Clustering of Customer Complaints from PDAM Kota Binjai Using the K-Means Method

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Abstract

PDAM Tirtasari Binjai City is a public service institution that has a monopoly on water supply in Binjai City. The predicate as a metropolitan city, illustrates that Binjai City is a city with dense industry and trade. In this study, discusses how to handle customer complaints of PDAM Binjai City to provide satisfaction to customers. The research method used in this study is K-Means which aims to describe the quality of service for handling customer complaints at PDAM Kota Binjai in increasing customer satisfaction. The informant determination technique carried out by the researcher is using the Clustering K-Means method.

Keywords: Data_Mining, K-Means Clustering, Customer Complaints.

INTRODUCTION

PDAM is a regional company as a means of providing clean water which is broadcast and monitored by the executive and regional legislatures. The modern managed drinking water company has existed since the Dutch colonial era in the 1920s under the name Waterleiding (water slide) while the Japanese occupation was called Suido Syo.

Based on data from the Binjai City PDAM from 2018-2020, it can ensure that the types of complaints in the Binjai area vary, the results are various kinds of complaints, both in terms of complaint factors and types of customers.With the PDAM in charge of serving facilities and infrastructure cases in Binjai City, the method of grouping data like this is with data mining. In data grouping research conducted using the Clustering K-Means method, a data mining technology design is needed to maximize the performance of PDAM Binjai City to find out various types of complaints that exist in the community in Binjai City.

RESEARCH METHODS

Based on research conducted by Diky Randyka Kurniawan, Budi Susetyo, Erwin Hermawan (2019) discussing the spatial analysis of K-Means Clustering the distribution of customer complaints of PDAM Tirta Pakuan based on WebGIS. From this research, the researcher conducts research with appropriate data so that it will produce what is needed by the user. Where all can identify problems with the K-Means method so that the research has conclusions that can help and provide valid results that are examined by the author.

Data mining according to Turban, et al (2005, p. 3) is a term used to describe the discovery of knowledge in the database. Data mining is a process that uses statistical, mathematical, artificial intelligence, and machine learning techniques to extract and identify useful information and related knowledge from large databases.

According to Larose (2005), data mining is an analysis of reviewing data sets to find unexpected relationships and summarizing data in a different way than before, which is understandable and useful for data owners. Data mining is related to other fields of science, such as database systems, data warehousing, statistics, machine learning, information retrieval, and high-

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level computing. In addition, data mining is supported by science such as neural networks, pattern recognition, spatial and analysis, image databases, signal processing.

- 1. Data mining as a process in knowledge discovery in data (KDD) The processes in KDD are:
- 1) Data selection

Selection (selection) of data from a set of operational data needs to be done before the stage of extracting information in KDD begins. Selected data used for the data mining process is stored in a file, separate from the operational database.

2) . Pre-processing / cleaning

Before the data mining process can be carried out, it is necessary to carry out a cleaning process on the data that is the focus of KDD. The cleaning process includes, among others, removing duplicate data, checking for inconsistent data, and correcting errors in data.

3) Transformation

Coding is a transformation process on the data that has been selected, so that the data is suitable for the data mining process. The coding process in KDD is a creative process and is highly dependent on the type or pattern of information to be searched in the database.

4) Data mining

Data mining is the process of looking for interesting patterns or information in selected data using certain techniques or methods. Techniques, methods, or algorithms in data mining vary widely. The selection of the right method or algorithm is highly dependent on the overall objectives and process of KDD.

5) Interpretation / evaluation

The pattern of information generated from the data mining process needs to be displayed in a form that is easily understood by interested parties. This stage is part of the KDD process called interpretation. This stage includes checking whether the pattern or information found contradicts pre-existing facts or hypotheses. (Fayyad, 1996).



Figure 1 Knowledge Discovery in Data (KDD)

2. Understanding the Clustering Method

According to Widodo (2013:9) "Clustering or classification is a method used to divide data sets into several groups based on previously determined similarities".

The purpose of this data clustering is to minimize the objective function set in the clustering process, which generally tries to minimize variations within a cluster. And minimize the variation between clusters. Broadly speaking, there are several methods of data classification. The choice of clustering

method depends on the type of data and the purpose of the clustering itself.

