GEOGRAPHIC INFORMATION SYSTEM

FOR CHOOSE NEW BRANCH AT HOKI DIM SUM

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ABSTRACT

Hoki Dim Sum is a restaurant that sells Chinese food namely dimsum. Hoki Dim sum has the characteristic form of the traditional good. The restaurant dates back to the beginning of the year 2013 and until recently Hoki dim sum has a lot of regulars who enjoy all forms of service at Hoki Dim Sum. The owner of Hoki Dim Sum want to open new branches, since early in the year 2015 hoki dim sum owners have experienced failure in opening a new branch that is caused during the Vice owner only estimates which locations will be selected to determine the location of a shophouse in accordance with strategic commercial location with an empty shop looking for recommended from existing ads in newspapers and the internet. Based on Newspaper and internet ads turned out at that shop does not down turnover which consequently strategic purchasing power of customers due to the lack of accurate information on the location of the shophouse obtained from newspapers and the internet. It is the owner that makes it difficult to determine its location to open a new branch.

Based on existing problems at the moment in Hockey Dim Sum, then it takes a geographic information system. Geographic information systems are built in the city of bandung. The purpose of the development of geographic information systems to determine the location of this shop that suits its location to open a new branch. System decision makers who used the WP method (Weighted Product), method of WP (Weighted Product) capable of providing a strategic commercial information

Based on the test results it can be concluded that a geographic information system that is built can make it easier for the owner in determining the location of the shop is conveniently located to open new branches.

Keywords: Geographic Information System, WP (Weighted Product).

1. INTRODUCTION

Hockey Dim Sum is a Chinese restaurant that sells food that is dimsum. Dim sum hockey has a characteristic form of tasty sauces. The restaurant was established since the beginning of 2013 and until today hockey dimsum has many regulars who enjoy all forms of service in Hockey Dim Sum.

In interviews with the owner or the owner dimsum is sarah natalia, he memamparkan about his experience that Hockey Dim Sum ever experienced one failure to open a new branch at the start of 2015, which caused during these representatives owner only predict just which locations will be selected for determine the location of the shop in accordance with the strategic shop locations by finding an empty shop recommended from existing ads in newspapers and the internet. Based on newspaper ads and internet Turns at that time the shop was not located and consequently a decline in the purchasing power of customers due to the lack of accurate information on the location of the shop obtained from newspapers and the Internet. Where hockey per day dim sum sold only maximum 5 servings clear that this decline in turnover the company is said to be the owner of hockey dimsum. As a result in the end of March 2015 the owners closed the shop at the new branch because the place is not in accordance with what is desired.

Hockey Dim Sum plans to open new branches to increase turnover. There are currently only looking for a dim sum hockey eligibility of its new location by observing the condition of the shop and the survey directly. This of course requires effort and a long time before the Hockey Dim Sum ensure the viability of a shop to open a new branch due to lack of accurate information about the shop.

Based on the interviews have been conducted, it can be seen that there is a problem in finding a suitable location with a strategic location to open a new branch.

These problems can be overcome by using a geographic information system to provide accurate information on the location of the shop is stratgis and is expected to resolve the issues raised in Hockey Dim Sum in determining the strategic shop locations to open new branches.

2. TEORI PENDUKUNG

2.1 Geografic Information System

According to Burrough, a geographic information system is a collection of powerful tools for collecting, storing, displaying and transform spatial data from the real world [1]. Meanwhile, according to Aronoff, geographic information systems (geographic information system / gis), hereinafter referred GIS is a computer-based infromasi system used to process and store data or geographic infromasi [2].

Based according to Burrough and Aronoff can be concluded that the geographic information system is a system designed to capture, store, process, display, and manage all types of geographic data or transform spatial data from the real world. Sig evolving towards the concept

GIS development, called SIG WEB. Conceptually this sense has a fundamental understanding of WEB GIS (geographic infromasi web-based system) is a GIS-based application that can be run and applied to a web browser, either in a LAN-based computer network or

a PC computer but have installed and configured the network settings in the web server or that have connected and running in a global network that is the Internet.

