

# Quality and Service Innovation Affecting Customer Satisfaction Through PDAM Billing Awareness

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## ABSTRACT

PDAM Kabupaten Jember, as a regional company providing drinking water services, focuses on improving service quality and implementing service innovations. Data on customer complaints that have increased since 2016-2019 shows that there is customer dissatisfaction with the services of PDAM Kabupaten Jember. The study aimed to examine the effect of service quality and innovation on customer satisfaction of PDAM Jember through customer awareness in paying PDAM water tariff bills. The research sample was 100 people who were taken using a simple random sampling method. The data analysis technique used warp PLS software to test the direct and indirect effects of the research variables. The research findings directly affect service quality and innovation on consumer awareness, a direct influence on service quality and innovation on customer satisfaction, and the effect of paying tariff awareness on customer satisfaction. The research findings also show an indirect effect of paying tariff awareness, strengthening the relationship between quality and service innovation on customer satisfaction. There is an indirect effect of paying tariff awareness, which strengthens service innovation on customer satisfaction.

**Keywords:** *Quality, Innovation, Awareness, Customer Satisfaction*

## 1. INTRODUCTION

Services performed by public organizations are intended for the benefit of the community and are regulated in the provisions of the applicable legislation. In providing services to the community, every public organization has rules and work procedures that the government has set. The services of public organizations are always required to fulfill the community's needs and improve the welfare of the community. As a party that feels public services, the community wants quality, innovative, effective, efficient, and uncomplicated services.

Public service is the focus of public service reform by placing and restoring the essence of public service. Before the reform, public services mainly were carried out with complicated rules and took a long time, resulting in dissatisfaction among the service users. After the reform era was implemented, services aimed at the community were carried out more effectively and efficiently by reducing various requirements and mechanisms that tend to be complicated and take a long time. Bureaucratic reform in public organizations for the benefit of the community emphasizes services that are fast, precise, responsive, responsible, effective, and efficient.

The government, as a party that is obliged to provide public services and goods for the community, is bound by general rules and policies. What is meant by public goods and services is in the form of products and or services provided by government organizations as stakeholders and managers of people's lives that cannot be represented to private organizations because they involve the interests of the public interests. The role of these government organizations remains as a pure provider of public goods and services.

One type of public service is clean water service, which in this case is managed by the Regional Drinking Water Company (PDAM) located in each city or district. In this study, clean water service is an essential theme of public service in Jember Regency, given the importance of the role of clean water supply in human life. Water is a basic need in human life. Clean water is a basic human need for the sustainability of life. The fulfillment of clean water for the community is a necessity of life which is the government's responsibility. In this case, regional-owned enterprises manage it. Regional drinking water companies (PDAMs) are regional business entities responsible for providing clean water for the community and the prosperity of the community.

PDAM Jember is a regional business entity that aims to meet clean water needs for the community, including activities for providing clean water facilities, developing clean water facilities, providing clean water facilities, and distributing clean water. In addition, the purpose of providing clean water services is to develop the economy to strengthen regional development and create employment opportunities and as one of the regional revenues from the non-tax sector. Regional Drinking Water Companies (PDAMs) must provide quality services and innovate to create drinking water customer satisfaction. Customer satisfaction is the spearhead of PDAM's success in running public services. Customer satisfaction is influenced by several factors, including service quality, service innovation, and public awareness of PDAM service users to pay PDAM tariff bills.

The quality of public services has a standard measure that is determined as good service. Service quality focuses on two aspects: technical quality, which involves what is provided, and functional quality, which measures how it is provided [1]. The excellent quality of public services will encourage the creation of public service innovations. Public services organized by government organizations are regulated by Law Number 25 of 2009 concerning public services [2]. What is meant by public service is a series of activities of public organizations to meet the needs of the community by applicable regulations in the form of goods, services, and administrative services. According to PP No. 96 of 2012 concerning public services [3], chapter 1 article 1 states that public services are service activities by the laws and regulations for every citizen in the form of goods, services, or administrative services carried out by public service institutions. In providing public services, every apparatus of public organizations (government) can be involved to provide services also related to the improvement of public service facilities and infrastructure. Public service activities require facilities, infrastructure, and human resources involvement is an essential thing that needs to be done by public organizations, so other efforts are fundamental to achieving service quality.

Public services also open opportunities for service innovation in the form of new concepts, processes, and applications to be implemented and developed by public organizations. What is meant by service innovation is a process consisting of new concepts and processes that are implemented within an organization. [4] state that innovation is an idea or concept that is perceived as something new. Innovation also refers to changes in concepts and ideas that are perceived as applicable by the community.

Innovations made by public or government organizations impact the behavior of people who use goods and services provided by government organizations. Furthermore, [4]) state that product innovation is a knowledge transformation process that is implemented by products and services that use new actions or processes. Successful innovation exploited from an idea is implementing knowledge, skills, and technology combined with experience to create products and services.

