

Improved Troubleshooting Services with Kaizen Philosophy, Case Study: PT XYZ

Muhammad Iqbal Aulia, Rosalendro Eddy Nugroho

Abstract— Companies engaged in the service sector are very dependent on the quality of services provided to customers, especially on companies engaged in internet services. In order to provide the best service to customers, companies in the internet sector or commonly called Internet Service Providers (ISPs) need to continue to improve the services provided to customers. One of the services that must be managed properly is the troubleshooting service. The main purpose of this service is to ensure that customers get the best quality internet services that meet customer expectations. In its implementation, disruption handling services really need support from various supporting components. Just like other service products, troubleshooting service are not free from problems in their management. Through the kaizen method combined using fishbone diagrams and why-why analysis to find the source of the problem, it is possible to improve service disruptions that can be implemented. The kaizen method can improve service by fixing problems that require less effort and are sustainable but have a big impact on achieving quality targets with an agreed average of handling disturbances.

Index Term- fishbone diagram, kaizen, quality, why-why analysis.

I. INTRODUCTION

Technology is a human need that has high urgency today. All aspects of human life are increasingly attached to the needs of technology in it. Be it health, education and business and even various other aspects are always associated with the technology that supports it. Technology that is currently needed by humans has even become a primary need is information technology. Information Technology in explaining the technology side such as hardware, software, databases, networks and other equipment. Meanwhile, in a broader concept, information technology describes a collection of information technology, users and management for the entire organization. The role that can be given by the application of information technology is to obtain information for personal life as well as for professions such as science, technology, trade, business news, and professional associations (Simarmata, 2020).

Information technology is an important part considering that this technology helps humans in communicating and disseminating information. Information technology will not

work without a communication network with a capable system. One part of the communication network system that is needed is the internet network or intranet network. The reliability of the network is an important parameter in network availability communication technology to support information technology used by individuals, organizations, and governments.

To ensure the availability of telecommunications network services, many supporting factors must be prepared, including:

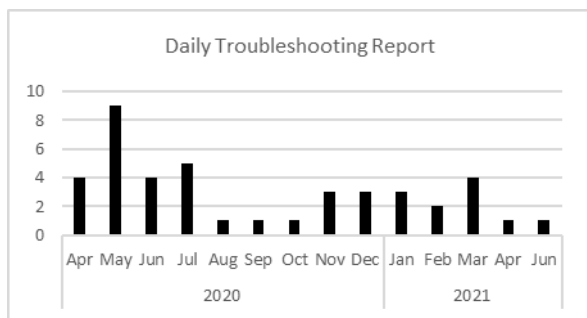
1. Backup connections both physical and logical.
2. Total availability of network devices and backup devices.
3. Delivery time of the device.
4. Process of handling disturbances.
5. etc

PT XYZ is a private company engaged in information technology and telecommunications or commonly referred to as an Internet Service Provider. In carrying out its operations there are challenges for PT XYZ. Even though the company is still young, PT XYZ already has many service locations from several customers. However, detailed information about customers, where the activation time is not recorded, makes it difficult for the NOC team to find installation records or service failure records. Of the 220 service locations, there are 83% whose activation date is not recorded, it can only be seen from the year of the project. Regarding the existing services at PT XYZ, it cannot be measured operationally, whether the services provided to customers are currently good or not, especially in the process of handling disturbances. The absence of one data (single database) that is certain and used by all employees to make reports is still not valid.

The Troubleshooting report has not been able to provide the information needed to measure or improve services. From April 2020 to June 2021, there were only 42 daily reports stored in the NOC data whereas the report data stored in the NOC folder was 455 reports. The rest of the daily reports are currently scattered on Email and Whatsapp Groups, so it takes a lot of time to retrieve and process the scattered data.

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Graph 1. Troubleshooting Report Chart

Improving the process of handling disturbances to be able to provide better services requires methods in the process. In order to achieve the target of improvement desired by the company, the application of the Kaizen philosophy has a specific purpose so that the problems in this study are formulated as follows:

1. What are the factors that hinder the handling of disturbances?
2. How to improve the troubleshooting service?

Based on the formulation of the problem, the objectives of this study are:

1. Identify and analyze the factors that hinder the troubleshooting process
2. Recommend appropriate improvement schemes for troubleshooting so that services will be better.

