DECISION SUPPORT SYSTEM USING FUZZY DATABASE MODEL TAHANI FOR HELPING SELULLER PHONE CHOICE

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ABSTRACT

In this paper, the authors build a decision support system using fuzzy database models to assist the selection tahani cellular phone. Decision support system (DSS) itself is a computer-based information system that produces a variety of alternative decisions to assist management in handling various problems in a structured or unstructured using data and models. The objective of DSS, to support decision-makers choose the alternative results with information processing models of decision makers and to solve problems that are semi structured and unstructured.

This research will implement the concept of fuzzy logic model Tahani to the database, with a membership function (membership function) is a curve that shows the mapping of points of data input into the membership values (often called the degree of membership), which has the interval between 0 and 1 .

Key Word : DSS, Fuzzy Models Tahani, Membership Functions.

1. INTRODUCTION

1.1 Background

Cellular (mobile) has many types and specifications. Phones that are offered make the consumer confusion in selecting the desired phone product, would not be surprised if consumers sometimes choose the wrong phone that according to his needs because of plurality types, specifications and prices offered.

One factor mobile consumers choose a product which are due to usability, usability is meant is that customers buy phones for communication purposes only, or even anything, if only for communication only or even the use of multimedia facilities and high technology-based mobile phone. That consumers are not wrong in buying mobile products, these usability criteria should be considered because the facilities provided by mobile phone affect the price level. All that might not be a problem if consumers do have a lot of money, but for what has a mobile phone with high technology if consumers do not need or do not even take advantage of facilities owned.

This efficiency criterion, only one among several criteria that are usually a barometer of consumers into buying products mobile. New single criterion alone there are many sub-sub

criteria to be considered, so natural that many consumers are either buying the phone. Most consumers are less concerned with the vital criteria of selection of phones and then tend to pay more attention in terms of physical models and colors of these phone product. Based on the research above, then the database will be developed as a model of fuzzy decision pendukug system. Most of the clarified standard database based on how data is viewed by the user. In fact, sometimes the user may need information from these data that are ambiguous, for example "find data of employees who are young and have a high salary." When this happens, you can use fuzzy data base. So far there have been several studies about fuzzy database. One of them is Tahani model. Tahani fuzzy database model is still using the standard relationship, only this model using fuzzy set theory to obtain information on his query.

1.2 Identification of Problems

Based on the above problems and considering the ability of fuzzy database in processing data that is linguistic, then teridetifikasi problem is "how to build Decision Support Systems Using Fuzzy Database Model Tahani To Pemelihan Cellular."

1.3 Objectives

The purpose of this research is to implement the Decision Support System Using Fuzzy Database Model Tahani To Pemelihan Cellular. "

2. MODELS, ANALYSIS, DESIGN and IMPLEMENTATION

2.1 Model

Data analysis techniques in the manufacture of software using the modeling software with the paradigm of the waterfall as seen in Most of the clarified standard database based on how data is viewed by the user. In fact, sometimes the user may need information from these data that are ambiguous, for example "find data of employees who are young and have a high salary." When this happens, you can use fuzzy data base. So far there have been several studies about fuzzy database. One of them is Tahani model. Tahani fuzzy database model is still using the standard relationship, only this model using fuzzy set theory to obtain information on his query.

a. Software Requirements Analysis
   Search process intensified and focused on the needs of the software. To determine the nature of the program that will be created, then the software engineer must understand the domain of information from the software, such as required functionality, user interface, etc. From these activities (search and software system requirements) must be documented and presented to the user.

b. Design
   This process used to change the above needs to be representation in the form of software design before coding begins. Design should be able to implement the requirements mentioned in the previous stage. Like the previous activity, then this process must also be documented as the configuration of the software.

c. Implementation / Coding
   To be understood by machines, in this case is a computer, then the design must be changed shape into a form that is understandable by machines, ie into the programming language through a process of coding. This stage is the implementation of the phase of design.

d. Testing / Verification / Installation
   Something that is made must be tested. Likewise with software. All software functions should be tested, so that the

software is free from error, and the results should be completely in accordance with the needs that have been defined previously.

e. Maintenance
A software maintenance is required, including the development, because software that is made is not always just like that. When executed might still exist a small error that was not found previously, or are there additional features that do not have the software. Development is needed when there is a change from an external company such as when there is a change of operating system or other device.

