CHAPTER 2
LITERATURE REVIEW AND THEORETICAL BACKGROUND

2.1. Literature Review

2.1.1. Previous Research

In the food business, service quality is an essential factor in achieving customer satisfaction. SERVQUAL is a method commonly used to measure service quality. Then Important-Performance Analysis (IPA), and TRIZ are methods and are commonly used to find solutions to problems related to service quality. The data obtained is the result of distributing questionnaires to customers.

The method used by Mensah (2009), Rahman et.al (2012), Sabir et.al (2014), Yulisetiarini (2014), Khairan et.al (2014), Naraswati and Fachira (2015), Oladotun (2016), Novrianto (2016), Akilimalissiga et.al (2017), and Rahmanti et.al (2017) is Service Quality (SERVQUAL). Mhlanga (2018) uses Dining Service Quality (DINESERV) in finding the gap value on the service quality in restaurants

Mensah (2009), Rahman (2012), Yuliestiarini (2014), Rahmawanti (2017), and Khairan (2014) add several methods to prioritize attributes which need more improvement. The evidence model is used by Mensah (2009) to determine attributes which need improvement based on socio-demographic, characteristics of respondents, characteristics of foodservice facilities, comparisons between expectations and perceptions of service quality, correlations between size of the facilities and perception of service quality, correlations between socio-demographic, characteristics and perception of service. Rahman (2012) uses a hypothesis analysis to determine the attributes which need priority improvement. While, the method used by Yulisetiarini (2014), and Rahmawanti (2017) to find priority improvements is the Importance888 Performance Analysis (IPA). Then, the method used by Khairan (2014) to determine the priority improvement is calculating the weight of the important level of customers based on the dimensions of each attribute.

Mensah (2009), Sabir et.al (2014), Naraswati and Fachira (2015), Oladatun (2016), Novrianto (2016), Akilimalissiga (2017) used the five (5) GAP analysis to improve service quality. While the proposed improvement made by Mhlanga (2018) is the result of the analysis of the overall Dining Service Quality (DINESERV) model which has negative value.The proposed improvement made by Rahman et.al

(2012) is based on the results from the Chis square test. The proposed improvement made by Khairan et.al (2014) uses the whole GAP analysis (GAP 1, GAP 2, GAP 3, GAP 4, and GAP 5). Whereas Yulisetiarini (2014) used the IPA model which is in quadrant A for proposed improvements. The method used by Rahmawanti et.al (2017) to solve problems related to service quality is the TRIZ method.

2.1.2. Current Research

The problem found in “Waroenk Ayomass” food stall is the quality of service that has not been able to satisfy customers. The service given by “Waroenk Ayomass” food stall is not yet structured, there are complaints from customers about the services provided by “Waroenk Ayomass” food stall. Besides the facility design and taste of food at “Waroenk Ayomass” food stall also received complaints from customers. These problems cause the owner of “Waroenk Ayomass” food stall to improve the quality of service immediately. Therefore, customers who come to “Waroenk Ayomass” food stall can be satisfied with the services provided and will become loyal customers. This research will use the SERVQUAL method and the TRIZ method.

Based on previous research, Khairan et.al., (2014) used the SERVQUAL method to propose improvements in the quality of Sari Bundo restaurant services in the Merak Branch. Questionnaire preparation consisted of importance level questionnaire, perception, expectation, management perception questionnaire regarding Customer expectations, standard performance questionnaire, service delivery questionnaire, additional attribute questionnaire to measure the causes of Gap 1 and Gap 2, and additional attribute questionnaires to measure Gap 3. Testing does by using a measuring instrument that is a validity test and reliability test. Overall Gap analysis was carried out in Gap 5 analysis. The overall Gap Analysis will be a proposed improvement in the quality of service, which is a problem in the Sari Bundu food stall in the Merak Branch.

Based on previous research, Rahmanti et.al., (2017) used the TRIZ method to get an improvement solution on the attributes that need improvement. Proposed improvements that need to be done based on the TRIZ method at Ocean garden restaurant are improvements to the procurement of raw materials, cleanliness of the restaurant before opening, and speed of service

2.2. Theoretical Background

This part explains about services in general and distinguishes between services and products. Then, this part also explains the SERVQUAL method and importance-performance method.

2.2.1. Service Definition

According to Kotler (2002: 486) as cited in Wijayanti (2015) service is an activity or action which is carried out by a party and given to another party. Economic activities which occur are not derived from products in physical form but from activities carried out by one party to another party. The products produced through services can be either linked or not to the physical product. One of the services which require physical products is the food at the restaurant. On the other hand, the services which do not need physical products (pure services) are lawyers, and waiters.

2.2.2. Service Characteristic

According to Kotler and Armstrong (2001) as cited in Wijayanti (2015) the purpose of service characteristics is to distinguish between goods and services. Service is intangible or does not have physical form, but goods has physical form. Services have four characteristics, they are intangible, variability, inseparability, and perishability.

a. Intangible

   Service characteristics are intangible. It means that services are something which cannot be seen or heard. Services can be in the forms of actions or processes of an object or product.

b. Variability

   Services are variability because the output of services vary from one another. The quality and type of services depend on who, when, and where the services are produced.

c. Inseparability

   Services are inseparability because services will be enjoyed or felt by the customers after they are sold to customers. After the services are sold, they will be produced and consumed at the same time.

d. Perishability

   Services are perishability because services can change any time. Services will only have value when the service is given to the customer.