2.1.1 Data Spasial

Each GIS software has been designed to overcome spatial data (also called geographic data). Spatial data is marked with information about the position, relations among other features, and details of inter-character non-spatial (Burrough, 1986). Within the GIS can be presented in two formats namely: raster and vector data. Here are two data formats:

a. raster Data

Raster data is data that is stored in the form of a rectangular box (grid) / cell to form a regular room. Digital photos like areal photography or satellite is part of raster data on a map [1]. Meanwhile, according to the book edy Prahasta raster data is display, placing and storing spatial data using a matrix structure or pixels that make up the grid [3]. So we can conclude raster data is data that is stored in the form of a rectangular box (grid) which can display, placing and mentyimpan spatial data using the pixels that make up the grid.

b. Data vector

Vector data is data the data recorded in the form of point coordinates that display, placing and storing spatial data using points, lines or areas (polygons) [1] Meanwhile, according to the book eddy Prahasta mean vector data is display, placing and storing data spatial using dots, lines or curves, or a polygon with the attribute-atrributnya. So the vector data is data that is recorded in the form koordiat point display, placing and storing spatial data using points, lines or curves, or polygons and their attributes.

Here is an explanation of the graphical representation of an object in the data vector is divided into three parts, namely in the form of a point (point), line (line), and area (polygon) [10].

a. Point

The point is a graphical representation of the simplest on an object. The point has no dimension but can be displayed in either symbol on the map and in the display monitor. Example: health facilitation location.

b. Line (line)

Line is a linear form that connects two or more points, and represents an object in one dimension. Example: Roads, Rivers, etc.

c. Area (polygon)

Polygon is a representation of objects in two dimesni. Example: Lake, parcels resistant, etc.

2.1.2 Data Non Spasial

According to Dr. Indiarto non-spatial data or attribute data is data that describes the characteristics of a feature on the earth's surface in the form of quantitative and qualitative [4]. Meanwhile, according to Eko Budiyanto non-spatial data or attribute data is data that is shaped table [5]. Based according to Dr. Indiarto and Eko Budiyanto can be concluded that non-spatial data is data that describes the characteristics of a feature on the earth's surface in the form of quantitative and qualitative presented in table form.

2.1.3 Layer

Layer is a layer or sheet. Layer in a geographic information system is a map layer that contains information from the map. Layers can be a polygon drawing, lines, text, or other symbol. Separation of images in multiple layers is shown to facilitate in drawing the map, in addition to the information displayed will be more detail [1].

2.2 Konsep Sistem Pengambil Keputusan

Decision support system is an interactive information system that provides information, modeling and manipulating data. The system was used to aid decision-making in situations of semi-structured unstructured situations, where no one knows for sure how the decision should be made [6].

2.3 Lokasi dan Indikator

In the study of geography, location is an important variable that can reveal many things about the symptoms or phenomena studied. Sumaatmadja

explained that: the location of an object in space can be explained and can provide clarity on the object or symptoms geography pertinent and further [7]. Studying geography tantamount to learn the locations on earth, and when the person or people are talking about locations on Earth's surface then the individual is talking about phenomena on Earth's surface. The location is very closely related to the distance on the earth's surface. A symptom may be strategic and have a high use value if it is located in a favorable location. Moreover, the site is used for a business or a business. The location and interconnectedness of marketing indicators in developing a business or enterprise. Umumunya a business and businesses should monitor the environmental forces or the location and the main actors customer environments that affect the ability to obtain income [8]. Sure to open a business must be located in the environment. The more strategic business location is selected, the higher the level of sales and affect the success of a business. Here are some factors that should be taken into consideration in choosing a location strategy on the indicators:

1. The level of overcrowding.
2. Taking into account traffic levels on a passing vehicle.
3. Adjust the funds to the business location you choose.

2.4 Wp (*Weighted Product*)

WP method is a method of decision-making by way of multiplication to connect rating attributes, where each attribute rating should be raised to a first weight attribute is concerned [9].

