Warehouse server productivity analysis with objective matrix (OMAX) method in passenger boarding bridge enterprise

C Basumerda*, U Rahmi and J Sulistio
Universitas Islam Indonesia, Jalan Kaliurang km. 14.5 Yogyakarta, Indonesia

*Email: chancard.basumerda@ui.ac.id

Abstract. One of the leading keys to successful management in Inventory Management is Human Resource. Its productivity directly improved the production process performance. This research objective is to analyze warehouse server productivity by incorporating Objective Matrix Method (OMAX). Three criteria are observed, they are Service Time, Database Input Time, and total output. The observation was conducted in 5 days. The object in this research is server at two warehouses in a passenger boarding bridge enterprise. First worker productivity is increase for 4 days with average Index Performance 141,67% and decrease in one day with index performance 33,33%. Meanwhile, second worker productivity is decrease for 4 days with average index performance 70,84% and increase in one day with index performance 33,33%. Productivity between one server with others were unequal. Based on the difference, furthermore analysis is done by using cause-effect diagram (fishbone) to determine the root of the problem stated. The cause of the problem is each server has difference technical ability, there is no Standard Operating Procedure for warehouse service and database input process, the warehouse layout and the working environment is not practicing proper 5S (sort, set in order, shine, standardize, sustain).

1. Introduction
In globalization era, companies are very much and ever increasingly aware of company’s productivity. One of the most significant things at any firms is Inventory Management. Inventory Management is general terms that show everything or organization human resource that kept in terms for internal and external demand [1]. Inventory management policy will affect to company performance in providing material that will be used to produce Passenger Boarding Bridge. There are several things inside Inventory Management such as cost, human resource, pattern of management, supporting technology [2]. Human resource is one this that is highlighted in Inventory Management. Its performance will affect production process. Warehouse employee have responsibility for goods receipt, saving goods and goods distribution system. The employee manages directly materials for production process. The company has two warehouses operate 8 hours every day for receive, save and distribute material. In fact, there are inequality between both worker’s performances. Based on the problem, writers conducted an analysis to compare between first employee and second employee productivity. Productivity is a description of relation between input used and output produced [3].

2. Method
The picture below is the research flow for productivity analyze at Passenger Boarding Bridge Enterprise. The observation was conducted in 5 days.
Observation is conducted for goods distribution from warehouse logistic. Criteria for this research is Service time and database input time. Calculation done by using stopwatch, writers calculate the time spent by workers for one work process. Therefore, the input compares with the amount of material in a day that can be served and the data has been entered into the database as output.

There are several methods to measure productivity, the Objectives Matrix Method is one off the best. Omax is a performance measurement method which evaluates several productivity criteria by weighting to obtain a total productivity index. The model proposes the development of productivity at the level of activity. The method is also use full for particularly projects and services function, which is difficult to measure the productivity [4].
In scaling process, the biggest point (10) corresponds to the biggest value of criteria. The smallest point (0) corresponds to the smallest value of criteria. To analyze the result writer use Fishbone diagram or also well-known as cause effect analysis. Ultimately after completion of the diagram it is a comprehensive evaluation of the causes of the main problems and reveals the root causes as well [5]. Based on [6] fishbone diagram use to show main factor that affect the quality and has an impact to the problem we are facing. Also, we can see more detail for factors that affect the main factor.

3. Data and Result

| Server | Date | Database Input Process Time (sec) | Service Time (sec) | Output |
|--------|------|----------------------------------|-------------------|--------|
| 1      | 13   | 65.45                            | 33                | 57     |
|        | 14   | 55.76                            | 57                | 77     |
|        | 15   | 69.05                            | 30                | 90     |
|        | 19   | 61.78                            | 81                | 92     |
|        | 20   | 50.5                             | 61                | 49     |
|        | 13   | 133.76                           | 64                | 78     |
|        | 14   | 50.17                            | 60                | 56     |
|        | 15   | 64.69                            | 64                | 48     |
|        | 19   | 75.45                            | 117               | 40     |
|        | 20   | 84.09                            | 74                | 46     |
| 2      | Sum  | 710.7                            | 641               | 633    |
|        | Average | 71.07                        | 64.1              | 63.3   |

The table above show criteria and output to calculate by Objective Matrix (OMAX). Based on the calculation the result obtained in the table below. The table show Performance Index between warehouse server.
Table 2. Server Index Performance

| Day | Server 1   | Server 2   |
|-----|------------|------------|
| 1   | 66.67%     | -33.33%    |
| 2   | 150.00%    | 33.33%     |
| 3   | 233.33%    | -66.67%    |
| 4   | 116.67%    | -100.00%   |
| 5   | -33.33%    | -83.33%    |

We can see that there are significant differences between server Performance Index. First server productivity tend to increase while the second server performance is decrease. Regarding the first server performance index which mainly has positive value and second server performance index which mainly has negative value.

4. Discussion

![Figure 3. Problem Analysis with Fishbone.]

Table 3. Company Analysis and Recommendation

| No | Primary Cause                                                                 | Company Analysis                                                                 | Recommendation                             |
|----|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------------------------------------|
| 1. | The company do not have Standard operation process for database Input Process | Database input process done without any certain SOP. So, the worker did their job not in order. | The company should make database input to both warehouse so the process can be done in sequence. |
2. The company do not have Standard Operation Process for warehouse service

Based on the observation warehouse service between two warehouses is different. Some workers from different department who does not have responsibility in warehouse take the material by their self, so the warehouse worker’s movement getting distracted.

Recommendation: The company should make the same SOP to bot warehouse. Besides, the company needs their workers commitment to follow the rules they already made.

3. Different server technical skill

The first workers have ability to serve and doing administration rapidly. But another worker has lower ability.

Recommendation: The company should make a training for the workers. So, their Administrative skill and warehouse service become equal.

4. Working environment is not 5s

At first warehouse, there is a pile of unmanaged files. It affects the worker’s performance. The stacked file blocked worker’s hand flexibility. The workers tend to become easily tired. The material cards did not place neatly, so it is hard for the workers to find the material card. A lot of wasted time for searching the material card.

Recommendation: Implement 5s working environment. Set aside items that are not needed. Set the material card position to make it easier to find.

5. Conclusion

From this research, it can be concluded that the first server’s productivity increased for 4 days with an average value of 141.67% and decreased in one day with index performance 33.33%. While the result for second server is decreased for 4 days on with average value 70.84% and increased in one day with index performance 33.33%.

The cause of differences in both warehouse server’s productivity is that each server has different technical skill, there is no SOP for warehouse service and database input process, the warehouse layout is not 5s and the working environment is not 5s.

6. References

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