Analysis of Customer Water Meter Accuracy Results on Increasing Revenue in Public Water Tirta Perwira Purbalingga Regional Drinking Water Public Company

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Abstract. This study aims to determine the internal control method for measuring the accuracy of customer water meters and to analyze the internal control results of water meter accuracy calculations on the accuracy of customer meters of the Tirta Perwira Purbalingga Regional Drinking Water Public Company seen from the level of water loss, the level of accuracy of water meters, and the quality of water meter equipment. The data collection methods for this study are primary data consisting of observation and interview methods and secondary data consisting of customer water meter accuracy measurement data and documentation. The data used in this study are accurate customer data and recap data of customer water meter accuracy results for 2024 at the Tirta Perwira Purbalingga Regional Drinking Water Public Company. Based on the results of research that has been carried out, it is clear that there are damaged and blurry water meters which have resulted in losses to the Tirta Perwira Purbalingga Regional Drinking Water Public Company. It can be concluded that the accuracy level of customers' water meters in the period January-May 2024 is said to be good from the water meter accuracy results.

Keywords: Internal Control, Water Loss Rate, Water Meter Accuracy

1 Introduction

Development is a process of change carried out to create success and progress for an area, implying that all individuals in the area must have a role in being able to take part and benefit from the development process in a proper and impartial manner [4]. The goal of economic development in every country, both developed and developing, such as Indonesia, has the same goal, namely trying to foster prosperity for its population [4]. Therefore, it can be interpreted that the implementation of development must be able to guarantee appropriate equality in the context of efforts to realize social justice [4].

One area of development for society is related to the provision of clean water because water is one of the primary needs that is needed by everyone [4]. Good clean water is a very important element to support human health, but providing clean water needs is not yet fully implemented

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in several parts of the world [4]. To support water needs, the Government established a Regional Drinking Water Company (PDAM) with the aim of providing a clean water supply for people in need [4].

The Regional Drinking Water Company (PDAM) is a service company that provides drinking water supplies to people in need in the Purbalingga Regency area [4]. PDAM Tirta Perwira aims to provide public use in the form of providing and maintaining water supplies to meet the needs of many people, especially in areas that are difficult to reach, far from water sources and do not have water catchment areas [4].

The Regional Drinking Water Company (PDAM) is the body that manages the availability of clean water which has the function of providing sustainable and excellent water services at affordable costs [3]. A common problem with PDAMs in Indonesia is water loss or in foreign terms Non-Revenue Water (NRW) or Non-Revenue Water (ATR) [3]. According to DPSPAM, physical water loss is the physical loss of water from the pressurized system and water storage tanks to the point of use [3]. Non-physical or commercial water loss is caused by unauthorized consumption, inaccuracies in customer meters, and data errors [3].

PDAM Tirta Perwira Purbalingga has a high water loss rate of 26% in 2023 (PDAM Tirta Perwira Purbalingga). This figure does not meet the water loss standards according to Minister of Public Works Regulation Number 20/PRT/M/2006, namely 20% [7]. This is because the Central Statistics Agency recorded that the population in 2023 will be 1,027,333, which results in a high level of water loss and can affect the availability of clean water.

Handling non-physical water loss can be achieved by taking strategic actions both through the administrative and legal sectors, including by establishing regulations to impose sanctions on water thieves and illegal connections, calibrating main water meters and customer water meters [6]. Regularly replacing customer water meters (every two or five years) can be done to prevent damage or leaks and re-checking to read customer water meters, as well as carrying out unannounced inspections for large-scale customers [6].

Based on the level of water loss that does not meet the standards set by the Ministry of Public Services and other problems that could cause water loss, water loss calculations are carried out. One way that can be done to determine the level of water loss is by measuring the accuracy of water meters used by PDAM Tirta Perwira Purbalingga. There are 2 methods used to measure water meters, namely the manual method using a measuring stick and the digital method using a water meter tester.