RESULTS AND DISCUSSION

After making observations the author will identify problems that are pleasing to the customer complaints of PDAM Binjai City, in this case the author tries to provide solutions to the problems found in PDAM Tirtasari Binjai City. and evaluate problems. Obstacles that occur and the expected needs so that obstacles can be repaired quickly and efficiently.

1. Display Login Menu

In the login menu display, the function is to call the initial display containing the main form, namely Username and Password, then the results of the display will be as below:

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	Clustering Keluhan Pelanggan PDAM Kota Binjai Menggunakan Metode K-Means Userrame	B ₁	22	☆		*	***
	Sign In						

Figure 3 Display Login Menu

2. Home Menu Display

This view contains the buttons used in the system process, the determination of the centroid, and the clustering process. The menu contains menus, namely Main Menu, Home, Data (Customer Complaints, Complaint Type, Customer Group, District), Centroid, Results, Cluster.



Figure 4 Display Menu Home

3. Home Menu Display

The Customer Complaint Type display contains No, Complaint ID, Customer Name, District, Complaint Type, Customer Group, Action.

O (i) localhost/pdam/a	dmin/c_keluhan						순 ☆ 🔲 🛓
2 Torna Banti Alimita Banti Alimita Banti	=						≛ Admin
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ата	1.0	Tambak				C Deload Tel	
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al Jenis Keluhan	Show	10 v entries				Search:	
🗍 Golongan Pelanggan	No	ID Keluhan	Nama Pelanggan	Kecamatan	Jenis Keluhan	Golongan Pelanggan	Aksi
	1		A	Binjai Selatan	Air Mati	Industri Kecil	0
W Recarious	2		B	Binjai Kota	Air Mati	Sosial	0
Centroid	3	3	с	Binjai Timur	Air Mati	Industri Kecil	Û
	4	4	D	Binjai Utara	Air Mati	Industri Kecil	10
T Charler	5	8	Е	Binjai Barat	Air Mati	Industri Kecil	0
	ő	ŵ.	¥	Binjai Timur	Pipa Bocor	Industri Besar	Û
	7		G	Binjai Utara	Pipa Bocor	Industri Kecil	10

Figure 5 Display of Customer Complaint Data

4. Display of Customer Complaint Type

The Customer Complaint Type display contains No, Complaint Type ID, Complaint Type, Customer Complaint Type Points, Action.

	=				≗ Admir
	Jenis K	eluhan			Data > Jenis Keluhan
	•]	Tambah			C Reload Table
	Show 10	✓ entries			Search:
Golongan Pelanggan	No	ID Jenis Keluhan	Jenis Keluhan	Poin Jenis Keluhan	≑ Aksi
	1		Air Mati	1	Û
	2	2	Pipa Bocor	2	
	3	3	Air Kecil	3	
	4	4	Pipa Patah	4	
	5	5	Stup Keran Dol	5	Ü
Cluster					

Figure 6 Display Types of Complaints

5. Display of Customer Class

In the Customer Group Type display contains No, Complaint Type ID, Customer Class, Complaint Type Points, Action.

🔹 PDAM Tirtasari - Kota Binjai 🛛 🗙 🛛	+	Reasonable II	the state in the local division in the local		
 → C ③ localhost/pdam/ac 	dmin/c_golongan_pe	anggan			🖻 🕁 🔲 🥑
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Keluhan Pelanggan	•	ramban		8	Reload Table
🔏 Jenis Keluhan	Show 1	0 v entries		Search:	
🗍 Golongan Pelanggan	No	ID Golongan Pelanggan	💠 🛛 Golongan Pelanggan	🔶 🛛 Poin Golongan	Aksi
A Kecamatan	1	1	Sosial	1	Û
·	2	2	Non Niaga	2	ŵ
2 Centroid	3	3	Niaga	3	Û
	4	4	Industri Besar	4	ů.
† Chueter	5	5	Industri Kecil	5	ŵ
y oldatel	6	б	Instansi	б	ŵ
	Showing	1 to 6 of 6 entries			Previous 1 Next
					11.10