2.2.3. Service Category

In running their business, companies usually have a target market as the primary target. Through the primary target, companies will offer product to customers according to the target market.

According to Kotler and Keller (2009) as cited in Wijayanti (2015) the offering activities in a company divided into five categories, they are pure physical product, physical products with support services, hybrid products, major service with accompanying minor goods and services, and pure services

a. The pure physical product is a service provided to customers in the form of physical products. In this case, the services provided by the company are physical products without service, for example, instant noodles.
b. Physical product with support services is a service provided to customers by offering physical products which are supported by several types of services to increase customer attractiveness. For example, a food stall provides larger parking area for customers.
c. Hybrid product is a service and product provided or offered to customers at one time. For example, food which is offered in restaurants equipped with good service.
d. Major service which is equipped with the minor goods for the additional services. For example, hotels provide room service to visitors or guests, but hotel rooms also provide breakfast to the guest of hotel rooms.
e. Pure service is a service provided to customers in the form of services only, for example, psychological consultations.

2.2.4. Customer Satisfaction

According to Firdiyansyah (2017) satisfaction is a feeling of happiness or disappointment about the expected results of a product or service. According to Sasongko and Subagio (2013) as cited in Firdiyansyah (2017) any some indicators to fulfil customer satisfaction, they are:

a. There were no complaints about the place of the research.
b. Customers give praise after making a transaction at the place of research.
c. Customers feel that the place which used as the object of research is a place that has good repute

2.2.5. Sample

The sample is a part of the entire object or phenomenon which is observed (Krisyanto, 2006: 149). According to Hair et al (2006: 112) as cited in Mulyono (2012) the minimum amount of unknown population samples are five times from variables analysed, or indicators. Besides, according to Malhotra (1993) as cited in Amirullah (2015) also says the number of respondents in this research is the number of attributes in the questionnaire multiplied by five. According to Sugiyono (2011:90) as cited in Khusaini (2016) the appropriate sample size in the research is 30 until 500 samples. According to Nurkhasanah et.al (2011) as cited in Effendi et.al (2018), sampling based on a linear time function can be done if the total population is not known surely. The number of the sample is calculated based on the linear time function, the formula is as follows:

$$n = \frac{T - t_0}{t_1} \quad (2.1)$$

Where:

n: number of sample

T: The available time for research

to: The fixed time does not depend on sample size, it is the time when taking sample

t1: The time which is used for each sampling unit, it is the time required by the respondent to fill in the questionnaire.

2.2.6. Service Quality (SERVQUAL)

SERVQUAL is a method developed by Parasuraman, Zeithaml, and Berry as cited in Sherly (2019). It is a method used to explain in detail the five service quality gaps. Through SERVQUAL method, information, or description of customer expectations can be known (Parasuraman et al, 1988). This information is formulated in the service quality (Q). Through the service quality information, the difference level between customer perceptions and expectations are obtained.

a. Customer expectation is customer beliefs before buying a product or service based on customer's standard. The customer's standard is a value which can be given by customers toward goods or services. Through customer expectations, some information can be obtained. Then, information obtained by customers can be a reference to improve or develop the service management quality.

The service quality measurement formulations based on Parasuraman in Tjiptono (2008) as cited in Sherly (2009) is:

$$Q = P - E \qquad (2.2.)$$

Q = Service Quality

P = Perception

E = Expectation

Based on the formula, perception is a customer's belief in the service provide. Then, the expectation is what the customer wants from the service that provided by the company. In the service quality, the service provider must give the service based the information collected from expectation, not predicting what service will be offered.

b. Dimensions of Service Quality

The 5 dimensions of SERVQUAL proposed by Parasuraman in Kotler and Keller (2012) as cited in Sherly (2018) are as follows:

i. Tangible is a dimension where a service is given to customers through physical facilities, for example, condition of the building
ii. Reliability is a dimension where the company provides the best service to customers accurately and reliably
iii. Responsiveness is an action taken by service providers to customers responsively
iv. Assurance is an action given by the service provider to the customer by paying attention to several guarantees such as understanding of service product offered, politeness, trustworthy behaviour.
v. Empathy is a concept to provide services by giving attention which satisfies customers

c. In the SERVQUAL method, there are gaps which are used to determine the gaps between customer expectations and customer perceptions. These gaps are known as Parasuranam five gaps model. According to Oladotun (2016), Parasuraman five gaps model will understand the service quality measured in the quality dimension.

i. Gap 1 = Gap between customer expectations and management perceptions
ii. Gap 2 = Gap between management perceptions and service quality specifications
iii. Gap 3 = The gap between service quality specifications and services provided

iv. Gap 4 = The gap between services provided with external communication

v. Gap 5 = The gap between customer expectations and customer perceptions.

The Parasuraman service quality model, as seen in Figure 2.1.

