

**ANALYSIS OF CUSTOMER SATISFACTION IN THE  
COMPETITIVE BANK: TAGUCHI SIGNAL-TO-NOISE RATIO  
APPROACH**

**THESIS**

**Submitted to International Program  
Industrial Engineering Department in Partial Fulfilment of  
Requirements for Bachelor Degree of Industrial Engineering  
Universitas Islam Indonesia**



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YOGYAKARTA  
2018**

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In the name of Allah, I hereby certify that this research is based on my own work and studies, except for the citations and summaries in which of those is explicitly knowledge. If in the future this statement is proved not right and violates the legal regulation of papers and intellectual property rights, I agree Universitas Islam Indonesia to revoke my bachelor certificate.

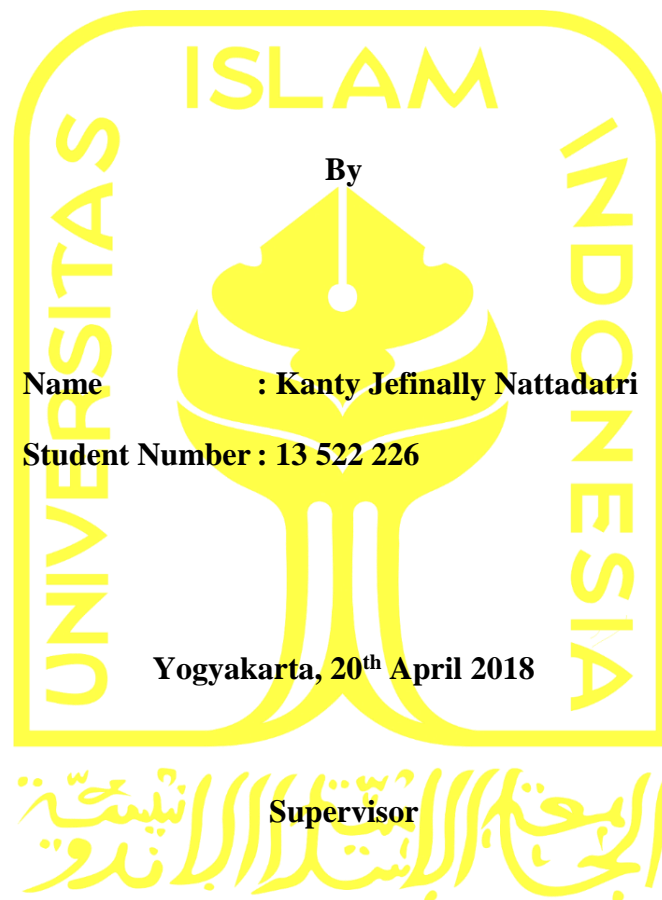
Yogyakarta, 20<sup>th</sup> April 2018

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**ANALYSIS OF CUSTOMER SATISFACTION IN THE COMPETITIVE BANK: TAGUCHI SIGNAL-TO-NOISE RATIO APPROACH**

**THESIS**



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TAGUCHI SIGNAL-TO-NOISE RATIO APPROACH**

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## **DEDICATION**

This thesis is wholeheartedly dedicated for the ones who I love since the day I was born. They are my queen Henny Yefinar, my king Daru Trisadono, my knights Andrea Begawan Poentadatri & Santri Dirga Setadatri, and my princess Kanya Loema Azzahradatri. Last but not least, for my beloved nanny, Mrs. Payem who rests in heaven. I sincerely love all of you eternally.

## MOTTO

”Education is not just about going to school and getting a degree. It's about widening your knowledge and absorbing the truth about life.”

**(Shakuntala Devi)**

“The most beautiful people we have known are those who have known defeat, known suffering, known struggle, known loss, and have found their way out of those depths.”

**(Elisabeth Kubler-Ross)**

“As engineers, we were going to be in a position to change the world - not just study it.”

**(Henry Petroski)**

## PREFACE

*Assalamualaikum Wr. Wb.*

*Alhamdulillahirrobbilalamin*, all praises to Allah SWT who has given His mercy and guidance to Author in finishing this undergraduate thesis. Gratitude is presented to Allah the Highest, while blessings and greetings are also delegated to the Prophet Muhammad. The Author would like to express the gratitude and highest appreciation to those who have supported and motivated the Author in completing this Thesis. The Author would like to say thanks to:

1. Dr. Drs. Imam Djati Widodo, M.Eng.Sc. as dean of Industrial Technology Faculty, Universitas Islam Indonesia.
2. Muhammad Ridwan Andi Purnomo., ST., M.Sc., Ph.D. as Head of International Program Industrial Engineering Universitas Islam Indonesia.
3. Ir. Hartomo Soewardi, M.Sc., Ph.D. as supervisor for unlimited help, support and advice.
4. BRI, BNI, and Mandiri Bank staffs who helped in data collecting process.
5. My beloved parents, brothers, and sister who always pray for my achievements.
6. My IP IE friends, especially the class of 2013, for solidarity, togetherness, inspiration, happiness, and many things that cannot be described here.
7. My fellow Mr. Tom's warriors: Fara, Sasa, Ekky, for the love, laughs, cries, hugs, and joy.

The Author realized that this report is not perfect. Thus, suggestions and critics are fully expected.

*Wassalamualaikum Wr. Wb.*

Yogyakarta, April 2018

Kanty Jefinally Nattadatri

## ABSTRACT

*This research presents an investigation about the level of customer satisfaction at the selected bank in Indonesia on basis five dimensions of service quality. They are reliability, responsiveness, assurance, empathy, and tangible. It is noteworthy for banks to provide the high quality of service but a few of a certain bank experiencing matters on service performance which is more and more declining. Thus, some improvements should be done on each attribute that has not achieved a quality target. Taguchi Signal-to-Noise Ratio approach is applied to assess service quality performance referring to the Ordered Categorical Data obtained from the paper-based survey with distributing questionnaire containing 21 attributes. The results of this research show that there are some attributes of dimensions respectively not satisfying the quality standard of the bank. They are Rel3 attribute: customer expectation-based service) of reliability dimension, Res1 attribute: understanding needs and wants of the customers of responsiveness dimension, A1 attribute: provide a clear explanation of bank's product to customer of assurance dimension, E1 attribute: polite and friendly staff of empathy dimension, and T1 attribute: modern looking equipment of tangible dimension.*

**Keywords:** *Taguchi Signal-to-Noise Ratio, Service Quality, Customer Satisfaction, Bank*



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## CHAPTER I

### INTRODUCTION

#### 1.1 Background

A service is an activity or series of activities of intangible nature that normally, but not necessarily, take place in interactions between customers and service employees and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problems (Shahin et al, 2012).

Service quality can be defined as the extent to which a service meets customers' needs or expectations (Wisniewski & Donnelly, 1996; Lewis & Mitchell, 1990; Dotchin & Oakland, 1994). Thus, service quality is the difference between customer expectations of service and perceived service. If expectations are greater than performance, then perceived quality is less than satisfactory and hence customer dissatisfaction occurs (Shahin, 2006; Parasuraman et al, 1985; Lewis & Mitchell, 1990). According to Parasuraman et al. (1991), service quality dimension consists of reliability, responsiveness, assurance, empathy, and tangible. Furthermore, it is explained there are three characteristics of service should be acknowledged for a full understanding of service quality. They are intangibility, inseparability, and heterogeneity (Parasuraman et al., 1985). Thus, this is critical to evaluate service of bank continuously such that customer satisfaction will be fulfilled.

Several marketing researchers have explored the practical impact of service quality and its effect on customer behavior. The consensus is that higher service quality should increase customer satisfaction, while high customer satisfaction can lead to the

greater customer loyalty (Yi, 1990) which effecting future revenue (Suda & Sarunya, 2001). Thus, high quality of service leads to better long run relationships between the service provider and the service recipient (Etgar & Fuchs, 2009).

There are many types of service industry. Service industry companies are involved in retail, transport, distribution, food services, banking, as well as other service-dominated businesses. Nevertheless, the banking sector plays an especially important role in the growth of Indonesian national economy (detikFinance, 2014). The role is manifested in its main function as an intermediary institution between the debtor and the creditor. Banks serve as bridges for financing the real sector, both to improve the business climate and investment climate as well as in the framework of job creation.

The first task of a bank is collecting funds from the public, which is known as funding activity. Funding is done by purchasing funds from the public. The purchase of funds from public is undertaken by putting various strategies so that people will deposit their savings to the bank. The general types of deposits chosen by the public are such as clearing accounts, savings deposits, time deposits, and certificates of deposit. Therefore, banks must provide encouragements and gain trustworthiness from people so that people will deposit their funds (Kuncoro, 2002). Such encouragements and trustworthiness can be gained by providing high quality of service.

However, the fact presented that a lot of the national banking performance in Indonesia was experiencing a decline in 2013-2016 (Linangkung, 2016). Referring to Financial Services Authority of Indonesia in 2013 the growth of the national banks' assets especially in Yogyakarta reached 16% but decreasing to 14% in 2014. Furthermore, this condition was continuing to decline 10.6% in 2015 and 2.5% in 2016. While, mass reduction was also occurred on the credit side. It began to decline in early 2014 as much 0.8% and in 2015 was as much 10.5%. As for in 2016 declined as much 3.1%. This situation can be caused by the unstable global economy condition and a dissatisfactory bank service quality.

Meanwhile, there are three competitive banks in Yogyakarta, as written by Suryani (2012), which are Bank X, Bank Y, Bank Z. Being the most competitive banks

in Yogyakarta, they must improve their service, especially service quality performance, to maintain the loyalty and trust given by public as well as to maintain their predicate as the most competitive banks. Thus, researcher conducted a preliminary study towards customers of each bank as an initial assessment to discover customers' satisfactory and dissatisfactory level on the bank's service quality.

According to the result of preliminary study conducted in three competitive banks, 36.67% of customer claimed to be dissatisfied on Bank's X's service quality performance. This number is the greatest compared to Bank Y with 16.67% and Bank Z with the total of 30%. It can be indicated that Bank X needs an evaluation in its service quality to increase customer satisfaction. The result was also relevant to the data on customer number of Bank X during the last four years starting from 2014 until the end of 2017. The data indicated a considerable decrease of customer either in the form of loans or deposits. The following is the data on the number of customers from Bank X during 2014 to 2017.

Table 1.1 Customer Number of Bank X from 2014 to 2017

Year	Loans Account			Deposits Account		
	Total Acc.	Δ (Acc.)	Δ (%)	Total Acc.	Δ (Acc.)	Δ (%)
2014	1,228			6,962		
2015	1,118	110	8.96	6,250	712	10.23
2016	1,171	53	4.7	5,462	788	12.6
2017	1,082	89	7.6	4,836	626	11.46

Source: Database of Bank X (2017)

According to Table 1.1, it can be seen that the number of customers in the last four years was continuing to decline. From 2014 to 2015, the number of customer accounts has decreased as much as 110 accounts or 8.96% and the number of customers accounts deposits fell 712 accounts or 10.23%. While from 2015 to 2016, the number of customer accounts loans increased 53 accounts or 4.7% but the number of customer accounts deposits dropped to 788 accounts or by 12.6%. This may be due to the low quality of service provided by Bank X to its customers. Thus, based on this phenomenon, researcher is interested to conduct an in-depth study covering an analysis of service quality performance in Bank X to identify the service performance level of the bank based on the five dimensions of service quality .

There have been many studies about service quality in banking services. For example, a study conducted by Blanchard and Galloway (1994) and Newman (2001) who implemented the SERVQUAL scale to measure service quality in retail banks. Lau et al (2013) also suggests that SERVQUAL is a suitable instrument for measuring service quality in the retail banking sectors in Hong Kong. In their studies, the authors determine that service quality has important implications as a diagnostic tool for improving client retention. However, the authors remarked that there are some limitations and inconsistencies of SERVQUAL scale when assessing reliability and as a predictor of performance variables. Furthermore, regarding to the questionnaire design of SERVQUAL, respondents would be often impatient due to too many items of the questionnaire. This may result in deviations in research results (Cronin & Taylor, 1992).

Aside from the SERVQUAL scale, there are other several methods which are usually used to analyze service quality. For example, Quality Function Deployment (QFD), Kano, Importance-Performance Analysis (IPA), and Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS). However, in the case study on QFD method, Jaiswal (2012) revealed that QFD has been found to have some considerable problems: ambiguity in the voice of the customer (VoC), managing large HoQ, and conflicts between Customers' requirements (CR). Furthermore, Sukwadi et al. (2011) identify and classify the service attributes that can promote student satisfaction in higher education using refined Kano model, but there was a deficiency in Kano model that prevented service providers from precisely evaluating the influences of quality attributes. In the other hand, Azzopardi and Nash (2013) concluded that IPA method has some serious drawbacks. Its conceptual and methodological foundations are weak. One of the biggest issues in IPA is selection of the optimal cut-off points (i.e. discriminating thresholds) for classifying performance and importance scores as different classifications lead to different managerial suggestions. This raises concerns over IPA validity in empirical applications. While Ece & Uludag (2017) indicated that TOPSIS can be inadequate for the types of problems encountered in service sector. This inadequacy can be due to the use of linguistic expressions by decision maker in the evaluation of alternatives or decision points and it can also be due to the classical logic based resolution algorithm of traditional multi-criteria decision making techniques.



