Management of Testing Services at Environmental Laboratory Regional Technical Implementation Unit of Bandung Regency using Soft System Methodology

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Abstract. One important element in environmental protection and management policy is the availability of valid and accountable environmental quality testing data. Environmental Laboratory Regional Technical Implementation Unit of Bandung Regency as the provider of testing services has been accredited by KAN based on ISO/IEC 17025:2017. In its implementation, there are still various problems related to the quality of testing services. This research uses data collection techniques from interviews, observation, document review and distribution of questionnaires using the Soft System Methodology (SSM) analysis method. From this approach, it was found that problems with incoming complaints were caused by errors in test results and delays in test results. CATWOE deepening and service quality dimensions are used to obtain a new conceptual model to solve this problem. A recommendation that might be implemented is to come up with an idea in the form of a process innovation that shifts some service procedures from manual to digital processes. This conceptual model must be applied and its shortcomings analyzed so that they can be improved by adjusting the conditions and organizational culture of the UPTD Environmental Laboratory. Furthermore, to resolve several other problems, further research is needed in terms of increasing the capacity of Human Resources (HR) and the possibility of budget availability to support infrastructure that can improve the quality of testing services.

Keywords: Service Quality, innovation, e-government, Soft System Methodology

1 Introduction

As a development manager, the government must ensure that the development it carries out is based on the principles of sustainable development. Sustainable development will only be achieved if the environment provides adequate support and capacity. All government agencies carry out duties and functions related to various aspects of public services, one of which is providing good environmental quality.

One important element in environmental protection and management policy is the availability of valid and accountable environmental quality testing data. To obtain environmental data with these characteristics, measurements must be carried out by an environmental laboratory whose competence has been proven based on SNI 17025: 2008 concerning General Requirements for Competency of Testing Laboratories and Calibration

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Laboratories as well as Regulation of the Minister of the Environment Number 6 of 2009 concerning Environmental Laboratories. A laboratory accredited by KAN is a quality guarantee (assurance) offered by the government that the tests carried out have implemented laboratory quality management standards, so that the test results obtained can be accounted for.

Within the scope of the Bandung Regency Government, environmental quality testing services are carried out by the Environmental Laboratory Regional Technical Implementation Unit of the Bandung Regency which was accredited by the National Accreditation Committee (KAN) in May 2007 and has been an environmental laboratory registered with KLH since November 2010. Vision of Environmental Laboratory Regional Technical Implementation Unit is the creation of a professional and competent environmental laboratory with accredited status according to ISO/SNI 17025:2017 to support environmental management efforts in Bandung Regency. Based on Regional Regulation Number 21 of 2007 concerning the Establishment of the Bandung Regency Regional Technical Institution Organization, the Environmental Laboratory UPT, Bandung Regency Environmental Service has the task of collecting and receiving test samples, laboratory testing and environmental analysis.

Based on the results of the internal audit carried out by the UPTD of Environmental Laboratory at the direction of the National Accreditation Committee (KAN), there are still problems in the implementation of testing services, namely:

a. The confidentiality of customer test result data is not guaranteed, which causes individuals to take advantage of this condition in ways that can harm customers
b. Delays in publishing laboratory test results cause delays in handling waste water that is not suitable for disposal into river banks.
c. Slow complaint handling will make customers reluctant to use UPT Laboratory services. With this reluctance, water and air quality is not guaranteed, especially in the Bandung Regency area.

Furthermore, this research aims to analyze service quality management based on public service quality theory at the Bandung Regency Environmental Laboratory UPTD using a Soft System Methodology approach

2 Method

2.1 Data Collection

The research was conducted in Bandung and analyzed the quality management of testing services implemented at the Bandung Regency Environmental Laboratory UPTD using Soft System Methodology (SSM). Data collection techniques were carried out using in-depth interviews, observation and document review. Apart from that, questionnaires were also distributed to determine the extent of the perception of UPTD service quality according to customers and actors who are UPTD staff. The customer questionnaire used the Slovin formula to produce 50 respondents.

