

# Design of Customer Satisfaction Application at BCA Kcp Rengasdengklok Using C.45 Algorithm Method

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**Abstrak**—Bank BCA selalu meningkatkan kualitas layanan sesuai dengan slogan “Senantiasa Disisi Anda”. Penilaian tersebut terdiri dari 4 atribut (waktu, akurat, fokus dan kepuasan). Setiap atribut memiliki bobot nilai angka 1 (sangat tidak puas) sampai 5 (sangat puas). Penilaian tersebut masih dilakukan secara manual (menggunakan kertas), oleh sebab itu penulis pada penelitian ini menggunakan algoritma C.45 dengan dilakukan 3 kali pengujian sehingga menghasilkan klasifikasi yang diperoleh bahwa nilai akurasi yaitu mencapai 88,75% dengan nilai AUC yaitu 0,744 dan pengujian pada aplikasi yang dibuat menghasilkan 0,722. Dapat disimpulkan bahwa penilaian layanan di BCA KCP Rengasdengklok termasuk kelompok klasifikasi yang cukup baik dikarenakan nilai AUC-nya antara 0.70-0.80.

**Kata kunci:** Pelayanan, Algoritma C4.5, Klasifikasi

**Abstract**—Bank BCA continuously improves service quality following the slogan “Always by your side”. The assessment consists of 4 attributes (time, accuracy, focus, and satisfaction). Each feature has a weighted value of 1 (very dissatisfied) to 5 (delighted). The assessment is still done manually (using paper). Therefore the authors in this study used the C.45 algorithm with three tests carried out to produce a classification obtained that the accuracy value reached 88.75% with an AUC value of 0.744, and testing on the application that was made resulted in 0.722. It can be concluded that the service assessment at BCA KCP Rengasdengklok belongs to a reasonably good classification group because the AUC value is between 0.70-0.80.

**Keywords:** Service, C4.5 Algorithm, Classification

## I. INTRODUCTION

Banking, commonly referred to as a bank, is a business entity that provides financial services for all levels of society. According to Law Number 10 of 1998, "Bank is a business entity that collects public funds in the form of savings and distributes them to the public in the form of credit and or other forms to improve people's living standards [1].

Bank BCA is the largest private bank in Indonesia, established in 1957. In providing services to the banking

world, it always wants to provide the best service for customers to maintain and for the long-term sustainability of a company. Customers judge the service on what they receive with what they expect [2]. The way to provide the best service to customers is to establish good relationships with customers and accept complaints felt by customers to improve service quality. The hope of every bank is customer satisfaction to develop the long-term sustainability of a company. As Bank BCA's commitment is "Always By Your Side".

The benchmark for the service quality of BCA KCP Rengasdengklok there is four attributes, namely as follows: Time (Time), Focus (Focus), Accuracy (Accurate), and Satisfaction (Satisfaction). Of the four attributes above are mainstays that must be done to improve service quality at BCA KCP Rengasdengklok. In improving the quality of service to customer satisfaction, when the customer finishes a transaction, several questions and answers are given in numbers 1, namely Very Dissatisfied (STP), to 5, namely Very Satisfied (SP). This assessment data must be managed properly by a web-based system to make it easier for customers to provide assessments and make it easier for each employee to make reports and find out the quality of services that have been provided.

The procedure that is running at the branch at the time of providing an assessment by customers is still manual, namely using paper by filling out a survey form manually, where the data is in the form of an archive so that it is vulnerable to damage and loss, therefore it is necessary to have an application with better storage (database) and safe. The reports generated on the service assessment are not timely (real-time). Therefore it takes a long time to find out the results of the report.

Meanwhile, to analyze and manage the data using data mining to produce an information [3]. In analyzing this research, the information obtained uses the classification and calculation methods algorithm C4.5 to produce a decision tree to determine the level of service satisfaction. Ramadhan, in his research using the C.45 algorithm method with rapidminer tools, produces an accuracy value of 96.50% [4].

Meanwhile, Febriyanto [5] and Dhika [6] Their research using data mining classification resulted in the same accuracy value, namely 91%. In addition, [7] also tested customer satisfaction and obtained 93.33% accuracy results with the Excellent Classification criteria in the Confusion Matrix. Not only determining customer satisfaction but the C4.5 algorithm method can also be used in determining the decisions of scholarship recipient students, resulting in a decision tree, namely 14 students who deserve scholarships [8].