Public awareness, in this case, PDAM service users, is defined as an internal impulse that consciously, through consideration of thoughts and feelings, causes an action that leads to the achievement of goals to meet the needs of life. Awareness of customers to perform the obligation to pay PDAM tariff bills is a customer condition that comes from the results of thoughts and considerations to achieve a goal. According [5], awareness of paying tariff bills is a customer's willingness to pay some money or meet some costs or exchange something to get a product and service needed by the customer. Awareness of paying can also be interpreted as some values that are willing to be contributed by customers as determined by laws and regulations that get counter-productive or direct returns in the form of products or services. The management of PDAM Jember's operational activities is aimed at providing services to the community. However, there are still some weaknesses in the service that lead to public complaints, so it has an impact on the awareness of customers who want to get excellent service from PDAM Jember Regency. The following is the customer complaint data of PDAM Jember in 2016-2019:

**Table 1.** Customer Complaint Data Table 2016-2019

Bulan	2016	2017	2018	2019
January	78	40	103	110
February	65	37	90	128
Maret	84	38	120	121
April	63	34	120	129
Mei	52	54	122	124
Juni	71	20	76	80
Juli	74	69	140	126
Agustus	69	135	140	128
September	73	102	179	132
Oktober	74	122	250	170
November	84	72	163	200
December	60	75	103	188
Jumlah	847	798	1606	1636

Source: PDAM Jember

The table above shows an increase in the number of customer complaints of PDAM East Java Regency. In 2016 the number of customer complaints was 847 types of complaints. In 2017 there were 798 complaints. In 2018, there were 1606 types of complaints. In 2019 there were 1636 types of complaints submitted by PDAM Jember Regency customers. This increase in the number of customer complaints shows that there is dissatisfaction with the quality of service both in terms of the installation of the PDAM water network and also the maintenance of the PDAM water network. In addition, the lack of innovation carried out by PDAM Jember Regency is also allegedly one of the causes of customer dissatisfaction. The table shows that there is an increasing number of customer complaints, especially in 2019. These customer complaints are generally caused by more minor than optimal services and limited facilities and services provided by the Jember PDAM office.

Many people complain about clean water services provided by PDAM Jember. Complaints felt by the community include the availability of clean water debit. This is because the supply of water from water sources still depends on the season and natural conditions. In the dry season, the amount of water distributed to the community will be less than during the rainy season. In addition, the quality of the distributed water is also often complained about by the community. Often, pristine water quality is not clear and cloudy in color and has a stumbling block in its distribution. So it seems that the quality of clean water is not suitable for consumption. Other problems that interfere with the service process carried out by PDAMs are caused by leaks or damage to water pipes that hinder water distribution.

In terms of revenue, the high number of arrears in drinking water payments by consumers can also hamper the operational activities of PDAM Jember. This is because the billing department is still less proactive in carrying out the billing function. Often, innovations in the use of social media and bill payment applications are still not used optimally. Some people still do not understand how to pay using the various payment applications offered by PDAM Jember, so more intensive socialization is still needed. Ease and facilities in payment are one of the service innovations currently being developed by PDAM Jember.

Several previous studies examining service quality and service innovation on customer satisfaction through public awareness are as follows:

1. Aditi, and Hermansyur [6], innovation and creativity significantly positively affect consumer satisfaction.

2. Basith et al. [7], the significant effect of product quality on customer satisfaction and service quality on customer satisfaction.
3. Antarego et al. [8] Service innovation affects customer satisfaction.
4. Sawitri, et al. [9] service quality has a significant effect on satisfaction.
5. Sukmawati and James [10] there is no significant effect of service quality on customer satisfaction.
6. Hartini [11], Innovation has no significant effect on customer satisfaction.

Based on several previous studies, it was found that research gaps showed that there was an insignificant effect of service quality and service innovation on customer satisfaction. At the same time, the novelty built in this study is to use customer awareness in fulfilling the obligation to pay PDAM tariff bills as an intervening variable which is assumed to strengthen service quality and service innovation that affects customer satisfaction of PDAM Jember Regency.

The formulation of the research problem proposed is: Does service quality affect customer awareness of paying PDAM tariffs? Does service innovation affect customer awareness of paying PDAM tariffs? Does service quality affect PDAM customer satisfaction? Does service innovation affect PDAM customer satisfaction? Does customer awareness of paying tariffs affect PDAM customer satisfaction? Does service quality affect customer satisfaction through awareness of paying PDAM tariffs? Does service innovation affect customer satisfaction through awareness of paying PDAM tariffs?

## 2. THEORETICAL REVIEW

### 2.1 Grand Theory

The grand theory that underlies this research is about the behavior displayed by each individual, in this case, various consumers or customers. The diversity of customer behavior has attracted the attention of many experts who researched this behavior. The theory of consumer behavior that examines the efforts or activities carried out by individuals to obtain goods and services. The behavior of consumers or customers, in this case, is how a customer responds and responds to changes in product prices, and increasing consumer needs will be motivated by needs. Customer needs arise when customers want to get the benefits of these needs so that it can be said that customer behavior appears as an effort to meet particular needs, desires, and goals [12].

The behavior of consumers or customers also arises from the intentions and conditions from within the customer, which government organizations can observe as a decision to select the product or service needed by paying a fee to meet these needs. Purchased to fulfill their needs and wants. In TPB theory, beliefs are the basis of information that ultimately determines behavior. This theory is not related to the amount of information (that is, to the number of confidence people hold) or to the accuracy of that information. Whereas beliefs in TPB theory reflect wishful thinking or bias in other ways, and do not represent information that is considered necessary in certain behaviors.