II. LITERATURE REVIEW

A. Quality

The meaning or definition of quality is different for each individual and depends on the context. However, according to Fandy Tjiptono and Anastasia Diana (2014), there are similarities between the elements that define a quality, namely:

1. Quality includes efforts to meet or exceed customer expectations
2. Quality includes products, services, people, processes and the environment
3. Quality is an ever-changing condition

There are several notions of quality according to experts, one of which according to Heizer, Render and Munson (2017) which defines quality as the ability of a product or service to meet customer needs. In addition, based on the American Society for Quality cited by Heizer, Render and Munson (2017) quality is described as the overall features and characteristics of a product or service that is able to satisfy apparent or vague needs. The impact of improving quality will help the company increase sales and reducing costs which in turn will increase profits, as described by Heizer, Render and Munson (2017) in figure 1:

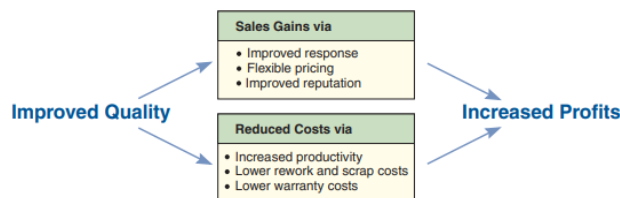


Figure 1. Ways Quality Improves Profitability

B. Quality in the Service Sector

In contrast to the production sector, quality in the service sector is more difficult to measure because it does not have a real component and it is difficult to find appropriate benchmarks. Moreover, customer expectations cannot be measured so that it is increasingly difficult to find the right measure of quality. Therefore, quality in the service sector can be seen from the determinants described by Heizer, Render and Munson (2017), including:

1. Reliability relates to consistency of performance and reliability. This means that the company produces good services the first time and continues to uphold its promises.
2. Responsiveness relates to the readiness of workers to provide services, also concerns the timeliness of services.
3. Competence means possession of the required skills and knowledge to produce services.
4. Access means easy to approach and contact.
5. Courtesy relates to politeness, mutual respect and friendliness of person-to-person relationships (including receptionists, telephone operators, and others).
6. Communication means keeping in touch with customers in a language they understand, and listening to them. It can also mean the company has to adapt its language to different customers – increasing the sophistication of its language with highly educated customers and speaking plainly with lay customers.
7. Credibility means mutual trust, trustworthiness, and honesty. Prioritize the interests of customers.
8. Security is freedom from fear, risk, and doubt.
9. Understanding/knowning (understanding/knowning) customers relates to efforts to recognize each customer's needs.
10. Tangibles include physical evidence of merit.

C. Total Quality Management

According to Ishikawa quoted by Fandy Tjiptono and Anastasia Diana (2014) in the book Total Quality Management, total quality management (TQM) is defined as a combination of all functions of the company into a holistic philosophy that is built on the concepts of quality, teamwork, productivity, understanding and customer satisfaction. . Meanwhile, according to Santosa quoted by the same book, the definition of TQM is a management system that elevates quality as a business strategy and is oriented to customer satisfaction by involving all members of the organization.

TQM is a concept that seeks to implement a world-class quality management system. This requires major changes in the culture and value system of an organization. According to Hensler and Brunell (in Scheuing and Christopher, 1993) quoted by Fandy Tjiptono and Anastasia Diana (2014), there are four main principles in TQM, namely :

1. Customer Satisfaction
2. Respect for Everyone
3. Management Based on Facts
4. Continuous Improvement

D. Kaizen

According to Masaaki Imai (2012), in Japanese, kaizen means “continuous improvement.” This implies an increase that involves everyone, both managers and workers and requires relatively little cost. Kaizen philosophy assumes that our way of life, be it our work life, social life or home life should focus on constant improvement efforts. This concept is so natural and obvious to many Japanese that they don't even realize they have it. In the main concept of Kaizen, management must learn to apply certain basic concepts and systems to realize a kaizen strategy including:

1. Kaizen and management
2. Process versus result
3. Follow the plan-do-check-act (PDCA) / standardize-do-check-act (SDCA) cycle
4. Prioritizing quality
5. Talking with data.
6. The next process is customer

E. TQM Tools

In practice there are tools that are very useful in TQM efforts, Heizer, Render and Munson (2017) explain that there are 7 tools that help in TQM efforts, namely:

1. Check Sheet
2. Scatter Chart
3. Cause-and-Effect Diagram (Fishbone Diagram)
4. Pareto Charts
5. Flowchart
6. Histogram
7. Statistical Process Control (SPC)