WP is one of the multi-criteria decision analysis (multi-criteria decision analysis / MCDA) is very popular. Methods of multi-criteria decision making multi-criteria decision making (MCDM). MCDA method, which granted is a limited set of decision alternatives described in terms of a number of decision criteria. Any alternative compared with other decisions by multiplying the number of ratios, one for each decision criteria. Each ratio is raised to the power equivalent to the relative weight of the matching criteria.

The concept of product weighted calculation method:

1. Make improvements weights first. The initial weight fixed in advance by the following formula

   : $W_j = \frac{w_j}{\sum w_j}$ (2.1)

   so that $\sum W_j = 1$

2. Determining the value of the vector S

   The preference for alternative given the following formula:

$$s_i = \prod_{j=1}^{n} X_{ij}^{\ w_j} \quad (2.2)$$

with i = 1,2,…,m dan j = 1, 2, …n. where :
S : Dianologikan alternative preferences as a vector S
X : criteria value
W : Weights criteria / sub-criteria
i : Alternative
j : criteria
n : The number of criteria

3. Then proceed to determine the value of the vector that will

use counting referrers (Vi) to perangkingan / search the best alternative to the following formula:

$$V_i = \frac{\prod_{j=1}^{n} x_{ij}^{\ w_j}}{\prod_{j=1}^{n} (x_{ij}^{\ *}) w_j} \quad (2.3)$$

Information:

V_i = the largest value of the alternative selected.

Π = product

X_{ij} = value alternative to attribute ke- ke- i j

w_j = the weight of each attribute

Simply like this:

$$V_i = \frac{S_i}{S_1 + S_2 + \cdots S_n} \quad (2.4)$$

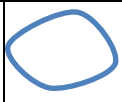
After doing the calculations preferences (vi) above will then obtain alternative options most worthy of the best and be the best choice in decision-making.

3. DISCUSSION

3.1 Analysis Data Stasial

Analysis of spatial data is used to provide information about the location of places based on geographical location latitude and longitude taken on attribute data. Here is a Spatial Data used in this study extend to Table 1.

Table 1 Data spatial

Layer	Description	Type Data Spatial	*Icon*
Layer Place Ruko	Office location to be displayed on a strategic map	Point	
Layer Bandung city	Areas to be searched in the opening of new branches, namely in the area of Bandung so restricted in the city of Bandung alone	Polygon	

3.2 Analysis Data Non Spatial

Non-spatial data analysis or data attributes that will be used to provide information on spatial data that can be viewed on table 2:

Table 2 Data non spatial or data atributte

No	Data	Dekription	Atributte
1	Data Ruko	Contains general information about the office	Id Ruko, Nama Ruko, Alamat Ruko, Harga, Luas Bangunan, Tempat Parkir, Latitude dan Longitude
2	Data Rw	Contains information to find out how many residents rw	Id Rw, Nama Rw, Jumlah Penduduk
3	Data Jalan	Contains information to determine the path of vehicles passing banykanya	Id Jalan, Nama Jalan, Jumlah Kendaraan

3.3 Analysis Determines New Branch

In promoting and developing the business, we need more intensive marketing. One of them is in the business with the opening of new branches. Analysis of determining the location of the new branch is done to determine which location will be used as the basis of determining the location of the branch. Determining the location of this new branch using methods Weighted Product, which can provide an alternative choice in determining the best location decision which locations and most appropriate potential to be the location of the branch restaurant.

The stages in determining the location of a new branch for the optimal shop Weighted Product method is as follows. The first stage of determining the location of the new branch is to first determine the weight and criteria, here are weights and criteria contained in Table 3 and Table 4.

Table 3 Weight Value

Value Weight	Weight Value
Very less	1
Less	2
Enough	3
Good	4
Very Good	5

Weights for determination of the location of the branch consists of a description of the weights is very less, less, sufficient, good and excellent, each value is 1, 2, 3, 4, and 5, which can be seen in Table 4.

