Increased productivity using *lean service* (Case study: regional drinking water company X)

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**Abstract.** Constraints found at the stage of requesting new connection services in regional drinking water company X is the slow administration and process of connecting pipes. This is following the average length of the new connecting service time of 8 working days from the target of 6 working days. The existence of these obstacles affects the productivity of the company. One indicator of increased productivity can be seen from the value of the Process Cycle Efficiency (PCE). The results of the PCE evaluation before the proposed improvement obtained the results of the current state PCE value of 14.98% and the percentage of PCE after the proposed improvement of 25.46%. After the proposed improvement is carried out, it reduces the processing time of the New Connection which was originally 10242 minutes to 6013 minutes.

1. Introduction

Regional Drinking Water Company X is a regional company that has a concentration in the field of water supply services. The presence of a Regional Water Supply Company is regulated through the Law of the Republic of Indonesia No.5 of 1962 concerning Regional Enterprises. Regional Drinking Water Company is formed as a business unit owned by the regional government that provides services, organizes public benefits in the field of drinking water, and fosters revenue. So as a company, the Regional Drinking Water Company is required to have a performance-oriented to customer satisfaction, to have competence in the procurement and distribution of clean water, and to be efficient to obtain revenue.

Productivity is an important factor affecting the continuity and development company. Companies must be able to increase output by reducing or save input. Output produced by the company influenced by the waste in-process production[3]. Regional Water Supply Company X has 4 types of services, namely: new connection, renaming, re-opening of channels, and connection revocation. With most services, there are new connecting services from October 2018 to April 2019 with 832 SL (Channels). Regional Water Supply Company X must maintain good service consistency with customers, one of which is the speed of service. As the number of customers increases, several complaints are still often raised by customers at the request stage of new connection services, such as the slow process of administration and the pipe connection process. This is following the average length of the new connecting service time of 8 working days from the target of 6 working days. This has become a major challenge for the Regional Water Company in terms of administration and planning to improve service performance to overcome the increased water consumption. Service firms need to meet the specific requirements of each and every customer so that they can always stay ahead of their competitors [10]. But in practice, the service process offered is not always smooth or in accordance with the company's
expectations. Not a few things that the company does not want and the consumer-related quality of service occurs.[6]

The service improvement step to improve performance is the application of the Lean concept to the Regional Water Company. Lean is lean because it provides a way to do better by using as little resources as possible - human effort, less equipment, less time and less space (less time) less space) by continuously approaching the desires that are desired by the customer [2]. Services are all actions or performance that can be offered by one party to another party which is essentially intangible and does not produce any ownership [7]. In this case, because the research was conducted in the service sector, the lean approach taken was lean service. The development of lean service concept is used by researchers to implement the concept of lean service in fast food restaurants, especially in the food company Jank Jank Wings to identify the waste that occurs in every process in this company and the process of improvement will be used the DMAIC method (define, measure, analyze, improve and control). In its development, the concept of lean service is still evolving and is examined in terms of the rationale and application of lean concepts into a service organization sector in terms of the foundation of existing lean services and analysis of withdrawals. the concept of the customer becomes a good service system [1]. Lean service is used as an approach to creating an effective internal service system so that important information can be ascertained to consumers or the public quickly and with effective service. Lean is an ongoing effort to eliminate waste and increase value-added products (goods and or services) to provide value to customers (customer value)[5]. By analyzing activities in the service process of the Regional Water Company, xi will find out which activities are included in the category of value-added activities and non-value-added activities. An analysis will be made of the service process at the Regional Water Company from the beginning to the end, to identify the waste contained in the Regional Water Company. Which is then analyzed and solved by applying lean concepts. Next, determine the proposed improvement using the 5W + 1H method. Therefore, in this study, the Lean service approach is used to make the Regional Water Company maintain its commitment as a regional company that has a concentration in the field of water supply and public service by the Law of the Republic of Indonesia No.5 of 1962 concerning Regional Enterprises.

2. Methodology

Service is the right of activity or series of invisible activities that occur due to interactions between consumers and employees or other rights provided by service providers that are intended to solve the problems of consumers or customers [9]. The service itself contains the importance of the meaning of communication. Lean is a continuous effort to eliminate waste or waste and increase the value-added of goods and services to provide value to customers or customer value. The purpose of lean is to increase customer value through a continuous increase in the ratio between value-added to waste (the value-to-waste ratio)[3]. Therefore, efforts to improve the production process always continue carried out with a systematic approach to identifying and eliminating waste or non-value-added activities through radical continuous improvement to achieve six levels of performance to increase productivity [3].