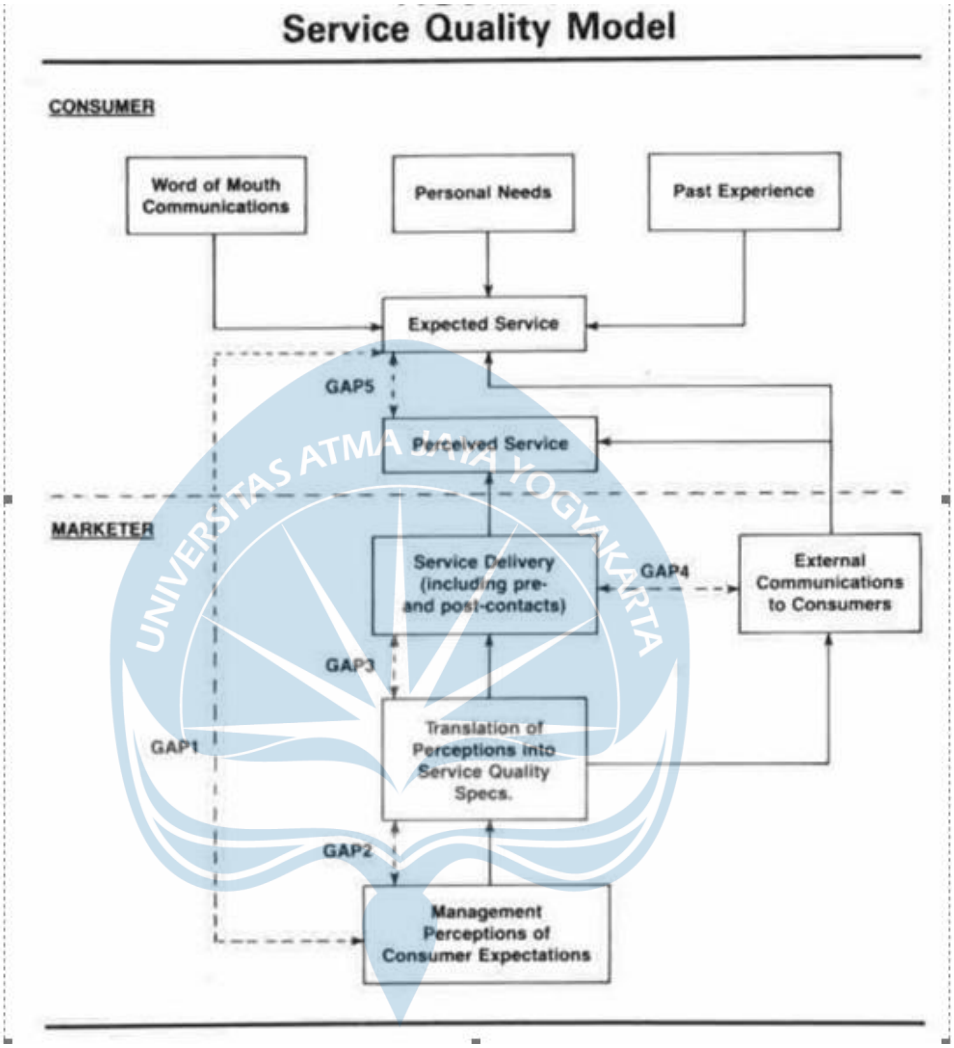

Figure 2.1. Service Quality Model

(Kotler dan Keller, 2012 as cited in Sherly, 2018)

d. SERVQUAL Measurement

SERVQUAL measurement is conducted to compare service performance based on the attributes. The quality of services will get a positive assessment if the performance of the services provided match with the standards. There are several formulas in SERVQUAL measurements:

i. Gap 5 = Customer perception score - Customer expectation score (2.3.)

ii. Gap 1 = Management perception score - Customer expectation score (2.4.)

iii. Gap 2 = Quality service specification score - Ideal condition (2.5.)
iv. Gap 3 = Service delivery score - Ideal condition (2.6.)
v. Gap 4 = External communication score - Customer expectation score (2.7.)

e. According to Mimi & Ekawati, as cited in Firdiyansyah (2017), there are several indicators to fulfil customer needs and customer accuracy so that customers' expectations are fulfilled:
   i. The condition of building is good.
   ii. Employees are fast to finish the job.
   iii. Employees are responsive to handle customer complaints.
   iv. Employees are able to know the changes in food taste quickly.
   v. Employees give attention to their customers well.

2.2.7. Importance-Performance Analysis Method

According to Suhendra and Prasetyanto (2015) the Importance-Performance Analysis (IPA) model is a model developed by Marlita and James (1977). In IPA model, there are four IPA quadrants. They are concentrate here, keep up the good work, low priority, and possibly overkill.

a. Concentrate here

   The quadrant "Concentrate Here" (A) is the important factor for customers. The actual condition is currently not satisfied. Attributes which is located in quadrant (A) need priority improvement.

b. Keep up with the good work

   The quadrant “keep up with the good work" (B) is an important factor as a supporting factor in customer satisfaction. In this quadrant, the management has a responsibility to be able to maintain the achievements.

c. Low priority

   The quadrant "Low Priority" (C) is a factor which is considered not necessary from customer expectation, therefore the factors in the quadrant (C) are not really need priority improvement.

d. Possibly overkill

   The quadrant "Possible Overkill" (D) is an unimportant factor, therefore the management should leave the factors in the quadrant (D) and prioritize the factors which need more improvement.