2.2 Data Processing

This research employed the Interactive Model [1]. In this model, the process continues after data collection is complete, from the initial to the last data. A data verification process is

carried out through data condensation and data display, so that in the end, conclusions can be drawn (Conclusions drawing/verification) as described below:

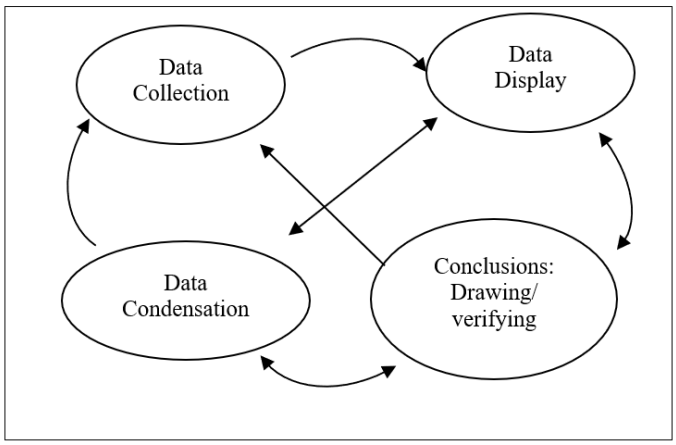

Fig. 1. Interactive Model [1]

2.3 Data Analysis

The results of interviews, observations, document studies, and distributing questionnaires were processed using SSM tools using source triangulation and technical triangulation.

The use of SSM is an effort to capture problems that occur and then provide recommendations for solutions to these problems. The seven stages of SSM can be described as follows [2]:

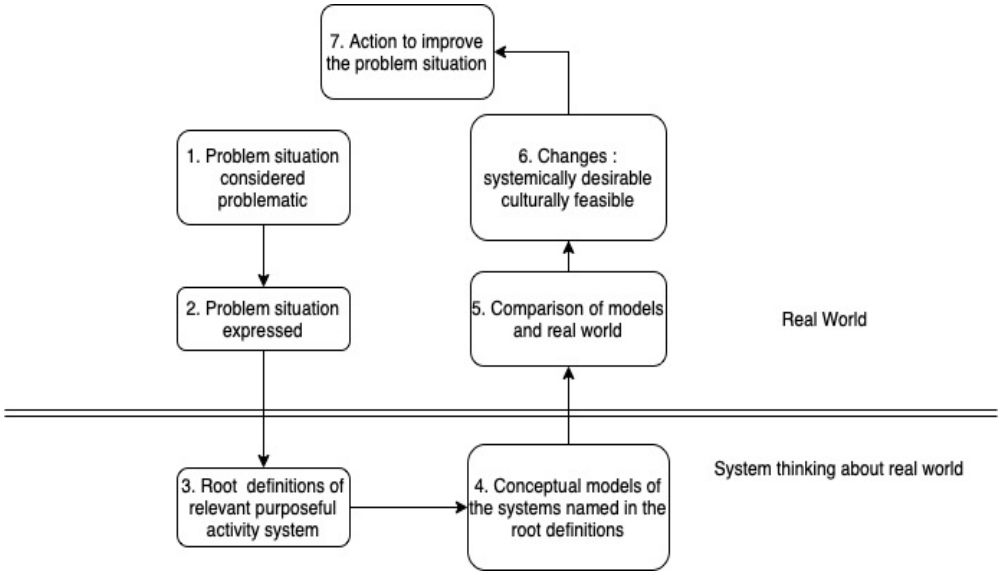

Fig. 2. SSM stage by *Checkland* [2]

The results of the distribution of questionnaires are used to confirm the quality of services available at the UPT Laboratory. In this research, the distribution of questionnaires is not processed into quantitative data, but the mapping of results based on customer answers is defined into a narrative.