Nevertheless, these beliefs are thought to guide a person's intentions and behavior. Specifically, beliefs about behavioral consequences (behavioral beliefs) are assumed to determine attitudes toward behavior, beliefs about the expectations and behavior of others (normative beliefs) are assumed to determine subjective norms, and beliefs about potential facilitating or inhibiting factors (control beliefs) are assumed to be determine perceived behavioral control. Attitudes, subjective norms, and perceptions of these controls combine to produce intentions and actual control, determining the individual's behavioral performance [13]. Theory of Planned Behavior, according to Ajzen, is a theory that assumes that a reasoned and planned action by an individual is rationally considered and implied in the form of decision making. A rational decision-making indicates that the decision is made under conditions of uncertainty. Rational decision-making shows the expectation of optimal results and leads to a consequence [12].

## 2.2 Service Quality Theory

[14] defines quality as a fit that is oriented to meet customer expectations. [15] put forward an opinion that explains quality in terms of both producers and consumers. According to the manufacturer, quality is a conformity of product specifications for goods and services produced by producers with certain specifications. Meanwhile, according to consumers, quality is a value or value attached to a product or service with a level of conformity to the requirements, compatibility, repair, free from damage. It can meet customer needs from the first time using the product or service [16].

Another opinion was put forward by [17] that quality is the overall characteristics and characteristics inherent in a product or service that satisfies the needs that are both inherent in the product and those implied in the service. So that it can be interpreted that quality is everything that meets the needs and desires of

customers. [18] identified five dimensions to measure service, namely:

1. Reliability, is the ability to perform services and satisfy as promised.
2. Responsiveness, is the ability to help customers and provide services to serve customers.
3. Assurance, is an attitude of courtesy and trustworthiness, knowledgeable and free from risk and doubt.
4. Empathy, is caring, understanding, and paying attention to customer needs.
5. Tangibles, are facilities in the form of objects, both supporting facilities, and infrastructure.

Meanwhile, [16] states quality as a condition related to products in the form of goods and services, the environment, processes, and humans that meet expectations. Quality is related to customer needs and customer perceptions of these products and services.

## 2.3 Service Innovation Theory

Basically, innovation is a concept consisting of products or services, ideas, concepts, methods, or systematics that are perceived as new. Innovation refers to the existence of new changes that are intended for experienced users. [4] state that innovation is a process of transforming knowledge and technology in the creation of new products and services, by exploiting new ideas in the form of knowledge, technical skills, and experience in creating products, services, and services. There are two steps towards innovation, namely (i) procedures for making plans and actualizing them appropriately (ii) conclusions which are the final results. The procedure consists of ways or ideas to realize the action, while the final result is from a service or manufacturing company. Two main inputs are essential for expected conclusions, and namely, first, the associate staff must have the capacity to create and manage arrangements that return imaginative plans. Both staffs must have the ability to choose which thoughts are valuable and productive. [19]. [20] distinguishes innovation as follows:

1. Continuous Innovation, namely innovation of old products and not making new products that influence consumer behavior such as introducing changes in new shapes and appearances to improve product taste.
2. Dynamic Continuous Innovation, namely creating new products or changes in services that have been carried out but do not change the

pattern of consumer behavior in using products or using services.

3. Disconnected Innovation, namely introducing new products that significantly affect consumer behavior patterns.

## **2.4 Theory of Awareness**

According to [21], what is meant by awareness consists of four stages where each stage is a requirement for the next stage, which includes knowledge, understanding, determining attitudes, and determining actions. [2] states awareness as an element of understanding reality and how to act. This awareness includes awareness of oneself, others, the past, and the future. Public awareness will grow when people have done whatever they need. The absolute needs of the community can be carried out in an anticipatory representation. This means that every member of the community must be aware of what they are doing, so that they become extrinsically motivated to satisfy the wants and needs of the public [23].

[24] stated that the awareness that applies in people's lives includes:

1. Knowledge is an understanding of what organizational institutions implement programs.
2. Attitude includes emotional responses in the form of statements of likes, dislikes, and responses to take action.
3. Behavior or practice is an act that is aggressive or apathetic about a program.

## **2.5 Satisfaction Theory**

Kotler and Armstrong [25] argue about satisfaction as a feeling of either pleasure or disappointment experienced by someone because of comparing product results with expectations for the product. [20] stated that the main factor determining people's satisfaction is the public's perception of the quality of goods or services. Several approaches to customer satisfaction in public organizations are [26]:

1. Narrowing the gap between the management of public and community organizations.
2. Public organizations can build commitment and create a vision of service improvement.
3. The public is allowed to submit complaints as input, criticism, and suggestions.
4. Public organizations develop services by community expectations.

Another opinion was expressed by [20], which states that the determinants of the level of customer satisfaction are:

1. Customer satisfaction on the quality of the product and or service if the customer can feel the quality of the product and or service used.
2. Customers will be satisfied with the quality of service by expectations.
3. Emotionally, people feel proud and confident in using certain products or services that tend to feel satisfied.
4. Product quality will determine the price of products that provide more value to customers.
5. Customer satisfaction can be achieved if the customer does not need to incur additional costs to obtain goods or services.