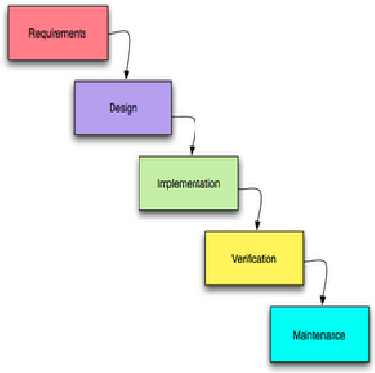


Figure 1 Model Waterfall

2.2 Analysis

A. Analysis System

Systems analysis (systems analysis) can be defined as the decomposition of a complete information system into their component parts with a view to identifying and evaluating problems, opportunities, barriers that occur and needs, so it can be proposed repair-repair. [7]

B. Database Analysis

Logic structure of the database can be depicted in a graph by using the Entity Relationship Diagram (ERD). ERD is the relationship between the entities that are used in systems to describe relationships between entities or data structures and the relationships between files. The main components of the formation of ERD is an Entity (entities) and relations (relationships) so that in this case the ERD is an entity set components and a set of relations which are described further through a number atributatribut (properties) that describe all the facts of the system being simulated. The ERD of the application to be made are as follows:

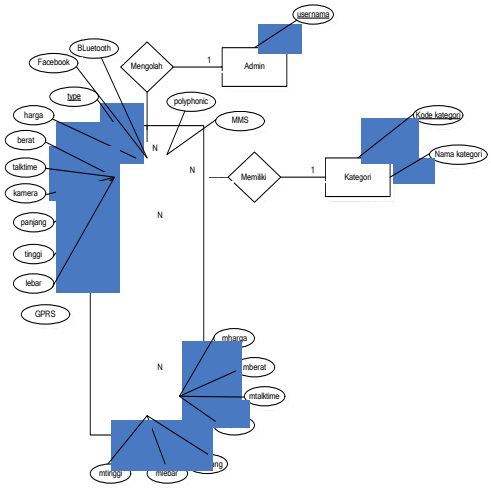


Figure 2 Entity Relationship Diagram (ERD)

C. Data Analysis With Fuzzy

The model used in this research is the basis of fuzzy data model to present system Tahani. Tahani fuzzy database model is still using the standard relationship, only this model using fuzzy set to get his information from the query [6]. Fuzzy set is a group representing a particular condition or situation in a fuzzy variable. Example: variable HARGA, divided into three fuzzy sets, namely: MURAH, NORMAL, and MAHAL.

In calculating the value of the price will be given a degree of membership in accordance with the specified category. Category used for the price are: MURAH, NORMAL, and MAHAL. The value of the weight will also be provided in accordance with the categories that have been determined to calculate the amount of weight. Categories used to weight that is: RINGAN, NORMAL and BERAT. Value of talktime will be provided in accordance with the categories used to calculate talktime is : SEBENTAR, NORMAL dan LAMA. For the value of the camera itself given the appropriate category for calculating the value of the camera are: STANDAR, NORMAL, BAGUS. Not just a camera which can be calculated values but variables such as length, width, and height which is a measure of where the phone can also be calculated for specified categories of long variables to compute the length value is: PENDEK, SEDANG, PANJANG, broadly defined categories of variables to calculate the width value is: KECIL, SEDANG, LEBAR, and for the high variable assigned a category to calculate the high value that is: PENDEK, SEDANG, TINGGI. The value of these categories, then created in a membership function. Each fuzzy variable using membership functions and triangular shoulder as an approach to obtain the degree of membership of a value in a fuzzy set.

a) Membership Function Price

Price variables are divided into three fuzzy sets, namely : MURAH, NORMAL and MAHAL, community MURAH and MAHAL using shoulder - shaped membership function approach, where's the set NORMAL membership function approach triangular.