Figure 7 Display of Customer Class

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6. Display District Menu

In the District menu display contains No, ID Type of Complaint, District, Points Type of Complaint, Action

	=				≛ Admir
	Kecama	atan			Data > Kecamatan
	•]	Tambah			C Reload Table
	Show 10	✓ entries			Search:
longan Pelanggan	No	ID Kecamatan	Kecamatan	Poin Kecamatan	Aksi
camatan	1		Binjai Utara	1	Û
	2	2	Binjai Selatan	2	Û
	3	3	Binjai Timur	3	Û
	4	4	Binjai Kota	4	Û
ster	5	5	Binjai Barat	5	Û
	Showing 1	to 5 of 5 entries			Previous 1 Next

Figure 8 Display District Menu

7. Centroid Menu Display

This Centroid menu displays data such as C11, C12, C13, C21, C22, C23, C31, C32, C33.

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\leftrightarrow \rightarrow C (i) localhost/pdam/admin/c_	centroid							ie 🖈 🗖 🍕	8 E
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👸 Jenis Keluhan	Show 10 v entries						Search:		
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I Kecamatan	2.81818 2.54545	5.09091	3.66667	2.5	1.16667	1	4.33333	2.33333	
₽ Centroid	Showing 1 to 1 of 1 entries						Previou	s 1 Next	
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🚳 🛅 🌢 🖾 🚾	0 9 0		6.5		(No. 1		A/C •	N ∰ ant €0 11:5 8/22	11 AM 2/2022

Figure 9 Display of the Centroid Menu

8. Cluster Menu Display

In the Customer Group Type display contains No, Complaint ID, Customer Name, District, Complaint Type, Customer Group, Cluster

🔹 PDAM Tirtasari - Kota Binjai 🛛 🗙 🗖	Ed Sheeran - Shap	e of You E 🔹 🗙 🚺	+	And in case of the local division of the loc	a second	_	
← → C ③ localhost/pdam/admin	v/c_cluster						순 ☆ 팩 🗖 🚨
Dam Tirta Sari Kota Engaj	=						≗ Admin
MAIN MENU & Beranda	CLUST	ER				Da	ta 🗦 Cluster Keluhan
DATA 器 Keluhan Pelanggan	-1	Grafik					
👸 Jenis Keluhan	Show 1	0 v entries				Search:	
🗍 Golongan Pelanggan	No	ID Keluhan	Nama Pelanggan	Kecamatan	Jenis Keluhan	Golongan Pelanggan	Cluster
A Kacamatan	1	1	A	Binjai Selatan	Air Mati	Industri Kecil	1
	2	2	В	Binjai Kota	Air Mati	Sosial	2
₽ Centroid	3	3	С	Binjai Timur	Air Mati	Industri Kecil	1
HASIL	4	4	D	Binjai Utara	Air Mati	Industri Kecil	1
번 Cluster	5	5	E	Binjai Barat	Air Mati	Industri Kecil	1
	6	6	F	Binjai Timur	Pipa Bocor	Industri Besar	1
	7	7	G	Binjai Utara	Pipa Bocor	Industri Kecil	1
	8	8	н	Binjai Barat	Pipa Bocor	Industri Kecil	1

Figure 10 Display Cluster Menu

Implementasi

This section describes the results of the data mining calculation trials in programming the K-Means algorithm using PHP that has been created. This trial aims to determine whether the system created can run well and in accordance with the system design that has been discussed in the previous chapter.

In the manual trial, this program uses a program that has been made, each feature or menu in the program is explained one by one in full:

1. The initial stage the user is asked to turn on the start button (apache and mysql) on the XAMPP Control Panel as below:

20													
	XAM	PP Contro	Panel v3	.3.0				Gardia					
Service	Module	PID(s)	Port(s)	Actions				e Netstal					
	Apache	3520 3560	89, 443	Step.	Admin	Canfig	Loga	Stal					
	MySQL	3188	3306	Step	Admin	Contig	Logs	Explorer					
	Fieldin			Slart	Admit	Canifig	Loga	E Services					
	Mercury			Start	Admin	Config	Logs	Q Help					
	Tomoat			Start	Admin	Config	Logs	540					
140,47 A 140,47 A 140,47 A 140,47 A 140,47 A 140,47 A 140,47 A 140,47 A 140,47 A 140,47 A 140,50 A 140,50 A 140,52 A 540,52 A	dal (man) dal (man)	there will be about rutinis XAMPP Ins Checking for Checking for Statting Ch Statting Ch Statting Ch Status char Attempting Status char Status char	a security dia og this application atlattere Director ir prerequisites sites found reduies eck-Timer rel Ready to start Apach oge detected: r in start MySQI oge detected: r	logue or thi tion with add ory "d twan e app unning L app unning	nga will br ministrator ippl"	eakt So thin rights!	k						

Figure 11 Early Stage

2. The second stage the user is asked to enter a user name and password to enter the system, as shown below:

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← → C (@ localbost/pdam/auth		¥i £i A 🖬 👗 I
	Clustering Keluhan Pelanggan POAM Kota Binjal Menggunakan Mendak K-Menin	
	Panelan	
	Sign in	
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Figure 12 Second Stage

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3. The third stage after logging in, the main menu will appear which will display other menus on the system as below:



4. The first fourth step is to add participants for customer complaint data by clicking on customer complaints:

· · · · · · · · · · · · · · · · · · ·	antine to Kession						ш н ц 🗕
Series Bahi	=						≛ Admin
	Kelub	an Delanoran				Data > Ke	utuan Dalamanan
	Refut	an r ciunggun				Landa y He	and the consequences of the second
	1.0						
88 Keluhan Pelanggan	1.1	ramoan				Heroad Tabl	2
🗃 Jenis Keluhan	Show	10 v entries				Search	
	No	ID Keluban	Nama Pelanggan	Kecamatan	Jenis Keluhan	Golongan Pelanggan	Aksi
M Kecamatan	1		A	Binjai Selatan	Air Mati	Industri Kecil	0
	2		В	Binjai Kota	Air Mati	Sosial	8
Centroid	3	3)	С	Binjai Timur	Air Mati	Industri Kecil	-
	4	4	D	Binjai Utara	Air Mati	Industri Kecil	
	5	5	E	Binjai Barat	Air Mati	Industri Kecil	
non. Di choster				Biniai Timur	Pipa Bocor	Industri Besar	
	6	6	P.	and an entrat			
	6	6	G	Binjai Utara	Pipa Bocor	Industri Kecil	0

Figure 14 Fourth Stage

y C (@ incandad plaining administ	Kelunan						еги ц
State Sala	=						≛ Admin
AAIN MENU & Beranda	Keluha	an Pelanggan				Data > Ke	luhan Pelanggan
IATA	1.1	Tambah				Beload Tabl	
🔐 Keluhan Pelanggan	-						
🚮 Jenis Keluhan	Show 1	10 v entries				Search:	
🗇 Golongan Pelanggan	No	ID Keluhan	Nama Pelanggan	Kecamatan	Jenis Keluhan	Golongan Pelanggan	Aksi
O Versenates	1	-	A	Binjai Selatan	Air Mati	Industri Kecil	0
C Passannadar	2	2	В	Binjai Kota	Air Mati	Sosial	
2 Centroid	3	R(C	Binjal Timur	Air Mati	Industri Kecil	0
ASIL	4	- 6	D	Binjai Utara	Air Mati	Industri Kecil	10
C ritester	5	5	E	Binjai Barat	Air Mati	industri Kecil	8
	6	6	F	Binjai Timur	Pipa Bocor	Industri Besar	
	7		G	Binjai Utara	Pipa Bocor	Industri Kecil	10

After clicking, the following menu will appear:

Figure 15 Stages of Entering the Customer Complaints Participants Menu

To add participants, click the Add button, a display like this will appear:

→ C ③ localhost/pdam/a	dmin/c_keluhan					ie 🖈 🛛 😩
	=	Tambah Keluhan		×		≛ Adm
		ID keluhan				
	Keluhan P	e			Data 3 Ke	uhan Pelanggan
		Nama Pelanggan				
Keluhan Pelanggan	+ 10	A			C Reload Tab	9
	Show) 10	Kecamatan			Search	
	No	Binjai Utara	*	uhan	Golongan Pelanggan	Aksi
		Jenis Keluhan			Industri Kecil	8
	2 7	Air Mati	*		Sosiel	
	a (a	Golongan Pelanggan			Industri Kecil	Ċ.
	4 4	Sosial	*		Industri Kecil	8
	5 5				Industri Kecil	a
	6 6		Simpen	Kembali	Industri Besar	12
	7 7	6	Binjai Utora	Pipa Bocor	Industri Kecil	Û
	and the second sec	н	Biniar Barat			

Figure 16 Stages of Adding Participant Menu

If you have filled in every data, if you want to save then click save if not then click again.

5. The fifth step is to click on the Complaint Type menu on the previous main menu and a display like this will appear:

🔹 PDAM Tirtasari - Kota Binjai 🛛 🗙 💽	,	-	and the Party of the local		
- > C () localhost/pdam/admin	/c_jenis_keluhan				ප් 🖬 🚨 😩
DIRTA SARI Eta MOU	=				≛ Admin
MAIN MENU & Beranda	Jenis Ke	luhan			Data > Jenis Keluhan
IATA	•	ambah		o	Reload Table
🗿 Jenis Keluhan	Show 10	✓ entries		Sei	rch:
📋 Golongan Pelanggan	No	0 ID Jenis Keluhan	0 Jenis Keluhan	0 Poin Jenis Keluhan	0 Aksi
Keramatan	1		Air Mati	1	0
	2		Pipa Bocor	2	0
Centroid	3	3	Air Kecil	3	0
ASIL	4	4	Pipa Patah	4	0
Chaster	5	5	Stup Keran Dol	5	0
	Showing 11	o 5 of 5 entries			Previous 1 Next

Figure 17 Fifth Stage

After clicking, the following menu will appear:

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	=				≛ Admin
	Jenis K	eluhan			Data > Jenis Keluhan
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		Tamban		5	Heloso Table
Jenis Keluhan	Show 10	 entries 		Sea	rch:
] Golongan Pelanggan	No	0 ID Jenis Keluhan	0 Jenis Keluhan	0 Poin Jenis Keluhan	0 Aksi
Kecamatan	1		Air Mati	1	0
	2		Pipa Bocor	2	0
Centroid	3	3	Air Kecil	3	0
ISIL	4	4	Pipa Patah	4	0
Cluster	5		Stup Keran Dol	5	0
	Showing 1	to 5 of 5 entries			Previous 1 Next

Figure 18 Steps for Entering the Participants Menu Type of Complaint

To add participants, click the Add button, a display like this will appear:

ID Jenis Keluhan	
5	
Jenis Keluhan	
pipa bocor	
Poin Jenis Keluhan	
5	

Figure 19 Steps to Add Participant Menu

If you have filled in every data, if you want to save then click save if not then click again.

6. In the sixth stage, click on the Customer Group menu on the previous main menu and a display like this will appear:

	=				± Admin
	Golonge	an Pelanggan		Data	a 💈 Golongan Pelanggan
		Tarroah		0 . Re	foad Table
35 Keluhan Pelenggan	Show 10	v entries		Search	
20 Joras Katuban		ID Golomous Pelanosan	Golongan Pelanggan	Poin Golongan	Aksi
	No	in an order of the state of the			
🗋 Golongan Pelanggan	1	61	Sosial	<u></u>	±
🗋 Golongan Pelanggan 🤤 Koclematian	1 2	1	Sosial Non Naga	1	0 0
 Golongan Pelanggan Kecamatan Centrad 	1 2 3	1	Sostal Non Naga Naga	1 2 3	10 10 10
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Colongen Petinggen Costored Costo	1 2 3 4 5	1 2 3 4 3	Sovial Neon Narga Narga Industri Besar Industri Kecil	1 2 3 4 5	0 0 0 0
 Golorgan Pelangan Kostmatan Costosid Addi. Cluster 	1 2 3 4 5 6	1 2 3 4 3 6	Sound Non Ninga Ninga Industri Besar Industri Kecil Industri Kecil	1 2 3 4 5 0	0 0 0 0 0