Meanwhile, Robust design or Taguchi method, is rarely used in service studies and therefore there is a few literatures available on its application in service industries. Hence, it does not mean that robust design, which have been generally employed for improving manufacturing processes, cannot be successfully employed for improving service processes. Shahin et al. (2012), Mishra and Gangele (2013), and Ho et al (2014) introduced the use of Taguchi's Signal-to-Noise Ratio scale to assess customer satisfaction of service in airport, retail outlet, and hotel. Result of their study claimed that S/N ratio provided the quality attribute improvement direction, lowering service quality variation, and improving satisfaction average. Thus, S/N ratio is better in assessing service performance than SERVQUAL scale. It is in accordance with Taguchi's point of view stated that S/N ratio has ability to measure relative quality and the use of S/N ratio is simple and with additive capability (Taguchi et al., 2005).

Taguchi suggested that good quality must meet the following requirement: quality attribute's average and target values should be consistent while the smaller variation of quality attribute would be better (Taguchi, 1991). Therefore, quality assessment should consider both the impact of average and variance at the same time. Peace (1993) indicated that S/N ratio has considered simultaneously the impact of average and variance in the assessment of quality attribute and integrated the analysis results from the 2-dimensional model into the one-dimensional model. Hence, S/N ratio has extremely good additive capability in quality evaluation and prediction (Taguchi, 1987). Fowlkes and Creveling (1995) argued that the advantage of S/N ratio is its ability to reflect the variations of the quality attributes. When implementing quality improvements, S/N ratio can independently adjust average values to the target values. The purpose of S/N is to implement the comparison of quality performance. Taguchi et al. (2005) also pointed out that one of the advantages of using S/N ratio is its direct link with economy as S/N ratio is deduced and varied into the ratio from loss function.

In studies of service quality, ordinal scale is the basis of questionnaire survey and statistical analysis. Most of the discussions are about dimension, reliability, validity, and weight (Ladhari, 2008), and studies on ordinal scale analysis methodology are rare. Hence, this study proposed the use of Taguchi Signal-to-Noise Ratio in customer

satisfaction analysis methodology to analyze the service quality performance of the competitive bank.

## **1.2 Problem Statement**

The problem statement is generally about the quality of services provided by the bank. Specific problem statement in this research are:

1. How good is the service performance of the competitive bank based on the five dimensions of service quality?
2. Which attribute of service quality dimension of the competitive bank should be improved based on Taguchi S/N Ratio method?

## **1.3 Objective**

In accordance with the above problem statement, the objective of this study is to:

1. To identify the service performance of the competitive bank based on the five dimensions of service quality.
2. To determine the attribute of service quality dimension of the competitive bank should be improved based on Taguchi S/N Ratio method.

## **1.4 Significance of Research**

This research can provide benefits for the parties as follows:

### **1. Bank Company**

The results of this study can be used as material for evaluation and consideration for the bank internals in determining the steps of improvement to achieve and improve customer satisfaction to create consumer loyalty in an increasingly tight competition of service providers.

## 2. Researcher

This study will be a tool for researcher to practice what have been learned during lectures, so the researcher can add insight, knowledge, and experience in the working field.

## 3. Educational Institution

The results of this study are expected to be an additional reference for future research, especially those who discussing customer satisfaction and can be considered as knowledge guidance in general.

### **1.5 Scope of Research**

There are some limitations that exist in this research, as mentioned as follows:

1. The research is not analyzing the financial performance of the bank.
2. The research only focuses on the service quality in a banking service by considering the service interaction between bank customers and bank employees.
3. The questionnaire design uses SERVPERF scale, while the customer satisfaction will be analyzed by Taguchi Signal to Noise Ratio method.

Furthermore, there are two assumption applied in this research, as written as follows:

1. It is assumed that all investigated competitive banks have same standard service quality performance which referred to international Standard Operating Procedure (SOP) of bank' service quality performance.
2. It is assumed that all respondents have bank account and have experienced the direct transaction in the competitive banks.

### **1.6 Organization of Thesis**

Systematical of thesis writing is arranged make this research more structured and easy to be read. Therefore, the research has six chapters as follows:

First, chapter one is introduction which explains about research background, problem statement, objective, significance of research, scope of the research.

Then, literature review will elaborate about the empirical and theoretical study in chapter two. Empirical study is primarily important to determine the literature study of the previous research. Theoretical study suggested the basic supporting theories. Literature review contains both concept and basic principles that needed to solve research problems. It also includes a description of the studies result that have been done before by other researchers that related with the research undertaken.

The research methodology, which applied in the research is described on chapter three. It consists of objective measurement using Taguchi Signal to Noise Ratio questionnaires and its procedures. This chapter also discusses the method for data processing and data collecting in the field, and flowchart of research.

Moreover, the fourth chapter describes data collecting and processing that contains collected and processed data after being processed by objective measurement and its comparison data of satisfaction and dissatisfaction of bank customer.

Chapter five describes research result of data processing in the table and graphic form, equation or model, and provides analysis which are suitable with the theory to answer the problem formulation.

Finally, chapter six is conclusion and recommendation that concludes brief statement to answer the problems stated on problem formulation, while recommendation contains suggestions for further research. After the research summarized and recommendations provided, the next part will contain References and Appendices. This chapter provides short and precise statements described in the previous chapter which answer the problem formulation of research. Suggestion related to the current study in purpose of the advancement in the future research is given based on the limitations of the current research.

## **CHAPTER II**

### **LITERATURE REVIEW**

#### **2.1 Service**

A service is any act or performance that one party can offer to another that is essentially intangible and does not result in ownership of anything. Its production may or may not be tied to a physical product (Kotler, 1987). This service perceived by customer is easily disappeared. Therefore, service development is different with product development in the market. The condition of service in the market depends on how customer perceive their satisfaction to the service performance (Supranto, 1997).

The service environment has evolved because of the changing patterns of government regulation, technological innovations, the service quality movement, pressures to improve productivity, relaxation of previous professional association restrictions on marketing internationalization, and globalization process (Lovelock et al. 1996). This has caused a lot of dynamism in the service sector. Competition has intensified, and consumers are exposed to more information.

To survive, service companies must differentiate themselves mainly by being as close to the customer as possible. This has led to an over emphasis in service marketing to enable marketers in developing service strategies to respond to the market (Newman, 2001). Service marketing concepts and strategies have developed in response to the tremendous growth of service industries resulting in their increased importance to economical world (Zeithaml and Bitner, 1996).

## 2.2 Service Quality

Service quality has been defined as customers' overall impressions of an organization's services in terms of relative superiority or inferiority. Further, service quality is considered to not only meet but to exceed customer expectations and should include a continuous improvement process. Customers evaluate organizational performance mainly on the process of their interpersonal contacts and interactions (Newman, 2001). Perceived service quality results from comparisons by customers of expectations with their perceptions of service delivered by the suppliers (Zeithaml et al., 1990). If expectations are greater than performance, then perceived quality is less than satisfactory and hence customer dissatisfaction occurs (Parasuraman et al., 1985; Lewis and Mitchell, 1990).

Service quality is the key determinant and long-term competitiveness of the organizational performance (Carrillat et al., 2007). Gronroos (1984) suggested that the service quality model is consisted of three functions of technical quality, functional quality, and corporate image. Technical quality refers to the results of interactions between customer and service provider, which can be objectively measured in general. Functional quality refers to the customer perception of service including the service process, which was generally subjective assertion. Garvin (1983) pointed out that service quality is user-oriented, namely, quality is subject to the subjective assertions of the customer rather than objective assessment.

To evaluate service quality, Parasuraman et al (1985) formulated a service quality model that highlight the main requirement for delivering the expected service quality. The model shows a total of five gaps. Four gaps are identified based on the marketer's side (gap 1-4), while the fifth gap represents the comparison between expectation and perception received by customer. The gap model will be explained in Figure 2.1 as follows:

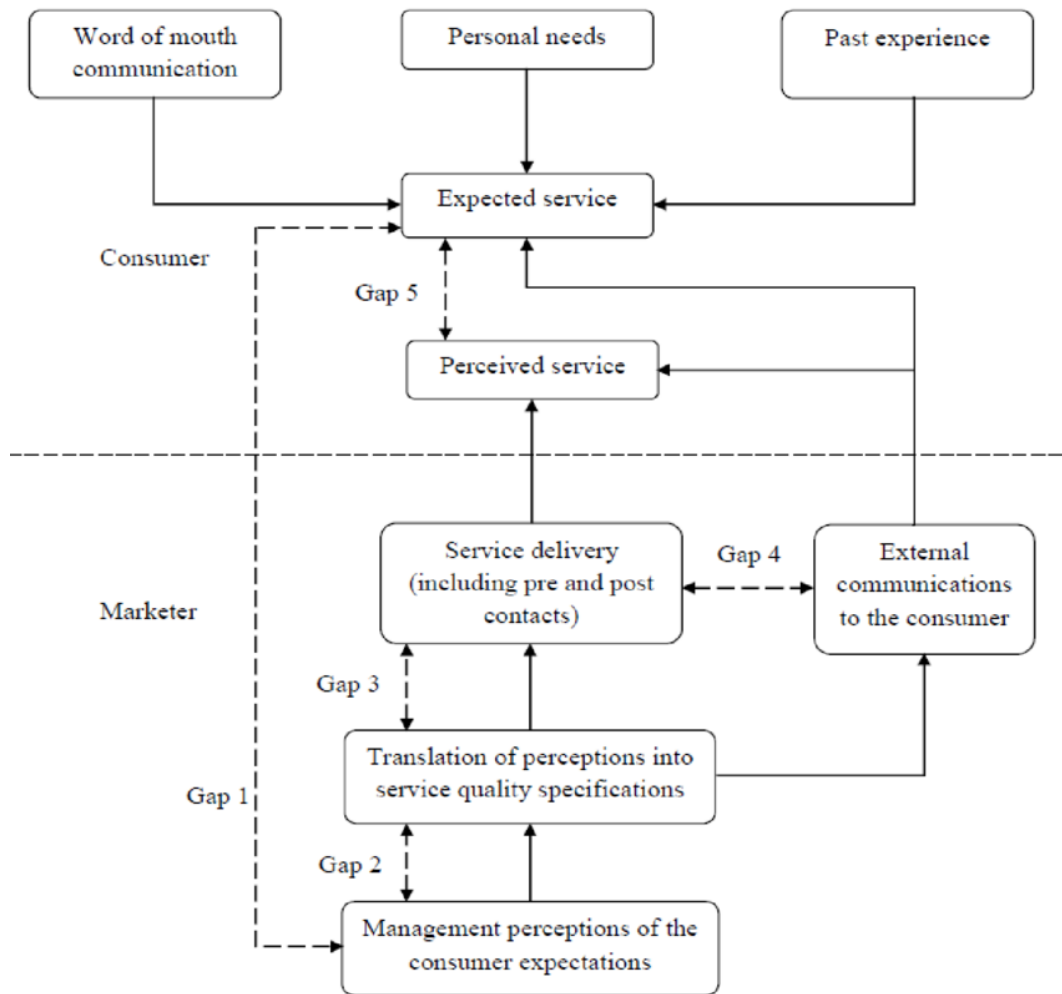


Figure 2.1 Gap Analysis Model

(Source: Parasuraman, 1985)

1. Gap 1 is the distance between what customers expect and what managers think they expect.

The problem occurred in this gap can be caused by:

- a. There is no direct interaction between management and customers.
  - b. Management does not conduct a clear survey about current customer condition.
  - c. Management is not ready to focus on customers.
2. Gap 2 is between management perception and the actual specification of the customer experience.

Managers need to make sure the organization is defining the level of service they believe is needed.

3. Gap 3 is from the experience specification to the delivery of the experience. Managers need to audit the customer experience that their organization currently delivers to make sure it lives up to the specification.  
The problem occurred in the third gap can be caused by:
  - a. The employees do not understand their roles.
  - b. The organization is hiring wrong person.
  - c. The organization gives less compensation to the employees.
  - d. The employees are not engaged in team work.
4. Gap 4 is the gap between the delivery of the customer experience and what is communicated to customers.  
Most organizations exaggerate what will be provided to customers or discuss the best case rather than the likely case, raising customer expectations and harming customer perceptions. The reasons behind this problem are:
  - a. The company gives promise that they could not afford to fulfill.
  - b. Less coordination between operational section and marketing section.
  - c. Different policies among service outlets.
5. Finally, Gap 5 is the gap between a customer's perception of the experience and the customer's expectation of the service.  
Customers' expectations have been shaped by word of mouth, their personal needs and their own past experiences. Routine transactional surveys after delivering the customer experience are important for an organization to measure customer perceptions of service.

Among the models for measuring service quality, the most acknowledged and applied model in diversity of industries is the SERVQUAL (service quality) model developed by Parasuraman et al. The SERVQUAL model of Parasuraman et al. (1988) proposed a five-dimensional construct of perceived service quality: reliability, responsiveness, assurance, empathy, and tangible as the instruments for measuring service quality (Parasuraman et al., 1988; Zeithaml et al., 1990).

