Change the work completion plan.

### ***Elements of planning***

According to (Raharja, 2014), there are three planning elements, namely:

#### ***1. Schedule***

The timetable is the gradual development of a project plan of systematic activities to achieve goals. Close to ordinary use in the preparation of activities in the formation of networks. represents the relationship of the order of workers in the project with a graph.

#### ***2. Purpose***

All briefing activities should have a goal that you must achieve. The three main project goals are time, budget, and quality. for assignments

#### ***3. Policies and Procedures***

It is no exaggeration to claim that the policies and procedures used are critical to the success of a task or project. This is particularly evident when project activities involve high-profile individuals who are recruited from multiple sources and come from different backgrounds and work under a different set of rules.

## **2.Methods**

The method in this study is to take samples using the conventional method where the sampling technique is to find subjects based on the things the researcher is interested in. In this study, the authors used samples at the PT.Dok Pantai Lamongan shipyard. The following are the research stages:

### **a. Initial identification stages**

#### **1. Problem identification**

Identification of research problems is a step taken by researchers since the beginning of the study. The steps of solving the problem is by explaining what the problem is and how the researcher and the research process work on it

#### **2. Literature Study**

At this stage, collecting data from the literature is. Literary studies used to help completing studies. In the process of writing this paper, there were several references to papers, through magazines, websites, interviews, and various object-related references.

#### **3. Field Study**

In this field study, the authors conducted a direct survey on the field by looking at what was done in the field. To get more information, the author conducts interviews directly with workers or employees.

b. Data collection stage

This data collection process will begin with the collection of primary and secondary data. The basic information collected is based on careful observation of relevant sources. While secondary data was obtained from other sources related to scientific research materials. The data collection techniques of this research include the following:

1. Observation

Observation is recording events or symptoms that occur in the field

2. Interview

This study used the interview method which involved the respondents answering several questions to the workers regarding what was done during the repair

3. Field Study

Field studies include problems - problems that occur when carrying out on-the-job training activities at PT. Lamongan Beach Dock by observing and studying ship repair procedures to make a schedule by controlling project work with reference to the method of checking whether workers can complete the project on time or slower

c. Data Processing Stage

The data collection stage of the things to be observed or studied in this stage. A list of tanker repairs and tanker maintenance orders is required as data.

**3. Finding and Discussion**

The data taken by the researcher is from the company through one of the interviews with employees from the shipyard in the Lamongan area and some are from a comparison of journals regarding the cost of ship docking services that he got.

Table 4. 1 Ship docking service

No	Ship name	Docking price
1	Spil Hasya	Rp 395.000.000
2	Km.Ever	Rp232.000.000

Source : Jurnal PT. Klasaman Indah Raya

From table 4.1, the cost of docking services for the ship was taken from several journals. The costs incurred on repairing the ship up to hundreds of millions is due to the ship underwent total repairs starting from repairs in the construction of the ship hull to the mechanics of the engine. Here, the researcher discusses repairs the hasya ship, namely the section starting from cleaning to the mechanical part according to the contents of the thesis which I will discuss this time and from the results of interviews from the shipyard. The repairs take approximately 21 days with 30 workers plus 2 workers.

Table 4.2 Data Numbers of workers

No	Workers name	Jumlah Pekerja
1	<i>Blasting</i>	8
2	<i>Hull</i>	13
3	<i>Cleaning</i>	11
4	Tambahan Tenaga Kerja	2
	Total	34

Source: Processed Data (2022)

Table 4.2 shows that the tanker repair consists of 3 parts of workers, namely the blasting section, there are five hull workers, 13 workers, and cleaning, there are 11 workers with an additional 2 workers so that the project can be run optimally.

Tabel 4.3 Ship data

No	Nama Bagian Kapal	Size
1	LOA	133.70 meter

2	LBP	133.00 Meter
3	BM	22.50 Meter
4	DRAFT	5.60 Meter
5	GRT	10165 Ton
6	H	10.20 Meter

Source: Processed Data (2022)