F. Internet

The internet is one of the implementations of computer networks or what is commonly referred to as a network. According to Edy Irwansyah and Jurike V. Moniaga (2014) Network is a collection of various computers and devices that are connected together, sometimes wirelessly, through communication devices and transmission media. When a computer is connected to the network, the computer is declared active (online). Networks allow computers to share data such as hardware, software and information. The internet is a global computer network communication system so that information can be connected all over the world. The standard used in internet connections is called the Internet Protocol Suite (TCP/IP). Through the internet many things can be done in the fields of business, government, academics and for the benefit of the individual himself. As expressed by Edy Irwansyah and Jurike V. Moniaga (2014) Some of the uses of the internet are as follows:

1. As a means of communication
2. For research as a means of accessing information
3. Facilities for shopping (online shopping)
4. Banks and investments
5. Entertainment
6. Share information, photos, videos

7. Accessing applications on the internet
8. Online teaching tools

III. RESEARCH METHOD

A. Method and Operational Variables

This research is a descriptive research where later this research will systematically describe the facts of a particular object (Sinulingga, 2011). This research will describe how the situation of handling disturbance in the company and explain the facts in it. Considering that this research is a descriptive study that aims to describe the situation and facts in the company, there are several variables related to the troubleshooting process. Research variables are everything in any form determined by the researcher to be studied so that information is obtained about it, then conclusions can be drawn (Sugiyono, 2016). The variables in this study can be seen in table 1.

Table 1. Operational Variables

No.	Variable	Dimension	Indicator
1	Quality of Troubleshooting	Reliability	Speed of troubleshooting
		Tangible	Reliability to handle interference
2	Man	Competency	Valid fault information data
3	Method	SOP	Technical skill of the NOC Team
			Number of SOPs in NOC
4	Machine	Data	Implementation of SOPs
5	Material	Network	Implementation of centralized data
		Equipment	Network equipment readiness for replacement

B. Method of Collecting Data

The methods used for data collection include:

1. Observation

The observation process is carried out by visiting the NOC department at PT XYZ when a network disturbance occurs. The search for data related to the disturbance handling process was also carried out during field observations.

2. Interview

The interview process was carried out by asking questions to the NOC team and the NOC team leader. Interviews were also conducted with the company's management, represented by the company's director

3. Secondary data study

Conduct a study on the currently available disruption escalation data and procedures.

C. Method of Analysis

The analytical method used in this research consists of 4 continuous processes. The processes consist of:

1. PLAN

The first process in the Analysis method is to carry out an improvement plan using the following tools:

- a. Fishbone Diagram
- b. Why-Why Analysis

2. DO

In this process improvement plans are outlined and targets are set. The tools used in this process use 5W+1H

3. CHECK

This process contains an analysis of the comparison

between the conditions before and after the improvement. Comparisons can use tables & graphs before and after repair.

4. ACTION

Take action on the results of improvements that have been made, namely continuing to make new standards on work procedures (SOP), data centralization and improvement of employee skills.

IV. RESULTS AND DISCUSSION

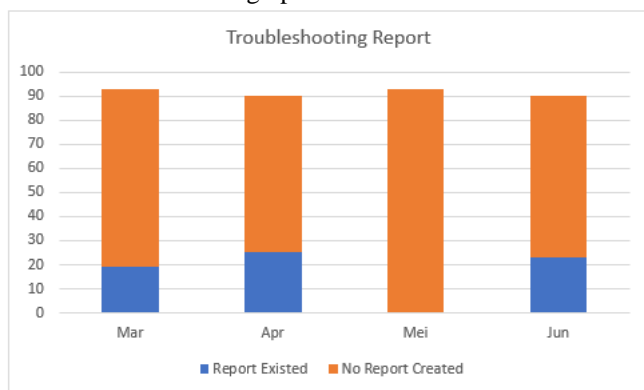
A. Data

Based on the number of customers shown in table 2 shows that many connections from 220 customer networks experienced dismantle or service termination. With Churn Rate that reached 31.36%, it shows that the service from PT XYZ has not met customer expectations.

Table 2. *Subscribers*

Customer	Aktif	Cancel	Dismantle	Grand Total	Churn Rate
CORPORATE	12		19	31	61,29%
PT AAA	22	8	39	69	68,12%
PT BBB	34		3	37	8,11%
PT CCC	83			83	0,00%
Grand Total	151	8	61	220	31,36%

In addition to these problems, the information in the daily reports and troubleshooting reports also does not provide complete information regarding the process of troubleshooting for each customer. This report only contains connection status, issues, and corrective actions taken without information regarding the time of the disturbance and the duration of the interruption. In practice, this report is often ignored by the team so that data that can be collected from March to June 2021 is only about 18% of which troubleshooting reports were made from the 366 reports that should be as shown in graph 2.