Lean focuses on the goal of continuously turning waste into value from the prospective customer. This is a systematic approach precisely for the improvement process, error proofing, and reducing waste [4]. Lean service in other definitions is a set of methods and equipment designed to reduce costs, improve performance, reduce waiting times, and eliminate waste so that the quality of services produced can be maximized. Lean has also been applied to service companies to eliminate waste and to improve service to consumers by research [8]. The concept of lean, in standardization and continuous improvement procedures, is the basic thing in the continuity of the service process itself to improve performance in a company.

Waste can be defined as any work activity that does not add value to the process of transforming inputs into outputs along with the value stream mapping. From a lean perspective, all types of waste found throughout the value stream process, which transforms inputs into outputs must be eliminated to increase the value of products (goods or services) and subsequently increase customer value [5]. The type of waste in manufacturing is certainly different from the waste in the company or the service sector here is a general description of waste in services.
Table 1. Waste in service

| No | Waste Service       | Definition                                                                 |
|----|---------------------|---------------------------------------------------------------------------|
| 1  | Over production     | The process of doing excessive service to consumers without considering the reciprocity |
| 2  | Waiting             | The process is waiting for information to arrive or waiting for service order procedures |
| 3  | Defects             | Error in the process of implementing a service                             |
| 4  | Excessive Transportation | Excessive displacement of the service process to consumers resulting in waste of time, effort and cost |
| 5  | Excess Inventory    | Storage of service inventories or service procedures is too early than customer service needs |
| 6  | Inappropriate processing | Incompatibility of service methods to consumers                            |
| 7  | Unnecessary Motion  | The treatment process is less effective and efficient for consumers         |

The 5W + 1H method (Kipling Method) has been used extensively and is considered an effective approach to gathering and presenting the information. 5W + 1H contains 6 basic questions in getting information: what, where, when, why, who, and how. A 5W + 1H analysis is carried out to explain the explanation in detail.

3. Result and Discussion
The data collected in this study consisted of primary and secondary data. Primary data is collected directly through observation activities, namely direct observation in the company that is the object of research and interviews with related parties the process of new connection services in the Regional Water Company x. Secondary data in the form of a company profile, organizational structure, service process flow, and other data from various references that support research.

Table 2. New connection service process

| No  | Process                          |
|-----|----------------------------------|
| 1   | New Connection Request           |
| 2   | Form Processing                  |
| 3   | Cashier (Payment of Fees)        |
| 4   | File Processing                  |
| 5   | Connection Installation          |
| 6   | Retrieval File                  |

From the data obtained, it can be seen that the recapitulation of new connection service waste is as follows:

Table 3. Recapitulation of new connection service waste

| No  | Waste         | Head of Meter Installation | Head of Customer Development | Planning | Head of Meter Reading |
|-----|---------------|---------------------------|------------------------------|----------|-----------------------|
| 1   | Overproduction| 4                         | 4                            | 5        | 7                     |
| 2   | Waiting       | 6                         | 7                            | 8        | 6                     |
| 3   | Defect        | 4                         | 5                            | 3        | 5                     |
| 4   | Excessive Transportation | 8                | 6                            | 6        | 5                     |
| 5   | Unnecessary Inventory | 5                | 4                            | 4        | 5                     |
| 6   | Inappropriate Processing | 3                | 5                            | 3        | 4                     |
| 7   | Unnecessary Motion | 5               | 4                            | 6        | 3                     |
|     | Total         | 35                        | 35                           | 35       | 35                    |
After getting the value of each waste that is there will be an appropriate tool selection using the Value Stream Analysis Tool. The value of each tool is obtained by multiplying the waste value in the results of the recapitulation of the questionnaire by the weight value in the Value Stream Analysis Tool table or VALSAT.