Table 4 citeteria dan Sub criteria Determine New branch Location

Criteria	Inicial
Population Surrounding Area	C1
Average vehicle passing	C2
Has a parking lot	C3
Building area	C4
Price	C5

Here are the weights the priority of each sub-criteria can be seen in Table 5.

Table 5 Grading weights

Inicial	Grading weights
C1	5
C2	5
C3	5
C4	4
C5	2

Then for a parking space has been determined also for the provision of nilinya can be seen in Table 6.

Table 6 Grading To park

Place Park	grading
There Is	5
Not There Is	1

The amount of data used in this study were 60 sub shop with the data according to these criteria. Here is the calculation method of wp (weighted product) in determining the new branch hockey analaisis dim sum, to sample data used 2 be the implementation of data Weighted Product, which can be seen in table 7.

Tabel 7 Sample Data

No	Ruko Name	Address	Price/ Month	Place Park	Building Area	Latitude	Longitude	Population Surrounding Area / RW	Average Vehicle pass / Road
1	Ruko Kliningan	Jl. Klininga n No	50.000.000	5	213	--6.940978	107.628382	350	1500

No	Ruko Name	Address	Price/ Month	Place Park	Building Area	Latitude	Longitude	Population Surrounding Area / RW	Average Vehicle pass / Road
		23 Buah Batu Bandung							
2	Ruko Mekar agung	Jl. Mekar Agung No 37 Bandung	70.000.000	5	200	-6.955588	107.608111	150	400

1. Perform calculations fixes the initial weight of each criterion. By equation formula (2.1).

$$W_1=\frac{5}{21}=0.24$$
$$W_2=\frac{5}{21}=0.24$$
$$W_3=\frac{5}{21}=0.24$$
$$W_4=\frac{4}{21}=0.19$$
$$W_5=\frac{2}{21}=0.09$$

2. fter performing the calculation of normalized weights, then the next step is to calculate the vector S using equation (2.2):
The weights used are also applied criteria beneficial and detrimental. Where the criteria considered to be beneficial would be positive while harming criteria is negative.

$S_1=(350^{0.24})\ (1500^{0.24})\ (5^{0.24})\ (213^{0.19})\ (50000000^{-0.09})$
$=4.07*5.78*1.47*2.77*0.20=19.1$
$S_2=(150^{0.24})\ (400^{0.24})\ (5^{0.24})\ (200^{0.19})\ (70000000^{-0.09})$
$=3.32*4.21*1.47*2.74*0.20=11.25$
Then do the calculation for the vector V which will be used as a basis of reference do perangkingan shop locations with equation formula (2.4). $V_1=\frac{19.1}{19.1+11.25}=0.62$

$V_2=\frac{11.25}{19.1+11.25}=0.37$

3. rom the wp Calculation method is found that has the highest value of v kliningan shop is located at Jl. Kliningan No 23 Buah Batu Bandung.
The end result can be concluded that the best alternative to open new branches in hockey dimsum on Jalan Kliningan No 23 Buah Batu Bandung.

3.4 Analysis of Non Functional Requirements

Non-functional analysis is the analysis needed to determine the needs of the system specifications. The specification also includes elements or components of what is needed for the system to be built up to such a system is implemented. The needs analysis also determines the input specifications required of the system, the output will be generated systems and processes needed to process inputs to produce a desired output.

3.4.1 Analysis *Hardware*

Analysis of the hardware is a hardware specification that is used to run the system by the client and the server. Hardware or hardware are very supportive of the application to be built. The higher specification hardware or hardware, the better the system menjalakankan. Here are the specifications of the hardware (Hardware) can be seen in Table 8.