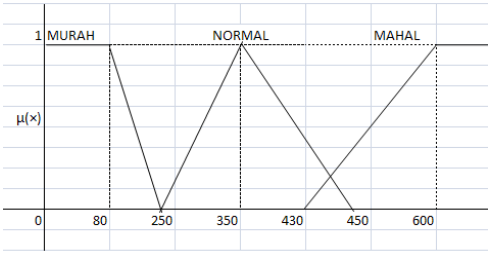


Figure 3 Membership Function Price x 10000

Membership function on the price variable can be formulated as follows:

$$\mu\text{PriceMURAH (x1)} = \begin{cases} 1 \\ (250 - x)/(250 - 80) \\ 0 \end{cases}$$

If $x \leq 80$
If $80 \leq x \leq 250$
If $x \geq 250$

$$\mu\text{PriceNORMAL (x2)} = \begin{cases} 0 \\ (x - 250)/(350 - 250) \\ (450 - x)/(450 - 350) \end{cases}$$

If $x \leq 250$ or $x \geq 450$
If $250 \leq x \leq 350$
If $350 \leq x \leq 450$

$$\mu\text{PriceMAHAL (x3)} = \begin{cases} 0 \\ (x - 430)/(600 - 430) \\ 1 \end{cases}$$

If $x \leq 430$
If $430 \leq x \leq 600$
If $x \geq 600$

b) Membership Function Weight

Weight variables are divided into three fuzzy sets, namely : RINGAN, NORMAL and BERAT, community RINGAN and BERAT using shoulder - shaped membership function approach, where's the set NORMAL membership function approach triangular.

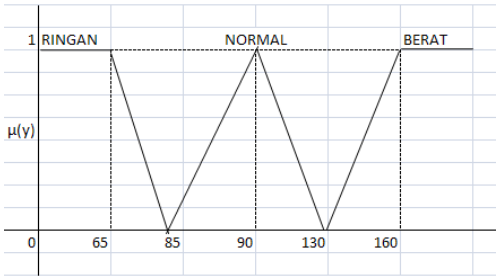


Figure 4 Membership Function Weight (gram)

Membership function on the weight variable can be formulated as follows:

$$\mu\text{WeightRINGAN (y1)} = \begin{cases} 1 \\ (85 - y)/(85 - 65) \\ 0 \end{cases}$$

If $y \leq 65$
If $65 \leq y \leq 85$
If $y \geq 85$

$$\mu\text{WeightNORMAL (y2)} = \begin{cases} 0 \\ (y - 85)/(90 - 85) \\ (130 - y)/(130 - 90) \end{cases}$$

If $y \leq 85$ or $y \geq 130$
If $85 \leq y \leq 90$
If $90 \leq y \leq 130$

$$\mu\text{WeightBERAT (y3)} = \begin{cases} 0 \\ (y - 130)/(160 - 130) \\ 1 \end{cases}$$

If $y \leq 130$
If $130 \leq y \leq 160$
If $y \geq 160$

c) Membership Function Talktime

Talktime variables are divided into three fuzzy sets, namely : SEBENTAR, NORMAL and LAMA, community SEBENTAR and LAMA using shoulder - shaped membership function approach, where's the set NORMAL membership function approach triangular.