Table 4. Recapitulation of VALSAT calculation

| Waste                | Means Score | Process Activity Mapping | Supply Chain Response Matrix | Production Variety Mapping | Quality Filter Mapping | Demand Application Mapping | Decision Point Analysis | Physical Structure |
|----------------------|-------------|--------------------------|------------------------------|----------------------------|------------------------|----------------------------|------------------------|-------------------|
|                      |             |                          |                              |                            |                        |                            |                        |                   |
| Overproduction       | 5           | 5                        | 15                            | 5                          | 15                     | 15                         |                        |                   |
| Waiting              | 6.75        | 60.75                    | 60.75                         | 6.75                       | 20.25                  | 20.25                      |                        |                   |
| Defect               | 4.25        | 4.25                     | 38.25                         |                            |                        |                            |                        |                   |
| Excessive Transportation | 6.25        | 56.25                    |                               |                            |                        |                            |                        |                   |
| Unnescesarry Inventory | 4.5         | 13.5                     | 40.5                          | 13.5                       | 40.5                   | 4.5                        | 4.5                    |                   |
| Inappropriate Processing | 3.75        | 33.75                    | 11.25                         | 3.75                       | 11.25                  |                            |                        |                   |
| Unnescesarry Motion  | 4.5         | 40.5                     | 4.5                           |                            |                        |                            |                        |                   |
| Total                | 35          | 214                      | 120.75                        | 31.5                       | 75.75                  | 51                         | 10.75                  |                   |
| Rank                 | 1           | 2                        | 6                             | 5                          | 3                      | 4                          | 7                      |                   |

Based on the results of VALSAT calculations that have been done, it is found that the tool with the highest weight is Process Activity Mapping (PAM). Therefore the tool used to map activities in the new connecting service process is Process Activity Mapping.

The following is a recapitulation of the results of the current state and future state based on the value of the process cycle efficiency calculation:

Table 5. Summary of current state and future state comparison results

| Category | Current State | Future State |
|----------|---------------|--------------|
|          | Time          | Percentace    | Time          | Percentace    |
| VA       | 1534          | 14.98%       | 1531          | 25.46%       |
| NVA      | 7252          | 70.81%       | 4347          | 72.29%       |
| NNVA     | 1455          | 14.21%       | 135           | 2.25%        |
| Total    | 10241         | 100%         | 6013          | 100%         |
| PCE      | 14.98%        |              | 25.46%        |              |

Then, PCE (Value Added) = PCEfuture – PCEcurrent
= 25.46% - 14.98%
= 10.48%

It can be seen that there is an increase in efficiency in the process cycle. The amount of time VA (Value Added) in the current state condition is 534 minutes with a percentage of 14.98% and in the future state is 1531 minutes with a percentage of 25.46, the amount of time NVA (Non-Value Added) in the current state condition is 7252 minutes with a percentage of 70.81% and at a percentage of future state condition is 4347 minutes with a percentage of 72.29%, the amount of NNVA (Necessary Non-Value Added) in the current state condition is 1455 minutes with a percentage of 14.21% and in the future state condition that is 135 minutes with a percentage of 2.25%. based on the Process Cycle
Efficiency value above, it is known that the efficiency of the new service process time has increased by 10.48%.

4. Conclusion
Based on the results of data processing and analysis that has been done, it can be concluded several conclusions include: Based on the weighting on the waste questionnaire obtained Value Added (VA) activity of 14.98% with a total time of 1534 minutes from 26 processes, the percentage of non-value-added NVA of 70.81% with a total time of 7252 minutes from 17 processes, and the percentage of necessary non-value-added (NNVA) of 14.21% with a total time of 1457 minutes from 9 processes. Critical waste results obtained in the New Connection Service Process are waste Waiting, waste Excessive Transportation, and Overproduction waste. Proposed improvement of 5W + 1H to reduce lead time by adding displays related to requirements, process flow, and all matters relating to new connection services and keep updating on new connection service process activities. Making HR planning for location survey officers will reduce some of the time of location survey delays, Updating pipeline data. With the installation of pipeline network data, it can be easier for officers, combining the activity of checking connection requirements, reducing the activity of printing documents as well as submitting the Official Report and RKB (Plans for Goods) and reducing the waiting time of the installation process queue. After the proposed improvement with the approach of 5W + 1H in the New Connection Service process, it was able to discuss the processing time of service which was originally 10241 minutes after the proposed improvement to 6013 minutes or reduced by 4228 minutes. Based on the proposed improvement of 5W + 1H, there is an increase in productivity from the value of PCE current state is 14.98% and the percentage of PCE after the proposed improvement is 25.46% or an increase of 10.48%.

5. References
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