The Importance-Performance Analysis (IPA) model is a model used to measure customer perceptions and priority of quality improvement. The focus of measurement of the IPA model is the level of conformity. Through the level of conformity will be known as the sequence of priority quality that can affect customer satisfaction. The measurement of the IPA model to the level of conformity knowing through the results of performance appraisal and the results of importance assessment. In the measurement of the IPA model, there are two axes, they are the X-axis and the Y-axis. The X-axis is used to determine the average value of the performance score. The Y-axis is used to determine the value of the average importance score.

$$Xi = \frac{\sum Xi}{n} \quad (2.8.)$$

$$Yi = \frac{\sum Yi}{n} \quad (2.9.)$$

Xi: Average score for the performance level in i-factor
Yi: Average score for the importance level in i-factor
∑Xi: Total score for the performance level in i-factor
∑Yi: Total score for the importance level in i-facto
n: number of items

The Importance-performance analysis diagram as seen in Figure 2.3

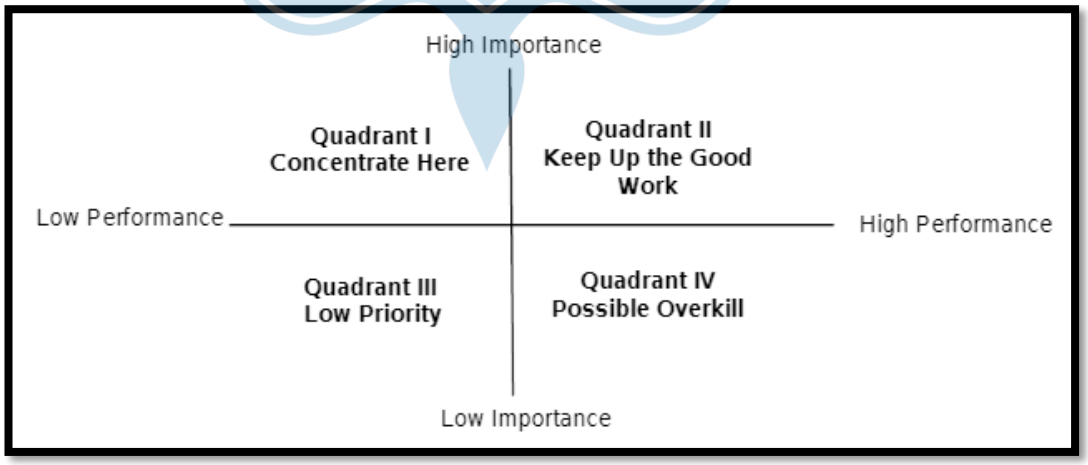

Figure 2.2. Importance-Performance Analysis Diagram
(Wong et.al., 2011)

2.2.8. TRIZ Method

The TRIZ method is a method developed by Generic Saulovich Altshuller. TRIZ is an abbreviation of the Russian language, namely the Theory of *Resheniya Izobretatelsikh Zaddatch*. In English, TRIZ is the Theory of Inventive Problem Solving. Rahmanti et.al., (2017) said TRIZ is a method used to solve a structured problem. Problem-solving is done in a collection of problems that have integrated with the resolution tools. The solution provided by the TRIZ method is in the form of recommendations. Forty (40) invention principles are used to provide solutions to the contradictions which occur between characteristics and find the ideal result. (Rantanen and Domb, 2002). TRIZ for 40 principles as seen in Table 2.1

Table 2.1. TRIZ for 40 Inventive Principles (Rantanen and Domb, 2002)

No	Inventive Principle	No	Inventive Principle
1	Segmentation	21	Skipping / Rushing Through
2	Taking out	22	Blessing in disguise or Turn Lemons into Lemonade
3	Local quality	23	Feedback
4	Asymmetry	24	Intermediary
5	Merging or Combining	25	Self-service
6	Universality	26	Copying
7	Nested Doll	27	Cheap short-living objects
8	Anti-weight	28	Mechanics substitution
9	Preliminary anti action	29	Pneumatic and Hydraulics (Intangibility)
10	Preliminary action	30	Flexible shells and thin films
11	Beforehand cushioning	31	Porous materials
12	Equipotentiality	32	Colour changes
13	The other way round	33	Homogeneity
14	Curvature Increase	34	Discarding and recovering
15	Dynamics	35	Parameter changes
16	Partial or excessive action	36	Phase transition
17	Dimensionality Change	37	Thermal expansion
18	Mechanical vibration	38	Strong oxidants (Boosted interaction)

Table 2.1. TRIZ for 40 Inventive Principles (Rantanen and Domb, 2002) (Continued)

No	Inventive Principle	No	Inventive Principle
19	Periodic action	39	Inert Atmosphere
20	Continuity of useful action	40	Composite material

a. Segmentation

Segmentation is a principle to divide an object or system into a separate part. The purpose of this principle of segmentation is so that separate objects or systems so that objects or systems can easily carry out activities.

