

The Operational Water Audit on Distribution Function PDAM Tirta Bhagasasi Tambun Branch

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Abstract—This research aims to study whether the water distribution function of PDAM Tirta Bhagasasi Bekasi Branch has been effective based on service claims and complaints from the customers. The research also aims to determine whether the PDAM has implemented a water audits and comply with the level of water loss PDAM according to water standard. This research uses a descriptive research type of qualitative approach, which is compiled by the data analysis method in the form of a preliminary examination, review and testing on the management control system, detailed audit, and audit report which yield recommendation to the company. The unit of analysis of this research is the Distribution Division of PDAM Tirta Bhagasasi Bekasi Tambun Branch. The data used in this research are primary and secondary data. Data collection techniques used library research methods, observation, interviews, questionnaires, and documentation. The result of the research proved that the company has an organizational structure with clear division of tasks, and the company policies regarding the distribution process so that the implementation of water distribution at PDAM Tirta Bhagasasi Bekasi Branch Tambun is efficient, but not fully effective, because there were still some deviations may result in a loss to the company. Besides, PDAM has not implemented water audit and water loss rates according to the water audit exceeding 10%, which according to the American Water Work Association (AWWA) should be complied with to reduce the rate of water loss.

Keywords: *operational audit, water audit, distribution function*

I. INTRODUCTION

Water is essential for the living creatures. One can sustain its life without food for several days but cannot survive without water. Water is used in everyday activity like brushing, cooking, drinking, faucets, farms, big industries etc. Its importance can be known from the past that ancient cities were established on the bank of the river where water was available easily which was useful for transportation and other activities. As water is available for free, all have lost its importance in life and are using it chaotically. PDAM Tirta Bhagasasi is one of 398 PDAMs that are spread throughout the archipelago. PDAM Tirta Bhagasasi serves water needs for Bekasi District and parts of Bekasi City. Out of the total number of 200,913 customers, only 86.3% (173,421) were active customers. However, in running its business, the company experienced several major problems, namely service

coverage that has not been able to meet the target for the past few years so that the allocation of PDAM water in Bekasi has not been evenly distributed, due to the high level of water leakage, so that many residents lost clean water and occurred losses to many parties, namely consumers and the PDAM Tirta Bhagasasi itself. The level of water leakage was around 36.3 percent from a total of 3.4 million cubic meters of drainage. The cause of water leakage at the company is due to old pipelines, also due to inaccurate meter readings as well as the presence of leakage on the gauge or water meter. But one other cause is the occurrence of water washing or illegal connections by the general public, including non-active customers. The purpose of this study is to find out whether the distribution function carried out by PDAM Tirta Bhagasasi Bekasi Tambun Branch has been running effectively, and what is the level of water loss in accord to the water audit?

II. LITERATURE REVIEW

A. Previous Research

Previous research is very important as a basis for developing this research. Its purpose is to find out the results that have been done by previous researchers. Research related to operational audit and water audit 8 articles was chosen. Overall the research concluded that the production function starting from the master production schedule, assessment of inventory levels, maintenance schedule, productivity and value added, equipment and production facilities, quality control and finished goods control has generally been well implemented. In general, the activities of the production function have been effective, but there are some problems in distribution, so the company needs to correct the deficiencies so that in the future the operational production can be effective. From the water audit, water counted in meter, clear water, stolen water, countless water, leakage can be identified. The quality of water supply is also known. Through the analysis of water use during water audits, wasteful and excess water usage is found. Steps that can be taken to optimize water loss are studied and it is found that the water meter in each house has not changed and is needed to raise awareness among the community for conservative water use.

B. Theoretical Basis

Management audit, also called operational audit, functional audit, audit system, is an examination of a company's operational activities, including accounting policies and operational policies that have been determined by management, to find out whether the operational activities have been carried out effectively, efficiently and economically [1].

Operational audit is a systematic examination that aims to start and report related resources and funds that are used effectively, efficiently, and economically and assess programs, functions and objectives that have been well planned [2].