1. Reliability

Reliability depends on handling customers' services problems; performing services right the first time; provide services at the promised time and maintaining



error-free record. Furthermore, they stated reliability as the most important factor in conventional service (Parasuraman et al., 1988). Reliability also consists of accurate order fulfillment; accurate record; accurate quote; accurate in billing; accurate calculation of commissions; keep services promise. He also mentioned that reliability is the most important factor in banking services (Yang et al., 2004).

## 2. Responsiveness

Responsiveness defined as the willingness or readiness of employees to provide service. It involves timeliness of services (Parasuraman et al., 1985). It is also involves understanding needs and wants of the customers, convenient operating hours, individual attention given by the staff, attention to problems, and customers' safety in their transaction (Kumar et al., 2009).

## 3. Assurance

Parasuraman et al. (1985) defined assurance as knowledge and courtesy of employees and their ability to inspire trust and confidence. According to Sadek et al. (2010), in British banks assurance means the polite and friendly staff, provision of financial advice, interior comfort, eases of access to account information and knowledgeable and experienced management team.

## 4. Empathy

Parasuraman et al. (1985) defined empathy as the caring and individual attention the firm provides its customers. It involves giving customers individual attention and employees who understand the needs of their customers and convenience business hours. Ananth et al. (2011) referred to empathy in their study on private sector banks as giving individual attention; convenient operating hours; giving personal attention; best interest in heart and understand customer's specific needs.

## 5. Tangible

Parasuraman et al. (1985) defined tangibility as the appearance of physical facilities, equipment, personnel, and written materials. Ananth et al. (2011) referred to tangibility in their study of private sector banks as modern looking equipment, physical facility, employees are well dressed, and materials are visually appealing.

### 2.3 Customer Satisfaction

In a competitive marketplace where businesses compete for customers, customer satisfaction is seen as a key differentiator and increasingly has become a key element of business strategy. Customer satisfaction is defined as the attitude resulting from what customers believe should happen (expectations) compared to what they believe did happen (performance perception) (Neal, 1998).

There is a substantial body of empirical literature that establishes the benefits of customer satisfaction for firms. It is well established that satisfied customers are key to long-term business success (Suda & Sarunya, 2001). It is also defined as a global issue that affects all organizations, regardless of its size, whether profit or non-profit, local or multi-national. Suda & Sarunya (2001) then stated that companies that have a more satisfied customer base also experience higher economic returns.

Consequently, higher customer satisfaction leads to greater customer loyalty (Yi, 1990), which in turn leads to higher future revenue (Suda & Sarunya, 2001). For that matter, many market leaders are found to be highly superior-customer-service oriented. They have been rewarded with high revenue and customer retention as well.

For that matter, organizations in the same market sector are compelled to assess the quality of the services that they provide to attract and retain their customers. Apparently, many researchers conceptualize customer satisfaction as an individual's feeling of pleasure (or disappointment) resulting from comparing the perceived performance or outcome in relation to the expectation. There are two general conceptualizations of satisfaction here, namely, the transaction-specific satisfaction and the cumulative satisfaction (Suda & Sarunya, 2001). Transaction-specific satisfaction is the customer's very own valuation of his or her experience and reaction towards a particular service encounter (Cronin & Taylor, 1992). This reaction is expressed by the customer who experiences a product or service for the first time. Meanwhile, cumulative satisfaction refers to the customer's overall evaluation of the consumption experience to date; an own accumulation of contacts with services provided them from day-to-day. It is from this accumulation that customers establish a personal standard which is used to gauge

service quality. However, in general, it is agreed that customer satisfaction measurement is a post-consumption assessment by the user, about the products or services gained (Suda & Sarunya, 2001).

## **2.4 Service Quality and Customer Satisfaction**

Customer satisfaction and service quality are inter-related. The higher the service quality, the higher is the customer satisfaction. Many agree that in the banking sector, there are no recognized standard scales to measure the perceived quality of a bank service. Thus, competitive advantage through high quality service is an increasingly important weapon to survive.

As a process in time, service quality takes place before, and leads to overall customer satisfaction. Service quality has been found to be an important input to customer satisfaction (Malta, 2002). Cronin and Taylor (1992) originally hypothesized that satisfaction is an antecedent of service quality. They argued also that service quality appears as the only one of the service factors contributing to customers' satisfaction judgements.

Lassar et al. (2000) examined the effects of service quality on customer satisfaction in private banking sector by using two well-known measures, the SERVQUAL and the technical/functional quality. They compared and contrasted empirically SERVQUAL and technical/functional quality model. They tried to compare the various dimensions of the two quality service models and their effects on satisfaction. They mentioned that customer satisfaction is a multidimensional construct, and that these dimensions will be differentially impacted by the various components of service quality.

## 2.5 Service Quality in Banking Services

Service quality has been viewed as a significant issue in the banking industry by Stafford (1994). Since banking services are generally characterized with undifferentiated products, it becomes imperative for banks to strive for improved service quality if they want to distinguish themselves from the competition. Positive relationship between high levels of service quality and improved financial performance has been established by Roth and Van der Velde (1991) and, Bennet (1992).

SERVQUAL was designed as a generic instrument to measure service quality in a broad range of service categories applied in different countries. It establishes quality measurement through a set of attributes that may be relevant aspects for different businesses. There are several studies that have taken SERVQUAL as the research instrument. One of the example is conducted by Lau et al (2013). The goal of this study is to identify the interrelationships between service quality, customer satisfaction and customer loyalty in the retail banking sector in Hong Kong. A sample of 119 retail banking customers was drawn from the Hong Kong and Shanghai Banking Corporation (HSBC) in Hong Kong. The questionnaire developed for this study was based on a SERVQUAL model. The results indicate that the five SERVQUAL dimensions have a positive influence on customer satisfaction. Tangibility, responsibility, reliability, and assurance were more significant in contributing to customer satisfaction, while empathy was the least significant. This study suggests that SERVQUAL is a suitable instrument for measuring service quality in the retail banking sectors in Hong Kong.

Blanchard and Galloway (1994) and Newman (2001) use the SERVQUAL scale to measure service quality in retail banks. In these contributions, the authors determine that the general approach to the measurement of service quality has important implications as a diagnostic tool for improving client retention. In addition, they argue that service quality is a possible source of brand differentiation for retail. However, the authors remarked that there are some limitations and inconsistencies of this measuring scale when assessing reliability and as a predictor of performance variables.

There is now a generalized use of the SERVPERF scale. In fact, some studies show that SERVPERF may be a more reliable service quality measure indicator than SERVQUAL for explaining satisfaction variables and loyalty measures for several industries with greater consistency (Cronin and Taylor, 1992; Brady et al., 2002). Culiberg and Rojsek (2010) use the SERVPERF scale to measure service performance in retail banks. They find a positive relation between service quality dimensions and overall customer satisfaction, especially with the assurance and empathy aspects of service quality. In their conclusions they suggest that service quality in retail banks can be a source of competitive advantage.

Thus, SERVQUAL is good to diagnose problems but SERVPERF is better at simplifying scale and analyzing quality performance (Carrillat et al, 2007). Furthermore, regarding to the questionnaire design of SERVQUAL, respondents would be often impatient due to too many items of the questionnaire. This may result in deviations in research results. However, SERVPERF cut half of the questionnaire items. Simple and service result-oriented performance assessment was the main advantage of SERVPERF (Cronin & Taylor, 1992). Based on the above review, researcher will apply SERVPERF scale for the questionnaire design.

## **2.6 Taguchi in Service Quality**

A literature review in service design reveals the dominance of four methods: blueprinting, quality function deployment (QFD), choice-based experimental designs, and robust designs in service quality (Raajpoot et al, 2008). Robust design, or Taguchi method, is rarely used in service design and therefore there is a few literatures available on its application in service industries. Hence, it does not mean that robust design, which have been generally employed for improving manufacturing processes, cannot be successfully employed for improving service processes. The evidences will be elaborated in further paragraphs.

One of recent studies that explored the possibility of incorporating robust design in service industry was conducted by Li-Hsing Ho, Shu-Yun Feng, and Tieh-Min Yen

(2013). The purpose of their study was to establish a new methodology for customer satisfaction analysis by using Taguchi Signal-to-Noise Ratio to assess service quality performance to effectively improve customer satisfaction. This study processed the Ordered Categorical Data and considered simultaneously the impact of average and variance as well as satisfaction and dissatisfaction information to correctly identify the improvement direction of quality attributes. With Taiwan's standard hotel as the research subject, this study discussed the methodology and benefits of applying Taguchi Signal-to-Noise Ratio to customer satisfaction analysis.

Another study was conducted by Ajay Mishra and Dr. Anshul Gangele (2013). This study introduces the concept of Taguchi method of optimization in analysis and quantification of factors affecting the success of retail outlets. Thus, L9 orthogonal array, Signal to Noise ratio (S/N), and ANOVA was used. Interaction between factors was not tested as it required the use of more complicated designs. The result of the study shows that pricing, employee behavior and product variety are the most important factors in the success of retail outlets.

Arash Shahin, Nasibeh Janatyan, and Nahid Nasirzaheh (2012) also demonstrated that Taguchi's robust design can be developed to design the best levels of service quality dimensions in the Isfahan International Airport services. About 13 dimensions of service quality have been assumed as control factors and the average passenger satisfaction has been assumed as response. Twenty-seven experiments have been designed for estimating the amount of passenger's satisfaction. The S/N ratios calculated highlight the 14th experiment as the best one. The value of passenger satisfaction in access-level B, i.e. fitness of variety services to passenger's requirements in different hours a day, is found as higher than other dimensions. Also, information about changes in services is found as the highest value of dissatisfaction

Taguchi suggested that good quality must meet the following requirement: quality attribute's average and target values should be consistent while the smaller variation of quality attribute would be better (Taguchi, 1991). Therefore, quality assessment should consider both the impact of average and variance at the same time. Peace (1993) indicated that S/N ratio has considered simultaneously the impact of average and vari-

ance in the assessment of quality attribute and integrated the analysis results from the 2-dimensional model into the one-dimensional model. Hence, S/N ratio has extremely good additive capability in quality evaluation and prediction (Taguchi, 1987). Fowlkes and Creveling argued that the advantage of S/N ratio is its ability to reflect the variations of the quality attributes (Fowlkes & Creveling, 1995). When implementing quality improvements, S/N ratio can independently adjust average values to the target values. The purpose of S/N is to implement the comparison of quality performance. Therefore, S/N ratio can measure relative quality and the use of S/N ratio is simple and with additive capability. Taguchi et al. pointed out that one of the advantages of using S/N ratio is its direct link with economy as S/N ratio is deduced and varied into the ratio from loss function (Taguchi et al, 2005). Based on the above review, researcher will apply Taguchi S/N ratio in the analysis of service quality performance.

## CHAPTER III

### RESEARCH METHODOLOGY

#### 3.1 Research Subject

The national competitive banks are selected as the subject of research to be analyzed on service quality, especially to the level of satisfaction about bank service and to the investigation of bank's service performance based on customer opinion. The minimum number of population to fulfill the requirement for direct measurement research is 30 respondents (Sugiyono, 2012). The criteria of required respondent for this research are:

1. Respondent has active bank account on the selected bank.
2. Respondent is a bank customer with minimum age of 17. People with the age of 17 serve as one of the sample criteria in this study because they are considered mature in providing an objective assessment of service performance of bank (Casey, 2011).
3. Respondent has experienced direct transaction in the bank.

#### 3.2 Data Collection Method

##### 3.2.1 Type of Data

There are two types of data used in this study. The description for each type described below:

- a. Primary

Primary data are data obtained directly from the research subjects which conducted by questionnaire and direct measurement. The data that obtained in pri-



mary data is the result of questionnaires in order to measure the satisfaction of bank customer.

b. **Secondary**

Secondary data obtained from sources related to the research that has been done before such as theoretical study that can support the research. For examples, such as published journals/papers, laboratory data, books, and information obtained through the internet. Then, the secondary data on this study are research or article obtained from article, book, journal and any other internet-based sources.

### **3.2.2 Apparatus**

In this research, some equipment was used as follows:

- a. Statistical Package for the Social Science (SPSS) software version 23 was used to analyze and run the statistical data.
- b. Questionnaires was developed to identify complaints of customers in the selected bank and to investigate the service performance in the certain bank. In order to ensure the validity and reliability of the study, the questionnaire was made under supervision of bank experts and was made based on literature. A translated questionnaire was available to make sure respondents who use local language are involved without any problem.

### **3.2.3 Survey**

Paper-based survey was conducted in two stages. They were preliminary survey and final survey. The preliminary survey was to identify some complaints of customers in several competitive banks by distributing questionnaires. The questionnaire for preliminary survey contained 5 items of question that applied the five bank service quality dimensions, such as reliability, responsiveness, assurance, empathy, and tangible. The total respondent of preliminary survey was 90 bank customers. The final survey was conducted to investigate the service performance in the certain bank that had the largest number of complaint. The participated respondents in this final survey were 30 bank customers. Their age was in range between 17 to 60 years old who were familiar with

the bank service. The questionnaire for final survey contained 21 items of question based on 21 service quality attributes, as written in Table 3.1. The whole survey was carried out under supervision of the researcher to avoid missing data.