b. Taking out

Taking out is a principle to separate objects or systems from disturbing parts and unnecessary parts.

c. Local quality

Local quality is change in a structure on an object or an external environment so that an object or external environment has different influences in different situations.

d. Asymmetry

Asymmetry is a principle that aims to change a system from symmetrical to asymmetrical. Symmetrical is the technique of composition of images arranged neatly and pay attention to the balance of form. The asymmetrical composition is a technique of composition of images that are arranged abstractly or randomly while still paying attention to art.

e. Merging or Combining

Merging or combining is a principle that aims to combine an object or the same system. Then this principle also aims to make parallel operations work simultaneously.

f. Universality

Universality is a principle that aims to make an object or system to perform multiple functions.

g. Nested Doll

Nested doll is a principle to place objects or systems in turn. The purpose of this principle is that an activity of an object or system can go to another part.

h. Anti-weight

Anti-Weight is composite the weight of an object or system with other object or system so that the object or system become balance.

i. Preliminary Anti Action

Preliminary anti action is a principle to calculate the effect of an action. These effects are good effects and bad effects.

j. Preliminary Action

Preliminary action is a principle for preparing objects or systems. The purpose of this system is to prepare actions or solutions to a problem that might occur.

k. Beforehand Cushioning

Beforehand cushioning is a principle to prepare security measures in conducting trials of objects or systems.

l. Equipotential

Equipotential is a principle to provide limits on changes in the position of an object or system. The purpose of this principle is to eliminate the less important parts.

m. The Other Way Round

The other way round is a principle that aims to solve the problem by reversing an action. The purpose of reversing action is to make the object move, but the surrounding environment is in a fixed condition.

n. Curvature Increase

Curvature increase is a principle that aims to move an object that is in the shape of a cube or symmetrical to a curved shape. This principle uses a square section. Examples of objects from this principle are rollers, balls, spirals, and cubes.

o. Dynamics

Dynamics is a principle that aims to design an object or a process in order to get optimal conditions. This principle can do by dividing an object or system into several parts that work together with each other.

p. Partial or Excessive Action

Partial or excessive action is a principle that aims to get perfect scores easy. This principle carried out if perfect scores are difficult to obtain using existing methods. This principle can do by way of overloading or reducing actions in order to get a good score than before.

q. Dimensionality Change

Dimensionality change is a principle that aims to move an object or system into two dimensions or three dimensions. Besides, the principle of "another dimension" can use multi-stories in compiling objects.

r. Mechanical Vibration

Mechanical vibration is a principle that causes an object or system to be in a vibrate (interested) situation. Vibration is used to place a system into the outside environment, so the vibration will affect people to coordinate with the object or system.

s. Periodic Action

Periodic action is a principle that is used to make an action carried out periodically.

t. Continuity of Useful Action

Continuity of useful action is a principle that aims to determine the advantages or disadvantages of objects or systems. The way to do this principle is to let the object or system work continuously at full load.

u. Skipping / Rushing Through

Skipping / rushing through is doing a process with acceleration. Example: damage tests.

v. Blessing in Disguise or Turn Lemons into Lemonade

Blessing in disguise or turn lemons into lemonade is a principle that utilizes hazard factors to achieve positive effects.

w. Feedback

Feedback is a principle carried out by making corrections (cross-checking and reconciliation) to improve a process.

x. Intermediary

Intermediary is a principle that uses intermediaries to achieve certain goals. Example: sales promotion. Sales promotion is a third party that aims to facilitate the business of buying and selling in negotiating with customers.

y. Self-Service

Self-service is a principle created for self-service. The objects or system has another function, which is to help.

z. Copying

Copying is a principle to use existing objects or systems to make them simpler and cheaper.

aa. Cheap Short-Living Objects

Cheap short-living objects is a principle that aims to replace the system or object to be cheaper by sacrificing certain qualities.

bb. Mechanics Substitution

Mechanics substitution is a principle that aims to make a system better. Change the system to become more structured. For example, systems that unstructured become structured. Systems that were previously static came to move.

cc. Pneumatic and Hydraulics (Intangibility)

Pneumatic and hydraulics is a principle to replace parts that do not exist in the object or system. Example: replace an object or system that was previously solid into gas or liquid as an object or system that is not solid.

dd. Flexible Shells and Thin Films

Flexible shells and thin films are a principle that aims to separate one object or system from another object or system.

ee. Porous Materials

Porous materials are a principle that aims to make it easier for customers to find something they need through the information contained in the system.

ff. Color changes

Color changes is principle that aims to change the color of the object or system based on the surrounding environment.

gg. Homogeneity

Homogeneity is a principle that aims to unite the object or system with the surrounding environment with the same material.

hh. Discarding and Recovering

Discarding and recovering is a principle that aims to modify objects or systems directly during operation.

ii. Parameter Changes

Parameter changes is principle that aims to change parameters in an object. Example: making changes or adding new policies.

jj. Phase Transition

Phase transition is a principle that aims to change the new system by utilizing the phenomenon that is happening.

kk.Thermal Expansion

Thermal expansion is a principle that aims to expand the marketing system.

ll. Strong Oxidants (Boosted interaction)

Strong oxidants are principle to change the situation to become more social. The purpose of this principle is to survive other environmental threats and be able to increase customer participation in services.

mm. Inert Atmosphere

Inert atmosphere is a principle that aims to make the atmosphere peaceful so that the situation becomes neutral.

nn. Composite Material/System

Composite material/system is a principle that aims to combine several systems into one (arrange or integrate objects according to the system).