Figure 20 Sixth Stage

After clicking, the following menu will appear:

10 - Contra	- John Hitt C.gr	and a Greek	- and a second se				
Series and		-1-1				≛ Admin	
8 Beranda		Golong	an Pelanggan		Data	> Golongan Pelanggan	
			Taskab			and Table	
😫 Keluhan Pelanggan			Tensual				
		Show 10	✓ entries		Search:		
🗍 Golongan Pelanggan		No	ID Golongan Pelanggan	Golongan Pelanggan	0 Poin Golongan	i Aksi	
🕀 Kecamatan		1		Sosial	1	0	
3		2	2	Non Niaga	2	0	
Centroid		3	0	Niaga	3		
		4	4	Industri Besar	4	10	
		5	5	Industri Kecil	5		
D cluster		6	6	Instansi	6	10	
						and a second	



To add participants, click the Add button, a display like this will appear:

ID Golongan Pelanggan	
Golongan	
industri	
Poin Golongan	
5	

Figure 22 Steps to Add Participant Menu

If you have filled in every data, if you want to save then click save if not then click back.

7. In the seventh stage, click on the District menu on the previous main menu and a display like this will appear:

PDAM Tirtasari - Kota Binjai 🛛 🗙 🤇				
→ C ③ localhost/pdam/adm	in/c_kecamatan			ප 🖈 🗖 🚢
	=			≛ Admin
	Kecamatan			Data > Kecamatan
	+ Tambah		ø	Reload Table
	Show 10 v entries		Sea	rch:
Golongan Pelanggan	No 0 ID Kecamatan	Kecamatan	0 Poin Kecamatan	0 Aksi
Kecamatan	1 1	Binjai Utara	1	Û
	2 2	Binjai Selatan	2	Û
	3 3	Binjai Timur	3	ΰ.
	4 4	Binjai Kota	4	0
Cluster	5 5	Binjai Barat	5	ΰ.
	Showing 1 to 5 of 5 entries			Previous 1 Next

Figure 23 Seventh Stage

	=				≛ Admin
	Kecama	tan			Data > Kecamatan
ra Keluhan Pelanggan	•	Tambah			Reload Table
	Show 10	← entries		s	earch:
Golongan Pelanggan	No	0 ID Kecamatan	Kecamatan	0 Poin Kecamatan	Aksi
Kecamatan	1		Binjal Utara	1	
	2	2	Binjai Selatan	2	Ú
		3	Binjal Timur	3	
	4	4	Binjai Kota	4	ΰ.
Cluster	5	5	Binjai Barat	5	Û
	Showing 1	to 5 of 5 entries			Previous 1 Next

After clicking, a menu will appear as shown below:

Figure 24 Stages of Entering the District Menu

To add participants, click the Add button, a display like this will appear:

Tambah Kecamatan	×
ID Kecamatan	
Kecamatan	
binjai kota Poin Kecamatan	
4	
	Simpan Kembali

Figure 25 Stages of Adding Participant Menu

If you have filled in every data, if you want to save then click save if not then click again.8. The eighth stage click on the Centroid menu on the previous main menu then a display like

=								
								≛ Admin
Centroid							Dat	a > Data Centroid
+ Set i	Centroid		~	Proses Cluste	ring		Reload Ta	able
Show 10 v	· entries						Search:	
C11	C 1 2	C 1 3	C 2 1	C 2 2	C 2 3	C 3 1	C 3 2	C 3 3
2.81818	2.54545	5.09091	3.66667	2.5	1.16667	1	4.33333	2.33333
Showing 1 to 1	of 1 entries						Previous	I Next
	Centroid +	Centroid sectors Show 10 w entries c11 c12 2.1118 2.54545 Showing 1 to 1 of 1 entries	Centroid	Centroid	Centroid	Store 10 etclastrop Store 10 etclastrop 2011 612 613 621 622 623 2013 2.013 6.201 2.6667 2.5 1.1667 Strove 10 etclastrop 1.1667 1.1667	Store 10 ether 211 C12 C13 C21 C22 C23 C31 211111 2.4543 5.00001 3.6667 2.5 1.16667 1 Stream 10 0.1 0.6667 2.5 1.16667 1	Centroid Protect Custom 0 model ************************************