Kotler and Armstrong [25] state that consumer satisfaction is a feeling of likes or dislikes experienced by customers who compare product performance with product expectations. If the comparison shows that the reality is better than expectations, the service has a quality that can meet customer expectations. Vice versa, if the comparison shows the reality is worse than expectations, the ignition can be declared not of quality. [27] states that customer satisfaction is a feeling that customers feel in the form of pleasure and dislike of the perceived value of conformity between expectations and product performance produced by the organization. Meanwhile, [12] stated that customer satisfaction encourages each individual to obtain satisfaction. Customer satisfaction is recognized as one of the critical success factors in today's competitive business environment as it affects market share and customer retention. Customers who tend to be satisfied will remain loyal to use the company's products and services [1]. According to [16], there are four ways that public organizations can measure customer satisfaction:

1. Suggestion and complaint handling system in which public organizations are oriented towards meeting customer expectations, public organizations provide opportunities and easy access for customers. In addition, public organizations must also be willing to accept criticism, input, suggestions, and even customer complaints through communication media such as websites and comment fields.
2. Ghost Shopping or mysterious shopping that is used to provide an overview of customer satisfaction by employing several people as mysterious buyers or ghost shoppers who act as potential customers who pretend to buy products

or services of public organizations. This ghost shopper will make careful observations of product developments and answer customer questions and complaints. This is done to assess the performance of public organizations.

3. Lost customer analysis is an attempt by public organizations to contact customers who no longer buy products and switch to other decisions.
4. Customer satisfaction survey is a survey conducted either by post, e-mail, internet, telephone, or direct interview. Surveys conducted by public organizations aim to obtain direct feedback from customers.

The hypothesis proposed in this study is based on developing a theoretical framework and the findings of previous studies. The following is an explanation of the development of the hypothesis:

### **2.6 Service quality affects customer awareness**

Quality is defined as a value or value to express an assessment of a product or service with a level of suitability, suitability, feasibility for use, avoids damage to make customers happy [16]. Meanwhile, customer awareness of paying the bill for drinking water shows the willingness and ability of customers based on knowledge, attitudes, and behavior to fulfill these obligations. The level of customer awareness can be built from the knowledge gained about the quality of service provided by the PDAM. Service information that is appropriately conveyed to customers creates understanding and influences thoughts and behavior to fulfill the obligation to pay tariffs with full awareness without any coercion and pressure. Awareness, according to [22], is an element in humans who can understand and understand a reality and respond and take action to fulfill obligations. Customers who can see, feel, enjoy the quality of service are expected to be able to raise awareness of customers to fulfill the obligation to pay drinking water tariffs for the continuity of PDAM services. So that hypothesis 1 is stated as follows:

*H1: Service quality affects customer awareness.*

### **2.7 Service innovation affects customer awareness**

Service innovation is not just creating new products or changing existing products. Still, it is a unified idea, concept, procedure, technical systematic about a product or service produced by a public organization. The innovation activities carried out also include service introduction activities, service

completeness, service use, and service systems carried out by PDAMs to be able to provide understanding, knowledge, and information that can raise customer awareness of the importance of sustainability and availability of clean water services for residents of Jember Regency. Service innovations carried out must foster behavioral changes and customer mindsets to fulfill obligations and get value or value benefits from PDAM services. Service innovations that PDAM Jember continuously carries out are sought to arouse customer awareness so that customers are willing to comply with the obligation to pay PDAM tariff bills for the continuity of service and the availability of clean water for the people of Jember. So that hypothesis 2 is stated:

*H2: Service innovation affects customer awareness.*

### **2.8 Service quality affects customer satisfaction**

Service quality is an important thing that focuses on public organizations to achieve excellence and meet customer expectations and desires. Service quality affects customer satisfaction, where poor service has an impact on decreasing customer satisfaction. Customer satisfaction is a specific evaluation of the overall service so that public organizations can measure customer satisfaction based on the service delivery process. [17] state that customer satisfaction is all feelings experienced by customers when customers compare the performance of products or services produced with customer expectations. Service quality will determine customer satisfaction using PDAM services. The increasing satisfaction of customers who use PDAM clean water means that the quality of service has been realized as expected. Hypothesis 3 is stated as follows:

*H3: Service quality affects customer satisfaction.*

### **2.9 Service innovation affects customer satisfaction**

Service innovations carried out by public organizations also require the support of technological advances to be able to survive in the era of business competition. As a provider of clean water services, PDAM needs to continuously innovate that provides convenience and service excellence both in terms of access to information, service responsiveness, speed, and accuracy of service, and the use of technology that supports innovation. Innovations carried out by PDAMs will produce competitive advantages where PDAMs can carry out creativity and develop ideas that are carried out sustainably. Product creativity can be done by developing new ideas and concepts or

developing existing ideas to provide added value for customers. This value is expected to foster customer satisfaction from using the service and changing consumer behavior. Consumer satisfaction can be seen when consumers understand and understand the procedures and procedures for obtaining services. So that hypothesis 4 can be stated as follows:

*H4: Service innovation affects customer satisfaction.*

### **2.10 Customer awareness affects customer satisfaction**

Awareness of the customer to pay the tariff has the meaning as a condition where the customer knows, understands, and understands the procedure for paying the tariff. Customer awareness arises because of the information that is appropriately conveyed to customers. Information and knowledge about the services provided by PDAM Jember will increase customer awareness and impact increasing customer satisfaction. [17] state that customer satisfaction can be achieved when the reality obtained from the use of services is by customer expectations. Satisfaction can be achieved when customers gain knowledge and understanding of the performance results carried out by PDAM. So that hypothesis 5 states as follows:

*H5: Customer awareness affects customer satisfaction.*

### **2.11 Service quality affects customer satisfaction through customer awareness**

The optimal service quality performed by PDAM Jember is the main focus to achieve customer satisfaction. Improvements carried out on an ongoing basis are beneficial to meet customer expectations. In addition, customer quality also includes providing information and ease of accessing service features that provide added value for customers. Information and knowledge about services will be understood and understood by customers to foster customer awareness to comply with the provisions to obtain service. Customer awareness in carrying out tariff payment obligations is one of the essential things expected from an increase in service quality. The growing awareness of customers who obey the provisions of this PDAM will increase customer satisfaction in using clean water services. Satisfaction will be achieved if the customer can feel the benefits of service by customers' wishes and expectations, which is achieved by improving the quality of service. So that hypothesis 6 is stated as follows:

*H6: Service quality affects customer satisfaction through awareness of paying tariffs.*

### **2.12 Service innovation affects customer satisfaction through customer awareness.**

Service innovation carried out by public organizations is a series of applications of ideas, concepts, functions, and features or services that can add value to customers. The application of innovations carried out by public organizations can change the mindset and behavior based on understanding and understanding of product or service knowledge to raise customer awareness in paying PDAM bill payments. Through increasing customer awareness, it will increase customer satisfaction. So that hypothesis 7 states as follows:

*H7: Service innovation affects customer satisfaction through customer awareness.*

## **3. RESEARCH METHODOLOGY**

The approach taken by researchers in this study is quantitative. The research model used is explanatory research, where the research is conducted to test the hypothesis that was previously proposed using a research instrument in the form of a questionnaire. The questionnaire instrument is a set of questions arranged to obtain data and information about something being researched. (Sugiyono, 2013). This research was conducted at the PDAM Jember Office, which is located at Jl Trunojoyo No. 73 Kaliwates Jember. This research lasted for 3 (three) months, namely, during August - October 2020, which researchers used to collect research data, distribute questionnaires, and process data to produce research results. What is meant by research population is the generalization area of research objects or subjects with specific qualities and characteristics determined by researchers to be studied and concluded [28]. The population used in this study is the number of registered customers of PDAM Jember until August 2020. The sample determination is carried out accurately and can represent the total population of consumers or customers of PDAM Jember registered up to August 2020. The sampling technique used in this study was simple random sampling. According to [28] what is meant by simple random sampling is a simple sampling technique without paying attention to population strata. The probability sampling used in this study is a sampling technique with equal opportunities for each member of the population to be selected as a sample. In contrast, the probability sampling technique is carried out by the researcher using the accidental technique (convenience sampling).

[28] states that what is meant by accidental technique is using a sampling technique that is carried out by chance, meaning that any PDAM customers who happen to be met by researchers are used as research samples. The Lemeshow formula determines the number of samples, and this is because the total population is unknown. Here's the Lemeshow formula:

$$n = \frac{z^2 p (1-p)}{d^2}$$

Information:

n = Number of samples

z = z score at 95% confidence = 1.96

p = Maximum estimate = 0.5

d = Sampling error (0,10)

Through the above formula, the number of samples to be taken is:

$$n = \frac{z^2 p (1-p)}{d^2}$$

$$n = \frac{1,96^2 (0.5) (1-0.5)}{0.12^2}$$

$$= 96.04$$

n = 96 people

Based on the above formula, the number of n is 96 respondents, so that to facilitate the research, the sample is fulfilled to 100 respondents. The operational definition of variables is built from the operational dimensions of the research variables.

### 1. Dimensions of service quality variables

Service quality is a dynamic condition of products, services, processes, and environments that meet expectations. Dimensions of service quality variables are reliability, responsiveness, assurance, empathy, and tangible [18].

### 2. Dimensions of service innovation variables

Mirnasari (2013) states that service innovation is an achievement achieved because it has made efforts to improve and improve the efficiency, effectiveness, efficiency, and accountability of services carried out by public organizations for the benefit of the community. The dimensions of service innovation are relative advantages, service improvements, service convenience, solutions to existing problems, and ease of access.

### 3. Dimensions of awareness variable paying PDAM tariff

Arizal, et al. (2018) stated that the awareness of paying PDAM tariffs is a form of customer willingness to make payments for clean water services to improve the quality of their environment. The variable dimensions of awareness of paying tariffs are the ability to pay directly and the ability to pay indirectly [29].

### 4. Dimensions of customer satisfaction variables

Customer satisfaction is a level of customer needs, desires, and expectations because these expectations or desires have been fulfilled and continues to repeat purchases and continued loyalty (Tjiptono, 2019). The variable of customer satisfaction is measured by the dimensions of the indicators of conformity to expectations, saying positive things, and willingness to recommend.

The data analysis technique used is Structural Equation Modeling (SEM) as an analytical tool that identifies the concept's dimensions as a combination of factor analysis and multiple regression. SEM consists of 2 parts: the latent variable model and the measurement model [30]. The latent variable model adapts the simultaneous equation model with the measurement model describing several indicators of the measured variable as the effect of the latent variable. Based on the formulated hypothesis, this research uses inferential statistical data analysis with Warp PLS (Partial Least Square) software which consists of model measurement (outer model), model structure (inner model), and hypothesis testing.

PLS can be used to see the relationship between indicators and latent constructs by calculating the total variance and error variance. [31] state that PLS forms two equations: the inner and outer models. The outer model determines the specification of the relationship between latent constructs, namely the relationship between variables X, Z, and Y variables with a reflective approach. In contrast, the inner model determines the specification of the relationship between latent constructs and their indicators using a constructive approach.

## 4. RESULT

Before testing the research results, it is necessary to test the research instrument, in this case, the questionnaire. Testing the questionnaire using two things, namely the validity test and the reliability test. The validity test is used to test the validity of the research instrument, while the reliability test is to test the constancy.