Forty (40) principles are used to choose principles that are appropriate to a particular problem. After knowing 40 principles, the next step is to formulate a trade-off. Trade-off formulations are used to eliminate the same numbers in the inventive principle (Rantenan and Dumb, 2002). Generic Saulovich Atshuller classifies principles on a 39 x 39 matrix contradiction. (Rantenen and Domb, 2002). TRIZ for 39 Parameter as seen in Table 2.2

Table 2.2. TRIZ for 39 Parameter (Rantanen and Domb, 2002)

No	Parameter	No	Parameter
1	Weight of moving object	21	Power
2	Weight of Stationary object	22	Loss of energy
3	Length of moving object	23	Loss of substance
4	Length of stationary object	24	Loss of Information
5	Area of moving object	25	Loss of Time
6	Area of stationary object	26	Quantity of substance /the matter

Table 2.2. TRIZ for 39 Parameter (Rantanen and Domb, 2002) (Continued)

No	Parameter	No	Parameter
7	Volume of moving object	27	Reliability
8	Volume of stationary object	28	Measurement accuracy
9	Speed	29	Manufacturing precision
10	Force	30	External harm affects the object
11	Stress of pressure	31	Object-generated harmful factors
12	Shape	32	Ease of manufacture
13	Stability of the object's composition	33	Ease of operation
14	Strength	34	Ease of repair
15	Duration of action by a moving object	35	Adaptability or versatility
16	Duration of action by a stationary object	36	Device complexity
17	Temperature	37	Difficulty of detecting and measuring
18	Illumination intensity	38	Extent of automation
19	Use of energy by moving object	39	Productivity

a. Weight of moving object

Weight of moving object is mass (weight) used to support (weight) objects.

b. Weight of Stationary Object

Weight of stationary object is mass (weight) used to support (weight) objects when the object is stationary.

c. Length of Moving Object

Length of moving object is a dimension of size by considering something long.

d. Length of Stationary Object

The concept of length of stationary object is same with the length of moving object.

e. Area of Moving Object

Area of moving object is a geometrical characteristic on the object. Part of the object is part of the object's surface and the surface size of the object (inside or outside of the object).

f. Area of Stationary Object

The concept of stationary object is same with the area of moving object.

g. Volume of moving object

Volume of moving object is the size of the volume used by the object.

h. Volume of stationary object

The concept of volume of stationary object is same with a volume of moving object.

i. Speed

Speed is the velocity of the object (process or movement in units of time).

j. Force

Force used in an interaction system.

k. Stress of pressure

Stress of pressure is force of each unit area and tension.

l. Shape

Shape is display of a system or form outside an object.

m. Stability of The Object's Composition

Stability of the object's composition is the relationship that occurs between the core elements in a system. Disassembly all decreases instability.

n. Strength

Strength is resistance to hold the force (prevent the object from being destroyed).

o. Duration of action by a moving object

Duration of action by a moving object is the productive time of an object (the time required for the object to work according to function).

p. Duration of Action by a Stationary Object

The concept of action by a stationary object is same with the duration of action by a moving object.

q. Temperature

The meaning of temperature is the temperature which present or occurs in an object or system.

r. Illumination Intensity

Illumination intensity is changes that occur in the unit area, including the lighting of a system continuously and quickly.

s. Use of energy by moving object

The meaning of use of energy by moving object is use energy to carry out its functions.

t. Use of energy by stationary object

The concept of use of energy by stationary object is same with the use of energy by moving object.

u. Power

The meaning of power is the time taken by the object to perform the function of the object.

v. Loss of Energy

The meaning of loss of energy is use of energy does not contribute to complete a job.

w. Loss of substance

The meaning of loss of substance is remove some parts or data from a system.

x. Loss of Information

The purpose of loss of information is to eliminating access to data contained in the system continuously. Loss of information can be used to eliminate data contained in systems in the human senses such as texture and stink.

y. Loss of Time

Loss of time is reducing the time that used to spend the activities.

z. Quantity of substance the matter

The meaning of quantity of substance the matter is the number of subsystems replaced. That can be replaced in whole or part permanently or temporarily.

aa. Reliability

The meaning of reliability is the ability of a system to perform predicted conditions.

bb. Measurement Accuracy

The meaning of measurement accuracy is performed calculations with a property system to reduce errors that occur and so that results are becoming more accurate.

cc. Manufacturing precision

Manufacturing precision is expanding the actual characteristics of a system by calculating specific objects or through existing demand characteristics.

dd. External harm affects the object

The meaning of external harm affects the object is a system that has advantages and weaknesses of the system has a goal to avoid external hazards that will affect the object.