Figure 26 Eighth Stage

To set the Centroid click the Centroid button it will appear like this:

Set Centroid		×
C 1 1	C 1 2	C 1 3
2.81818	2.54545	5.09091
C 2 1	C 2 2	C 2 3
3.66667	2.5	1.16667
C 3 1	C 3 2	C 3 3
1	4.33333	2.33333
c	Random Centroid	Simpan Batal

Figure 27 Steps to Add Set-Centroid Menu

To add a centroid, click set-Centroid, the Centroid is automatically filled and then save, after the Centroid is set, click the Cluster process to process the Cluster, wait a few minutes until the process is complete.

9. The ninth stage after the Cluster process on the Centroid menu, enter the Cluster menu to see the results of the Cluster and its groups as shown:

	=						≛ Admin
	CLUS	TER				Data	> Cluster Keluhan
		-					
		Orafix					
	show	10 ~ entries				Search:	
	No	ID Keluhan	Nama Pelanggan	Kecamatan	Jenis Keluhan	Golongan Pelanggan	Cluster
D Kecamatan	1	1	A	Binjai Selatan	Air Mati	Industri Kecil	,
	2	2	в	Binjai Kota	Air Mati	Sosial	2
Centroid Centroid	з	3	c	Binjai Timur	Air Mati	Industri Kecil	1
	4	.4	D	Binjai Uhara	Air Mati	Industri Kecil	1
Charles and the second s	5	8	E	Binjal Barat	Air Mati	industri Kecil	1
	6	6	E	Binjai Timur	Pipa Bocor	industri Besar	1
	7	7	G	Binjai Utara	Pipa Bocor	Industri Kecil	2

Figure 27 The Ninth Stage

To add a graph click the graph on the Cluster it will appear below:



Figure 28 Graph Results

After all the processes are complete, you can see the output or results of each customer complaint, type:

complaints, customer groups, and districts used in the statistical form will appear image as below:

							± Admir
	-	Grafik					
	Show	10 v entries				Search:	
	No	ID Keluhan	Nama Pelanggan	Kecamatan	Jenis Keluhan	Golongan Pelanggan	Cluster
Keluhan Pelanggan	1	3	A	Binjai Selatan	Air Mati	industri Kecil	¥.
	2	2	8	Binjai Kota	Air Mati	Sosial	2
Series Renarian	3	з	c	Binjal Timur	Air Mati	industri Kecil	1
	4	4	D	Binjai Utara	Air Mati	Industri Kecil	1
	5	5	E	Binjai Barat	Air Mati	Industri Kecil	1
	0	0	<i>e</i>	Binjal Timur	Pipe Bocor	Industri Besar	3.
	7	7	G	Binjai Utara	Pipe Bocor	Industri Kecil	1
SIR.	6	8	н	Binjai Barat	Pipa Bocor	Industri Kecil	1
	0	0	T.	Binjal Kota	Pipa Bocor	Sosial	2
	10	10	3	Riniai Timur	Stup Keron Dol	Industri Koril	

Figure 29 Program Output Results

CONCLUSION

It can be tested using the Clustering Method with the K-Means algorithm, it can be seen groups of Complaint Types, Customer Types, Districts from the Binjai City area. From the tests carried out using the Clustering method with the K-Means algorithm, it can be seen that the customer complaints of PDAM Binjai City have a Customer Complaints group, 9Types of Customers, and Districts. In the program can help users in classifying customer complaints PDAM Kota Binjai. The results of the data that have been described previously that for Centroid 1 It can be seen that in Cluster 1 in group 1, namely South Binjai District, with the type of complaint Air Kecil, with the type of customer, namely small industries (Coffee Shop, Nasi Warung, Kedai), can it is known that in cluster 2 in group 2, namely East Binjai, with the type of complaint Leaking Pipe, with the type of customer namely Social (Orphanage Homes, Nursing Homes, Rehabilitation, Places of Worship), it can be seen that in Cluster 3 in group 3, namely East Binjai , with the type of complaint Air Kecil Homes, Nursing Homes, Rehabilitation, Places of Worship).

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