2 Literature review

2.1 Definition of Internal Control

According to Government Regulation Number 60 of 2008, an internal control system can be defined as an activity carried out periodically by leaders and all employees to provide confidence that the goals of the organization or company have been achieved through various activities carried out effectively and efficiently, and compliance with applicable legal regulations applies [2].

Internal control research in a company or organization is implemented to achieve several goals, including maintaining the accuracy of the company's or organization's water meters [2]. The risk of water loss may occur at customers' water meters [2]. Therefore, an adequate internal control system is needed to protect the accuracy of water meters from these risks [2].

2.2 Definition Water Meters

A water meter is a tool used to calculate the volume of water distributed by the Regional Drinking Water Company to customers so that the amount of money that must be paid can be determined [1]. This meter is a distribution unit that functions as an accountability system and has an influence on water loss from a non-physical perspective [1].

Before being installed, this PDAM water meter was calibrated by the calibration body of the Directorate of Meteorology of the Indonesian Ministry of Trade and sealed as proof that it has been tested [1]. Water meter specifications are used to suppress leaks from water meters which result in inaccurate water meters used [1]. Water meter leaks can cause, among other things, high levels of water loss that occur in PDAMs [1]. The level of water loss can result in losses for PDAM [1].

2.3 Definition Water Meter Accuracy

Wikipedia, accuracy is "the degree of closeness of a quantity measurement to the actual value" so it can be concluded that water meter accuracy is the degree of closeness of the measurement of the quantity of water that comes out to the quantity recorded on the water meter. This shows that the closer the quantity of water that comes out is to the quantity recording system on the water meter, the more accurate the water meter is considered to be. Water meter accuracy has specifications according to SNI 2547:2008, namely that the water deviation in water meter accuracy must be below or equal to 0.05 ($\leq 5\%$).

3 Research Methods

The reseacrh method used by the author is a qualitative descriptive method. The concept of qualitative descriptive methods is used to analyze each condition with the data collection aspects used. The qualitative descriptive method aims to provide results in the form of a description of certain conditions. The following are the methods used in the data collection process, namely: primary method is information collected directly from the source. In this data collection process, the following are two primary data collections in the form of the first, the observation method, which is a method carried out directly involved in daily activities or situations observed as a data source. Data obtained through work practices in the field related to the accuracy of air meters belonging to PDAM Tirta Perwira Purbalingga customers. The second is the interview method, which is an approach that involves asking questions and answers with certain individuals, such as section heads or engineering employees who have relevant knowledge to obtain information regarding the air meter accuracy process for PDAM Tirta Perwira Purbalingga customers.

Secondary data is data obtained indirectly from PDAM Tirta Perwira. Secondary data used includes the Ultrasonic Flow Meter (UFM) test, checking the accuracy of the air meter and measuring air pressure using a water meter tester, the amount of air distributed, and the number of customer connections.

4. Result and Discussion

4.1 Results

Based on the statement above, one of the data obtained from PDAM Tirta Perwira Purbalingga is measuring the accuracy of customer water meters. Measuring the accuracy of customer water meters aims to determine the accuracy of customer water meters in Purbalingga City. Sampling is carried out at the customer's water meter in the pipe section that has the highest level of water loss when the step test is carried out.

The results of the survey that has been carried out can be seen in table. The accuracy of customer water meters can be calculated using the formula:

Accuracy =(V.Measuring Cup-V.Water Meter)/(V.Measuring Cup) x 100%

=(2,100-2,000)/2,100 x 100%

= 5%

The maximum accuracy limit for customer water meters is 5%. Based on the calculation results above, the accuracy of water meters in Purbalingga City is classified as good because it is still at the maximum limit of water meter accuracy.