Operational auditing is a systematic process for evaluating an organization's effectiveness, efficiency and economic operations under control and management reporting to the person who precisely results from the evaluation together with recommendations for improvement [3].

From the definitions above, it can be concluded that the notion of operational audit is a process of evaluating the operations of an entity to achieve its objectives in accordance with standards and regulations effectively, efficiently and economically.

There are 4 stages in an operational audit [4], namely:

- Preliminary Survey, is intended to get an overview of the company's business conducted through question and answer with the company's management and staff and the use of questionnaires.
- Review and Testing of Management Control Systems, is to evaluate and test the effectiveness and control of management through questionnaires, flowcharts and narrative explanations are used and several transactions are tested.
- Detailed Examination, is checking the company's transactions to find out if the process is in accordance with policies set by management. In this case the auditor must use observations on the activities of the functions contained in the company.
- Report Development, in preparing the audit report, the auditor does not give an opinion on the reasonableness of the company's financial statements but the reports made are similar to management letters, because they contain audit findings regarding inefficiencies, inefficiencies and inefficiencies and weaknesses in the management control system found in the company.

Water audit was a picture in the late 80s to overcome problems related to drought, shortages, leakages, and losses [5]. Some of the total water use is leakage, some is caused by inaccurate measurements, some of which may be unauthorized use, and part of that is water sent to customers [6]. The water audit determines where the water ends and how much gets there. Water audits improve knowledge and documentation of distribution systems, problems and risk areas and a better understanding of what happens to water after leaving the point source [7]. A leak detection program helps minimize leakage and overcome small problems before they become big problems.

Water auditing is an accounting procedure for finding water loss in a system [8]. From that, countless water uses, unauthorized supplies, etc., are known. Whereas according to Gandhi et al states that water audit is a process to calculate the water used that is treated so that the exact water usage is known and through analysis during domestic water audits the water usage is known [9]. Audits were chosen to ensure the validity and reliability of information, as well as to assess the system's internal controls [10]. Water auditing is the most effective tool for water management. The purpose of the Water audit is to provide a rational scientific framework that categorizes all water uses in the system. This is a tool to overcome deficiencies, leaks and other water losses.

Water audit helps to know what is happening after the water leaves from a treatment plant, if there are losses occurring, where the losses are occurring etc. is known, according to that the leakage detection program and other program to reduce loss takes place. These programs have outcomes as follows: Optimization of water losses, Financial Improvement, Knowledge distribution system, increases reliability of supply system, improve public relations, improving service system etc.

The distribution is an organizational tool that is interdependent in providing a product to be used or consumed by consumers / users [11]. Meanwhile, distribution is an activity carried out by companies that make products available to target customers [12]. The clean water distribution system is the distribution or distribution of water through a pipeline system from the building (reservoir) to the service area (consumers). In planning the water distribution system, several factors that must be considered include the service area and the number of population to be served, water needs, topographic location of the service area, type of system connection, distribution pipe, drainage type, network pattern, clean water distribution system equipment, leak detection [13]. The clean water distribution system is the distribution or distribution of water through a pipeline system from the building (reservoir) to the service area (consumers) [13]. In planning the water distribution system, several factors that must be considered include the service area and the number of populations to be served, water needs, topographic location of the service area, type of system connection, distribution pipe, drainage type, network pattern, clean water distribution system equipment, detected.

III. METHODS

The research strategy used in this study is a descriptive method with a qualitative approach. Descriptive method is a method that serves to describe or give a picture of the object under study through data that has been collected as it is, without analysing and making conclusions that are applicable to the public [14]. This research was conducted on the distribution function in the Regional Water Supply Company (PDAM) of Tirta Bhagasasi Bekasi.

Data was collected from primary and secondary sources, primary data obtained are data relating to the distribution function carried out by the company of the parties concerned and direct observation of the object under study. Secondary

data is data obtained from the company in the form of company history, organizational structure and company data (research objects) relating to the operational audit of the distribution function.