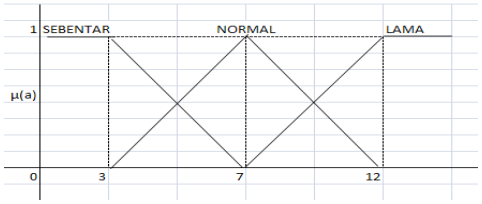


Figure 5 Membership Function Talktime (Hour)

Membership function on the talktime variable can be formulated as follows:

$$\mu\text{TalktimeSEBENTAR (z1)} = \begin{cases} 1 \\ (7 - z)/(7 - 3) \\ 0 \end{cases}$$

If $z \leq 3$
If $3 \leq z \leq 7$
If $z \geq 7$

$$\mu\text{TalktimeNORMAL (z2)} = \begin{cases} 0 \\ (z - 3)/(7 - 3) \\ (12 - z)/(12 - 7) \end{cases}$$

If $z \leq 3$ or $z \geq 12$
If $3 \leq z \leq 7$
If $7 \leq z \leq 12$

$$\mu\text{TalktimeLAMA (a3)} = \begin{cases} 0 \\ (z - 7)/(12 - 7) \\ 1 \end{cases}$$

If $z \leq 7$
If $7 \leq z \leq 12$
If $z \geq 12$

d) Membership Function Camera

Camera variables are divided into three fuzzy sets, namely : STANDAR, NORMAL and BAGUS, community STANDAR and BAGUS using shoulder - shaped membership function approach, where's the set NORMAL membership function approach triangular.

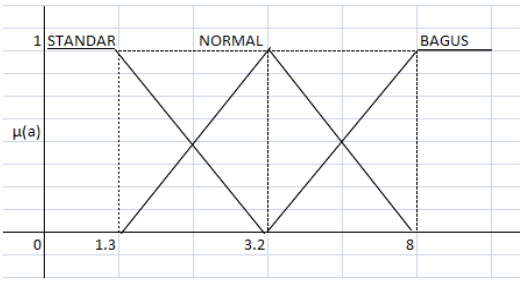


Figure 6 Membership Function Camera (M Pixel)

Membership function on the camera variable can be formulated as follows:

$$\mu\text{CameraSTANDAR (a1)} = \begin{cases} 1 \\ (3.2 - a)/(3.2 - 1.3) \\ 0 \end{cases}$$

Jika $a \leq 1.3$
Jika $1.3 \leq a \leq 3.2$
Jika $a \geq 3.2$

$$\mu\text{CameraNORMAL (a2)} = \begin{cases} 0 \\ (a-1.3)/(3.2-1.3) \\ (8-a)/(8-1.3) \end{cases}$$

Jika a ≤ 1.3 or a ≥ 8
Jika 1.3 ≤ b ≤ 3.2
Jika 3.2 ≤ b ≤ 8

$$\mu\text{CameraBagus (a3)} = \begin{cases} 0 \\ (a-3.2)/(8-3.2) \\ 1 \end{cases}$$

Jika a ≤ 3.2
Jika 3.2 ≤ a ≤ 8
Jika a ≥ 8

e) Length of Membership Function Cell Phone

Variable Length phone is divided into three fuzzy himpuan namely: PENDEK, SEDANG, and PANJANG, community PENDEK and PANJANG using shoulder - shaped membership function approach, where's the set SEDANG membership function approach triangular.

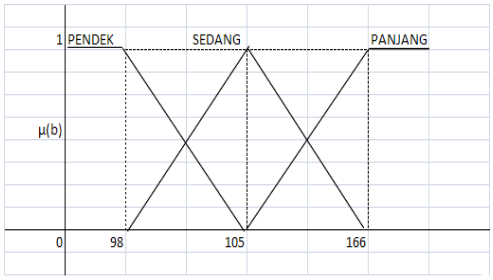


Figure 7 Length Of Membership Function Cell Phone (mm)

Membership function on variable length can be formulated as follows:

$$\mu\text{LengthPENDEK (b1)} = \begin{cases} 1 \\ (105-b)/(105-98) \\ 0 \end{cases}$$