Table 8 Spesicasi hardware

Type	Client	Server
Processor A	*Intel(R)Pentium(R) Dual CPU*	*Intel Pentium 3.73 Ghz Extreme Edition*
Memory	Memori (RAM) 512 MB atau lebih tinggi,	Memori (RAM) 1 Gb atau lebih tinggi
Layar	Monitor resolusi 1024x768 256 warna	Monitor resolusi 1024x768 256 warna

Jaringan	*Network Interface card,* Modem	*Network Interface card,* Modem
Penyimpanan Internal	*Hardisk minimal 10 Gb*	*Hardisk* minimal 40 Gb

3.4.2 Analisis Software

Other supporting devices for the determination of the new branch membanl.gun applications using geographic information systems in the form of software (software) is needed. From the observation of software, there are some important things that must be considered for the system will be designed to run well and as expected by the client. The software used can be seen in Table 9.

Table 9 Software Specifications

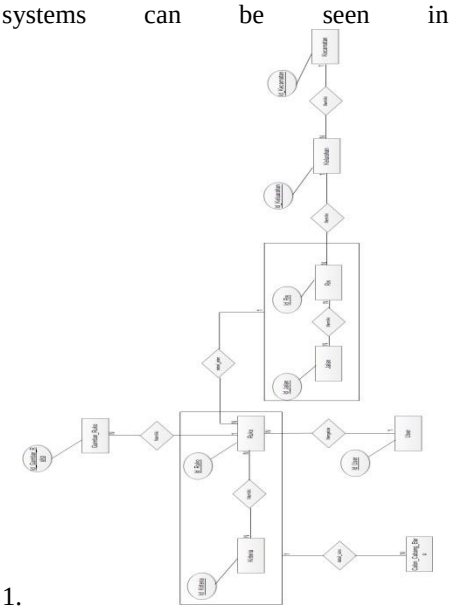
Type	Client	Server
Os (*operating system*)	windows xp atau lebih tinggi	Linux
Web Browser	Chorme, Mozilla Firefox, Internet Explore	Chorme, Mozilla Firefox, Internet Explore

3.4.3 Analysis User

Web-based geographic information system for the determination of a new branch in the city of Bandung is usable material suitability analysis in decision making on actions for stakeholders who use the application or system program infromasi this geographical. There are three stakeholders menbggunakan this application is including the owner, and the owner representative who has the task bps respectively in a running application.

3.4.4 Analisis Basis Data

In the development of their information systems required to generate the information needed. The data needed to be mutually relate to one another as if the data do not relate to each other will not form a processing the data into information. To model the data relationships in structured model of analysis software used a tool in the form of a diagram called Entity Relationship Diagram (Erd) Below are the ERD process database analysis in the determination of a new branch using geographic information systems can be seen in Figure 1.