Graph 2. *Troubleshooting Report Chart*

B. DISCUSSION

In the discussion of this research, an analytical model is used to fix this problem. The analytical model used in improving this disruption service is PDCA with the improvement of the kaizen method.

1. Analysis of Planning Stages.

The results of observations and FDG can be concluded that the work of the NOC department is not optimal, as indicated

by several things including:

1. Based on SLA data shows Availability is still below the 99.5% agreement
2. Not yet have any procedures in the NOC department.
3. It is not possible to measure the performance of disturbance handling services in the NOC department.

The method of observation and FGD found factors that caused less than optimal handling of disturbances. From these factors, 4 factors were selected that could be immediately repaired through the kaizen method as shown in the fishbone diagram below (figure 2).

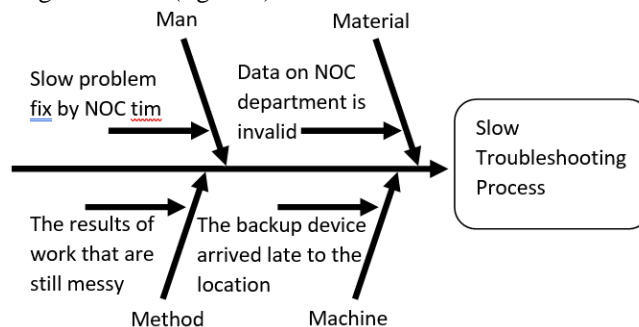


Figure 2. *Fishbone Diagram*

After being analyzed using why-why analysis, it was found that several factors could be improved so that the disturbance handling process became better in terms of reliability and responsiveness, as shown in table 3.

Table 3. *Why-why Analysis*

Aspect	Man	Method	Material	Machine
Cause	Slow problem fix by NOC tim team	The results of the work are still messy	Data on NOC department is invalid	Device backup late arrived
Why-1	Slow repair process	Irregular way of working	Incomplete data material & Uninformative data content	Delivery time of backup device
Why-2	Slow to determine the solution to the problem	The way it works is still best practice	Update data is not in place (another folder) & there is no progress progress information	The slow delivery request from NOC
Why-3	The NOC team is slow to find the source of the problem	NOC doesn't follow good way of working	Data storage is still messy	Slow availability of information from Warehouse team
Why-4	Lack of knowledge of the NOC tim team	No work guide	Separate data storage on each NOC . computer	The difficulty of information on the availability of backup devices
Why-5	NOC team competence is not enough	There is no Standard Operational Procedure yet	There is no centralization of data yet & there is no information about the time of interruption	There is no data base of backup devices that can be monitored by NOC
Root Cause	NOC team competence is not enough	There is no Standard Operational Procedure yet	No data centralization yet	There is no data base of backup devices that can be monitored by NOC

The next step after explaining Why-why analysis and fishbone diagrams is to use the 5W+1H method. With this method, it is hoped that the analysis objectives can be made in line with the improvement targets and determine the next improvement steps.

Table 4. *5W + 1H*

Concept	Information
What	The method used to reduce the delay in handling disturbances is PDCA with Why-Why Analysis and Fishbone diagrams
Where	The scope is in the NOC department at PT XYZ
When	Repair starts immediately after finding the root cause of the slow process of troubleshooting
Why	Due to the lack of data and information and slow team competence, the handling process takes a long time
Who	Head of Operations PT XYZ
How	By improving the data owned by the NOC department, setting standards and increasing NOC Competence

2. Implementation of DO Stages

In Kaizen, it must have a target so that the implementation

of Kaizen becomes effective and efficient, the target for improvement is to determine improving the quality of troubleshooting services so that the corrective steps are directed and clear as shown in figure 3

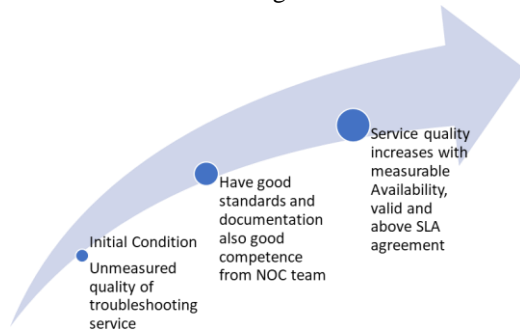


Figure 3. Improvement Target

If PDCA is applied to problem solving, it is continued at the stage where various solutions are found/proposed and their effectiveness is tested. Table 5 shows the improvement plan that will be achieved in the Improvement stage

