Analysis of customer satisfaction level factors on service of PDAM Tirtanadi in Padang Bulan branch

M A Ridha\textsuperscript{1}, A Marisa\textsuperscript{1} and B O Y Marpaung\textsuperscript{1}

\textsuperscript{1}Master Degree Program of Architecture, Faculty of Engineering, Universitas Sumatera Utara – Padang Bulan, Medan, Indonesia
Telephone +62(61) 8219525 Postal Code 20155
E-mail: abdi_ridha@yahoo.co.id

Abstract. The Regional Water Company of Tirtanadi in Padang Bulan Branch seeks to provide services to meet the needs of clean water, but on the way, it often gets complaints from the public or customers. Community complaints in obtaining clean water are still an obstacle in PDAM Tirtanadi, especially in the service area of Padang Bulan Branch. This research was carried out useful in the development of the theory especially about the level of customer satisfaction with the services provided by PDAM Tirtanadi Padang Bulan Branch. Can also provide information or a more real picture, especially about the condition of customer service PDAM Tirtanadi Padang Bulan Branch with satisfaction received by customers so that they find the factors that cause the optimal service provided. The study was conducted by distributing questionnaires as many as 400 respondents. From the results of this analysis, the results of the level of service, especially the quality of the smell of clean water, need attention, and the skills of field workers need to be improved.

1. Introduction
Infrastructure is a basic facility, and installation where the continuity and growth of the community are very dependent. Infrastructure is closely related to the population and socio-economic population. In short, it can be said that in line with the increasing population, the urban facilities and infrastructure system will continue to grow. This demand is related to the level of clean water services provided by the government. One important component of basic urban infrastructure is clean water services.

PDAM Tirtanadi is a Regional Owned Enterprise, which is a company engaged in the provision of clean water services. One of the objectives of the establishment of this PDAM is to fulfill the community’s need for clean water, including the provision, development of facilities and infrastructure and distribution of clean water, whereas the other objectives are to participate in developing the economy to support regional development and seek profit as the main source of funding for the region. While in the field of service by developing professional services to provide satisfaction to its customers.

PDAM Tirtanadi Padang Bulan Branch is one of the marketing branches in the zone I region, with the number of customers up to the end of 2017 amounting to 52,204 customers. PDAM Tirtanadi Padang Bulan Branch has sought to provide services to meet the need for clean water, but often complain clean water seems to be still an obstacle that has not been fully overcome. In its implementation, PDAM Tirtanadi Padang Bulan Branch is faced with several of customer complaints.
problems related to the level of customer satisfaction. Based on data sourced from PDAM Tirtanadi, Padang Bulan Branch from January to December 2017 obtained 6,521 complaints and complaints relating to customer satisfaction [1]. The forms of complaints and customer complaints include:

1. Small and dead water discharges of 11.42% or as many as 745 reports
2. 37.29% of pipes leaked or 2,432 reports
3. Water meters die by 40.30% or 2,628 reports
4. Water meter readings that are not in accordance with the volume used are 1.18% or 77 reports
5. The distribution of clean water is not smooth as much as 9.81% or 639 reports

The level of customer satisfaction is influenced by:
1. Water quality distribution (clarity, the taste of water, the smell of water), 2. Continuity of water (availability of water at certain hours, smooth running water), 3. Condition of water meters (meter reading, meter replacement, lighting), 4. Payment location (close to where you live, easily accessible), 5. Handling complaints (responsive service, officers serving well).

The impact of complaints and complaints submitted by customers is not only limited to customers, but also on public activities, especially in public service facilities, especially in the Padang Bulan area. This fact shows that PDAM Tirtanadi Padang Bulan Branch is faced with a problem concerning service, which is still a lack of quality services provided to its customers. Therefore, the quality of service of PDAM Tirtanadi Padang Bulan Branch that can give satisfaction to its customers is one of the important issues in realizing a professional and reliable public service system. The Continuity of Regional Companies PDAM Tirtanadi Padang Bulan Branch is very dependent on the existence and loyalty of its customers. Meanwhile, on the other hand customer loyalty requires a balance of satisfying service.

The Regional Water Company of Tirtanadi Padang Bulan Branch as one of the Regional Owned Enterprises is required to develop and develop quality services continuously, so that finally it can overcome various complaints about dissatisfaction that has been felt by the customers, while the company can seek to increase customer satisfaction accurately and real. Complaint handling provides an opportunity to turn a disgruntled customer into a satisfied customer. If a customer is satisfied, satisfaction is not necessarily going to happen in the future. Therefore, this satisfaction is only short term. If you want to maintain it, you should always look for customer value, especially for the future, and complete it with customer analysis. The process of handling customer complaints must be effective, which starts identification, along with determining the source that causes customers to be dissatisfied and not complain.