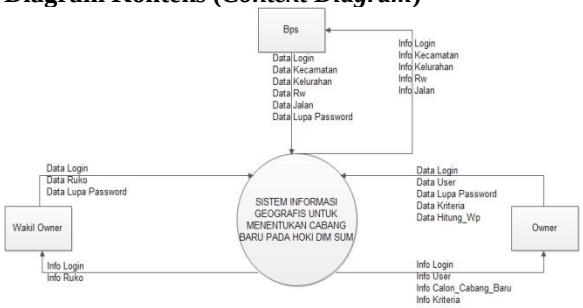


Picture 1 Erd

3.5 Analysis Functional Requirements

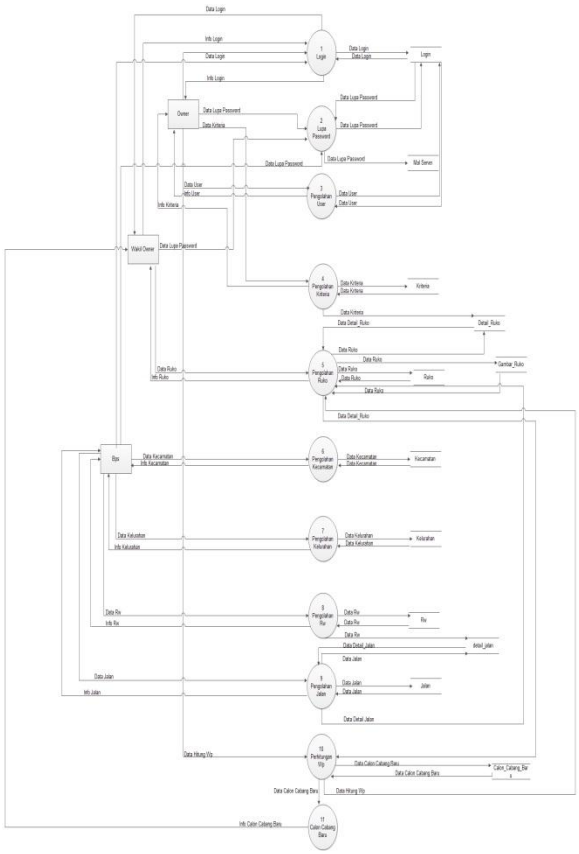
Functional needs analysis conducted to provide an overview of the issues and procedures that are running or have been used in Cv Hockey Dim Sum. The system is built is expected to facilitate the owners in determining the new branch via the information system is built.

3.5.1 Diagram Konteks (*Context Diagram*)



Picture 2 Diagram Konteks

3.5.2 Data Flow Diagram

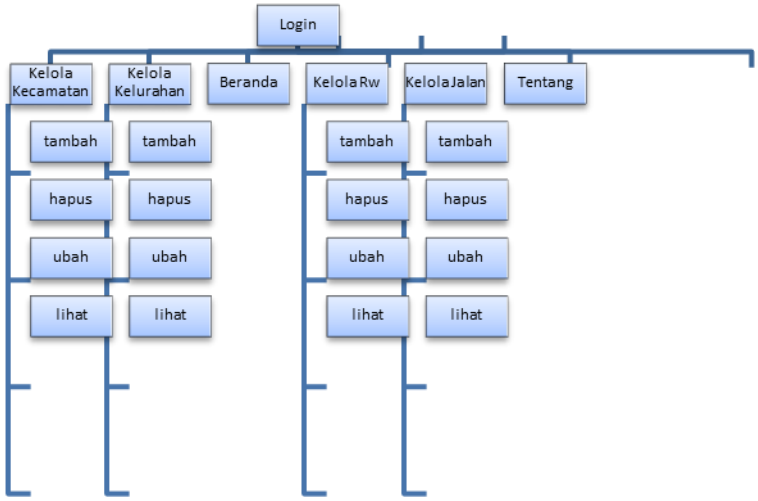


Picture 3 Data Flow Diagram

3.6 Perancangan Struktur Menu

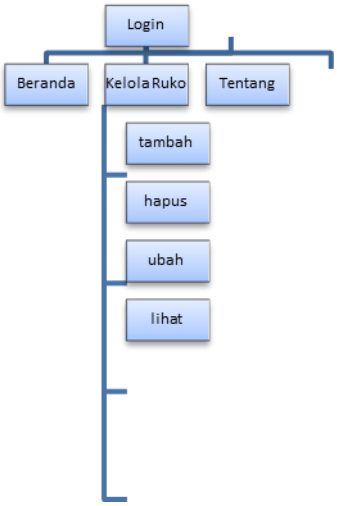
The menu structure is a common form of a draft program for enabling users to run a computer program. So when running a program, the user does not have difficulty in choosing the desired menu. In designing this software, there are 3 separate menu structure of the menu structure to access rights bps, deputy owner and access rights owner. as shown in Figure 4,5 and 6.

