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MAPPING POVERTY CHARACTERISTICS IN LAMPUNG PROVINCE USING BIPLOT ANALYSIS

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Abstract

Poverty is a condition of inability to meet minimum basic needs such as food, clothing, health, housing and education. This study aimed to determine the mapping of poverty characteristics in Lampung Province using Biplot Analysis. The research data used in this study is secondary data, namely data on district/city poverty characteristics in Lampung Province in 2021 which are sourced from the published BPS Lampung. From the results of the analysis it was found that districts/cities in Lampung Province have similar characteristics which are divided into four parts, namely Quadrant I North Lampung, Mesuji and West Lampung Regencies have similar characteristics of poverty in illiteracy rate (X2), highest diploma owned (X4) and The population is sick and not receiving treatment (X5), Quadrant II South Lampung, East Lampung, Pringsewu, West Tulang Bawang and Metro City forms its group which means it has no resemblance to any variable because the object is opposite the direction of the variable vector, Quadrant III District Central Lampung, Pesawaran and Bandar Lampung City have a high correlation for women who do not use family planning devices (X6) and building ownership status (X7). X1), Not attending school anymore (X3), Floor area per capita (X8), and Facilities high defecation capacity (X10). Meanwhile, the characteristics of the sick and unmedicated population (X5) and the type of building materials (X9) had a higher diversity than the other variables. These two characteristics vary relatively in 13 regencies and 2 cities in Lampung Province.

Keywords: *Poverty, Biplot Analysis, Lampung Province*

INTRODUCTION

Based on data from the Central Bureau of Statistics (BPS) Indonesia, Indonesia's population in 2020 is 270,020,000 people with a population growth rate of 1.25 percent per year (Central Bureau of Statistics Lampung, 2020). With this population density, Indonesia is one of the world's developing countries, ranking fourth highest after China, India, and America. Based on these conditions, there is a need for joint responsibility for the central government and local governments in the welfare of their people, which with the increase in population must be balanced with the expansion of employment and education, so that community productivity will be stable. Because if it is not balanced with decent jobs and education, then the population's productivity will be low. If the income of the population is low, the population will experience difficulties in meeting basic needs, both food and non-food needs, this is the cause of poverty problems in Indonesia.

According to data from Indonesia's Central Statistics Agency (BPS), Indonesia has 37 provinces. Each province has different resources. This leads to income inequality and uneven distribution in each region. Because of this inequality, each province experiences different poverty problems. Of the 34 provinces, Lampung Province is one of the provinces whose poverty rate increased in 2020.

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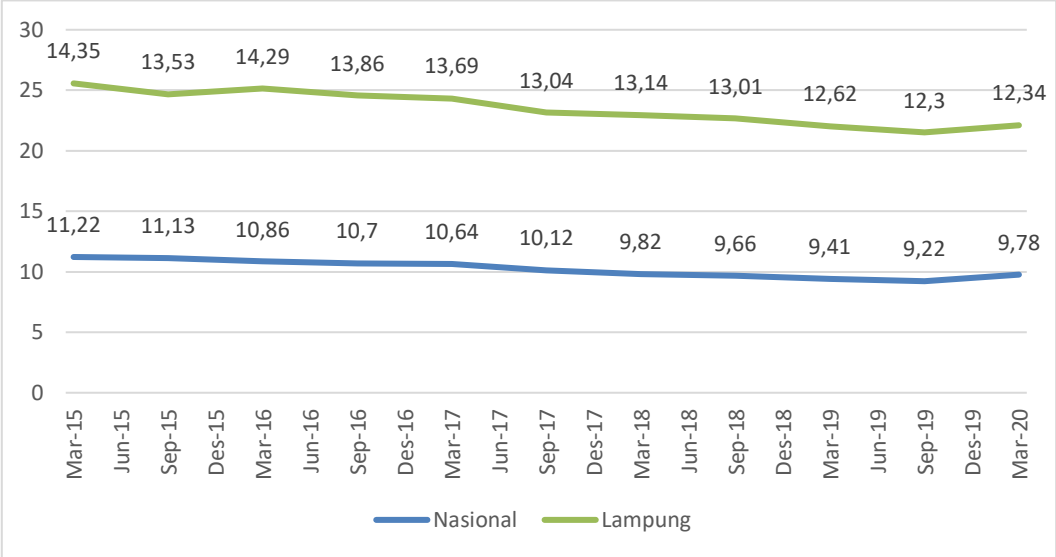
Lampung is a province in the south of Sumatra Island, Indonesia. This province has 13 regencies and 2 cities, namely West Lampung Regency, Tanggamus Regency, South Lampung Regency, East Lampung Regency, Central Lampung Regency, North Lampung Regency, Way Kanan Regency, Tulang Bawang Regency, Pesawaran Regency, Pringsewu Regency, Mesuji Regency, West Tulang Bawang Regency, West Coast Regency, Metro City and Bandar Lampung City which is also the center of government of Lampung Province. The following is the trend of the percentage of poor people in Lampung Province, March 2015 – March 2020:



Source : National Socioeconomic Survey

Graph 1. 1 Trends of the Poor in Lampung Province, March 2015-March 2020

Lampung Province is also the main gateway or primary traffic of economic activities between Java Island and Sumatra Island through Bakauheni Port and Panjang Port, or Radin Inten II Airport as the main airport in Lampung Province. Apart from being the main gate of Sumatra Island, Lampung is also a maritime area surrounded by vast sea waters. So that most people work as fishermen, fishery activists and farming. People living in coastal areas focus on fishery commodities such as shrimp ponds and other aquaculture such as marine, brackish and freshwater aquaculture. While people who live far from coastal areas, most people grow crops or gardening, such as planting rice, corn, coffee, pepper, cloves, oil palm, rubber and others. In other words, Lampung Province has abundant natural resource potential, which means it is natural that the people are prosperous.