To handle customer service, PDAM Tirtanadi Padang Bulan Branch has six drill well units whose locations are spread over the service area as well as the supply of water discharge originating from Sibolangit and Sunggal IPAM. Along with the development of the population, customers in the Padang Bulan Branch area are also increasing, therefore the PDAM must be able to prepare sufficient water supply to meet the level of population development. To anticipate this increase in customers, Padang Bulan Branch PDAM Tirtanadi has sought several potential water sources in order to meet clean water needs, including: (1) Construction of the Pancur Batu Drinking Water Treatment Plant with a capacity of 40 liters per second ) Uprating the Sunggal Drinking Water Treatment Plant with a capacity of 500 liters / second. [2]

In a situation like this, improving service quality and realizing customer satisfaction is one way that can be done by PDAM Tirtanadi Padang Bulan Branch and utilizing the best momentum that exists, to stay afloat, grow and create profits. Satisfaction or failure of a customer is highly dependent on the company's ability to provide customer value by the perceived value of its customers.

The research problem proposed is the level of customer satisfaction with service at PDAM Tirtanadi Padang Bulan Branch which is influenced by water quality, continuity, meter conditions, payment locations and handling customer complaints.

The purpose of this study was to identify the level of satisfaction and the influence factors of service satisfaction levels provided by PDAM Tirtanadi Padang Bulan Branch.

This research is expected to have benefits including:
1. This research is useful in the development of theory, especially about the level of customer satisfaction with services provided by PDAM Tirtanadi Padang Bulan Branch.
2. To provide information or a more real picture, especially about the condition of customer service PDAM Tirtanadi Padang Bulan Branch with satisfaction received by customers so as to find factors that cause the optimal service provided.
3. This research is also useful as a material consideration in the preparation of government policies and related parties to maximize public service.

The limitations of the problem in this study are as follows:
1. Location of research or study area and data collection only in the scope of PDAM Tirtanadi Padang Bulan Branch
2. The satisfaction referred to in this study concerning customer satisfaction and the factors that influence customer satisfaction PDAM Tirtanadi Padang Bulan Branch.
3. Review of service quality is limited to small water discharge, leaky pipes, dead/damaged meters, meter readings that are not by the use and distribution of non-current clean water.

2. Method
The research approach used in this study is a quantitative descriptive approach to primary process data obtained from research samples or in other words research procedures that emphasize numerical data (numbers) which are processed by statistical methods [3]. Variable determination methods determine the problem of the level of customer satisfaction in the community in the Padang Bulan Region. The method study was conducted by distributing questionnaires with quantitative methods. To determine the number of samples used the Slovin formula [3], namely:

\[ n = \frac{N}{1 + Ne^2} \]  \hspace{1cm} (1)

To measure the level of customer satisfaction in PDAM Tirtanadi Padang Bulan Branch, researchers in this case used 20 questions with the number of respondents as many as 400 respondents in the form of questionnaires used in general, using a Likert scale model, starting from the lowest level (very dissatisfied) to the highest (very satisfied) [4].

2.1 Testing validity
Validity (validity) of a measuring instrument is the ability of the measuring instrument to measure what actually must be measured or in other words a measuring to be able to measure indicators - indicators of a measurement object. Validity is necessary because processing other data that is not valid or biased will produce incorrect conclusions.

2.2 Reliability Testing
Reliability testing is done to determine the consistency of the measuring instrument used, so that the results of a measurement can be trusted. The statistical formula used is the technique of alpha Cronbach's reliability analysis. The function of this formula is to find out the reliability (reliability) of the questionnaire instrument as a measure of the satisfaction level of the PDAM customers. Alpha Cronbach reliability analysis formula. The function of this formula is to find out the reliability of the questionnaire instrument as a measure of PDAM customer satisfaction level. Alpha Cronbach's reliability analysis formula as follows:

\[ \alpha = \frac{k}{k - 1} \left[ 1 - \frac{\sum_{j=1}^{k} \sigma_j^2}{s_x^2} \right] \]  \hspace{1cm} (3)