Based on the five service quality dimensions proposed by Parasuraman et al. (1988; 1991) of service quality this research constructed the service quality attributes by referring to the recent 30 years literature on bank industrial service quality to summarize 21 attributes of bank service quality as the items of the questionnaire. The service quality performance was assessed by using the SERVPERF questionnaire to understand the actual perceived quality of customers after getting the service. The assessment of customer perceived service quality was implemented by using the 5-point scale with “1” standing for “strongly dissatisfied”, 5 standing for “strongly satisfied”.

Table 3.1 Attributes of Bank Service Quality

<b>Dimension</b>	<b>No</b>	<b>Service Quality Attribute</b>
<i>Reliability</i>	1	Accurate order fulfillment (Parasuraman et al., 1988)
	2	Accurate record (Parasuraman et al., 1988)
	3	Customer expectation-based service (Yang et al., 2004)
	4	Keep services promise (Parasuraman et al., 1988)
<i>Responsiveness</i>	5	Understanding needs and wants of the customers (Kumar et al., 2009)
	6	Convenient operating hours (Kumar et al., 2009)
	7	Ability to solve customers' problem (Van Iwaarden et al., 2003)
	8	Attention to problems (Kumar et al., 2009)
<i>Assurance</i>	9	Provide a clear explanation of bank's product to Customers (Van Iwaarden et al., 2003)
	10	Eases of access to account information (Sadek et al., 2010)
	11	Knowledgeable and experienced management team (Sadek et al., 2010)
	12	Customers' safety in their transaction (Kumar et al., 2009)
<i>Empathy</i>	13	Polite and friendly staff (Sadek et al., 2010)
	14	Giving individual attention (Ananth et al., 2011)
	15	Good communication skill with customer (Van Iwaarden et al., 2003)
	16	Bank call center is easy to be reached (Van Iwaarden et al., 2003)
<i>Tangible</i>	17	Modern looking equipment (Ananth et al., 2011)
	18	Comprehensive physical facility (Ananth et al., 2011)
	19	Employees are well dressed (Ananth et al., 2011)
	20	Materials are visually appealing (Ananth et al., 2011)
	21	Building is visually appealing (Van Iwaarden et al., 2003)

### 3.3 Data Processing and Analysis

#### 3.3.1 Taguchi's Signal-to-Noise Ratio

The purpose of Taguchi S/N Ratio is to implement the comparison of quality performance. Therefore, S/N Ratio can measure relative quality and the use of S/N Ratio is simple and with additive capability. The measurement level of the satisfaction survey was the Ordered Categorical Data of count value data type to distinguish count value S/N ratios into the *Smaller the Better*, the *Larger The Better* and *Ordered Categorical Data* (Taguchi et al, 2005). This research uses the *Larger The Better* and the *Smaller the Better* attributes of the count values to assess the service quality performance, considering the impact of average and variance, and integrating the data of satisfaction and dissatisfaction.

In the assessment of customer satisfaction, Likert Scale is generally used in the design of questionnaire to prioritize the actual customer perception of service quality by level (Naik et al., 2010). With Likert five-point scale data, this study used the S/N ratio to explain the methodology for customer satisfaction and summarize the questionnaire survey data of the customer satisfaction, as shown in Table 3.2, where  $y_1$  represented number of times of answering level 1 by customers, with the 5-point scale  $l = 1, 2, 3, 4, 5$ , then  $y_t$  represented the number of collected valid questionnaires.

Table 3.2 Customer Satisfaction Likert Five-Point Scale Data Summary

Level $l$	1	2	3	4	5	Total
	Strongly Dissatisfied	Dissatisfied	Fair	Satisfied	Strongly Satisfied	
Number of Times	$y_1$	$y_2$	$y_3$	$y_4$	$y_5$	$Y_t$

Priority level data can be converted into the data type of count value to distinguish the satisfied and dissatisfied service quality performance. Define level 4 (satisfied) and level 5 (strongly satisfied) as levels of customer satisfaction about service quality; define level 2 (dissatisfied) and level 1 (strongly dissatisfied) as customer dissatisfaction of service quality attributes. Hence, among collected valid questionnaires, the service quality attribute  $i$ 's customer satisfaction value was  $s_i = y_{i4} + y_{i5}$ , while the

service quality attribute  $i$ 's customer dissatisfaction value was  $d_i = y_{i1} + y_{i2}$ . For considering the satisfied and dissatisfied information S/N ratio analysis, the satisfaction coefficient  $p_{si}$  and the dissatisfaction coefficient  $p_{di}$  should be calculated as shown in Equation 3.1 and Equation 3.2.

$$p_{si} = \frac{(y_{i4} + y_{i5})}{y_t} \quad \dots(3.1)$$

Where:

$p_{si}$  : satisfaction coefficient  
 $(y_{i4} + y_{i5})$  : service quality attribute  $i$ 's customer satisfaction value  
 $y_t$  : total of service quality attribute  $i$ 's customer value

$$p_{di} = \frac{(y_{i1} + y_{i2})}{y_t} \quad \dots(3.2)$$

Where:

$p_{di}$  : dissatisfaction coefficient  
 $(y_{i1} + y_{i2})$  : service quality attribute  $i$ 's customer dissatisfaction value  
 $y_t$  : total of service quality attribute  $i$ 's customer value

According to data conversion of Equation 3.2, dissatisfaction coefficient  $p_{di}$  was a the *Smaller the Better* quality attribute, as customer dissatisfaction was not expected during the service providing process, hence the smaller dissatisfaction coefficient was the better; the satisfaction coefficient  $p_{si}$  is the *Larger the Better* quality attribute as larger number represented more customers. After data conversion,  $i$ -th dissatisfaction coefficient's S/N ratio can be represented by Equation 3.3 while  $i$ -th satisfaction coefficient S/N ratio was represented by Equation 3.4. Equations 3.3 and 3.4 considered the differences in perception of different customers in addition to taking into account of the average values.

$$S/N_{di} = \eta_{di} = -10 \text{ Log} \left( \frac{p_{di}}{1 - p_{di}} \right) \quad \dots(3.3)$$

Where:

$\eta_{di}$  : customer dissatisfaction of service quality of  $i$ -th attributes  
 $p_{di}$  : dissatisfaction coefficient

$$S/N_{si} = \eta_{si} = -10 \text{ Log} \left( \frac{p_{si}}{1 - p_{si}} \right) \quad \dots(3.4)$$

Where:

$\eta_{si}$  : customer satisfaction of service quality of  $i$ -th attributes  
 $p_{si}$  : satisfaction coefficient

The purpose of the log functions of Equations 3.3 and 3.4 was to get the additive capability, and the “-” was to make the quality decision-making consistent while  $i = 1, 2, 3, \dots, n$  represented  $n$  service quality attributes. The greater  $\eta_{si}$  value represented better quality, namely the higher customer satisfaction of service quality attributes (Lee et al, 2008). Meanwhile, the greater  $\eta_{di}$  value represented higher quality, namely, the lower customer dissatisfaction level about the service quality attributes. Fowlkes and Creveling (1995) suggested that the S/N has the advantage of addition. Hence, when measuring two groups of data under same conditions and calculating their S/N ratios, the results can be added up when maximizing S/N ratio (Joseph & Wu, 2002). As a result, Equation 3.5 Integrated with the  $i$ -th satisfaction and dissatisfaction data was applied to assess service quality performance.

$$\eta_{ti} = \eta_{si} + \eta_{di} \quad \dots(3.5)$$

Where:

$\eta_{ti}$  : total service quality performance

$\eta_{si}$  : customer satisfaction of service quality of  $i$ -th attributes

$\eta_{di}$  : customer dissatisfaction of service quality of  $i$ -th attributes

Similarly, a greater  $\eta_{ti} = \eta_{si} + \eta_{di}$  denotes better service quality of  $i$ -th attribute, therefore, this research used it to analyze the service quality attribute performance and determine the improvement priority.

However, if there are two attribute have the same total S/N Ratio value, then standrd deviation of each attribute was used as the benchmark of comparison, the smaller standard deviation represented better quality performance (Yang, 2005). The standard deviation can be written as follow in Equation 3.6:

$$S_i = \sqrt{\frac{\sum(x-\bar{x})^2}{N-1}} \quad \dots(3.6)$$

Where:

$S_i$  : standard deviation of attribute  $i$

$x$  : each value in data set of customer priority level

$\bar{x}$  : mean of all values in data set of customer priority level

$N$  : number of respondent

### 3.3.2 Validity Test

Joppe (2000) stated that validity test determines whether the research truly measures that which it was intended to measure or how truthful the research results are. Researchers generally determine validity by asking a series of questions and will often look for the answers in the research of others. The steps in validity test are explained below:

- a. Determining the hypothesis

$H_0 = r_{\text{count}} \geq r_{\text{table}}$ , the data obtained is valid

$H_1 = r_{\text{count}} \leq r_{\text{table}}$ , the data obtained is not valid

- b. Specifying the value of  $r_{\text{table}}$

With the significance level of 5% and the degrees of freedom (df) = n-2, or in this research df = 30 – 2 = 28, then the value of  $r_{\text{table}}$  can be determined based on r table namely: df = 28,  $r_{\text{table}}$  0.361.

- c. Determining the value of  $r_{\text{count}}$

The value of  $r_{\text{count}}$  can be obtained after doing the data processing using SPSS 23.0. The value of  $r_{\text{count}}$  can be seen in the output of SPSS 23.0 on Corrected Item – Total Correlation. As for the manual calculation can be seen on the attachment page by using the following formula (Sugiyono, 2010):

$$r_{xy} = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{[(N \sum X^2 - (\sum X)^2)(N \sum Y^2 - (\sum Y)^2)]}} \quad \dots(3.7)$$

Where:

$r_{xy}$  : correlation of coefficient between X variable and Y variable

X : item score

Y : total question score

N : number of respondent

$\sum X$  : sum of item score

$\sum Y$  : sum of total question score

$\sum X^2$  : sum of squared item score

$\sum Y^2$  : sum of squared total item score

$\sum XY$  : sum of the X and Y multiplication

- d. Compare the value of  $r_{\text{table}}$  and  $r_{\text{count}}$

1. If  $r_{\text{count}}$  is positive and  $r_{\text{count}} \geq r_{\text{table}}$ , then  $H_0$  is accepted

2. If  $r_{\text{count}}$  is positive and  $r_{\text{count}} < r_{\text{table}}$ , then  $H_0$  is rejected

If one item is rejected, then an iteration should be done until the valid item is found. To obtain an accurate result, valid calculation, and for time savings purpose, then the validity test is done by using SPSS 23.0. The procedure of validity test by using SPSS 23.0 is written as follow:

1. Turn on *Variable View* and define each column
2. Click *Data View* and fill in the data tabulation of questionnaire
3. Click *Analyze* → *Correlate* → *Bivariate*
4. Enter the entire X variable item into *Items*
5. Make sure to select *Pearson* in Correlation Coefficient category, *Two-tailed* in Test of Significant category, and tick the *Flag significant correlation*
6. Click OK

### 3.3.3 Reliability Test

Joppe (2000) defined reliability as the extent to which results are consistent over time and accurate representation of the total population under study is referred to as reliability and if the results of a study can be reproduced under a similar methodology, then the research instrument is reliable.

In academic publications, the most commonly used reliability coefficient is Cronbach's alpha, which is a generalized measure of a uni-dimensional, multi-item scale's internal consistency (Cronbach, 1951; Peterson, 1994). This criterion is defined as:

$$\alpha = \frac{k}{k-1} \left( 1 - \frac{\sum a_b^2}{\sigma_1^2} \right) \quad \dots(3.8)$$

Where:

- $\alpha$  : alpha reliability coefficient
- $k$  : number of question
- $\sum a_b^2$  : number of variance items
- $\sigma_1^2$  : total of variance

A total assumption is that the average covariance among indicators must be positive. Therefore, one can easily see that Cronbach's alpha varies between 0 and 1. An issue in assessing Cronbach's alpha is that correlations among indicators and scale length are critical, influencing alpha. In addition, sample size has significant effect on

the precision of the estimation of alpha. A common threshold for sufficient values of Cronbach's alpha is 0.6 (Hair et al., 2006).

In this research, reliability items are tested by using *SPSS version 23 for Windows*. The Cronbach's alpha value will be considered for overall reliability items in a single variable. The procedure of reliability test using SPSS are written as follow:

1. Turn on *Variable View* and define each column
2. Click *Data View* and fill in the data tabulation of questionnaire
3. Click *Analyze* → *Correlate* → *Reliability Analysis*
4. Enter the entire X variable item into *Items*
5. Make sure to select *Alpha* in Model category
6. Click OK

### **3.4 Research Flowchart**

After describing overall method and the way to collecting the data, here we construct the flowchart from the beginning until the end of research. The flowchart explains a process clearly through symbols and text. Moreover, flowchart gives the gist of the process flow in a single glance. Flowchart of research in this study shown in Figure 3.1.

Based on the research flowchart in Figure 3.1, the conducted research has several steps. It was started by reviewing literature including journals, books, and newspapers to earn an insight about research in bank's service performance. Researcher also did an observation to select the competitive banks that need to be investigated. Next, an initial questionnaire was made to conduct a preliminary survey. After getting the result of preliminary survey, the next step was determining the problem formulation of research which become a reference in making the final questionnaire. After that, data collection is conducted by distributing the final questionnaire to respondents. After summarizing the collected data, a validity test was done so that a reliability test could also be done. If the collected data is not reliable, researcher must recreate the final questionnaire.