#### 4.1 Validity test

The validity test can be seen from the score of the value of the Convergent validity indicator variable. The criteria for the loading factor value of each indicator is more significant than 0.5, so it can be said to be valid. This validity test aims to determine the validity of the research instrument used in the form of a questionnaire. The validity test consists of 2, namely convergent validity and discriminant validity. Here are the results of the validity test:

**Tabel 1** Convergent Validity Of Service Quality

Indicator	Normalized pattern loading	Standar	Criteria
X11	0,612	0,5	Valid
X12	0,655	0,5	Valid
X13	0,669	0,5	Valid
X14	0,619	0,5	Valid
X15	0,681	0,5	Valid

Source: data processed by Warp PLS 5,0

**Tabel 2** Convergent Validity Of Service Innovation

Indicator	Normalized pattern loading	Standar	Criteria
X21	0,651	0,5	Valid
X22	0,816	0,5	Valid
X23	0,713	0,5	Valid
X24	0,638	0,5	Valid
X25	0,669	0,5	Valid

Source: data processed by Warp PLS 5,0

**Tabel 3** Convergent Validity Of Customer Awareness

Indicator	Normalized pattern loading	Standar	Criteria
Z1	0,643	0,5	Valid
Z2	0,872	0,5	Valid

Source: data processed by Warp PLS 5,0

**Tabel 4** Convergent Validity Of Customer Satisfaction

Indicator	Normalized pattern loading	Standar	Criteria
Y1	0,621	0,5	Valid
Y2	0,613	0,5	Valid
Y3	0,645	0,5	Valid
Y4	0,592	0,5	Valid
Y5	0,561	0,5	Valid

Source: data processed by Warp PLS 5,0

In addition to testing convergent validity, validity testing is also carried out by testing discriminant validity which is calculated from combined loadings and cross-loadings, namely to measure the construct of

latent variables and predict indicators of construct variables that are larger than the size of the construct indicators of other variables. Discriminant validity is measured by calculating the value of square root average extracted (AVE). The following is the calculation of the discriminant validity table:

**Tabel 5** Discriminant Validity of Service Quality

Indicator	Combined loadings and cross-loadings	Standar	Criteria
X11	0,748	0,5	Valid
X12	0,905	0,5	Valid
X13	0,805	0,5	Valid
X14	0,514	0,5	Valid
X15	0,680	0,5	Valid

Source: data processed by Warp PLS 5,0

**Tabel 6** Discriminant Validity of Service Innovation

Indicator	Combined loadings and cross-loadings	Standar	Criteria
X21	0,817	0,5	Valid
X22	0,829	0,5	Valid
X23	0,890	0,5	Valid
X24	0,753	0,5	Valid
X25	0,675	0,5	Valid

Source: data processed by Warp PLS 5,0

**Tabel 7** Discriminant Validity Variabel Customer Awareness

Indicator	Combined loadings and cross-loadings	Standar	Criteria
Z1	0,843	0,5	Valid
Z2	0,541	0,5	Valid

Source: data processed by Warp PLS 5,0

**Tabel 8** Discriminant Validity Variabel Customer satisfaction

Indicator	Combined loadings and cross-loadings	Standar	Criteria
Y1	0,813	0,5	Valid
Y2	0,918	0,5	Valid
Y3	0,827	0,5	Valid
Y4	0,842	0,5	Valid
Y5	0,878	0,5	Valid

Source: data processed by Warp PLS 5,0

### 4.2 Reliability test

Reliability testing is used to measure the consistency of the questionnaire instrument using Warp PLS 5.0 software. The reliability test is indicated by the composite reliability score and Cronbach's alpha. Research variables are reliable if each variable has a composite reliability value and Cronbach's alpha is more than 0.6. The following are the results of testing the reliability of the questionnaire instrument as shown in the following table:

**Table 9** Reliability Test

Composite reliability coefficients			
Quality	Innovation	Aware	Satisfaction
0.856	0.843	0.883	0.932
Cronbach's alpha coefficients			
Quality	Innovation	Aware	Satisfaction
0.785	0.758	0.817	0.909

Source: data processed by Warp PLS 5,0

### 4.3 Model Fit Test

The model fit test or known as the model fit test, is carried out before conducting the path analysis significance test. The suitability test of this model is also to show whether the research model that has been built has been tested statistically ideal based on three criteria. The model fit test must meet three indices, namely: average path coefficient (APC), average R-squared (ARS), and average variances factor (AVIF) with APC and ARS criteria accepted with the condition that p-value is less than 0.05 and AVIF smaller than five or ideally 3.3, and the ideal R-squared contribution ratio (RSCR) 1. The following is a table of model fit test results:

**Table 10** Model fit and quality indices

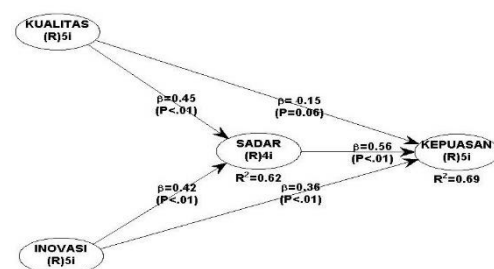
Model fit and quality indices
Average path coefficient (APC)=0.389, P<0.001
Average R-squared (ARS)=0.655, P<0.001
Average adjusted R-squared (AARS)=0.646, P<0.001
Average block VIF (AVIF)=2.012, acceptable if <= 5, ideally <= 3.3
Average full collinearity VIF (AFVIF)=4.020, acceptable if <= 5, ideally <= 3.3
R-squared contribution ratio (RSCR)=0.928, acceptable if >= 0.9, ideally = 1