Table 5. Improvement Implementation

Solution	Target	Result
Conduct training on the NOC team	Improve the competence of the NOC team	Speed up the process of troubleshooting & good troubleshoot report
Creating Standards, SOPs or Work Instructions	The handling process is more focused and measurable	
Make data and documents centralized and validated	Get valid and updated data	
Create the latest backup device availability data	Speed up the Backup device request process	

3. Implementation of Check Stages (Managerial Implications)

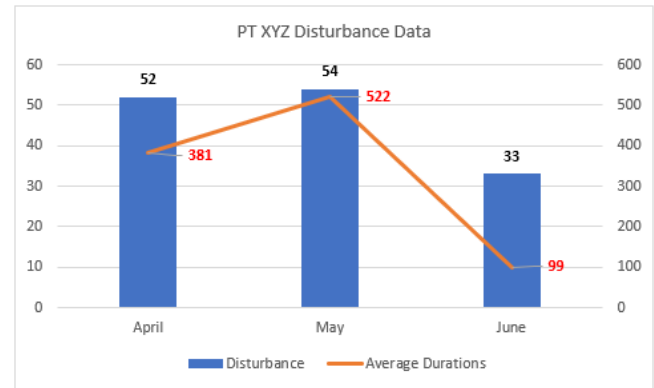
The next step is to check whether the improvements made have a positive impact on the planned improvement in handling disturbance services at PT XYZ. Checks are carried out based on the variables used in this study by comparing the data before and after repairs.

Table 6. Improvement Result

Variable	Initial Condition	Improvement	Final Result
Man	NOC team competence is still not good	NOC team training conducted	One training has been carried out and a minimum of 1 training is planned per month
Method	There are no Standards, Procedures or Work Instructions	Making Standards, Procedures or Work Instructions	One Procedure has been made and consistently 2 Standards, Procedures or Work Instructions will be made every month
Machine	Data on NOC department is invalid and scattered	Performed data cleaning and addition of information	The data is organized in a separate folder and updated regularly, as well as the addition of information on the start and end times of disturbances
Material	There is no data sharing from the Warehouse team regarding stock	Information has been provided from the Warehouse team to the NOC team	The NOC team gets information on the stock of the device continuously.
Troubleshooting Quality	There is no benchmark for speed & reliability of handling disturbances	Interruption start and end time information has been added	There is already a benchmark for calculating the speed and reliability of troubleshooting process

The results of troubleshooting quality in the last 3 months from April 2022 to June 2022 also showed better results. In

June 2022, the average length of interruption can be reduced to 99 minutes per disturbance from the previous 522 minutes per disturbance in May 2022 and 381 minutes per disturbance in April 2022. Even this is not able to meet the agreed standard where the company expects which is under 60 minutes for each disturbance. However, the improvement efforts made have shown good results.



Graph 3. Disturbance Data

4. Follow-up Act Stages

At this stage the improvement is continued by improving the quality and information of the data and the consistency of reporting. These steps can be done by using Trouble Tickets and Asset Management Applications that can help improve benchmarks and accommodate other information needs in the process of handling disturbances.

Ongoing training should be carried out in order to improve the capacity of the NOC so that the improvement process runs faster. The addition of Procedures and the creation of standards are continued to ensure all processes run as they should.

V. CONCLUSIONS AND SUGGESTIONS

A. CONCLUSIONS

After observation and analysis using a fishbone diagram, the cause of the slow handling of disturbances felt by customers and PT XYZ management can be identified. Where this problem occurs due to several factors that cause delays including:

- Slow problem fix by NOC tim team
- The results of the work are still messy
- Data on NOC department is invalid
- The backup device arrived late to the location

Improvement of treoubelshooting services is carried out by several processes, such as:

- Conduct training on the NOC team
- Making Standards, SOPs or Work Instructions and conducting socialization
- Make data and documents centralized and validated
- Create the latest backup device availability data

From the improvements made, the speed of handling disturbances can be measured and the quality as measured by the speed of repair increases from 522 minutes per disturbance to 99 minutes per disturbance.

B. SUGGESTIONS

Suggestions for the future is that in making improvements it must be consistent, and stay focused so that Kaizen goals can be achieved and improvements in the company become more visible. Suggestions for companies related to improving service disruptions include:

1. Implement the Standards, Procedures or Work Instructions that have been made and increase the number continuously
2. Continued training planning to certification for the NOC team
3. Developed more in-depth related to data recording and analysis of disturbances with the use of Trouble Tickets.

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