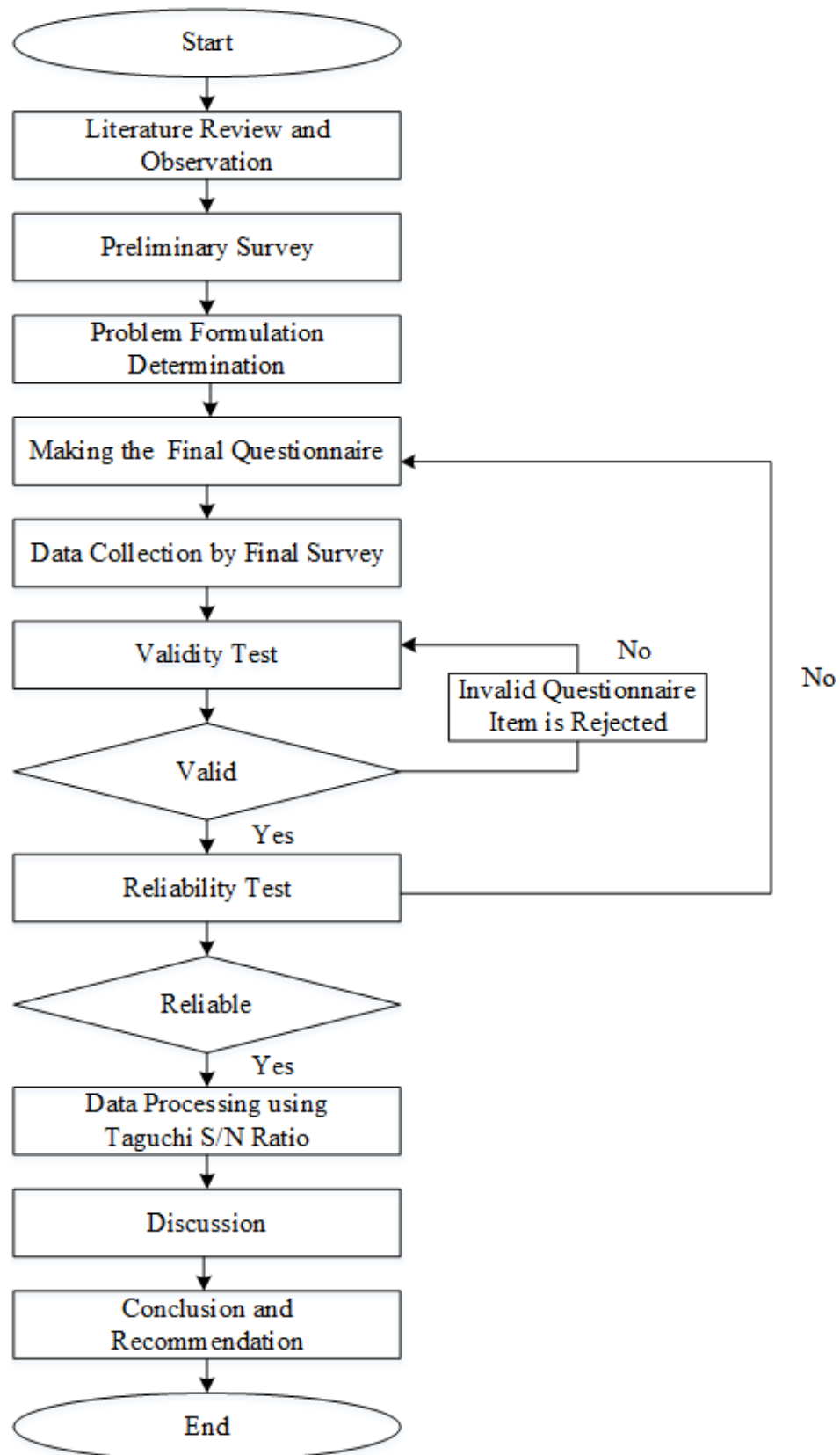


Figure 3.1 Flowchart of Research

The objective of this research is to know the service performance level of the competitive bank and to know which attribute of service quality dimension that should be improved. The collected data was objectively measured using Taguchi S/N ratio calculation method to measure the service performance of the competitive bank according to objective assessment from bank customers.

Then, researcher will analyze the collected data and will process the data to find out the service performance level of each attribute of service quality dimension. Finally, researcher could conclude from the analyzed data and provide recommendation to improve the service quality performance of the bank and finish the research by writing the report.

## CHAPTER IV

### DATA COLLECTION AND PROCESSING

#### 4.1 Data Collection

The data collection of this research is described as respondents' profile and the result of paper-based survey.

##### 4.1.1 Respondents' Profile

In this study, the researcher described respondents profile in terms of gender, occupation, education level, and experience level, and experience with the bank. The study employed a closed ended paper-based survey to categorize respondent's profiles and their responses were analyzed using frequencies and percentage distributions as shown in the following Table 4.1, Table 4.2, and Table 4.3, and Table 4.4.

Table 4.1 Respondent Profile in term of Gender

<b>Gender</b>	<b>Frequency (Person)</b>	<b>Percentage (%)</b>
<b>Male</b>	11	36.67
<b>Female</b>	19	63.33
<b>Total</b>	30	100

The result in Table 4.1 show that female were the majority respondents as represented by 19 (63.33%) and male were the minority 11 (36.67%). The findings revealed that there is big gender imbalance in the Bank.

Table 4.2 Respondent Profile in term of Occupation

<b>Occupation</b>	<b>Frequency (Person)</b>	<b>Percentage (%)</b>
<b>Student</b>	7	23.33
<b>Government Employees</b>	2	6.67

<b>Occupation</b>	<b>Frequency (Person)</b>	<b>Percentage (%)</b>
<b>Private Employees</b>	13	43.33
<b>Entrepreneur</b>	4	13.33
<b>Others</b>	2	6.67
<b>Unemployed</b>	2	6.67
<b>Total</b>	30	100

Regarding occupation in Table 4.2, 21 (or 70%) respondents are under employments whereas only 2 (or 6.67%) are jobless, while 7 (or 23.33%) are students. The study therefore indicates that majority of the bank customer is quite prosperous.

Table 4.3 Respondent Profile in term of Education Level

<b>Education Level</b>	<b>Frequency (Person)</b>	<b>Percentage (%)</b>
<b>Primary School</b>	1	3.33
<b>Secondary School</b>	1	3.33
<b>High School</b>	16	53.33
<b>Diploma/Undergraduate</b>	10	33.33
<b>Postgraduate</b>	2	6.67
<b>Total</b>	30	100

Concerning the education qualification in Table 4.3, over half of the respondents had no professional qualification. This revealed by respondents with High School Graduates, Degree, and Postgraduate qualifications being 16 (or 53.33%), 10 (or 33.33%) and 2 (or 6.67% customers, respectively. As for others are customers who graduated from primary school and secondary school with only 2 (or 6.67%). These results indicate that majority of Bank customers are semi-illiterate.

Table 4.4 Respondent Profile in term of Experience with the Bank

<b>Education Level</b>	<b>Frequency (Person)</b>	<b>Percentage (%)</b>
<b>&lt; 1 year</b>	5	16.67
<b>1 - 3 years</b>	8	26.67
<b>4 - 6 years</b>	11	36.67
<b>&gt; 6 years</b>	6	20
<b>Total</b>	30	100

Lastly regarding experience with the Bank in Table 4.4, 11 (or 36.67%) respondents have been customers for the bank for a period ranging between 4-6 years, 8 (or 26.67%) respondents had banked with Bank X for a period ranging between 1-3 years, 6 (or 20%) respondents had banked with Bank X for a period of over 6 years, and 5 (or 16.67%) respondents had banked with Bank X for less than a year. This indicates

that majority of the respondents had knowledge and experience about the bank since they had been the customers for relatively long period of time that is 3 year and above.

#### 4.1.2 Result of Questionnaire

By literature review and expert interviews with bank representatives, this study established a total of 21 standard bank service qualities attributes as shown in the second column of Table 4.2 and constructed the questionnaire accordingly to comply with practice and research demands. The survey subjects of this study were customers of Bank X. Researcher distributed 34 questionnaire copies to randomly selected customers. After removing 4 invalid questionnaire copies, researcher get a total of  $n = 30$  valid samples.

Table 4.5 Result of Questionnaire

Att	Service Quality Attribute	y1	y2	y3	y4	y5	y <sub>t</sub>
Rel1	Accurate order fulfillment	0	1	8	15	6	30
Rel2	Accurate record	0	2	11	11	6	30
Rel3	Customer expectation-based service	1	5	15	7	2	30
Rel4	Keep service promise	0	7	6	9	8	30
Res1	Understanding needs and wants of the customers	0	2	15	11	2	30
Res2	Convenient operating hours	0	1	12	15	2	30
Res3	Ability to solve customers' problem	0	2	8	12	8	30
Res4	Attention to problems	0	2	10	10	8	30
A1	Provide a clear explanation of bank's product to customer	0	8	12	10	0	30
A2	Eases of access to access to account information	0	3	6	11	10	30
A3	Knowledgeable and experienced management team	0	7	11	8	4	30
A4	Customers' safety in their transaction	0	4	8	11	7	30
E1	Polite and friendly staff	0	10	7	11	2	30
E2	Giving individual attention	0	1	9	13	8	30
E3	Good communication skill with customer	0	2	17	9	2	30
E4	Bank call center is easy to be reached	0	2	14	10	4	30
T1	Modern looking equipment	0	8	11	8	3	30
T2	Comprehensive physical facility	0	1	8	13	9	30
T3	Well-dressed employees	0	2	2	13	13	30
T4	Materials are visually appealing	0	1	7	18	4	30
T5	Building is visually appealing	0	2	12	12	4	30

With Likert five-point scale data, researcher summarized the questionnaire data of customer satisfaction. As shown in Table 4.2, the 3<sup>rd</sup> until 7<sup>th</sup> column containing  $y_1$

represented number of times of answering level  $l$  by customers, with the 5-point scale  $l = 1, 2, 3, 4, 5$ , then  $y_t$  represented the number of collected valid questionnaire. For example, there is a customer who claimed to be dissatisfied on the service quality attribute of Accurate Order Fulfillment (Rel1), but nobody claimed to be strongly dissatisfied. The other 8 customers claimed the attribute as fair, but 15 customers declared to be satisfied and 6 others stated as strongly satisfied. In overall, only one customer claimed to be strongly dissatisfied on one attribute which is Customer Expectation-based Service (Rel3).

## 4.2 Data Processing

### 4.2.1 Validity Test

With a significance level of 5%, degrees of freedom (df) = n-2, or in this study df = 30 – 2 = 28. The value of  $r_{table}$  can be determined from table r namely: df = 28,  $r_{table}$ : 0.361.

To obtain an accurate result, the value of  $r_{count}$  can be obtained by using SPSS 23.0 software, the results are written follows:

Table 4.6 Validity Test of Questionnaire

<b>Dimension</b>	<b>Service Quality Attribute</b>	<b><math>r_{table}</math></b>	<b><math>r_{count}</math></b>	<b>Status</b>
<b>Reliability</b>	Accurate order fulfillment	0.361	0.772	Valid
	Accurate record	0.361	0.447	Valid
	Customer expectation-based service	0.361	0.606	Valid
	Keep services promise	0.361	0.562	Valid
<b>Responsiveness</b>	Understanding needs and wants of the customers	0.361	0.672	Valid
	Convenient operating hours	0.361	0.512	Valid
	Ability to solve customers' problem	0.361	0.730	Valid
	Attention to problems	0.361	0.590	Valid
<b>Assurance</b>	Provide a clear explanation of bank's product to customer	0.361	0.443	Valid
	Eases of access to account information	0.361	0.585	Valid
	Knowledgeable and experienced management team	0.361	0.423	Valid
	Customers' safety in their transaction	0.361	0.651	Valid
<b>Empathy</b>	Polite and friendly staff	0.361	0.759	Valid
	Giving individual attention	0.361	0.609	Valid
	Good communication skill with customer	0.361	0.605	Valid
	Bank call center is easy to be reached	0.361	0.361	Valid

Dimension	Service Quality Attribute	$r_{table}$	$r_{count}$	Status
Tangible	Modern looking equipment	0.361	0.403	Valid
	Comprehensive physical facility	0.361	0.404	Valid
	Well-dressed employees	0.361	0.454	Valid
	Materials are visually appealing	0.361	0.462	Valid
	Building is visually appealing	0.361	0.513	Valid

According to Table 4.6, all attributes are said to be valid because  $r_{count} \geq r_{table}$ . Thus, there is no attribute should be removed or deleted.

#### 4.2.2 Reliability Test

Reliability test is used to assess the consistency of respondents' answers to the overall question posed. In this study, Cronbach's Alpha value is calculated using SPSS 23.0. Table 4.7 shows the results of reliability test:

Table 4.7 Reliability Test Result

Cronbach's Alpha	N of Items	Status
0.694	21	Valid

According to Table 4.7, the value of Cronbach's Alpha on the reliability test is 0.694. Hair et al. (2006) stated that a common threshold for sufficient values of Cronbach's Alpha is 0.6. Thus, the result indicates that the answers to the questionnaire items are consigned or reliable since the value of Cronbach's Alpha  $\geq 0.6 = 0.694$ .