Table 1. Results of collecting customer water meter accuracy data in the accurate category

NAME	ADDRESS	STAND	GU	WM	DEVIATION	%	CATE-GORY
KRISNO ADI	P. SAMARA HOUSE BLOK E-5 KR. LEWAS	1090,6925	2100	2000	100	5	accurate
URIP SNATOSA	P.SHAMARA HOUSE BLOK E.7	902,5659	2000	2000	0	0	accurate
P. BRALING ESTATE	P. BRALING ESTATE BLOK F.2	36,3712	2100	2000	100	5	accurate
NENENG N	P. SHAMARA HOUSE BLOK K.6	211,6254	2100	2000	100	5	accurate
UJANG YAN YAN MULYANA	P.SHAMARA HOUSE BLOK K.4	50,4827	2000	2000	0	0	accurate
IMAM SUBEKTI	P. BRALING ESTATE BLOK A.4 KTS	1094,9157	2100	2000	100	5	accurate
TEGUH WAHYONO	P. BRALING EST B.5 - KR. LWS	536,6826	2000	2000	0	0	accurate
SRI HIDAYATI	P. BRALING EST B.6 – KR LEWAS	306,2308	2100	2000	100	5	accurate
WILIS HIDAYAT	P. BRALING EST B.2 – KR LEWAS	2055,8927	2100	2000	100	5	accurate

BURHAN	P. SHAMARA HOUSE BLOK G -5	86,3532	2000	2100	-100	-5	accurate
WISNU ISMAYADI	P. SHAMARA HOUSE BLOK G.6	945,5362	2070	2000	70	3	accurate
ZULFAHMI	P. SHAMARA BLOK G – 8 KR LEWAS	567,3817	2000	2000	0	0	accurate
JARWO	P. SHAMARA BLOK H – 1 KR LEWAS	784,9539	2100	2000	100	5	accurate
TARYONO	P. SHAMARA BLOK H – 2 KR LEWAS	1528,5631	2000	2000	0	0	accurate
SUGENG PRIYANTO	P. SHAMARA HOUSE BLOK H.4	165,6857	2000	2000	0	0	accurate
TATANG SAHYONO	P. SHAMARA HOUSE BLOK H.8	144,4336	2100	2000	100	5	accurate
MASTRI TAMPUBOLON	P. SHAMARA HOUSE BLOK H – 7	180,1776	2000	2000	0	0	accurate
II SETIAWATI	P. SHAMARA HOUSE BLOK 1.4 KTS	68,8472	2000	2000	0	0	accurate
AJI PURNOMO	P. SHAMARA HOUSE BLOK I 1	352,9582	2000	2000	0	0	accurate
AZIZ ARIO TEJO	P. SHAMARA HOUSE BLOK 1.7 KTS	210,3995	2100	2000	100	5	accurate
JAMES ERFIN JUPITER	P. SHAMARA HOUSE BLOK I – 8	167,7864	2100	2000	100	5	accurate

4.2 Discussion

Table 2. Recaps customer water meter accuracy results for the period January - May 2024

CATEGORY		**MONTH**					**TOTAL**
MOST ACCURATE		**JANUARY**	**FEBRUARY**	**MARCH**	**APRIL**	**MAY**	
1	Accurate	115	238	448	359	606	1766
2	Not Accurate	16	22	24	12	22	96
3	Damaged Meter	0	21	55	16	0	92
4	Blurry Meter	0	13	17	13	33	76
5	Buried Meter	0	6	2	3	4	15
TOTAL		**131**	**300**	**546**	**403**	**665**	**2045**

Based on the survey results, customer water meter accuracy is divided into 2, namely accurate water meters and inaccurate water meters. From the results of the calculations that have been carried out, it was found that there was some increase in the accuracy of customer water meters. In January there were 115 accurate House Connections, in February there were 238 House Connections, in March there were 448 House Connections, in April there were 359 House

Connections, and in May there were 606 House Connections. From the data above, calculations have been carried out with a maximum limit of 5%.

In the recap of the customer water meter accuracy results, there is an inaccuracy in the customer meter because the water pressure released by the customer has exceeded the usage limit of 2000/liter. Not only water pressure affects inaccuracy but the occurrence of damaged meters and blurry meters. Based on this statement, the water meter replacement is in an inaccurate and damaged condition because it exceeds the technical age limit, which is approximately 5 years and the water meter has never been replaced. If the water meter replacement is carried out, it can increase income at PDAM Tirta Perwira Purbalingga. Apart from increasing income through regular replacement of water meters, PDAM must also implement production cost efficiency through energy efficiency and reduce water loss levels to increase income.