Where: \[ \alpha \] = Cronbach Alpha reliability coefficient
The number of test items tested

\[ k = \text{The number of test items tested} \]

\[ (\Sigma s_j^2) = \text{Amount of variance; } j = 1, 2, 3 \ldots k \]

\[ (s_x^2) = \text{Test score variance} \]

The level of reliability can be interpreted:
1. If \(\alpha > 0.90\) then the reliability is perfect
2. If \(\alpha\) is between 0.70 - 0.90 is high
3. If \(\alpha\) is between 0.50 - 0.70 then moderate reliability
4. If \(\alpha < 0.50\) is low

states if the coefficient number \(\alpha = 0.60\), then the group of items - question items can be considered reliable, this study uses SPSS tools [2]

Next is the calculation using the ideal score, which is the score used to calculate the score to determine the rating scale and the number of answers. To calculate the number of ideal scores (criteria) of all items used the following formula:

**Criterium Score = Scale Value x Number of Respondents**

### 3. Results and Discussions

The characteristics of the respondent's data for distributing questionnaires were 400 respondents based on:
1. Respondents have been in the research area for at least one year
2. Respondents are clean water users of PDAM Tirtanadi Padang Bulan Branch at least one year
3. Respondents understand the desires that customers should get
4. Respondent is the use of fixed facilities PDAM Tirtanadi Padang Bulan Branch

#### 3.1 Testing of Analysis:

Customer data of PDAM Tirtanadi Padang Bulan until the end of 2017, totaling 52,204 customers.

Based on Slovin formula to find the number of samples as follows:

\[ n = \frac{52.204}{1 + (52.204)(0.05)^2} \]

\[ = 396.589 \approx 400 \text{ respondent} \]

- Validation testing

Validation testing of the questionnaire was carried out using the SPSS program, so the results of the analysis of the program can be seen in the following table:

| Item | r   | r-table | Keterangan |
|------|-----|---------|------------|
| 1    | 0.428 | 0.098  | Valid      |
| 2    | 0.301 | 0.098  | Valid      |
| 3    | 0.502 | 0.098  | Valid      |
| 4    | 0.633 | 0.098  | Valid      |
| 5    | 0.394 | 0.098  | Valid      |
From the results of the analysis of validity, the results obtained $r > r_{table}$ so that the data from the respondents' is valid.

- Reliability testing

After analyzing reliability testing a value of $\alpha = 0.742$, If $\alpha$ between 0.70 - 0.90: high reliability, then the results of the questionnaire obtained include high reliability. Generally a variable is said to be reliable if giving Cronbach Alpha values greater than 0.60. [5]

To find out value of measuring the level of customer satisfaction is done by Likert scale measurement. The answers from the Likert scale are then processed into value points. Respondents were analyzed to find out which items were the real boundaries between high scores and low scores on the total scale.

The results of the statement questionnaire from 400 respondents generated the customer satisfaction level scale as follows:

**Table 2. Customer Satisfaction Level Scale**  
Source: Data Processing Results

| No. | Customer Satisfaction Level | Rating Scale |
|-----|-----------------------------|--------------|
| 1.  | Strongly Disagree           | 0 - 400      |
| 2.  | Disagree                    | 400 - 800    |
| 3.  | Less agree                  | 800 - 1200   |
| 4.  | Agree                       | 1200 - 1600  |
| 5.  | Strongly agree              | 1600 - 2000  |

The results of the analysis of the measurement of customer satisfaction from the distribution of questionnaires to customers as many as 400 respondents with 20 items of questions:

**Table 3. Results of Customer Satisfaction Levels**  
Source: Data Processing Results

| No. | Service Elements | Customer Satisfaction Level | Results | Category |
|-----|------------------|-----------------------------|---------|----------|
| 1.  | Water clarity    | SS: 97, S: 254, KS: 49     | TS: -   | STS: 1.746 | Agree   |

| 6   | 0.471            | 0.098                       | Valid   |
| 7   | 0.512            | 0.098                       | Valid   |
| 8   | 0.516            | 0.098                       | Valid   |
| 9   | 0.375            | 0.098                       | Valid   |
| 10  | 0.314            | 0.098                       | Valid   |
| 11  | 0.344            | 0.098                       | Valid   |
| 12  | 0.417            | 0.098                       | Valid   |
| 13  | 0.299            | 0.098                       | Valid   |
| 14  | 0.433            | 0.098                       | Valid   |
| 15  | 0.422            | 0.098                       | Valid   |
| 16  | 0.302            | 0.098                       | Valid   |
| 17  | 0.387            | 0.098                       | Valid   |
| 18  | 0.312            | 0.098                       | Valid   |
| 19  | 0.429            | 0.098                       | Valid   |
| 20  | 0.390            | 0.098                       | Valid   |
4. Conclusions and Recommendation