3 Result and Discussion

To determine the problem of quality of testing services at the Bandung Regency Environmental Laboratory UPT, this was done using a structured approach, namely Soft System Methodology (SSM). Following are the steps taken:

3.2 Describing the System Problem

The UPTD of Environmental Laboratory service as a whole still uses physical files and manual techniques and has not implemented the paperless principle. Using manual techniques and physical documents will also cause many problems specifically in this research. It can be concluded that the problems currently existing at the UPTD of Environmental Laboratory are:

a. Errors in test results are caused by several things:
    1. Error in labeling samples by customer service, resulting in mixed samples
    2. The test analyst's inaccuracy in analyzing the sample
    3. Damage to test equipment
    4. Error in sample order in Excel data recapitulation
b. Delays in test results are caused by several things:
    1. The backlog of samples is due to the increasing demands on BLUD targets
    2. There are several LHU (Test Result Reports) that have been completed but not taken by the customer
    3. Error in test results which results in re-testing, so that the test results for that customer are 2x longer.

3.3 Describing the Problem Situation in Rich Picture

Problems can be described by mapping them with possible root causes. In addition, detailed mapping will enable researchers to discover new problems and root causes that have not previously been identified. The problem expressed in the first step is described by including possible root causes to make it easier to find a solution. The following is a Rich Picture depicted by researchers in the testing service process at the UPTD of Environmental Laboratory of Bandung Regency:

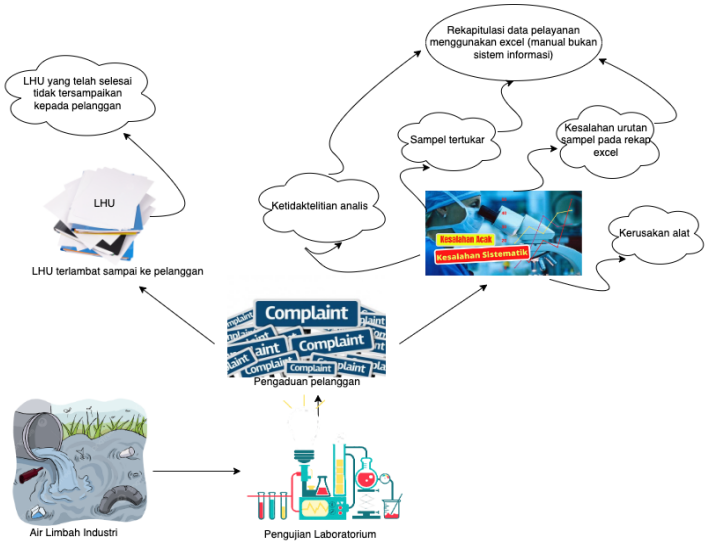

Fig. 3. Rich Picture Environmental Laboratory Service Problems
Source: Data processed

3.4 Defining Keyterm

This stage is a technique for dividing roles and stakeholders related to testing services at UPTD into the CATWOE concept. With the data collection instruments that have been carried out, the results can be analyzed as follows:

Table 1. Defining Keyterm

CATWOE	Dimension (Parameter)				
	Tangibles	*Emphaty*	*Reliability*	*Responsiveness*	*Assurance*
Clients (Organization, community, individual)	75% of customers do not mind the size of the building, but there are some customers who feel that the equipment used by UPTD needs to be replaced	59% of customers agreed that UPTD served them attentively, but interview results showed that customers were served indifferently	57.5% of customers agreed that UPTD was reliable in serving, but during field observations, the accuracy of LHU completion could not be measured because the LHU was delivered the following month	62.4% of customers agree that UPTD has a fast response. However, when reviewing the documents, there were still complaints that were not written down, so the response could not be seen	62.4% of customers agree that UPTD has adequate service quality guarantees. In document review, there are still many test parameters that KAN has not accredited.