#### 4.2.2 Signal-to-Noise Ratio Result

The analysis result of customer satisfaction at the selected bank in Indonesia may be seen in Table 4.9. While the standard deviation (Std) for each attribute was shown in the 3<sup>rd</sup> column of Table 4.8. For example, by referring to Equation 3.6, the standard deviation of accurate order fulfillment (Rel1) can be calculated as follow:

$$S_{Rel1} = \sqrt{\frac{\sum(x - \bar{x})^2}{N - 1}}$$

$$= \sqrt{\frac{\sum[(3 - 3.867)^2 + [(4 - 3.867)^2 + \dots + [(3 - 3.867)^2]}{29}}$$

$$= 0.776$$

Thus, the standard deviation of accurate order fulfilment (Rel1) was 0.776. When standard deviation was used as the benchmark of comparison in the case of same total S/N ratio value, the smaller standard deviation represented better quality performance (Yang, 2005).

Table 4.8 Standard Deviation Result

<b>Att.</b>	<b>Service Quality Attribute</b>	<b>Std</b>	<b>R(Std)</b>
<b>Rel1</b>	Accurate order fulfillment	0.776	7
<b>Rel2</b>	Accurate record	0.877	12
<b>Rel3</b>	Customer expectation-based service	0.900	14
<b>Rel4</b>	Keep service promise	1.133	21
<b>Res1</b>	Understanding needs and wants of the customers	0.728	4
<b>Res2</b>	Convenient operating hours	0.675	1
<b>Res3</b>	Ability to solve customers' problem	0.900	13
<b>Res4</b>	Attention to problems	0.925	15
<b>A1</b>	Provide a clear explanation of bank's product to customer	0.785	8
<b>A2</b>	Eases of access to access to account information	0.980	17
<b>A3</b>	Knowledgeable and experienced management team	0.988	20
<b>A4</b>	Customers' safety in their transaction	0.988	19
<b>E1</b>	Polite and friendly staff	0.986	18
<b>E2</b>	Giving individual attention	0.765	6
<b>E3</b>	Good communication skill with customer	0.718	3
<b>E4</b>	Bank call center is easy to be reached	0.819	10
<b>T1</b>	Modern looking equipment	0.916	16
<b>T2</b>	Comprehensive physical facility	0.765	5
<b>T3</b>	Well-dressed employees	0.858	11
<b>T4</b>	Materials are visually appealing	0.699	2
<b>T5</b>	Building is visually appealing	0.814	9
<b>Average</b>		0.859	

Based on Table 4.8, the standard deviation average of attributes from five service quality dimensions was 0.859. While the rank of standard deviation [R(Std)] was shown in the 4<sup>th</sup> column. The smallest standard deviation was ranked as the first one, which was owned by convenient operating hours (Res2) attribute. While the largest standard deviation was owned by keep services promise (Rel4) attribute.



Table 4.9 Result of Signal-to-Noise Ratio Calculation

<b>Att.</b>	<b>Service Quality Attribute</b>	<b><math>\rho_{di}</math></b>	<b><math>\rho_{si}</math></b>	<b><math>\eta_{di}</math></b>	<b><math>\eta_{si}</math></b>	<b><math>\eta_{ti}</math></b>	<b>R(<math>\eta</math>)</b>
<b>Rel1</b>	Accurate order fulfillment	0.033	0.700	14.624	3.680	18.304	5
<b>Rel2</b>	Accurate record	0.067	0.567	11.461	1.165	12.626	10
<b>Rel3</b>	Customer expectation-based service	0.200	0.300	6.021	-3.680	2.341	18
<b>Rel4</b>	Keep service promise	0.233	0.567	5.166	1.165	6.331	16
<b>Res1</b>	Understanding needs and wants of the customers	0.067	0.433	11.461	-1.165	10.296	13
<b>Res2</b>	Convenient operating hours	0.033	0.567	14.624	1.165	15.789	6
<b>Res3</b>	Ability to solve customers' problem	0.067	0.667	11.461	3.010	14.472	7
<b>Res4</b>	Attention to problems	0.067	0.600	11.461	1.761	13.222	8
<b>A1</b>	Provide a clear explanation of bank's product to customer	0.267	0.333	4.393	-3.010	1.383	21
<b>A2</b>	Eases of access to access to account information	0.100	0.700	9.542	3.680	13.222	9
<b>A3</b>	Knowledgeable and experienced management team	0.233	0.400	5.166	-1.761	3.405	1
<b>A4</b>	Customers' safety in their transaction	0.133	0.600	8.129	1.761	9.890	14
<b>E1</b>	Polite and friendly staff	0.333	0.433	3.010	-1.165	1.845	20
<b>E2</b>	Giving individual attention	0.033	0.700	14.624	3.680	18.304	4
<b>E3</b>	Good communication skill with customer	0.067	0.367	11.461	-2.374	9.088	15
<b>E4</b>	Bank call center is easy to be reached	0.067	0.467	11.461	-0.580	10.881	12
<b>T1</b>	Modern looking equipment	0.267	0.367	4.393	-2.374	2.020	19
<b>T2</b>	Comprehensive physical facility	0.033	0.733	14.624	4.393	19.017	3
<b>T3</b>	Well-dressed employees	0.067	0.867	11.461	8.129	19.590	1
<b>T4</b>	Materials are visually appealing	0.033	0.733	14.624	4.393	19.017	2
<b>T5</b>	Building is visually appealing	0.067	0.533	11.461	0.580	12.041	11

Customer satisfaction level at  $i$  attribute had  $y_i$  times of response as shown from the 4<sup>th</sup> column to the 8<sup>th</sup> column of Table 4.5. Based on Table 4.5, Based on Table 4.5, the response of accurate order fulfillment (Rel1) is summarized as  $y_1 = 0$ ,  $y_2 = 1$ ,  $y_3 = 8$ ,  $y_4 = 15$ ,  $y_5 = 6$ . Level 4 and 5 were customer satisfaction level, the satisfaction number can be calculated by:

$$s_i = y_{i4} + y_{i5}$$

With accurate order fulfillment (Rel1) as an example, the satisfaction number was:

$$y_{Rel4} + y_{Rel5} = 15 + 6 = 21$$

Then, calculate satisfaction coefficient  $p_{si}$  by Equation (1), accurate order fulfillment (Rel1) satisfaction coefficient will be:

$$p_{sRel1} = \frac{(y_{Rel4} + y_{Rel5})}{y_t} = \frac{21}{30} = 0.700$$

Similarly, the dissatisfaction number can be calculated by:

$$d_i = y_{i1} + y_{i2}$$

With accurate order fulfillment (Rel1) as an example, the dissatisfaction number was:

$$y_{Rel1} + y_{Rel2} = 0 + 1 = 1$$

According to Equation (1), dissatisfaction coefficient of accurate order fulfillment (Rel1) can be calculated as:

$$p_{dRel1} = \frac{(y_{Rel1} + y_{Rel2})}{y_t} = \frac{1}{30} = 0.033$$

Use Equation (2) and Equation (3) to calculate S/N ratio, with accurate order fulfillment (Rel1) as example, input  $p_{dRel1}$  into Equation (2) to calculate S/N ratio ( $\eta_{dRel1}$ ):

$$S/N_{dRel1} = \eta_{dRel1} = -10\text{Log}[0.033/(1 - 0.033)] = 14.624$$

Input  $p_{sRel1}$  into Equation (3) to calculate S/N ratio ( $\eta_{sRel1}$ ),

$$S/N_{sRel1} = \eta_{sRel1} = -10\text{Log}[(1 - 0.0700)/0.0700] = 3.680$$

According to Equation (4), calculate total performance of satisfaction and dissatisfaction of service quality attributes  $\eta_{ti} = \eta_{si} + \eta_{di}$ , with room comfort and atmosphere (T1) as an example:

$$\begin{aligned}\eta_{tRel1} &= \eta_{sRel1} + \eta_{dRel1} \\ &= 14.624 + 3.680 \\ &= 18.304\end{aligned}$$

Higher S/N ratio represented better service quality. As shown in the 8<sup>th</sup> column [R( $\eta$ )] of Table 4.9, accurate order fulfillment (Rel1) ranked the 5<sup>th</sup> in overall. Bank service quality performance was assessed by considering the average and standard deviation of quality attributes as well as integrating satisfaction and dissatisfaction information.

## CHAPTER V

### DISCUSSION

In this study, the method of Taguchi's S/N Ratio was applied to investigate the level of customer satisfaction at the selected bank in Indonesia. By using the S/N ratio, an appropriate level of customer satisfaction was determined with the minimum deviation from satisfaction data (Yang, 2005). According to the result of analysis, the total S/N ratio values were computed for each attribute of five service quality dimensions. By comparing each attribute of the dimensions, the best and worst attributes can be addressed. For example, referring to Table 4.9, the values of S/N ratio for 4 attributes (Rel1, Rel2, Rel3, and Rel4) of Reliability dimension were respectively 18.304, 12.626, 2.341, and 6.331. The greater total S/N ratio value represented better customer satisfaction of service quality attributes (Lee et al, 2008). Thus, the best satisfaction level was Rel1 attribute: accurate order fulfillment while the worst satisfaction level was Rel3 attribute: customer expectation-based service. It is important to note that such analysis helps in recognizing dissatisfaction of service quality dimensions.

However, the through calculation result of S/N ratio on Table 4.9 indicated that employees are well dressed (T3) with S/N ratio value at 19.017 was found as higher than the other 20 attributes, while provide a clear explanation of bank's product to customer (A1) was found as the highest value of dissatisfaction. Thus, the selected bank has the best quality in employees are well dressed (T3) attribute, while the quality of provide a clear explanation of bank's product to customer (A1) attribute should be improved to decrease the customer dissatisfaction.

Although the S/N ratio value of material are visually appealing (T4) was equal to the comprehensive physical facility (T2) at 19.017, however due to lower standard

deviation of materials are visually appealing (T4) at 0.699 compared to the comprehensive physical facility (T2) at 0.765, the customer perception was highly consistent, namely, the competitive bank provided stable and consistent service quality to this attribute. Hence, after the S/N ratio analysis, the performance of material are visually appealing (T4) was better to be ranked 2<sup>nd</sup> while the comprehensive physical facility (T2) became 3<sup>rd</sup>.

The S/N ratio value of giving individual attention (E2) was equal to the accurate order fulfillment (Rel1) at 18.304, however, due to lower standard deviation of giving individual attention (E2) at 0.765 compared to the accurate order fulfillment (Rel1) at 0.776, the customer perception of giving individual attention (E2) was highly consistent, namely, the competitive bank provided stable and consistent service quality to his attribute. Hence, after the S/N ratio analysis, the giving individual attention (E2) was better to be ranked 4<sup>th</sup> while the accurate order fulfillment (Rel1) became the 5<sup>th</sup>.

Furthermore, the S/N ratio value of attention to problem (Res4) was equal to the ease of access to account information (A2) at 13.222, however, due to lower standard deviation of attention to problems (Res4) at 0.925 compared to the eases of access to account information (A2) at 0.980, the customer perception of attention to problems (Res4) was highly consistent, namely, the selected bank provided stable and consistent service quality to this attribute. Hence, after the S/N ratio analysis, the attention to problem (Res4) was better to be ranked 8<sup>th</sup> while the eases of access to account information (A2) become the 9<sup>th</sup>.

Thus, Taguchi's S/N ratio analysis result indicated that there are some attributes of dimension respectively not satisfying the quality standard of bank. They are Rel3 attribute: customer expectation-based service of Reliability dimension, Res1: Understanding needs and wants of the customers of Responsiveness dimension, A1 attribute: Provide clear explanation of bank's product to customer of Assurance dimension, E1 attribute: Polite and friendly staff of Empathy dimension, and T1 attribute: Modern looking equipment of Tangible dimension.

## CHAPTER VI

### CONCLUSION AND RECOMMENDATION

#### 6.1 Conclusion

It may be concluded as follows:

1. This study found that service quality of bank has not yet satisfied the customer satisfaction generally. Thus, the attributes of service quality dimensions should be improved.
2. There are some attributes of dimensions respectively not satisfying the quality standard of bank. They are Rel3 attributes: Customer expectation-based service of Reliability dimension, Res1 attribute: Understanding needs and wants of customer of Responsiveness dimensions, A1 attribute: Provide a clear explanation of bank's product to customer of Assurance dimension, E1 attribute: Polite and friendly staff of Empathy dimension, and T1 attribute: Modern looking equipment to Tangible dimension.

#### 6.2 Recommendation

Based on the study that has been performed, the researcher can provide some recommendation to the selected bank as follows:

1. The evaluated banks need to conduct a monthly measurement of their service quality to inspect the customer perception and customer expectation of the existing service quality so that customer satisfaction can be maintained from time to time.

2. The evaluated banks should modernize the physical facilities of the building, parking area, and the condition of the waiting room to satisfy the customer in the future and of course for the progress of the development of service quality to customer satisfaction.
3. Due to time consideration, the statistical sample of the study was limited to 30 bank customers. In future study, the sample size and duration of the data collection could be extended. Moreover, conducting the investigation in a different case study rather than in a bank might provide different findings.
4. This research only assumed the analysis using S/N ratio determine the attributes of bank service quality service quality dimension that should be improved. The optimization of factors affecting the success of bank service quality could be applied to provide a good opportunity for future study. Thus, the best control factor levels, the noise factors levels, and the target value should be determined.