ee. Object-generated harmful factors

The meaning of object-generated harmful factors is hazard effects can affect the quality and efficiency of objects or systems.

ff. Ease of manufacture

Ease of manufacture is an object or system that has convenient facilities and does not require much effort in the fabrication or manufacturing process.

gg. Ease of operation

The ease of operation aims to get the result “hard process” is low. After that, the result for “easy process” is high.

hh. Ease of repair

Ease of repair is a system that has the characteristics of quality that is comfortable, simple, the time used is used to correct errors.

ii. Adaptability or versatility

The meaning of adaptability or versatility is the system or object can utilize and accept changes from outside.

jj. Device complexity

Device complexity is system users can be part of the system, so the level of system complexity can increase. The size of the complexity can affect the user in mastering a system.

kk. Difficulty of detecting and measuring

The meaning of difficulty and measuring is making observations on a complex system and requires a lot of time. Example: rising costs in measuring dissatisfaction.

ll. Extent of automation

The extent of automation is the development or expansion of system functions. The system can carry out its functions without human interface. There are three

levels. The lowest level is used manually operated tool. The middle level is the continuous operation of the system. The social program (intervals) is used to reprogram (if needed). The highest level is that the machine can do its activities and know the operator needed.

mm. Productivity

The meaning of productivity is Performance which measured using units of time.

Rantenan and Dumb (2002) said that resolving tradeoffs summarized in the contradiction matrix arranged in a table contradiction matrix. The row shows features that should be improved. The column shows features that get worse. Contradiction matrix table as seen in Appendix 15. Stages to the TRIZ method as seen in Figure 2.4

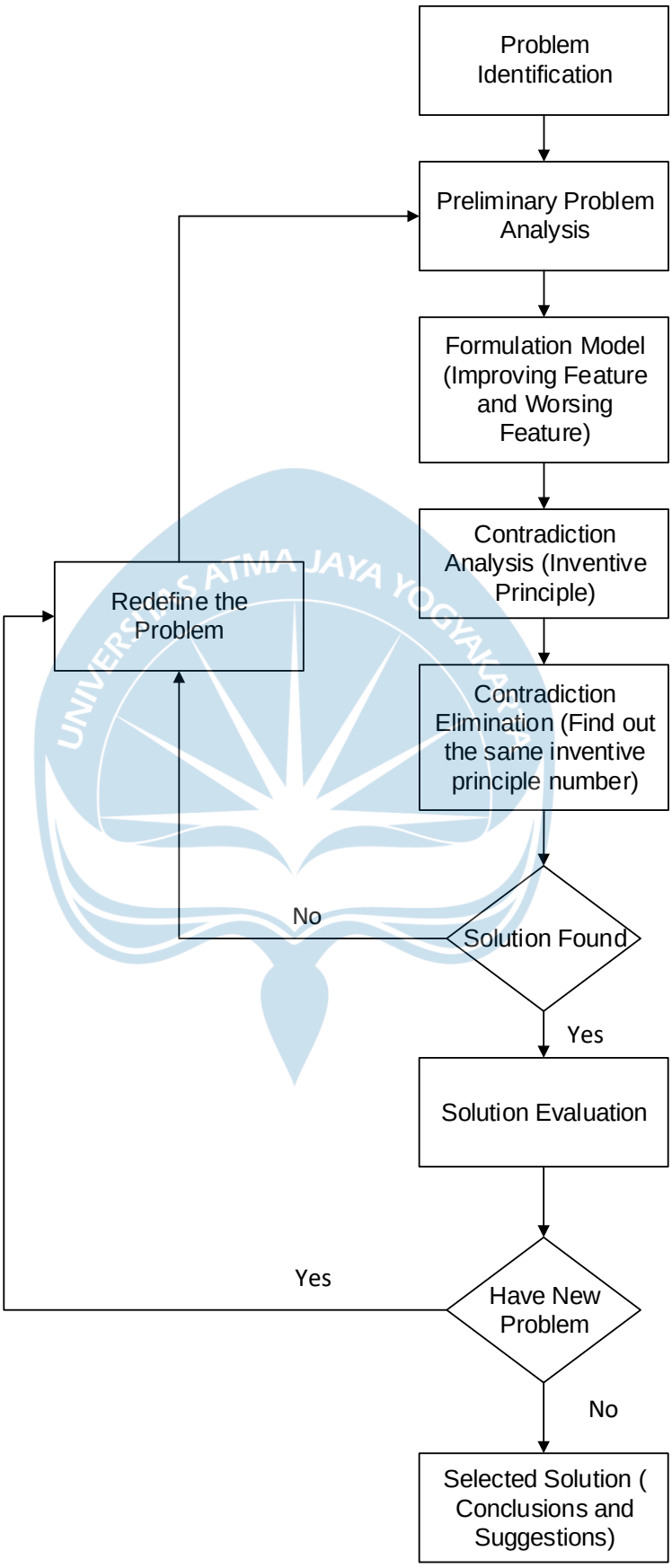

Figure 2.3. Steps of TRIZ Method (Rantanen and Domb, 2002)