Source: data processed by Warp PLS 5,0

The calculation of the fit and quality indices model shows the Average Path Coefficient (APC) = 0.389 and P<0.001 Average R-squared (ARS)=0.655, and P<0.001 Average adjusted R-squared (AARS) = 0.646, P<0.001 Average block VIF (AVIF) = 2.012, this shows that the model used in this study is feasible and statistically acceptable as seen from the p-value

which shows a number less than 0.05. The value of R-squared contribution ratio (RSCR) = 0.928 indicates an ideal test value statistically. The hypothesis testing table shows that H1 is accepted, meaning that service quality affects customer awareness, H2 is accepted, meaning that service innovation affects customer awareness. H3 testing is accepted, meaning that service quality affects customer satisfaction. The H4 test is accepted; it shows that service innovation affects customer satisfaction. The H5 test shows that customer awareness affects customer satisfaction. The H6 test shows that service quality affects customer satisfaction which is strengthened by customer awareness. And the H7 test shows that service innovation affects customer satisfaction which is strengthened by customer awareness.

Path analysis for the service quality variable indicates a direct effect with a coefficient value of 0.449 with a p-value <0.001. Service quality affects customer satisfaction by 0.150 and p-value 0.061. Service quality indirectly affects customer satisfaction through customer awareness of 0.250 and p-value <0.001. The total effect is 0.101, and the p-value is 0.152. Path analysis for service innovation variable, namely service innovation, affects customer awareness by 0.424 and p-value <0.001. Service innovation directly affects customer satisfaction by 0.365 and p-value <0.001. The calculation of the indirect effect of service innovation on customer satisfaction through customer awareness is 0.236 and p-value <0.001. This indicates that customer awareness strengthens the influence of service innovation on customer satisfaction by 0.236. At the same time, the total effect is 0.601 and p-value <0.001. This means that the total value of service innovation that affects customer satisfaction which is strengthened by customer awareness, is greater than the direct and indirect effects. So that it can be said that service innovation affects customer satisfaction which is strengthened by the customer awareness variable; this shows that the better the innovation, the more customer satisfaction will be. The following figure shows the model fit test to test the feasibility of the test model:



**Figure 1** Structural Equation Modeling Warp PLS 5.0 Testing Model

Source: Data processed by Warp PLS 5.0

## 5. DISCUSSION

### ***5.1 The Effect of Service Quality on Customer Awareness***

Services carried out by public organizations are general activities provided to the community for the benefit of ordinary life. Public services should be able to meet the expectations and satisfaction of customers who use these services. Satisfactory service will lead to a conscious attitude of the customer to pay the PDAM Jember tariff bill. The awareness of customers to carry out their obligations arises from the fulfillment of customer expectations for improving the quality of PDAM Jember's services so that customers consciously carry out their obligations to get services by customer expectations. Public awareness is essential for the continuity of quality services. Without public awareness, customer satisfaction cannot be produced. Customer quality has a positive effect of 0.449 and a significant level  $<0.001$ . This shows that service quality has a positive and real or significant impact on customer awareness. So that the better the quality of service provided by the PDAM will be able to increase customer awareness of paying PDAM tariff obligations. Because there is still no research that examines the effect of service quality on customer awareness, this is a research update that can be a reference for future research.

### ***5.2 The Effect of Service Innovation on Customer Awareness***

Service innovation is an effort made by public organizations to carry out a series of services that provide convenience, benefits, and complete facilities for customers. The application of this service innovation is carried out with the hope of providing added value for customers and society in general. Service innovation is also expected to provide understanding and understanding to foster customer awareness to be willing to make payment obligations so that customers get services that are as expected. Customers who feel the benefits and advantages of PDAM innovation will undoubtedly raise awareness and change in behavior so that they are willing to fulfill the obligation to pay PDAM tariffs. Technological innovation consists of two dimensions, namely product innovation and procedure innovation. Improving the quality of products or services or innovation in creating new products is called product innovation. Innovation implies an innovative procedure made to increase the effectiveness of production [19]. The results showed that service innovation had a positive effect of 0.424 with a significant level of  $<0.001$ . This shows that the better

service innovations carried out by PDAM Jember, the greater awareness of customers in carrying out their obligation to pay PDAM tariffs. Because there is still no research that also examines the effect of service innovation on customer awareness, this is a research update that can be a reference for future research.

### ***5.3 The Effect of Service Quality on Customer Satisfaction***

The service quality of PDAM as a public company owned by the local government of Jember must serve the public and be committed to optimally empowering all components of the company. Optimal service quality will lead to services that provide benefits and value for customers and the wider community. Service quality is an essential part of the company and is needed in the formation of customer satisfaction. Service quality is crucial for redesigning and improving product and service delivery processes to meet the quality standards that customers demand. In addition, the company also uses its resources to provide better services to meet customer expectations. Improved service quality is very high and better can help companies to maintain a competitive advantage. [32]. The results of this study indicate that optimal service quality aims to meet customer expectations. So the results of this study are in line with the opinion that optimal service quality will increase customer satisfaction [33]. This study indicates that service quality has a positive influence on customer satisfaction of 0.150 and a significant level of 0.006. This shows that the better the service quality of PDAM Jember, it will increase customer satisfaction. The results of this study also support the research of [34];[35] stated that service quality affects satisfaction.