Conclusions. From the results of the analysis carried out through the SPSS program and manual calculation, the customer satisfaction levels is at PDAM Tirtanadi Padang Branch have answers to 30% of Highly Approve customers in terms of water availability services, payment locations, officer friendliness, usage rates and convenience complaint information. While the categories of water clarity, odor quality, fluency, quantity, water flow, meter reading, officer skills, distance of payment location, payment place, customer waiting room, complaint service and other information convenience obtain agreed value with a percentage value of 60%, and less Agree 10% this is found in the service element of the quality of water taste and speed of the officer. In this case PDAM Tirtanadi Padang Bulan Branch must improve itself, especially in terms of improving water quality, namely the quality of taste and in increasing the speed of officers in handling each report from customers. The same thing also happened in the assessment of the level of customers whose agreed value of 60% was still at the level that needed attention because the value obtained was still not maximal.

|   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|
| 2. | Water quality | 31 | 81 | 135 | 39 | 114 | 1.076 | Disagree |
| 3. | Quality of water odor | 77 | 209 | 101 | 13 | - | 1.550 | Agree |
| 4. | Smooth water | 152 | 117 | 98 | 21 | 12 | 1.576 | Agree |
| 5. | Water availability | 101 | 253 | 36 | 6 | 4 | 1.641 | Strongly agree |
| 6. | Water quantity | 22 | 301 | 53 | 24 | - | 1.521 | Agree |
| 7. | Water flow | 87 | 218 | 42 | 38 | 15 | 1.524 | Agree |
| 8. | Meter reading | 24 | 117 | 159 | 100 | - | 1.265 | Agree |
| 9. | Officer skills | 33 | 128 | 195 | 44 | - | 1.350 | Agree |
| 10. | Officer speed | 11 | 63 | - | 326 | - | 959 | Disagree |
| 11. | Location of payment | 21 | 271 | 106 | 2 | - | 1.723 | Strongly agree |
| 12. | Distance to payment location | 38 | 298 | 63 | 1 | - | 1.573 | Agree |
| 13. | Transfer to pay location | 46 | 325 | 28 | 1 | - | 1.616 | Strongly agree |
| 14. | The place of payment | 24 | 350 | 25 | 1 | - | 1.597 | Agree |
| 15. | Customer waiting room | 58 | 291 | 50 | 1 | - | 1.606 | Agree |
| 16. | Complaint service | 99 | 250 | 12 | 1 | 38 | 1.533 | Agree |
| 17. | Hospitality of officers | 99 | 250 | 50 | 1 | - | 1.647 | Strongly agree |
| 18. | Ease of other information | 14 | 265 | 120 | 1 | - | 1.492 | Agree |
| 19. | Usage tariff | 175 | 207 | 17 | - | 1 | 1.755 | Strongly agree |
| 20. | Ease of complaint information | 101 | 267 | 32 | - | - | 1.669 | Strongly agree |
Recommendation. Based on the benefits of the research, the recommendations in this study are aimed at Local Governments, especially the Regional Water Company of Tirtanadi, Padang Branch. This research is useful as input in increasing customer satisfaction in service to the community, so that people can enjoy drinking water supplied by PDAM Tirtanadi feeling satisfied.

Acknowledgment. This study of the analysis of factors that influence the level of satisfaction in PDAM Tirtanadi Padang Bulan Branch is a research of lecturers and students in the Master Degree in the faculty of engineering at the University of North Sumatra. This research can be an input for PDAM Tirtanadi Padang Bulan Branch in increasing the need for clean water in the people of Medan City.

References
[1] Monthly Report of PDAM Tirtanadi Padang Bulan Branch, 2017
[2] Business Plan for PDAM Tirtanadi 2015-2019, PDAM Tirtanadi, North Sumatra Province
[3] Azwar 2003, Siti Rochmah, Journal of Customer Satisfaction Analysis of Service Quality of Malang PDAM, Universitas Brawijaya
[4] Savana Marsha, 2012, Journal of Analysis of the Level of Customer Satisfaction with Services at Regional Water Companies in Bengkalis District, University of Riau
[5] Idham Khalid Siregar, ST, 2018, Analysis of the Level of Drinking Water Service in the Context of Drinking Water Customers’ Tirtanadi, PDAM Tirtanadi, North Sumatra Province