*Actors (*quality manager, administration manager, the head of UPT, CS)	64.67% of actors agreed that the UPTD facilities and infrastructure were adequate	59.44% of actors felt that they had shown empathy for customers. When observations were made, CS still seemed indifferent in serving customers	71.48% of actors feel capable of serving customers according to SOP. Based on the document review, management training is still inadequate	58.33% of actors agree that UPTD tries to respond quickly to customers. Based on the interview results, it still takes 1-2 days to respond to requests to schedule sampling	64.19% of actors agreed that UPTD had implemented the ISO 17025:2017 quality management system. The results of the interviews were that not all UPTD personnel understood and comprehended the contents of the procedure.
Transformation (Acceptance of services, testing process, reporting results, sending LHU)	Observation results show that the UPTD service process still uses manual infrastructure (books and forms)	Measuring empathy in the service process only relies on a complaint box that cannot be processed further	N/A	Customers need 1-2 days to wait for the UPTD response for the sampling scheduling process	Customer data is not guaranteed to be confidential because it is not controlled properly (only stored in a cupboard that is easily accessible)
Worldview (A broad and in-depth view of the quality of laboratory services and its problems)	The existence of website facilities provided by Diskominfo is considered to be able to move UPTD services from manual to digital	N/A	100% of actors agree that having an information system will increase the reliability value of UPTD	The use of a service information system is considered capable of providing a fast response in scheduling sampling and retrieving results	Certainty that the use of information systems will increase the quality assurance of UPTD services
Owner (The head of UPT)	The Head of UPTD has not been able to provide	The Head of UPTD has not innovated regarding rewards for	The control system in the reliability aspect is carried out	The Head of UPTD has not yet determined the completion time for	The Head of UPTD has attended laboratory quality

	additional facilities and infrastructure due to budget constraints	certain customer criteria	through an annual Management Review	handling complaints	management training
Environmental Constraint (Limitations for solution and recommendations)	UPTD's strategy in providing additional infrastructure to improve service quality without increasing large costs is by providing a service information system	To increase empathy for customers, UPTD can place a special CS for handling complaints	Service information systems can be designed according to customer needs	Increasing UPTD's response to customers can be possible if you use a notification-based information system	The UPTD strategy increases service guarantees without adding parameters that require new instruments (because it costs money)

Source: data processed, 2023

3.5 Create Models Based on Keywords

This stage describes problem situations that occur in reality and attempts to solve them by creating conceptual imitations. The conceptual model was designed by adapting the SOP that UPTD had prepared. However, there is a slight change where the service process involves a website-based information system.

The initial process is to describe the real conditions that exist at UPTD. Per quality procedures Pr.7.1.2, the service process begins with a test request carried out by coming directly to UPTD or via the WhatsApp application. After that, it continues with manual recording carried out by customer service to be reported to the sampling supervisor for scheduling. This scheduling process takes 1 – 2 days. After that, sampling and testing will be conducted for 14 (fourteen) days until the LHU is issued. Delivery of physical LHU documents can be sent, picked up directly by the customer or delivered at the next visit.

Based on real world conditions with research that has been carried out, a stage in systems thinking can be described that can be adopted to improve the quality of testing services at the Bandung Regency Environmental Laboratory UPTD. This process innovation does not completely change existing procedures, it only includes service processes that can be adopted into a website-based information system. The following image is a scheme depicting real world conditions with several stage changes separated into a picture of system thinking.

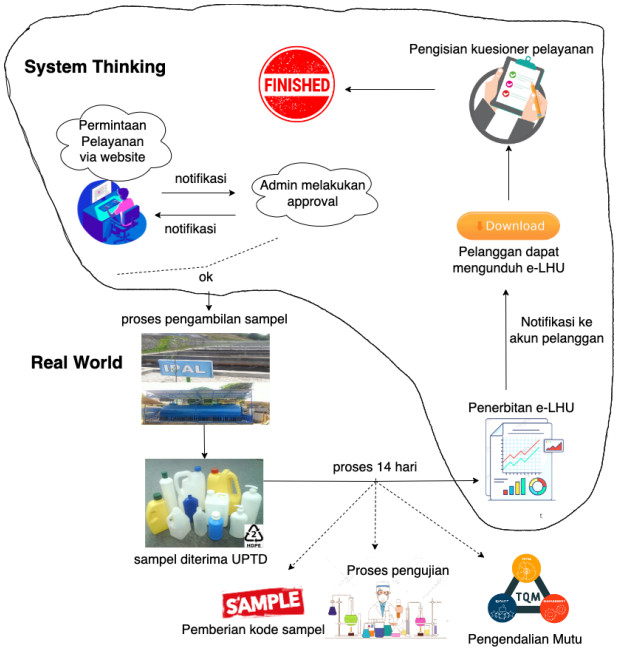

Figure 5. Conceptual method with SSM
Source: Data Processed, 2023

3.6 Comparing with the Original Model

At this stage, a comparison is made between the conceptual model and real conditions at UPTD. This stage is needed to assess the possibility of adapting the conceptual model in UPTD.