Table 4.3 shows the size of the Hasya Spiral ship from several sections, starting from LOA measuring 133.70 meters LBP 133.00 meters BM 22.50 meters DRAFT 5.60 meters GRT 10165 Ton H 10.20 meters. I got the data when I did OJT at the shipyard in Lamongan. Calculation of additional wages in this study uses a formula based on the provisions contained in Kepmenakertrans No. 102/MEN/VI/2004, the following is the formula for wage rise:

$$\text{Penambahan Upah Jam Ke 1} = 1,5 \times \frac{\text{Upah Normal}}{7} \dots\dots\dots (1)$$

$$\text{Penambahan Upah Jam Ke 2} = 2 \times \frac{\text{Upah Normal}}{7} \dots\dots\dots (2)$$

The following is the result of the duration of work after additional working hours:

Tabel 4.4 Worker Wages per item After Addition

No	Jobdesc item	Number of workers	Duration (days)	Wages/day (Rp)	Total (Rp)
1	Cleaning and painting	13	2	248.692	7.401.992
2	Cleaning	10	2	248.692	5.693.840
3	Corrosion rate	5	1	248.692	1.423.467
4	Plat replacement	6	1	248.692	1.708.152
total worker per item					16.227.451

Source: Processed Data (2022)

In table 4.4, the results of the calculation of the formula above show that the data is a calculation of the amount of each part of the work with the results of my interviews with the shipyard. Therefore, the total number of each job becomes 34 workers with a total expenditure of Rp. 16,227,451

The following is the formula for determining the duration after the addition of labor and working hours:

$$D = \frac{V}{Q_t \times T_t} \dots\dots\dots (3)$$

Keterangan :

D = Duration (Jam/Orang)

V = work volume (kg)

Qt = Productivity (kg)

Tt = Worker numbers per item After Addition penambahan (people)

The following is the result of the duration of work after additional working hours:

Tabel 4.5 The result of the duration of work after additional working hours

No	Jobdesc item	Working hours (7 hours)	3 hours overtime	Normal work+overtime 10 Jam	Durasi (Day)
1	Cleaning and painting	202	719.322	720.736	1
2	Cleaning	26	92.586	201.586	2
3	Corrosion rate management	0.94	3.346.	9.846	1

4	Plat replacement and construction	12	638.136	147.136	1
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Source: Processed Data (2022)

From the data table 4.5, the duration of the work is the calculation of the data on the duration of the worker per share after adding working hours starting from cleaning to changing the plate, which previously took approximately 2 days to complete. After adding the labor, the average completion is 1 day. After getting the results obtained on the duration and cost of adding labor. The next step is to find the difference in the workers' wages included in direct wage costs:

Tabel 4.15 Difference in Wages Before and After the Addition of Labor

No	Part name	Durasi Sebelum Penambahan			Durasi Setelah Penambahan		
		Durasi (Hari)	Tenaga Kerja	Upah (Rp)	Durasi (Hari)	Tenaga Kerja	Upah (Rp)
1	Cleaning and painting	21	11	7.401.992	2	13	7.401.992
2	Cleaning	21	8	5.693.840	2	10	10.153.840
3	Corrosion rate	21	3	1.708.152	1	5	3.046.152
4	Plat replacement	21	4	1.423.467	1	6	2.538.460

Source: Processed Data (2022)

Table 4.15 shows the results of calculating the formula above for the addition of manpower before adding the project. The duration of work was 21 days after being added to the division of work, such as the example of painting workers before adding the labor. If the duration was 21 days after being added to 2 days of completing the project. The same is true for cleaning workers who previously had a work duration of 21 days after being added to 2 days, corrosion workers who before being added had a 21-day work duration after being added to 1 day and plate work which previously had the same duration, namely 21 days of completion after adding labor to 1 day is then in the completion of the project.

Tabel 4.16 Difference in Wages Before and After working hour addition

No	Working name	Duration before the addition			Duration after the addition			
		Durasi (Hari)	Tenaga Kerja	Upah (Rp)	Durasi (Hari)	Tenaga kerja	Upah (Rp)	Selisih (Rp)
1	Cleaning and painting	21	11	170.800.000	1	13	170.800.000	-
2	Cleaning	21	8	5.693.840	2	10	10.153.840	4.460.000
3	Corrosion rate	21	3	1.708.152	1	5	3.046.152	1.338.000
4	Plat replacement	21	4	1.423.467	1	6	2.538.460	1.114.993

Source: Processed Data (2022)

Table 4.16 shows the results of the calculation of the formula above for the calculation of workers' wages before and after adding examples of painting and cleaning work before adding the labor, has a wage of IDR 170,800,000 and wages after adding IDR 170,800,000 has no difference in wages, while the cleaning work before being added has a total wage of Rp. 5,693,840, and after the addition of labor, the wage is Rp. 10,153,840 has a difference of Rp. 4,460,000, then the corrosion rate worker before being added has a total wage of Rp. 1,708,152 and after the addition of labor workers have a wage of Rp. 3,046,152 with a difference of Rp. 1,338,000, and plate installation workers before being added have a wage of Rp. 1,423,467 and wages after the addition of Rp. 2,538,460 have a difference of Rp. 1,114,993.