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## ATTACHMENT 1

### Questionnaire of Preliminary Survey at Bank X

#### QUESTIONNAIRE OF PRELIMINARY STUDY

**Respondent's Personal Data:**

Name : .....

Gender : M / F

Occupation : .....

**Instruction:**

Give answers to the following questions by filling in the answering spaces and/or checking [✓] on the appropriate box:

1.) *Tangible Dimension*

- a. Do you have any complaint about the building, parking area, or waiting room owned by BRI Bank (Monjali Branch)?

Yes                                       No

If yes, mention your complaint(s) below:

- 1) .....
- 2) .....
- 3) .....

- b. Do you have any complaint about the appearance (clothing and makeup) of the employees' at BRI Bank (Monjali Branch)?

Yes                                       No

If yes, mention your complaint(s) below:

- 1) .....
- 2) .....
- 3) .....

2.) *Reliability Dimension*

- a. Does BRI Bank (Monjali Branch) provide services in accordance with what is offered (savings, ATM machines, internet banking, loans, etc.)?

Yes                                       No

If no, mention your complaint(s) below:

- 1) .....
- 2) .....
- 3) .....

b. Do you have any complaints about the products offered by BRI Bank (Monjali Branch)?

Yes  No

If yes, mention your complaint(s) below:

- 1) .....
- 2) .....
- 3) .....

3.) *Responsive Dimension*

Do you have any complaint against the alertness of the services provided by BRI Bank (Monjali Branch) employees?

Yes  No

If yes, mention your complaint(s) below:

- 1) .....
- 2) .....
- 3) .....

4.) *Assurance Dimension*

Do you have any complaint about the ability of BRI Bank (Monjali Branch) employees to solve the problems faced by customers?

Yes  No

If yes, mention your complaint(s) below:

- 1) .....
- 2) .....
- 3) .....

5.) *Empathy Dimension*

Do you have any complaints against the attitude shown by employees of BRI Bank (Monjali Branch) in serving customers?

Yes  No

If yes, mention your complaint(s) below:

- 1) .....
- 2) .....
- 3) .....

**ATTACHMENT 2**

**Questionnaire of Preliminary Survey at Bank Y**

**QUESTIONNAIRE OF PRELIMINARY STUDY**

**Respondent's Personal Data:**

Name : .....

Gender : M / F

Occupation : .....

**Instruction:**

Give answers to the following questions by filling in the answering spaces and/or checking [✓] on the appropriate box:

1.) *Tangible Dimension*

a. Do you have any complaint about the building, parking area, or waiting room owned by BNI Bank (Palagan Branch)?

Yes  No

If yes, mention your complaint(s) below:

- 1) .....
- 2) .....
- 3) .....

b. Do you have any complaint about the appearance (clothing and makeup) of the employees' at BNI Bank (Palagan Branch)?

Yes  No

If yes, mention your complaint(s) below:

- 1) .....
- 2) .....
- 3) .....

2.) *Reliability Dimension*

a. Does BNI Bank (Palagan Branch) provide services in accordance with what is offered (savings, ATM machines, internet banking, loans, etc.)?

Yes  No

If no, mention your complaint(s) below:

- 1) .....
- 2) .....
- 3) .....

b. Do you have any complaints about the products offered by BNI Bank (Palagan Branch)?

Yes  No

If yes, mention your complaint(s) below:

- 1) .....
- 2) .....
- 3) .....

3.) *Responsive Dimension*

Do you have any complaint against the alertness of the services provided by BNI Bank (Palagan Branch) employees?

Yes  No

If yes, mention your complaint(s) below:

- 1) .....
- 2) .....
- 3) .....

4.) *Assurance Dimension*

Do you have any complaint about the ability of BNI Bank (Palagan Branch) employees to solve the problems faced by customers?

Yes  No

If yes, mention your complaint(s) below:

- 1) .....
- 2) .....
- 3) .....

5.) *Empathy Dimension*

Do you have any complaints against the attitude shown by employees of BNI Bank (Palagan Branch) in serving customers?

Yes  No

If yes, mention your complaint(s) below:

- 1) .....
- 2) .....
- 3) .....

### ATTACHMENT 3

#### Questionnaire of Preliminary Survey at Bank Z

#### QUESTIONNAIRE OF PRELIMINARY STUDY

##### Respondent's Personal Data:

Name : .....

Gender : M / F

Occupation : .....

##### Instruction:

Give answers to the following questions by filling in the answering spaces and/or checking [✓] on the appropriate box:

##### 1.) *Tangible Dimension*

- a. Do you have any complaint about the building, parking area, or waiting room owned by Mandiri Bank (Sudirman Branch)?

Yes  No

If yes, mention your complaint(s) below:

- 1) .....  
 2) .....  
 3) .....

- b. Do you have any complaint about the appearance (clothing and makeup) of the employees' at Mandiri Bank (Sudirman Branch)?

Yes  No

If yes, mention your complaint(s) below:

- 1) .....  
 2) .....  
 3) .....

##### 2.) *Reliability Dimension*

- a. Does Mandiri Bank (Sudirman Branch) provide services in accordance with what is offered (savings, ATM machines, internet banking, loans, etc.)?

Yes  No

If no, mention your complaint(s) below:

- 1) .....  
 2) .....  
 3) .....



b. Do you have any complaints about the products offered by Mandiri Bank (Sudirman Branch)?

- Yes  No

If yes, mention your complaint(s) below:

- 1) .....
- 2) .....
- 3) .....

3.) *Responsive Dimension*

Do you have any complaint against the alertness of the services provided by Mandiri Bank (Sudirman Branch) employees?

- Yes  No

If yes, mention your complaint(s) below:

- 1) .....
- 2) .....
- 3) .....

4.) *Assurance Dimension*

Do you have any complaint about the ability of Mandiri Bank (Sudirman Branch) employees to solve the problems faced by customers?

- Yes  No

If yes, mention your complaint(s) below:

- 1) .....
- 2) .....
- 3) .....

5.) *Empathy Dimension*

Do you have any complaints against the attitude shown by employees of Mandiri Bank (Sudirman Branch) in serving customers?

- Yes  No

If yes, mention your complaint(s) below:

- 1) .....
- 2) .....
- 3) .....

**ATTACHMENT 4**  
**Questionnaire of Final Survey**

**RESEARCH QUESTIONNAIRE**

**Analysis of Customer Satisfaction in the Competitive Bank Using Taguchi Signal-to-Noise Ratio**

**[Case Study in BRI Bank (Monjali Branch)]**

Dear,  
Mr./Mrs./Ms.

With honor,

I hereby request your willingness to fill out this questionnaire as part of research' data collection in order to complete the final project (thesis) of Islamic University of Indonesia, Industrial Engineering Department (S-1).

The purpose of this study is to find out the performance of bank services based on the quality of service. Thus, I expect you to answer this questionnaire honestly. I genuinely thank you for your willingness and participation in this questionnaire.

Yogyakarta, September 2017

Best Regards,

Kanty Jefinally Nattadatri

Respondent's No: \_\_\_\_\_

**Respondent's Identity**

Instruction:

Write your identity by filling in the space in the Name category and checking [✓] in the box for the next category!

---

Name : \_\_\_\_\_

Gender :

 Female Male

Occupation :

 Student Entrepreneur Government Employees Others Private Employees Unemployed

Education Level :

 Primary School Diploma/Undergraduate Secondary School Postgraduate High School

Experience with the Bank :

 Less than a year 1 until 3 years 4 until 6 years More than 6 years

**Instruction:**

Fill in accordance with your answer by marking (√) on the available column.

**Information:**

Please give an answer in your assessment column about the service quality at BRI Bank (Monjali Bank) by choosing one of the options below:

VD : Very Dissatisfied

ND : Not Satisfied

F : Fair

S : Satisfied

VS : Very Satisfied

Dimension	No	Service Quality Attribute	Assessment				
			VD	ND	F	S	VS
<i>Reliability</i>	1	Bank can fulfill customer demand accurately					
	2	Bank can make account records accurately					
	3	Bank provide services according to customer expectations					
	4	Bank delivers the promised service to its customers					
<i>Responsiveness</i>	5	Bank understands the needs and desires of its customers					
	6	Bank provides fast service in a proper					
	7	Bank can give suggestions or solutions to customers' interests					

Dimension	No	Service Quality Attribute	Assessment				
			VD	ND	F	S	VS
	8	Bank is willing to help customers					
<i>Assurance</i>	9	Employees and bank staff can provide a detailed description of the bank's products to customers					
	10	Bank provides easiness in accessing account information					
	11	Employees and bank staff have good experience and skills					
	12	Bank can provide a sense of security to customers when making transactions					
<i>Empathy</i>	13	Employees and bank staff provide friendly and courteous service					
	14	Employees and bank staff pay personal attention to customers					
	15	Employees and staff of the bank can communicate well to the customer					
	16	Employees and bank staff are easy to contact					
<i>Tangible</i>	17	Bank has modern equipment and furnishings					
	18	Bank has complete facilities					
	19	Employees and bank staff are well-dressed					

Dimension	No	Service Quality Attribute	Assessment				
			VD	ND	F	S	VS
	20	The interior design of the bank looks attractive					
	21	Bank building looks attractive					

## ATTACHMENT 5

## Questionnaire Data

Customer	Reliability				Responsiveness				Assurance				Empathy				Tangible				
	Rel1	Rel2	Rel3	Rel4	Res1	Res2	Res3	Res4	A1	A2	A3	A4	E1	E2	E3	E4	T1	T2	T3	T4	T5
1	3	3	3	4	3	4	5	5	4	4	2	4	2	2	3	4	4	2	5	5	3
2	4	3	3	5	4	4	4	5	4	5	3	4	2	4	4	4	4	4	4	4	4
3	4	3	3	3	2	3	3	4	4	5	2	3	2	3	3	3	5	3	5	4	3
4	4	2	2	5	3	3	4	3	4	5	3	3	3	3	3	3	5	3	4	4	3
5	4	3	3	5	4	5	4	3	4	5	2	4	4	4	4	4	3	4	5	4	4
6	5	3	4	5	4	4	5	3	3	5	5	5	5	4	3	3	4	4	4	4	4
7	4	4	4	4	3	3	5	2	2	5	5	2	4	4	3	3	3	3	4	3	3
8	3	4	3	3	4	3	5	4	3	5	4	4	2	4	4	4	3	4	4	4	4
9	3	3	3	2	3	3	4	5	4	5	3	4	2	3	4	3	2	3	5	3	3
10	5	4	4	5	4	3	3	5	3	4	3	5	3	4	3	4	2	5	4	4	4
11	4	5	5	2	5	4	4	3	2	3	4	4	3	5	4	4	3	3	4	5	4
12	4	4	3	2	4	4	5	4	2	4	5	3	4	5	3	3	5	4	4	4	3
13	3	3	3	3	4	2	4	3	2	5	4	2	4	5	3	3	4	4	5	3	3
14	5	4	3	4	3	3	3	4	2	3	3	2	5	3	4	5	3	4	4	4	4
15	3	3	4	4	3	3	3	3	2	4	2	2	4	4	3	3	2	3	5	3	3
16	5	4	3	5	4	4	4	3	3	5	5	5	4	4	3	5	2	4	4	4	4
17	4	4	2	4	3	4	3	3	3	4	4	3	2	3	3	4	4	4	5	4	4
18	4	4	2	5	4	3	4	5	3	2	4	4	2	3	3	3	3	5	4	3	4
19	4	5	2	3	3	4	5	3	2	4	3	5	3	5	3	4	2	5	5	4	5

Customer	Reliability				Responsiveness				Assurance				Empathy				Tangible				
	Rel1	Rel2	Rel3	Rel4	Res1	Res2	Res3	Res4	A1	A2	A3	A4	E1	E2	E3	E4	T1	T2	T3	T4	T5
20	3	4	3	2	5	4	5	4	3	3	3	5	4	5	5	3	2	5	4	5	3
21	4	5	3	2	3	5	4	4	4	4	4	4	4	5	4	5	4	5	5	5	3
22	4	5	4	2	3	4	3	5	4	3	3	4	3	5	4	3	4	4	3	4	5
23	5	5	5	4	4	3	4	4	4	4	3	5	4	4	5	3	4	4	5	4	3
24	4	4	4	5	3	4	5	5	3	3	4	5	4	3	3	4	3	5	3	4	4
25	5	3	3	4	4	4	4	5	3	4	2	3	4	4	4	3	3	5	4	4	5
26	4	5	3	3	3	4	4	4	3	2	4	3	3	4	3	3	3	4	5	3	5
27	3	3	1	2	3	4	3	4	2	4	3	4	2	4	2	5	2	5	5	2	4
28	4	4	2	4	3	3	3	4	3	2	3	3	2	3	2	4	3	4	2	4	2
29	2	3	4	4	2	3	2	2	3	3	2	4	2	5	3	2	2	5	5	4	2
30	3	2	3	3	3	4	2	3	4	4	2	3	3	4	3	2	3	3	2	3	3