Based on the previous discussion, it is necessary to propose a Flowchart for preparing customer water meter accuracy to carry out a water meter accuracy calculation and check problematic water meters. The flowchart is created based on explanations obtained from the reference section, namely the technical section and the preparation of SOPs that have been approved by the leader. The following is an image of the proposed Flowchart.

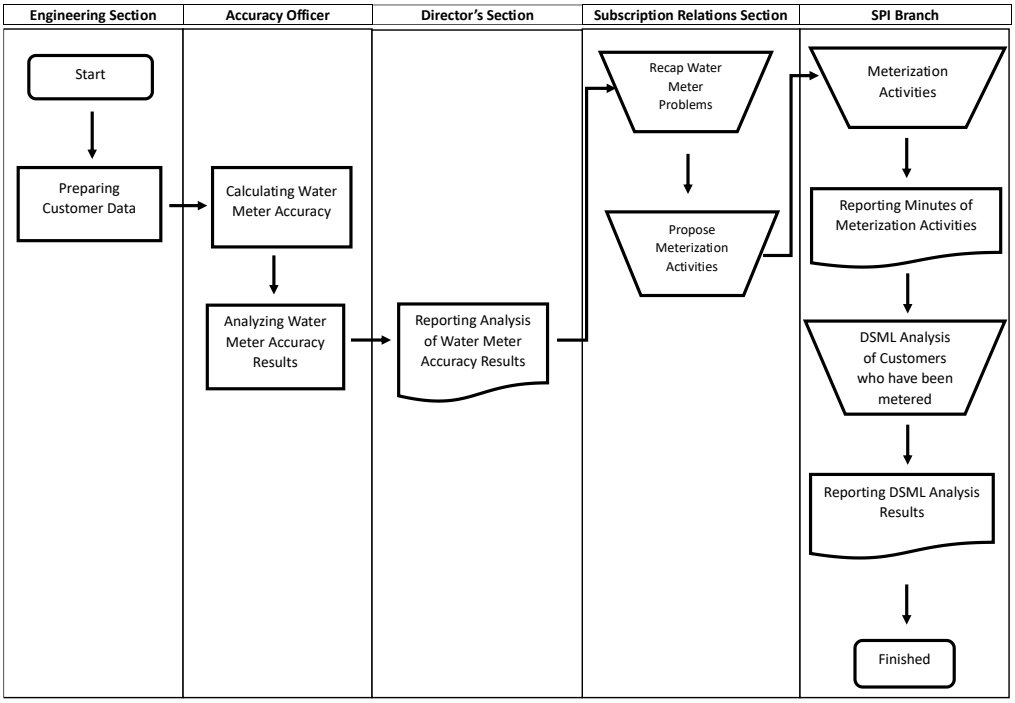

Figure 1. Flow chart for preparing customer water meter accuracy

5. Conclusions and Recommendations

5.1 Conclusions

It can be concluded that each month produces different water meter accuracy index figures with an accuracy limit of 5%. This shows that PDAM still lacks the ability to provide water meters that comply with water meter accuracy specifications. Not only that, PDAM in implementing the customer data input system is still an evaluation in implementing the work system in the company.

5.2 Recommendations

It would be better if the Tirta Perwira Purbalingga Regional Drinking Water Company is expected to routinely carry out inspections at customer locations every month to optimize checking water index numbers and checking water meters as quality control which is implemented so that the water meters used by customers still function well and efficiently so that can maintain the level of accuracy of the water meter. If the water meter is damaged then the PDAM will follow up by replacing the water meter with a new one and if the meter is buried then the meter position must be lifted to make it easier for the meter reader to carry out the inspection properly. It is recommended that the Tirta Perwira Purbalingga Regional Drinking Water Company make a flowchart explaining the submission of water meter accuracy and meterization activities in order to find errors or deficiencies in the submission activities.

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