Table 2. Comparison Between Conceptual Models and Real World Conditions

Activities on Conceptual Models	*Real World Condition*	Recommendation
Customers make requests via digital accounts	Customers make requests via WhatsApp or walk in	Socializing the new SOP for submitting service requests
Admin approves in less than 24 hours	Customer service provides guaranteed service of 1-2 days	Trimming time by instantly displaying available dates
A questionnaire is obtained every time a customer receives service	Questionnaires are carried out every 6 months manually	New SOPs regarding processing customer satisfaction data need to be adjusted
Customers receive a digital LHU that can be downloaded immediately after testing is complete	Customers must wait for the physical LHU to be delivered or taken to UPTD	Creating an e-LHU concept with digital signatures in coordination with Diskominfo
LHU confidentiality is better maintained	The physical LHU is stored in an unlocked cupboard and is accessible to everyone	Providing e-LHU which can only be accessed by limited customers

More controlled samples	There are still samples that have not been tested	Using of information systems with the FIFO (First in First Out) concept
Customer satisfaction increases with the use of information systems	The procedures for using the information system are not yet known to customers	A technical explanation of the new flow on the initial appearance of the website and an explanation of the various advantages of using a digital information system

Source: data Processed, 2023

3.7 Making Changes or Adjustments to the Model and Improving the Proposed System to Resolve Problems Quickly

At this stage, a recommended improvement (action to improve the problem situation) is implemented in real world conditions. Because it takes a relatively long time to implement the conceptual model, research cannot be continued at this stage. However, if this conceptual model is implemented in the future, here are various possibilities and recommendations that can be made to improve the system at UPTD.

Table 3. Proposed Changes and Corrective Actions

Proposed changes	Corrective action
Socialization regarding UPTD's new SOP in serving customers	Scheduling inviting customers by providing tutorials on the front page of the website
Reducing service reception time (within certainty of scheduling)	Creating a system using a database of service availability dates
Adjustment of SKM processing schedule	Creating a new policy regarding SKM data processing
Creating e-LHU with a digital signature concept	Coordinating with Diskominfo for registration of digital signatures (in the form of barcodes)
Providing customers with an understanding of the benefits of using information systems	Displaying strategic and educational objectives on the home page of the website

Source: data processed, 2023

4 Conclusion

Based on research, it was found that the quality of service at the Bandung Regency Environmental Laboratory UPTD is as follows:

1. Tangibles

   Physical observations from UPTD have not shown that there are adequate facilities, because they still share a building with DLH. Infrastructure in the form of supporting testing instruments needs to be rejuvenated, meaning it needs to be replaced with new equipment.

2. Empathy
   Customer service officers are less responsive to customers who come walk in. The applicable procedures are not explained in detail so some customers still seem confused about several stages.
3. Reliability
   Overall, UPTD is able to provide the testing services customers require. However, the commitment to timeliness of testing is somewhat difficult to measure because several customer complaints regarding delays in test results were not made in writing. Meanwhile, for each LHU, the date listed is 14 days, not the actual date of publication.
4. Responsiveness
   The results of the questionnaire show that UPTD is considered fast response in responding to customer needs. But for scheduling, UPTD still takes 1 – 2 days to provide certainty.
5. Assurance
   Environmental Laboratory UPTD which has been accredited by the National Accreditation Committee (KAN) and registered with the Ministry of Environment and Forestry (KLHK) is a technical quality guarantee offered to customers. However, in its implementation, UPTD does not provide a guarantee of confidentiality of customer test results.

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