### ***5.4 The Effect of Service Innovation on Customer Satisfaction***

Service innovation in public organizations is mainly carried out to design new ideas, concepts, procedures, and service systems that can provide more value and benefit customers and society in general. There is a strong relationship between innovation and customer satisfaction. Innovation can increase customer satisfaction because innovation will maximize the value of customer purchases. Therefore, companies must be innovative and have an effective organizational management system. Companies must be committed to managing an integrated innovation management system to increase customer satisfaction. The company's innovation to achieve customer satisfaction goals is reflected in the performance generated by the company [36]. Service innovations

designed with this purpose will influence the mindset and behavior patterns of customers so that they feel satisfied with PDAM services. The results showed a service innovation that had a positive effect on customer satisfaction of 0.365 and a significant level of  $<0.001$ . This means that the better the application of service innovation can increase customer satisfaction of PDAM Jember. The results of this study support the results of research by [37], which states that service innovation affects customer satisfaction.

### ***5.5 The Effect of Customer Awareness on Customer Satisfaction***

Customer awareness is when customers have knowledge, understanding, and understanding of a series of services received and pay a certain amount of costs to get services that meet expectations. This awareness arises because customers get information and knowledge about PDAM Jember services. This increase in customer awareness can also have an impact on increasing customer satisfaction. Customer awareness is a form of understanding and behavior that will foster a willingness to perform payment obligations. After performing these obligations, customers will get the company's products and services. And after feeling the benefits of the product or service, consumers will feel satisfied. Customer awareness to pay a certain amount of money to get the desired product or service will make customers feel the product's superiority or service arise [38]. The study results indicate that there is awareness of customers paying PDAM tariffs that affect customer satisfaction by 0.560 and a significant level of  $<0.001$ . This shows that the higher the level of customer awareness in paying PDAM tariff bills, the higher the satisfaction of customers who use PDAM services. The quality of service provided by PDAM Jember for customers is focused and aims to achieve customer satisfaction and expectations. However, customer satisfaction is not achieved; the low awareness of customers can cause them to carry out their obligations to pay PDAM tariff bills. [39] states that customer satisfaction is influenced by quality improvement or product quality valued by consumers. Improving service quality will increase profits for the company because improving service quality fosters customer awareness to be willing to buy products or services provided by the company. On the other hand, customers who are not satisfied with the quality of the company's services will, of course, tend to have low awareness to buy the company's products or services. This study indicates that service quality has a positive effect on customer satisfaction, which is reinforced by customer awareness. The test results show a coefficient value of 0.250 and a significant level of  $<0.001$ . This means

that the better the quality of service, the more customer awareness will increase and make customers feel customer satisfaction.

### ***5.6 The Effect of Service Innovation on Customer Satisfaction Through Customer Awareness***

Service innovation consists of efforts to apply concepts, ideas, and ideas in concrete actions that can provide added value or benefits for customers. The application of innovations carried out by PDAM aims to inspire mindsets, change behavior patterns, and increase customer knowledge to raise customer awareness in paying PDAM bills. Through increasing customer awareness, it will increase customer satisfaction. The results showed that service innovation positively affected customer satisfaction, which was strengthened by customer awareness of a coefficient of 0.236 and a significant level of  $<0.001$ . This means that the better application of service innovations carried out by PDAM Jember will increase customer awareness in carrying out payment obligations and increase customer satisfaction who have enjoyed service innovations.

## **5. CONCLUSION**

Based on the testing and discussion results, it can be concluded that: Services related to the livelihoods of the community are managed by the state, in this case, the regional-owned company PDAM. Based on the management of people's livelihoods to provide clean water, PDAM focuses on improving service quality and service innovation to raise awareness and increase customer satisfaction. Service quality and service innovations carried out by PDAMs can increase awareness of paying PDAM tariffs and increase customer satisfaction. Service quality affects positively and significantly (significantly) customer awareness of paying bills for service improvement efforts and fulfilling expectations. Service innovation has a positive and significant (significant) impact on customer awareness of paying PDAM tariff bills.

Service quality affects positively and significantly (significantly) PDAM customer satisfaction. Service innovation affects positively and significantly (significantly) PDAM customer satisfaction. Customer awareness of paying tariff bills has a positive and significant (significant) impact on PDAM customer satisfaction. Customer awareness strengthens service quality which positively and significantly affects service quality. Service innovation affects positively and significantly (significantly), which is strengthened by the awareness of customers in paying PDAM tariffs.

Some suggestions put forward in this research are:

#### For PDAM Jember

PDAM Jember must continuously improve service quality and develop service innovations carried out by all elements in the PDAM organization. In addition, it is necessary to develop optimal service innovation management and utilize the use of digital information media to be able to educate and provide knowledge and understanding for the community, especially PDAM customers, where customers can feel and enjoy quality and service innovations that provide convenience and benefits for customers. PDAM must improve routine and periodic supervision and checks to ensure that clean water production and service activities can run as optimally as possible. The development of quality and innovative services will undoubtedly raise customer awareness to carry out their obligations in paying PDAM tariff bills. Customers who are aware of their obligations and receive optimal service will undoubtedly feel satisfied. Of course, the more customers who feel satisfied can reduce the number of complaints that have been a problem in service at PDAM Jember.

#### For future research

Future research is expected to develop more varied research variables, such as customer trust and customer perceptions about service digitization. It will produce novelty or research novelties that will add to the repertoire of knowledge, especially in public service management.

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