Steps for TRIZ method (Rantanen and Dumb, 2002)

a. Preliminary Problem Analysis

The preliminary problem analysis step is to identify and collect service problems that occur. The identification of the problem is done on the attributes which need improvement based on the SERVQUAL method. Attributes which need improvement are made the first solution through discussion with the owner and suggestion provided by the customer.

b. Formulation Model

The formulation model is done by translating the first solution on the technical parameters. The technical parameters will be divided into two (2) parts. Part one (1) is improving features and part two (2) is Worsening features. Each technical parameter is translated through 39 technical parameters.

c. Contradiction Analysis

The contradiction analysis step is carried out to find inventive principle. The inventive principle is obtained through the intersection between improving features and worsening features. The inventive principle will bring up useful numbers for improvement solutions in improving service quality.

d. Contradiction Elimination

The contradiction elimination step is carried out on the numbers generated by the inventive principle. The numbers which are eliminated are the numbers which have the same inventive principle, at least two equation.

e. Evaluation Solution

At the evaluation solution step is the stage to consider which solution between the first solutions and solutions from the results of the inventive principle. The chosen solution is the solution which provides the benefits desired by all parties without any harm or disappointment.

2.2.9. Questionnaire

According to Umar (2003) as cited in Setyawan (2018) the questionnaire is a method used when conducting research to find out the responses of respondents towards the research objects. There are several advantages when the research is conducted using questionnaires, such as the questionnaire can be distributed to many respondents at one time, therefore the researcher can obtain data quickly. Besides, the questions are more structured.

2.2.10. Scala Design

According to Likert (1932) as cited in Rinker (2014) the Likert scale is the scale which uses several questions to measure individual behavior by responding to the 5 choice points on each item, very agree, agree, enough, disagree, and very disagree. Therefore, Rinker (2014) states that in measuring the research questionnaire, the Likert scale can be used as a measurement scale design. The examples of assessment categories using Likert scale can be seen in Table 2.3.

Table 2.3. Scale Design Using Likert Scale (Rinker, 2014)

The Likert Scale	Category
5	Very Agree
4	Agree
3	Enough (between agree and disagree)
2	Disagree
1	Very Disagree

2.2.11. Validity Test

Validity Test is a method used in research to find out whether the instrument is used to obtain data (valid) or not. Valid data is the appropriate data between data when conduct research with data reported by researchers (Setyawan, 2018). According to Chee (2018), the correlation formula is:

$$r = \alpha = R = \frac{n\sum XY - \sum X \sum Y}{\sqrt{\{n\sum X^2 - (\sum X)^2\}\{n\sum Y^2 - (\sum Y)^2\}}} \quad (2.9)$$

Where:

r = Correlation

X = Score of each item

Y = Total score minus the item

n = sample size

Noted: According to BAPM (2008), The Pearson moment product correlation formula is available in the Calculator scientific, MS Excel, statistical software.

$$t = \frac{r_{xy}\sqrt{n-2}}{\sqrt{1-r_{xy}^2}} \quad (2.10)$$

Where :

r_{xy}: the already calculated Pearson correlation coefficient

n = number of respondents

Noted : Using excel, in the line after Pearson correlation, look for the value of t-count by defining a function in Excel resulting from the interpretation of the formula t, the syntax can be written as [= SQRT (n-2) * rxy / SQRT (1-rxy ^ 2)]. After that for the t-table value can be calculated using the excel function by writing syntax [= tinv (probability; the degree of freedom)].

2.2.12. Reliability Test

A reliability test is a method used to test the level measuring instrument that can provide a reliable measurement (Setyawan,2018). The reliability coefficient will show that the instrument is reliable or unreliable. According to Sekaran (2000) as cited in Samuel and Wijaya (2008) states that there are several criteria in the reliability coefficient as seen in Table 2.4

Table 2.4. Reliability Criteria (Sekaran, 2000 as cited in Hatane, 2008)

Reliability Coefficient	Reliability Criteria
0.81 <r ≤ 1.00	Good
0.6 <r ≤ 0.799	Reliability is Received
0.00 <r ≤ 0.6	Reliability is Poor

Reliability testing is done using the Cronbach Alpha method (α). According to Ety Rochaety (2007: 54) as cited in Gunawan (2018), the reliability test formula is:

$$a = r = \frac{n}{n-1}\left(1 - \frac{\sum_{i=1}^{n} S_i^2}{S_t^2}\right) \quad (2.11)$$

α = Cronbach Alpha Reliability Coefficient

r = Reliability coefficient

n = Number of items

S_i^2= Score variance of the i-question.

S_t^2= Variance in the total score.

2.2.13. Font Size

According to Agustrijanto (2001) as cited in Negara (2013), fonts are the forming elements of words. The words that have been formed can be arranged into a sentence.

According to Nala (1992) as cited in Negara (2013), the font size formula is:

$$T\ (high\ of\ letter) = \frac{distance\ read\ in\ mm}{200} \quad (2.12)$$

$$Wide\ = \frac{2}{3}Tcm \quad (2.13)$$

$$Thick\ = \frac{1}{6}Tcm \quad (2.14)$$