In the tanker repair project workers, there is some division of work with different durations. The duration of 2 days 13 workers and a budget of IDR 7,401,992. Meanwhile, for work with 2 days duration, there are 10 workers with a budget of IDR 5,693,840. And, for working with a 1-day duration there are 6 workers with a budget of IDR 1,423,467. Meanwhile, for work that has a duration of 1 day with 5 workers, it has a budget of IDR 1,708,152. To compare which one is more efficient and economical, Researchers used some methods, namely adding working hours for 3 hours overtime and increasing the number of workers so that the project does not experience delays in this method comparing which one is more efficient and economical. The budget of 42,537.6 for 13 workers for 21 days or around 2,025.6 per day it is known that the production value is around 2.02 hours for 1 worker for 1 day.

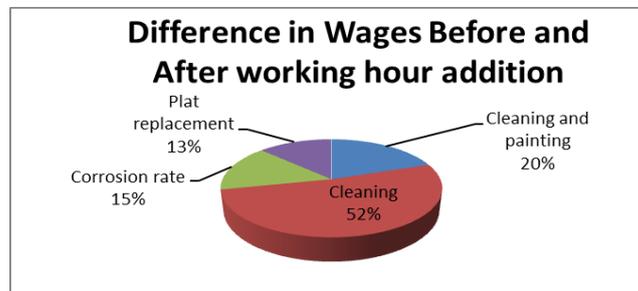
Cleaning work With man-hours of 5,633.97 for 10 workers for 21 days or around 268.28 per day it is known that the production value is around 26 man-hours for 1 worker for 1 day of work the corrosion rate With man-hours is 119. for 6 workers for 21 days. it is known that the production value is around 0.94 man hours for 1 worker for 1 day. plate

replacement work With hours of work of 2,585.79 for 5 workers for 21 days or around 123.13 per day. it is known that the value of productivity is around 12 hours of people for 1 worker for 1 day.

After finishing finding the production value, then a comparison is made between the addition of labor with the hours worked for each part of the work. This needs to be done by adding a workforce of 2 people so that project work and project acceleration are more efficient. From the results obtained by calculating each job, it can be seen that the productivity of each part of the work, including painting and cleaning work, has a productivity value of 202 with 13 workers with a duration of 2 days of completion. With a total labor cost of IDR 7,401,992. Cleaning work has a productivity value of 26 with 10 workers with a duration of 2 days of completion. With a total labor cost of IDR 5,693,840

Corrosion rate workers have a productivity value of 0.94 with 6 workers with a duration of 1 day of completion. With a total labor cost of IDR 1,423,467. Plate replacement workers have a productivity value of 12 with 5 workers with a duration of 1 day of completion. With a total labor cost of IDR 1,708,152. The results of the study that the addition of labor is more efficient. From an economic point of view, because the costs incurred are less and the working time does not exceed the specified duration.

Based on the results researchers, the efficiency comparison between the addition of working hours and labor for each part of the work is technically and economical. Under the addition of working hours, it is more efficient and economical because the process is faster while the addition of labor is much more economical because the company usually saves expenses by 2,000, so the costs can be made for other needs, especially for buying other materials.



#### 4. Conclusion

The company can add 2 additional workers to each part of the ship repair project in the cleaning and painting section. The duration of the project is 1 day and costs Rp. 170,800,000 by the company. Meanwhile, cleaning repair work can be completed within 2 days at a cost of IDR 10,153.40. The ship repair project for the corrosion rate section can be worked on for 1 day at a cost of IDR 3,046,152. The plate replacement ship repair project work can be done within 1 day with the cost of IDR 2,538,460. From this comparison, it was found that the addition of workers was more efficient because the expenses incurred by the company did not exceed the estimated ship repair project. In addition, the duration of work will also be shorter and completed on time.

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