**ATTACHMENT 6**  
**Result of Validity Test Using SPSS Ver. 23**

Table 1. Reliability Dimension

<b>Correlations</b>						
		Rel1	Rel2	Rel3	Rel4	Total
Rel1	Pearson Correlation	1	,345	,175	,408	,772
	Sig. (2-tailed)		,062	,356	,025	,000
	N	30	30	30	30	30
Rel2	Pearson Correlation	,345	1	,271	-,299	,477
	Sig. (2-tailed)	,062		,147	,109	,008
	N	30	30	30	30	30
Rel3	Pearson Correlation	,175	,271	1	,054	,606
	Sig. (2-tailed)	,356	,147		,776	,000
	N	30	30	30	30	30
Rel4	Pearson Correlation	,408	-,299	,054	1	,562
	Sig. (2-tailed)	,025	,109	,776		,001
	N	30	30	30	30	30
Total	Pearson Correlation	,772	,477	,606	,562	1
	Sig. (2-tailed)	,000	,008	,000	,001	
	N	30	30	30	30	30

Table 2. Responsiveness Dimension

Correlations						
		Res1	Res2	Res3	Res4	Total
Res 1	Pearson Correlation	1	,154	,460	,133	,672
	Sig. (2-tailed)		,415	,011	,483	,000
	N	30	30	30	30	30
Res 2	Pearson Correlation	,154	1	,193	,088	,512
	Sig. (2-tailed)	,415		,306	,642	,004
	N	30	30	30	30	30
Res 3	Pearson Correlation	,460	,193	1	,133	,730
	Sig. (2-tailed)	,011	,306		,485	,000
	N	30	30	30	30	30
Res 4	Pearson Correlation	,133	,088	,133	1	,590
	Sig. (2-tailed)	,483	,642	,485		,001
	N	30	30	30	30	30
Total	Pearson Correlation	,672	,512	,730	,590	1
	Sig. (2-tailed)	,000	,004	,000	,001	
	N	30	30	30	30	30

Table 3. Assurance Dimension

Correlations						
		A1	A2	A3	A4	Total
A1	Pearson Correlation	1	,185	-,382	,294	,443
	Sig. (2-tailed)		,327	,037	,115	,014
	N	30	30	30	30	30
A2	Pearson Correlation	,185	1	,057	-,021	,585
	Sig. (2-tailed)	,327		,765	,911	,001
	N	30	30	30	30	30
A3	Pearson Correlation	-,382	,057	1	,095	,423
	Sig. (2-tailed)	,037	,765		,616	,020
	N	30	30	30	30	30
A4	Pearson Correlation	,294	-,021	,095	1	,651
	Sig. (2-tailed)	,115	,911	,616		,000
	N	30	30	30	30	30
Total	Pearson Correlation	,443	,585	,423	,651	1
	Sig. (2-tailed)	,014	,001	,020	,000	
	N	30	30	30	30	30

Table 4. Assurance Dimension

Correlations						
		E1	E2	E3	E4	Total
E1	Pearson Correlation	1	,282	,300	,057	,755
	Sig. (2-tailed)		,131	,107	,765	,000
	N	30	30	30	30	30
E2	Pearson Correlation	,282	1	,274	-,136	,582
	Sig. (2-tailed)	,131		,143	,475	,001
	N	30	30	30	30	30
E3	Pearson Correlation	,300	,274	1	-,051	,610
	Sig. (2-tailed)	,107	,143		,790	,000
	N	30	30	30	30	30
E4	Pearson Correlation	,057	-,136	-,051	1	,379
	Sig. (2-tailed)	,765	,475	,790		,039
	N	30	30	30	30	30
Total	Pearson Correlation	,755	,582	,610	,379	1
	Sig. (2-tailed)	,000	,001	,000	,039	
	N	30	30	30	30	30

Table 5. Tangible Dimension

Correlations							
		T1	T2	T3	T4	T5	Total
T1	Pearson Correlation	1	-,346	-,017	,257	-,115	,403
	Sig. (2-tailed)		,061	,930	,171	,546	,027
	N	30	30	30	30	30	30
T2	Pearson Correlation	-,346	1	,000	,000	,306	,404
	Sig. (2-tailed)	,061		1,000	1,000	,100	,027
	N	30	30	30	30	30	30
T3	Pearson Correlation	-,017	,000	1	-,048	,039	,454
	Sig. (2-tailed)	,930	1,000		,802	,836	,012
	N	30	30	30	30	30	30
T4	Pearson Correlation	,257	,000	-,048	1	-,061	,462
	Sig. (2-tailed)	,171	1,000	,802		,750	,010
	N	30	30	30	30	30	30
T5	Pearson Correlation	-,115	,306	,039	-,061	1	,513
	Sig. (2-tailed)	,546	,100	,836	,750		,004
	N	30	30	30	30	30	30
Total	Pearson Correlation	,403	,404	,454	,462	,513	1
	Sig. (2-tailed)	,027	,027	,012	,010	,004	
	N	30	30	30	30	30	30

## ATTACHMENT 7

Table of Critical Values for Pearson's  $r$ 

TABLE Values of  $r$  for the .05 and .01 Levels of Significance

$df(N - 2)$	.05	.01	$df(N - 2)$	.05	.01
1	.997	1.000	31	.344	.442
2	.950	.990	32	.339	.436
3	.878	.959	33	.334	.430
4	.812	.917	34	.329	.424
5	.755	.875	35	.325	.418
6	.707	.834	36	.320	.413
7	.666	.798	37	.316	.408
8	.632	.765	38	.312	.403
9	.602	.735	39	.308	.398
10	.576	.708	40	.304	.393
11	.553	.684	41	.301	.389
12	.533	.661	42	.297	.384
13	.514	.641	43	.294	.380
14	.497	.623	44	.291	.376
15	.482	.606	45	.288	.372
16	.468	.590	46	.285	.368
17	.456	.575	47	.282	.365
18	.444	.562	48	.279	.361
19	.433	.549	49	.276	.358
20	.423	.537	50	.273	.354
21	.413	.526	60	.250	.325
22	.404	.515	70	.232	.302
23	.396	.505	80	.217	.283
24	.388	.496	90	.205	.267
25	.381	.487	100	.195	.254
26	.374	.479	200	.138	.181
27	.367	.471	300	.113	.148
28	.361	.463	400	.098	.128
29	.355	.456	500	.088	.115
30	.349	.449	1000	.062	.081

Adapted from A. L. Sockloff and J. N. Edney, Some extension of Student's  $t$  and Pearson's  $r$  central distributions, Technical Report (May 1972), Measurement and Research Center, Temple University, Philadelphia.

## ATTACHMENT 8

### Example of Manual Calculation for Validity Test

The manual calculation of validity test for Accurate Order Fulfillment (Rel1) attribute  
of Reliability dimension

$$r_{xy} = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{[(N \sum X^2 - (\sum X)^2)(N \sum Y^2 - (\sum Y)^2)']}}$$

Where:

N	: Number of respondent	= 30
$\sum X$	: Sum of item score	= 116
$\sum Y$	: Sum of total question score	= 429
$\sum X^2$	: Sum of squared item score	= 466
$\sum Y^2$	: Sum of squared total item score	= 6275
$\sum XY$	: Sum of the X and Y multiplication	= 1697

Calculation:

$$r_{xy} = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{[(N \sum X^2 - (\sum X)^2)(N \sum Y^2 - (\sum Y)^2)']}}$$

$$r_{xy} = \frac{30 \times 1697 - (116)(429)}{\sqrt{[(30 \times 466 - (116)^2)(30 \times 6275 - (429)^2)']}}$$

$$r_{xy} = \frac{50910 - 49764}{\sqrt{[(13980 - 13456)(188250 - 184041)']}}$$

$$r_{xy} = \frac{1146}{\sqrt{[(524)(4209)']}}$$

$$r_{xy} = \frac{1146}{\sqrt{2205.516}}$$

$$r_{xy} = \frac{1146}{1485.098}$$

$$r_{xy} = 0.772$$

## ATTACHMENT 9



DESCRIPTION OF ASSIGNMENT AND RESPONSIBILITY  
BRI UNIT ORGANIZATION  
PT. BANK RAKYAT INDONESIA (PERSERO) TBK.

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### (1) Customer Service

*Assignment and Responsibility:*

1. Provide administrative services to customers or prospective customers who will use banking services in BRI Unit as good as possible in order to improve the quality of service to customers.
2. Provide information to customers or prospective customers about BRI Unit products in particular and BRI products in general to support the marketing of BRI products.
3. Collect, provide and process internal and external data related to BRI Unit loans, deposits and other bank services, and identify and describe the principles for presenting the data, information or reports required to support the performance of the BRI Unit.
4. Implement policies / guidelines / provisions in the field of credit administration of BRI Units, deposits and other bank services in accordance with the provisions of its implementation to complete the operational administration of BRI Unit loans and deposits and other bank services in accordance with their duties.
5. Conduct examination and registration of BRI Unit loan requests and deposits and other bank services to ensure the completeness, security and validity of credit documentation and administrative ordering in accordance with applicable regulations.
6. Prepare documents and credit bookkeeping records or other documents / bookkeeping records to support the process of completing the administration of BRI loan Units, deposits and other bank services at BRI Unit.
7. Manage the BRI Unit loan baits along with its collateral, barklas deposits and other bank services to ensure the completeness, validity, security and orderly administration.
8. Organize and document incoming or outgoing letters according to their field of duty to ensure letters or documentation are distributed or archived in accordance with applicable provisions and interests.
9. Draft letters / documents / reports required by the BRI Unit for management purposes with a simple analysis to be presented to the Boss in an accurate and timely manner in accordance with the applicable provisions and interests.
10. Administer registers related to the process of loan services and deposits and other bank services to support operational fluency and ensure the administration of the register is in compliance with applicable regulations.
11. Administering the salaries of employees, medical expenses and other employee's rights to comply with HR requirements ensures that the administration is in compliance with applicable regulations.
12. Apply logistics supplies for the benefit / smooth operation of BRI Units in accordance with applicable regulations.
13. Submit suggestions to provide input on policy review / provisions related to their tasks in order to improve the performance of BRI Units.

14. Provide data or information needed in order to carry out follow-up audits in accordance with their field of duty to ensure that follow-up improvements are carried out in a positive response to the Audit findings.
15. Foster good relationships and cooperation with related parties both internal and external with supervision Superiors to facilitate the completion of tasks.
16. Carry out official duties of the Bosses in accordance with their roles and competencies to achieve targets / standards established effectively and efficiently, as long as the main tasks have been completed.

*Service Standards:*

1. Smile, say hello, focus on the customer and offer help
2. Be initiative to explore customers' needs
3. Be able to explain products and features to customers
4. Process customer demand quickly
5. Accurate, always verify and confirm
6. Respond to customer requests with empathy
7. Offer other products and services (crosseling)
8. Offer help back, say thank you and close with regards

**(2) Teller**

*Assignment and Responsibility:*

1. Provide cash transaction services in terms of receipt of deposits, withdrawals and payments to and from customers or prospective customers in accordance with BRI's operational systems and procedures.
2. Conduct cash management BRI Unit together with Head of BRI Unit / Supervisor Unit to secure bank assets and ensure cash handling is in accordance with the system and procedures BRI Unit.
3. Conduct planning of need / amount of BRI Unit cash to facilitate transaction service either deposit receipt or payment from and to customer or prospective customer in accordance with prevailing regulation.
4. Ensure and make a document of the completeness of the cash transactions evidence and over-book under supervision in accordance with applicable systems and procedures.
5. Conduct physical examination of money to ensure the authenticity of the money received and to avoid receiving counterfeit money.
6. Maintain cash security during operating hours and ensure that the amount is in accordance with transaction data with BRI's system and operational procedures.
7. Manage and deposit the cash to the Kaunit / Supervisor Unit when the cash position reaches the maximum cash teller and every end of the day to ensure cash security.
8. Conduct a reconciliation of transactions at the end of each day to ensure that transactions are executed in accordance with applicable procedures.
9. Foster good relationships with customers and prospective customers as well as establish cooperation with related units to provide excellent service and to support the achievement of targets set.

10. Submit suggestions to provide input on the review of policies / provisions relating to their tasks in the context of improving the performance of BRI Units.
11. Conduct follow-up audits in accordance with their powers to ensure that follow-up improvements are carried out in a positive response to the Audit findings.
12. Carry out other official duties of the Bosses according to their roles and competencies in achieving the targets / standards established effectively and efficiently, as long as the main tasks have been completed.

*Service Standards:*

1. Enthusiastically welcome customers by standing, focusing on customers, smiling, and give greetings.
2. Process customer transactions quickly and thoroughly
3. Strive to know and mention customers
4. Friendly when serving customers
5. Actively performs verification and identification
6. Offer help back, say thank you and close with regards

### **(3) Security**

*Assignment and Responsibility:*

1. The auxiliary elements of the institution / project / agency head in the field security and order of work environment.
2. Provide law enforcement and security in the work environment.
3. Arrange the parking of the customers' vehicle.
4. Guide customers into the bank.
5. Help customers to get information about product / brochure / transaction slip / queue number.

*Service Standards:*

1. Smile, say hello, focus on the customer
2. Be initiative asks and directs customers to the destination
3. Give a sense of security and comfort for customers
4. Actively set the queue
5. End the service by saying thank you