1. Structure Menu Bps



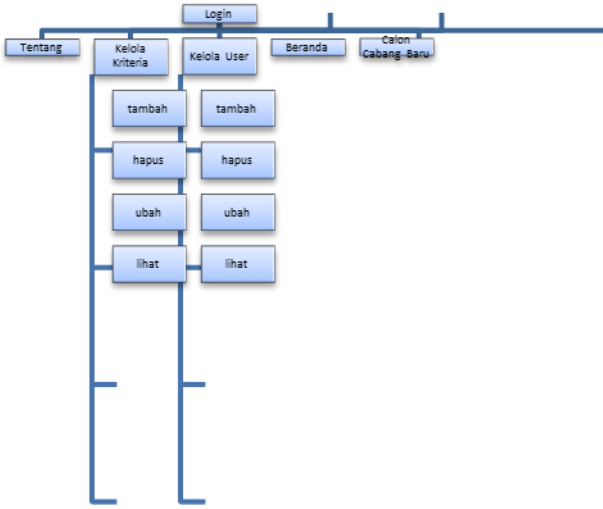
Picture 4 Structure Menu Bps

2. Sturcture Menu Wakil Owner



Picture 5 Structure Menu Wakil Owner

3. Struktur Menu Owner

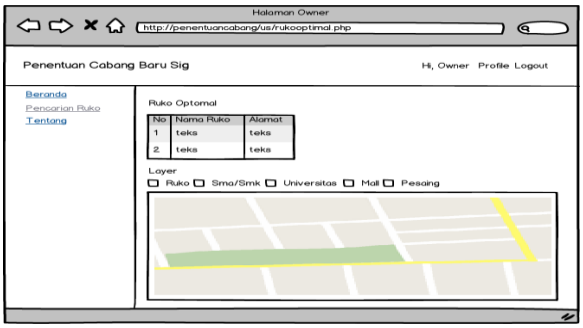


Picture 5 Structure Menu Owner

3.7 Perancangan Antarmuka

The design phase of the interface is made to give an idea or design of the program to be built so that the user can know. The following interface design in the determination of a new branch using geographic information systems. Here is the interface in determining the prospective new branch

Interface office unbiased shop recommended optimal results analaisis wp method that can be seen in Picture 7.

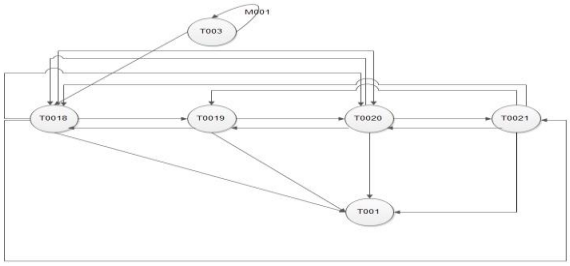


Picture 7 Antar Muka Calon Cabang Baru

3.8 Jaringan Semantik

Semantic network shows the relationship between various objects. Semantic network consists of circles that show the objects and information about specific objects. Here is a semantic network in the determination of a new branch using geographic information

systems.



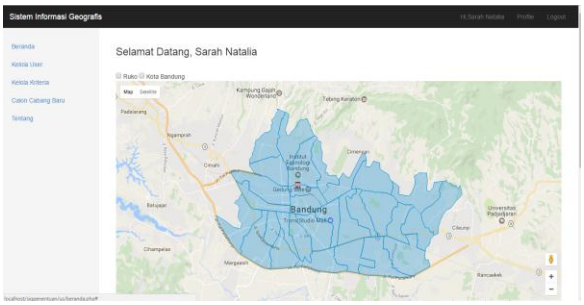
Picture 8 Network Semantic

4. IMPLEMENTATION AND TESTING SISTEM

4.1 Interface Implementation

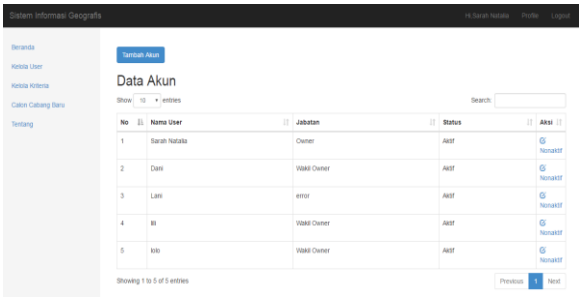
Dilakkukan interface implementation with the page program built with the encoding in the form of program files. In the implementation of this interface is distinguished by users are bps, deputy owner and owner. As for the view implementation of a geographic information system to determine a new branch in hockey dim sum.