If b ≤ 98
If 98 ≤ b ≤ 105
If b ≥ 105

$$\mu\text{LengthSEDANG(b2)} = \begin{cases} 0 \\ (b-98)/(105-98) \\ (166-b)/(166-105) \end{cases}$$

If b ≤ 98 or b ≥ 166
If 98 ≤ b ≤ 105
If 105 ≤ b ≤ 166

$$\mu\text{LengthPANJANG(b3)} = \begin{cases} 0 \\ (b-105)/(166-105) \\ 1 \end{cases}$$

If b ≤ 105
If 105≤ b ≤ 166
If b ≥ 166

f) Membership Function Cell Phone Width

Variable Width phone is divided into three fuzzy sets, namely: KECIL, SEDANG, and LEBAR, community KECIL and LEBAR using shoulder - shaped membership function approach, where's the set SEDANG membership function approach triangular.

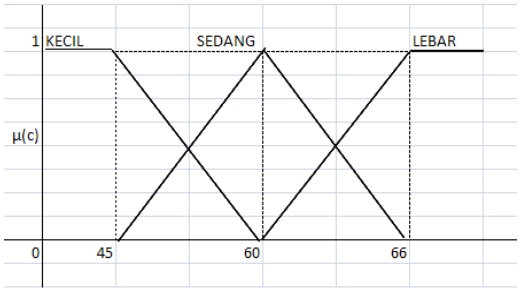


Figure 8 Membership Function Cell Phone Width (mm)

Membership function to the variable width can be formulated as follows:

$$\mu\text{WidthKECIL (c1)} = \begin{cases} 1 \\ (60-c)/(60-45) \\ 0 \end{cases}$$

If c ≤ 45
If 45 ≤ b ≤ 60
If c ≥ 60

$$\mu\text{Width SEDANG(c2)} = \begin{cases} 0 \\ (c-45)/(60-45) \\ (66-c)/(66-60) \end{cases}$$

If c ≤ 45or c ≥ 66
If 45 ≤ c ≤ 60
If 60 ≤ c ≤ 66

$$\mu\text{WidthLEBAR(c3)} = \begin{cases} 0 \\ (c-60)/(66-60) \\ 1 \end{cases}$$

If c ≤ 60
If 60 ≤ c ≤ 66
If c ≥ 66

g) Membership Function Height phones

Variable Height phones are divided into three fuzzy sets, namely: PENDEK, SEDANG, and TINGGI, community PENDEK and TINGGI using shoulder - shaped membership function approach, where's the set SEDANG membership function approach triangular.

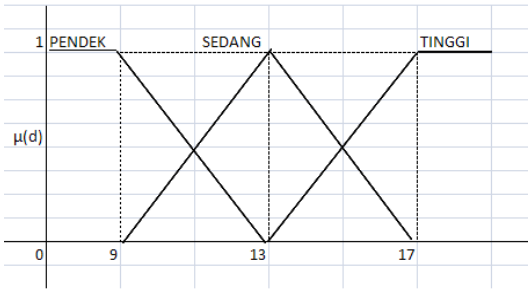


Figure 9 Membership Height Phone (mm)

Membership function to the variable height can be formulated as follows:

$$\mu\text{HeightPENDEK (d1)} = \begin{cases} 1 \\ (13-d)/(13-9) \\ 0 \end{cases}$$

If d ≤ 9
If 9 ≤ d ≤ 13
If d ≥ 13

$$\mu\text{HeightSEDANG(d2)} = \begin{cases} 0 \\ (d-9)/(13-9) \\ (17-d)/(17-13) \end{cases}$$

If d ≤ 9 or d ≥ 17
If 9 ≤ d ≤ 13
If 13 ≤ d ≤ 17

$$\mu\text{HeightTINGGI(d3)} = \begin{cases} 0 \\ (d-13)/(17-13) \\ 1 \end{cases}$$