As for determining the satisfaction of BRT Bus passengers using the C4.5 algorithm method, the accuracy results are 95%, indicating that the satisfaction of the BRT bus is very good [9]. Thus, the study shows that the C4.5 algorithm is very suitable for measuring customer/customer satisfaction.

This study examines customer satisfaction regarding the services that have been provided. To determine the level of customer satisfaction using the C4.5 algorithm method, the C4.5 algorithm calculation using RapidMiner tools and programming languages in building applications, namely PHP and MySQL as the database. Based on the explanation of the problem, the authors chose the title "Designing Customer Satisfaction Applications at BCA KCP Rengasdengklok Using the C4.5 Algorithm Method" [5].

## II. METHOD

### A. Bank

The definition of a bank as regulated in law number 10 of 1998 concerning banking is "a business entity that collects public funds in the form of savings and distributes them to the public in the form of credit and other forms in order to improve the standard of living of the community.[1] The definition of a bank according to another opinion is an institution in carrying out financial activities needed by the community. [10]

### B. Service

According to the Big Indonesian Dictionary, it is stated: "Services are matters and conveniences provided in connection with" buying and selling goods and services" [11] according to Tjiptono in the journal [12] "Consumer satisfaction as a conscious evaluation or cognitive assessment concerns whether the product performance is relatively good or bad or whether the product is suitable or not suitable for the intended use". Meanwhile, according to another opinion, service is an attitude that is expected and results in the reality of a consumer's desire so as to form a service quality. [2].

### C. Customer Satisfaction

Consumer satisfaction is very important because it can be profitable and makes competition within a company [7]. Meanwhile, according to Kotler, consumer satisfaction is a feeling of the expected reality [2].

### D. Data Mining

Data Mining is a term used to describe the discovery of knowledge in databases" [13]. Meanwhile, according to Pramudiono, namely "Automatic analysis of large or complex data with the aim of finding important patterns or trends that are usually not aware of their existence" [14].

Another opinion reveals that data mining is a technique in learning to analyze and knowledge [15].

### E. Classification of Data Mining

Classification is a process of grouping data that will be used to predict data in a decision tree that does not yet have a certain data class [5]. The steps in preparing KDD, namely: data cleaning, data integration, data selection, data transformation, data mining, pattern evaluation, knowledge presentation. The levels of classification in data mining (Gorunescu, 2011) are:

- 0.90-1.00 = very good
- 0.80-0.90 = good
- 0.70-0.80 = enough
- 0.60-0.70 = bad
- 0.50-0.60 = wrong

### F. Algoritma C4.5

Decisions so as to produce the best and significant accuracy values. Meanwhile, according to [3] the c4.5 algorithm is the development of IDE3 to create a decision tree with processed data.

The first step is to calculate the entropy, the formula is as follows:

$$Entropy(S) = \sum_{i=1}^n - p_i \log_2 p_i$$

Description:

S = case set

n = number of partitions S

pi = the proportion of Si to S

To make a decision tree, you must first choose the root by determining the highest gain value, the formula is:

$$Gain(S, A) = Entropy(S) - \sum_{i=1}^n \frac{|S_i|}{|S|} * Entropy(S_i)$$

Description:

S = case set

A = feature

n = number of attribute partitions A

|Si| = proporsi the proportion of Si to S

|S| = number of cases in S

In this study there is a flow of research methods in data collection and system development. The flow of the research method specified in the waterfall method is as follows:



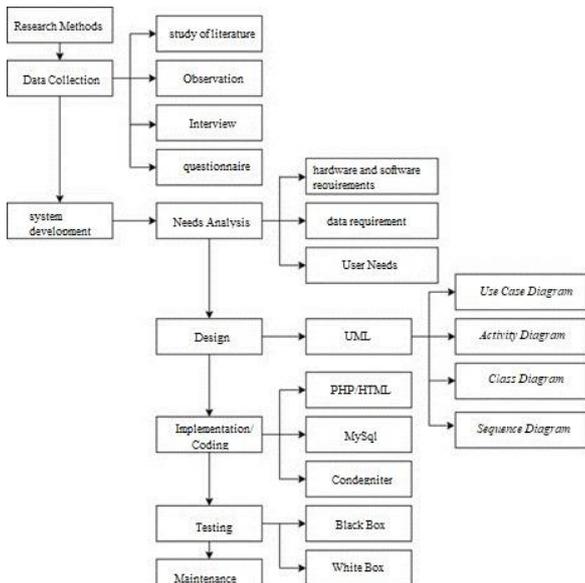


Figure 2 Research Method Flow

### III. RESULTS AND DISCUSSION

Data processing in designing customer satisfaction applications to get accurate results is carried out with 2 tests, namely manual testing using rapidminer tools and testing using a system designed using the PHP programming language with a codeigniter framework and a database using mysql. In the depiction of the design using UML modeling which consists of use case diagrams, activity diagrams, class diagrams and sequence diagrams. The flowmap of the proposed system for customer satisfaction applications is:

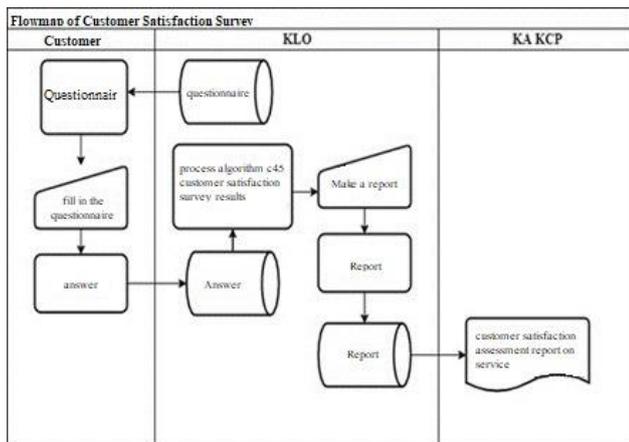


Figure 3 FLOWmap System

#### 1. Data Collection

In the process of data collection will be explained to design and develop the system in this study. Data collection is done by using

stages of literature study, observation, interviews and questionnaires

#### 2. System Design

The following is a design model for customer satisfaction applications:

#### 3. Use Case Diagram

The function of the use case diagram is to describe the usability of a system. The following is a proposed use case diagram for a service quality application:

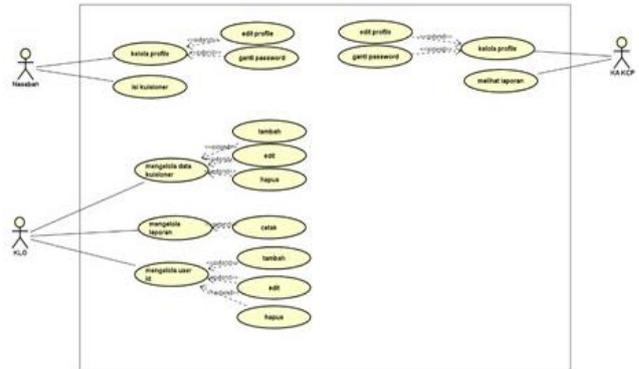


Figure 4 Usecase Diagram

#### 4. Activity Diagram

The activity is carried out by the user, namely the customer, starting from the user selecting the questionnaire then the system will display the questionnaire, the user can fill in the questionnaire correctly and the system will save the answers from the completed questionnaire. Activity Diagram for Filling the Questionnaire as follows:

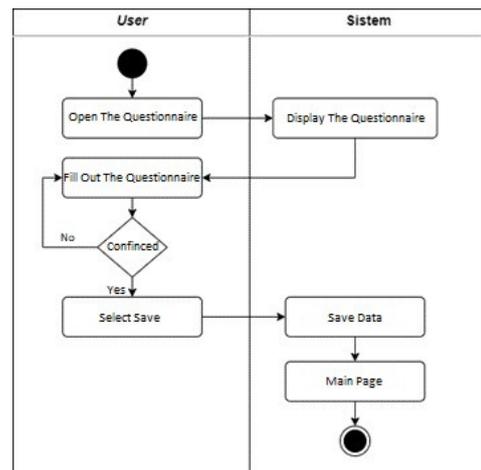


Figure 5 Activity Diagram

#### 5. Class Diagram

Class System diagram of the proposed application of customer satisfaction with services at BCA KCP Rengasdengklok, as follows:

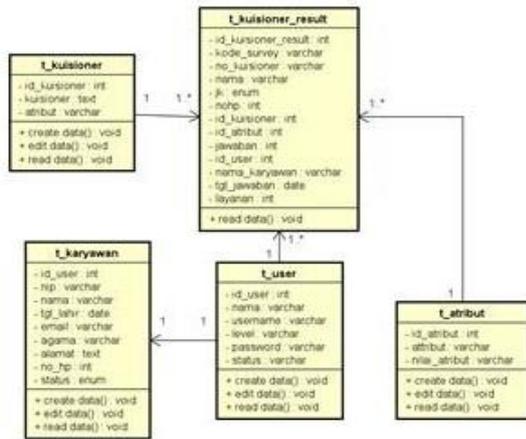


Figure 6 Class Diagram

### 6. Sequence Diagram

Sequence Diagram describes a process performed by each user as messages sent and received. Sequence diagram of the proposed service quality application system, namely:

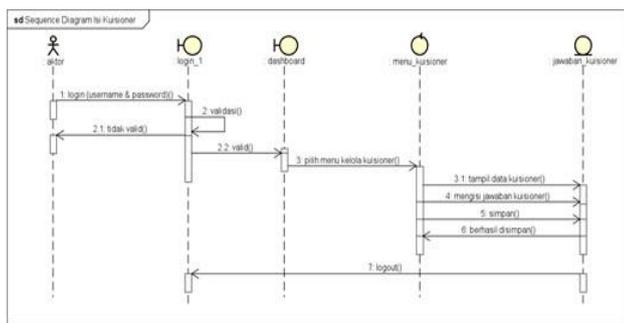


Figure 7 Sequence Diagram

### 7. System Implementation

In addition to system design, the interface design for the customer satisfaction application aims to describe an application display design that will be implemented using pencil tools, as follows:

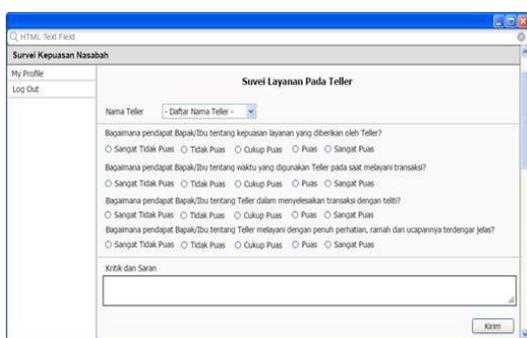


Figure 8 Customer Satisfaction Survey Design

Implementation of the system in the first stage using rapidminer tools, carried out 3 times of testing. Data obtained by 100 respondents by distributing questionnaires on March 17 - April 6 2021 through a system that has been created. Taken 80 data (calculation of the sample using data solve) as a sample in

this research. The data to be processed using rapid miner is as follows:

Table 1 Data that will be imported to Rapidminer

Nama	Waktu	Akurat	Fokus	Kepuasan	Layanan
Polynomial	Integer	Integer	Integer	Integer	Binominal
Id	Attribute	Attribute	Attribute	Attribute	Label
Iqbal	5	5	5	5	Satisfied
Andri Mulyadi	5	5	5	5	Satisfied
Vustikawati Aulia	5	5	5	5	Satisfied
Abdulmalik	5	5	5	5	Satisfied
..	..	..	..	..	..
Vinka Syafana	3	2	2	2	Not Satisfied

After the decision tree processing using rapidminer tools is complete, it will produce a decision tree as follows:



Figure 9 Decision Tree Results

Tests carried out 3 times with k-fold validation 10, k-fold validation 5 and k-fold validation 3. The results of 3 tests using rapidminer tools are as follows:

Table 2 Results of Data Analysis Using Rapidminer

K-Fold Validasi	Accuracy	Precision	Recall	AUC
10	85,00%	87,88%	93,55%	0,526
5	86,25%	88,06%	95,16%	0,568
3	88,75%	89,55%	96,77%	0,744

Based on the table above, the smaller the validation value, the higher the accuracy value obtained. The AUC value obtained at validation 3 is 0.744, based on the classification level 0.70-0.80 = enough. It can be concluded that the services at BCA KCP Rengasdengklok on 17 March – 6 April 2021 are quite satisfactory.

Based on the results of analysis and testing that produces a decision tree and rules that are formed, the next step is to implement it into a program that has been made using the PHP programming language with the PHP framework and MySQL database; it looks like this::

#### 1. Login Page

On the login page for admins and employees, users who will access the application must first log in by entering



registered username and password. The display is as follows:

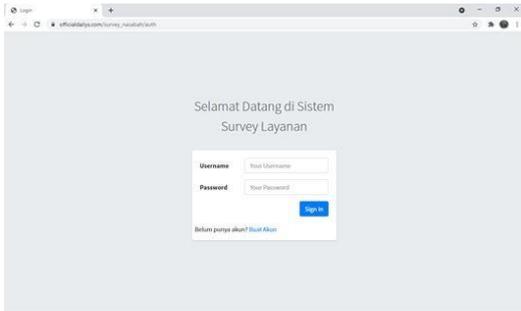


Figure 10 Login Page

2. Register Page

For users who do not have an account to login and access the application, they must first register on the register form. Display registers are as follows:

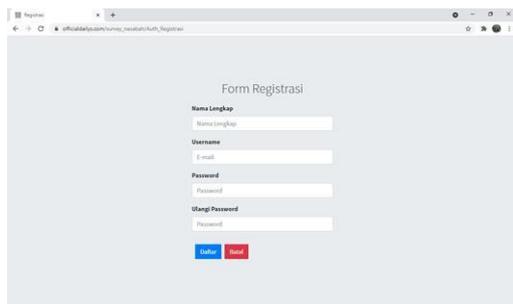


Figure 11 Register Page

3. Customer Survey Results Page

Customers who have filled out the questionnaire will be stored in the database and displayed in the administrator on the customer survey results menu. The customer survey result page is as follows:

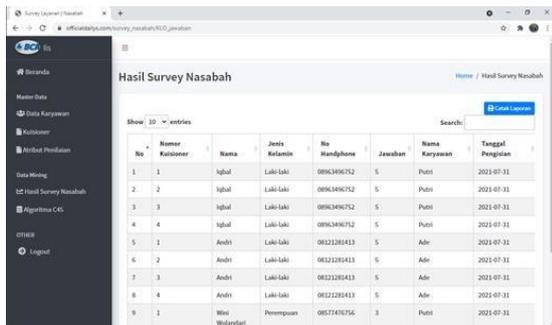


Figure 12 Customer Survey Results Page

4. Algoritma C45 Page

On the c4.5 algorithm page displays the results of entropy, gain and also the conclusion of the assessment results that have been given by the customer. The c45 algorithm page is as follows:

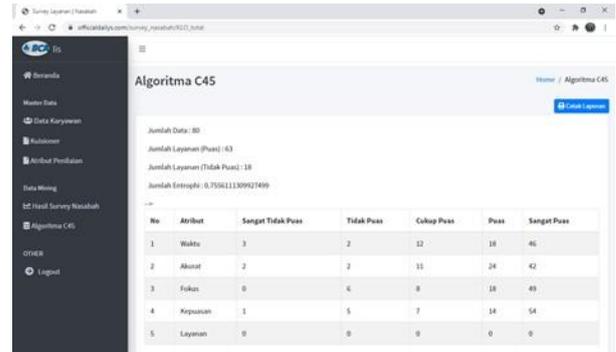


Figure 13 Algoritma C4.5 Page

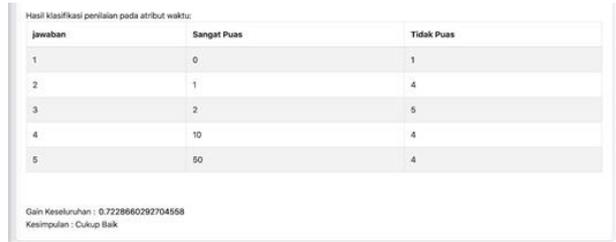


Figure 14 C4.5 Algoritma Algorithm Results Page

5. Questionnaire page for customers

This questionnaire page is filled out by customers who have transacted at Tellers and CSOs. Here's how it looks:

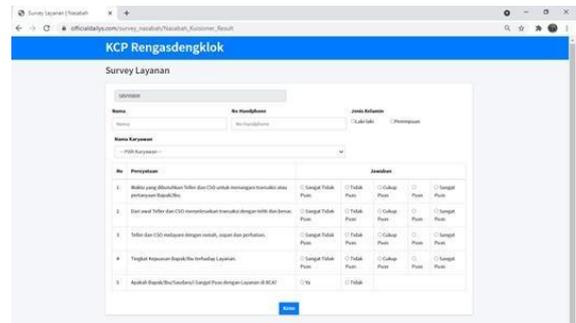


Figure 15 Customer Questionnaire Page

IV. CONCLUSION

Some conclusions from the research this:

1. The developed web-based application can simplify evaluating staff performance at the Contact Center of PT. XYZ. The calculation method in the application follows the provisions or standards that exist in the internal organization, both the targets to be achieved and the assessment reference.
2. The application developed can help staff monitor work achievement every month. So that if there are poor work achievements in the previous month, staff can find out more quickly and make performance improvements in the following month. In addition, the application can also be helpful for department heads if a special evaluation is needed for staff based on final grades.



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