4.1.1 Interface Implementation Beranda



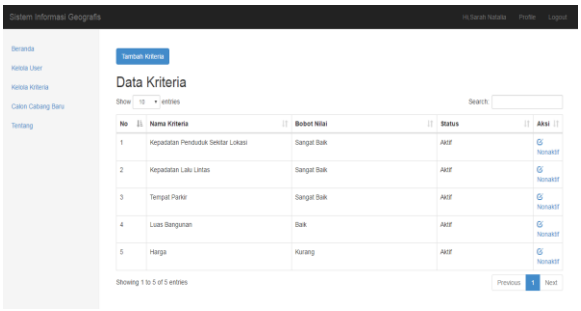
Picture 9 Interface Implementation Beranda

4.1.2 Interface Implementation Manage User



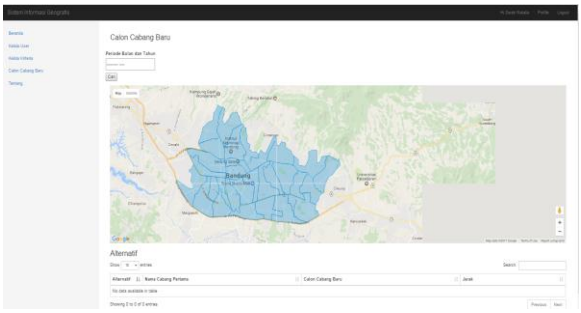
Picture 10 Implementation Manage User

4.1.3 Inteface Implementation Manage Criteria



Gambar 11 Inteface Implementation Manage User

4.1.4 Interface Implementation Candidates New Branch



Picture 12 Interface Candidates New Branch

4.2 Testing System

Testing of the system is the thing to do in order to find flaws and make the implementation of a truly meet the needs of the system.

4.2.1 Black-Box Testing Results

Here is a black-box test results that can be seen in Table 9.

Table 9 Result Testing *Black-box*

Item Uji	detail Testing	Type Testing	Result be expected
Login	Verifikasi *Login*	*Black-Box*	succes
Pengolahan User	Pengolahan Data User	*Black-Box*	success
Pengolahan Kriteria	Pengolahan Data Kriteria	*Black-Box*	succes
Calon Cabang Baru	Lihat Ruko yang direkomendasikan dari hasil perhitungan metode Wp (*Weighted Product*) berupa alternatif terbaik yang ditampilkan	*Black-Box*	succes

CLOSE

Based on research that has been done can be concluded that the geographic information system to determine the new branch can help the owner or owner in providing information shop is located in the opening of new branches in Hockey Dim Sum

DAFTAR PUSTAKA

[1] Edy Irwansyah. 2013. *Sistem Informasi Geografis.* Yogyakarta: Digibooks.
[2] Bramantiyo Marjuki. 2014. *Sistem Informasi Geografis.*
[3] Eddy Prahasta. 2001. *Konsep-Konsep Dasar Sistem Informasi Geografis.* Bandung: CV Informatika Bandung.
[4] Drs Indiarto. 2013. *Sistem Informasi Geografis.* Yogyakarta: Graha Ilmu Yogyakarta.
[5] Eko Budiyanto. 2002. *Sistem Informasi Geografis Menggunakan Arcview.* Yogyakarta: Andi Yogyakarta
[6] Kusrini. 2007. *Konsep dan Aplikasi Sistem Pendukung Keputusan.* Yogyakarta: Andi.
[7] Suratmadja, Nursid. 2002. *Suatu Pendekatan dan Analisis Keruangan.* Bandung: Alumni.
[8] Philip Kotler. 2000. *Manajemen Pemasaran Jilid 1* . Jakarta: Prenhallino.
[9] Kusumadewi, Sri Hartati, Harjoko Agus, Retantyo, 2006. *Fuzzy Multi-Attribute Decision Making (Fuzzy Madma).* Yogyakaryta: Graha Ilmu.