If d ≤ 13
If 13 ≤ d ≤ 17
If d ≥ 17

D. Functional Needs Analysis

1. Context Diagram

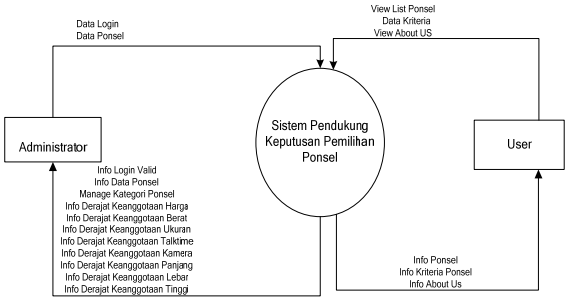


Figure 10 Diagram context Election Decision Support System for Mobile

2. DFD Level 0

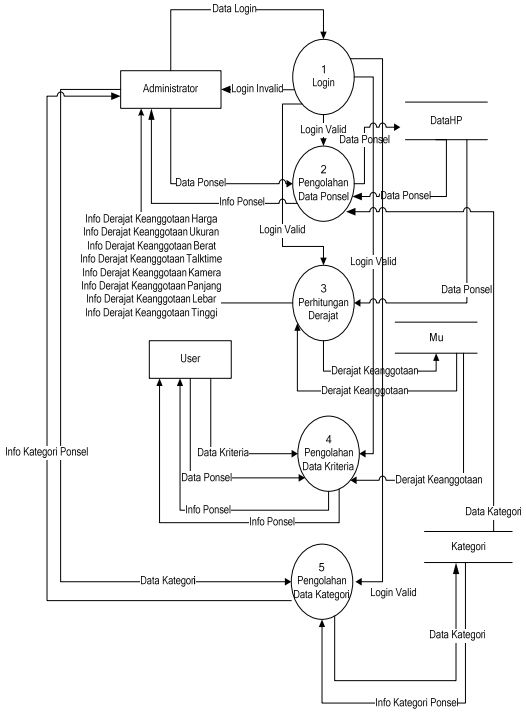


Figure 11 DFD Level 0 DFD DSS Mobile Selection

3. Relation Scheme

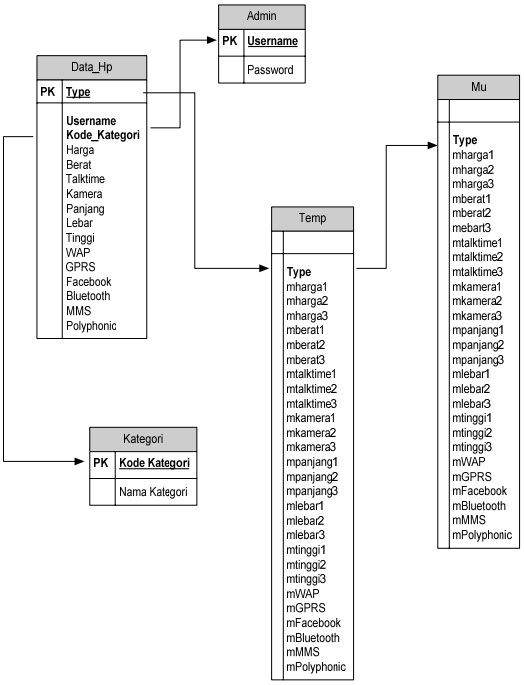


Figure 12 Relation Scheme

2.3 Design

A. Menu Structure Design

In designing a menu structure which required application berisikanmenu and submenus that serves to facilitate users in using the application. Here was described on the menu structure in this application:

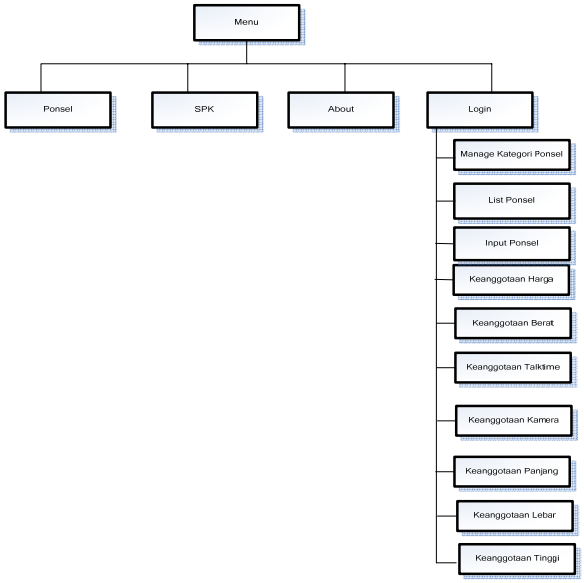


Figure 13 Structure of menu

B. Home Design Applications

Here is a picture design of the main menu :

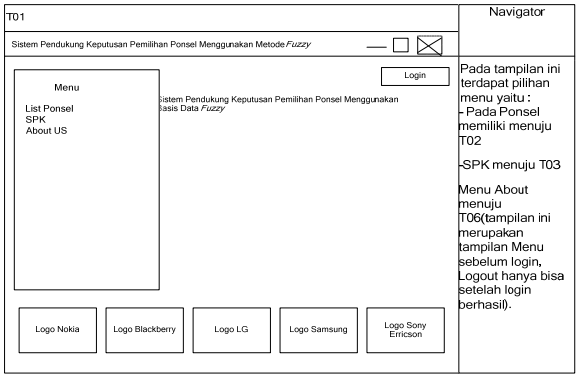


Figure 14 Display Design Menu Home Before Login

C. DSS Design Determination Process

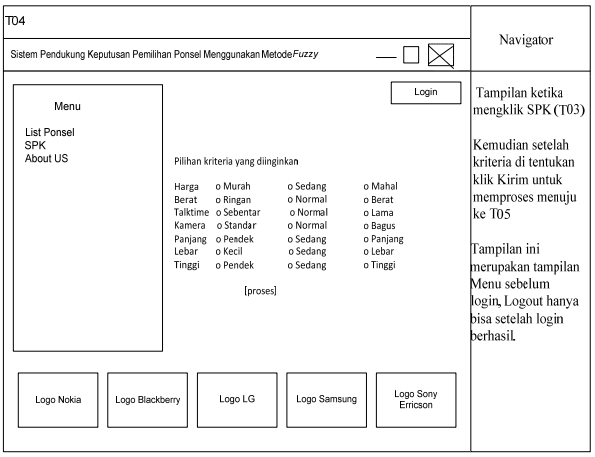
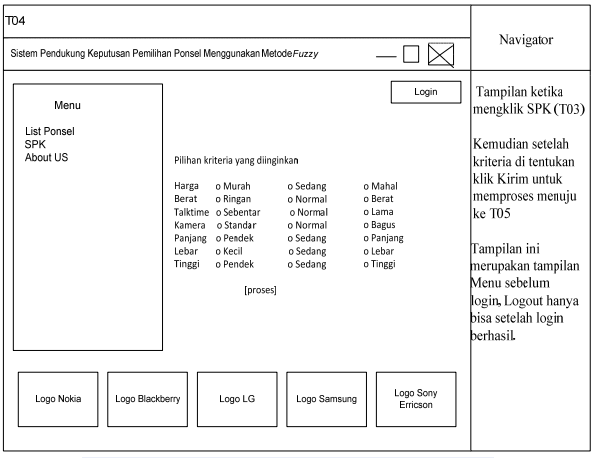


Figure 15 Display Design Menu DSS

D. DSS Design Process Views



Picture 16 Display Design Cell Phone Recommended

2.4 Implementation

At this phase will be implementation of the system built. This stage is performed after the analysis and design done, and then implemented in the programming language used.

A. Implementation System

The objective is to confirm the implementation of the design program modules on the system actors so the user can provide input to the system builder.