The method used to analyse the data in this study is a qualitative descriptive analysis, which is an analysis based on a state statement and a measure of quality. Qualitative analysis is given in the form of a description of qualitative data that is associated with other data to get clarity on a truth or obtain a new picture, reinforce an existing picture or vice versa.

IV. RESULTS AND DISCUSSION

A. Preliminary Examination

After conducting the observations with some parts related to water distribution management in PDAM Tirta Bhagasasi Bekasi, we have found several tentative audit finding, namely: the occurrence of leakage of pipes that are not detected, there is an illegal network that is not detected, delay in the distribution of parts in detecting leaks, the network map is not clearly drawn, many complaints of turbid water, dead water, smelly water and small water volume flowing, lack of coordination between parties and the customer relationship regarding customer complaints.

B. Review and Testing of Management Control Systems

Researchers conducted interviews and made questionnaires to be filled out by informants according to the sections related to distribution. The following are the conclusions of the results of interviews and questionnaire answered that have been distributed and filled out by the production, distribution, and customer relations departments: (a) distribution planning has been going well, only there are still shortcomings in planning the transmission and distribution pipeline inspection. Even though the inspection should have been carried out continuously in order to reduce the level of leakage. (b) The distribution has fulfilled the procedures carried out in accordance with the guidelines. need further attention in the implementation of distribution is the distribution of water that sometimes cannot meet customer needs, it will have an impact on customer satisfaction, in addition the company also needs to pay attention to the availability of distribution pipeline maps in order to facilitate the resolution of leaks and improve supervision in connection installation supervision new subscription. (c) Evaluation of distribution has been going well, this can be seen from the answers of dominant informants who agree. But there are still shortcomings in the timeliness in resolving leaks, it can affect the company's operational costs that will increase and need to be considered again regarding the evaluation of the customer's water meter so that the recording of consumer water usage does not occur error.

C. Detailed Examination

Doing in-depth audit try to find the supporting evidence from tentative audit findings, the detailed audit stage summarizes and groups each audit findings support by conditions, criteria, causes, and consequences. The definitive audit findings namely: (a) Pipes leakage that is not detected, (b)

An Illegal network that is not detected by the company, (c) Abnormal customer water meters. (d) Delay in the distribution of parts in resolving leaks, (e) Map of pipelines that are not clearly drawn, (f) There are many complaints of turbid water, dead water, smelly water and the small volume of water that flows from customers but is not quickly handled, (g) Replacement of water meters that have exceeded their technical age are not structured, (h) Minutes of new installations made by the distribution are late so that the customer's account does not appear, (i) Revocation of delinquent customers often results in delays, (j) Lack of coordination between distribution and customer relations regarding customer complaints.

D. Report Development

From the findings, researchers found constraints and weaknesses in the management control system that applies to companies in managing the distribution function at PDAM Tirta Bhagasasi Bekasi Tambun Branch in the stages of distribution planning, distribution implementation, and evaluation of distribution. This results in delays in the distribution operations and the customer's water requirements so that it can cause losses for the company. Based on the results of the audit it can be concluded that the distribution activities carried out by the company are still not running effectively. This can be seen from how much the influence of irregularities or weaknesses on the company's revenue and the impact caused by these irregularities or weaknesses. As for other factors outside the effectiveness that cause the unfulfilled distribution objectives are also influenced by other factors such as natural factors.

The content of the official report, the first part is the opinion of auditor, then follow by executive summary and detail of examination.

V. CONCLUSION

The company already has a Standard Operating Procedure with clear segregation of duties, authority and responsibilities, as well as good distribution implementation policies, so that the implementation and control of the distribution function at the PDAM Tirta Bhagasasi Tambun Branch is efficient but less effective, due to the distribution officers still not carrying out their duties optimally.

The level of water loss at PDAM Tirta Bhagasasi Tambun Branch exceeds 10% which according to the International Water Association (IWA) of the American Water Work Association (AWWA) must be followed up to reduce the level of water loss.

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