B. Hardware Implementation

Hardware used to implement the system are as follows:

1. Processor with a speed of at least 500 Mhz
2. 256 MB RAM minimum
Three. Hard Disk 40 GB minimum
4. Monitor with 1024 x 768 resolution
5. Minimum of 64 MB VGA
6. Standard Keyboard and Mouse

C. Software Implementation

Software used to implement the system are as follows:

1. Windows XP Operating System.
2. XAMP for database storage.
Three. Macromedia Dreamweaver for writing program code.
4. Mozilla Firefox as a browser.

D. Implementation Form

Implementation of the form carried out to find every page program. Here is a form that has made the implementation.

Table 1. Implementation Form

Menu	Deskripsi	Nama File
Login	Login untuk admin	login.php
Logout	Keluar dari menu admin	logout.php
List Ponsel	Untuk user hanya dapat melihat kategori, type dan dan harga, untuk admin dapat melihat kategori, type, harga, detail ponsel, edit ponsel, hapus ponsel dan menghitung derajat keanggotaan ponsel	mponsel.php, detail-ponsel.php, edit-ponsel.php, hapus-ponsel.php, derajat-keanggotaan.php
SPK	Untuk menentukan kriteria ponsel	spk.php, tampil-proses.php
About Us	Untuk melihat profile vendor.	aboutus.php
Manage Kategori Ponsel	Untuk admin menambah kategori ponsel	mkategori.php
Input Ponsel	Untuk admin menambah dan mengubah data ponsel	input-ponsel.php
Keanggotaan Berat	Untuk admin melihat derajat keanggotaan berat	keanggotaan-berat.php
Keanggotaan Harga	Untuk admin melihat derajat keanggotaan harga	keanggotaan-harga.php
Keanggotaan Talktime	Untuk admin melihat derajat keanggotaan talktime	keanggotaan-talktime.php
Keanggotaan Tinggi	Untuk admin melihat derajat tinggi	keanggotaan-tinggi.php
Keanggotaan Lebar	Untuk admin melihat derajat keanggotaan lebar	keanggotaan-lebar.php
Keanggotaan Panjang	Untuk admin melihat derajat keanggotaan panjang	keanggotaan-panjang.php

3. Display interface

Here is a display interface program before login :

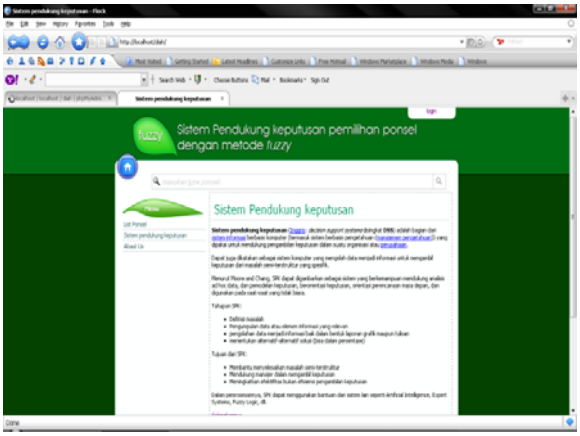


Figure 17 Display Interface

4. Conclusion & Suggestion

4.1 Conclusion

Based on the research and discussion, we can conclude the following things:

1.Has made a decision support system applications using tahani fuzzy database models in the selection of mobile phone brands were Nokia, LG, Samsung, Sony erricsin device, and Blacberry.

2. Based on the results of testing done on the system showed that the selection of this mobile application system has been running well and in accordance with user needs. By using fuzzy database models Tahani on this application, the value of recommendations ranging from mobile phones (0 1), where the value of 1 indicates full value and increasingly close to 0 then the phone is not recommended.

4.2 Suggestion

The suggestions that the authors put forward will further enhance the results already obtained. Here are some suggestions submitted by the author:
1. Still needed development and refinement of the terms so that the graphic user interface
2. programs look more attractive appearance.
3. Forgotten password facility to allow a user if at any time - there is a forgotten password.

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