However, based on data from the Central Statistics Agency, Lampung experienced an increase in the number of poor people reaching 1,050,000 people (12.34 percent), an increase of 784,000 people compared to 2019 conditions of 1,040,000 people (12.30 percent).

The commodity that contributes significantly to poverty is the food commodity, compared to other commodities. One of the causes of the increase in poverty in 2020 was the increase in prices of several essential commodities. Meanwhile, non-food commodities contributing significantly to the poverty line are housing, electricity, gasoline, education and others (Central Bureau of Statistics Lampung, 2020). Several factors that are thought to affect the poverty rate and the development of the gini ratio during the period September 2019 – March 2020 include:

1) The general inflation that occurred between September 2019 – March 2020 was 1.42 percent.

2) In the period September 2019 – March 2020, the growth rate of several food commodity prices was quite volatile. The price of rice commodities had increased by 1.30 percent from Rp. 11,070 (September 2019) to Rp. 11,213 (March 2020). In March 2020, the price of granulated sugar commodities increased significantly, namely by 25.94 percent from Rp. 12,593,- (September 2019) to Rp. 15,859,- (March 2020). Likewise, purebred chicken eggs increased by 9.53 percent from Rp. 21,543 (September 2019) to Rp. 23,596 per kilogram (March 2020). The shallots' price experienced a high increase of 100.39 percent from Rp. 23,884 (September 2019) to Rp. 47,862 (March 2020).
3) In general, Lampung's economic development is not very good, in the first quarter of 2020 the economy grew by 1.73 percent, where the most significant contribution to economic growth came from other service groups by 0.62 percent, and construction groups by 0.40 percent.

Based on the results of the March 2020 Susenas, there was an increase in the average per capita monthly expenditure of the lower class population. Residents' spending on decile 1 (households in the lowest 10% group) increased by 5.35 percent compared to September 2019. The same thing happened to decile 3 (households in the lowest 20-30% group) which increased by 4.23 percent.

According to Kartasasmita, Ginandjar in Nurwati (2008) The factors that cause poverty include low levels of education, low degrees of health, limited employment, and conditions of isolation. In a report issued from the World Bank (2006), five factors are considered to influence the occurrence of poverty: education, type of work, gender, access to essential health services and infrastructure and geographical location. As stated by (Nazara, Suahasil (2007) in Nurwati (2008)).

According to Bappenas (2018) At the concept level, several groups of views identify the causes of poverty, especially in rural areas. Some of the views that cause poverty include political economy views. The group argues that the rise of rural poverty results from a concentration of wealth and power. The process occurs through three levels, namely: a) the global level, the emergence of poverty due to exploitative and unbalanced exchange relations between rich countries and poor countries so that poor countries will remain poor, although still benefit from capital investment; b) at the national level, rural poverty arises as a result of the actions of some interest groups, especially urban interest groups, such as middle-income groups in urban areas who seek to make profits at the expense of the interests of rural residents; and c) at the local level, rural poverty arose as a result of the actions of local elites consisting of landlords, merchants, money releasers (*Money Lenders*), and bureaucrats who continue to consolidate their power and wealth. Then the ecological view group. According to Chambers in Bappenas (2018) The group sees rural poverty as a result of uncontrolled population growth and pressure on resources and the environment. The existence of population pressure causes agricultural business to become narrower. This resulted in real wages falling and the number of unemployed people increasing. Some workforce is forced to migrate to urban areas and marginal neighborhoods. In addition, physical ecologists also see the physical characteristics of poor groups such as malnutrition, unhealthy environmental conditions, inadequate housing, less comfortable environment, and uncertain climatic conditions as causes of rural poverty.

According to Chambers in Ramadan et al., (2020), one dimension of poverty is alienation. The meaning of this dimension is the location factor that causes a person or group of people to become poor. These so-called poor people are generally located in areas far from the centers of economic growth. This is because most welfare facilities are more concentrated in centers of economic growth such as in urban areas or big

cities. People who live in remote areas or are difficult to reach by welfare facilities have a relatively low standard of living so that this condition is the cause of poverty.

Poverty is also caused by lack of capital in a broad sense. According to Sach in Bappenas (2018) states that those who are the poorest of the poor (extreme poor) generally lack one of the six types of capital (human resources, business, infrastructure, natural resources, public institutions, and knowledge) that cause the poor group to fall into the poverty trap.

From various expert opinions, various factors that cause poverty, can be grouped into several factors, namely:

- Factors of natural and environmental conditions, such as increasing environmental damage, uneven distribution of resources, and frequent natural disasters.
- Population factors, namely high population growth that suppresses natural resources and population migration from rural to urban areas.
- Exploitation factors that occur between classes, between groups, between regions, and between countries, including the existence of unbalanced international economic relations between developed and developing countries.
- Institutional and structural factors such as the existence of various inappropriate government policies and tend to ignore rural areas.

The technological factor is one of the most critical factors in encouraging and increasing the productivity of agricultural enterprises, which is also the main livelihood of most rural residents including poor people in developing countries.

These factors are related to each other that form a cycle of poverty. Poor households are generally poorly educated and concentrated in rural areas, because they are poorly educated, so that the rewards to be obtained are not adequate to meet the needs of food, clothing, health, housing, and education. As a result, poor households will produce low-income families in the next generation.

Based on the description above, it can be said that the factors causing poverty are very complex and influence each other, meaning that poverty occurs not caused by one factor alone, but multi-factors. However, the dominant factors influencing the onset of poverty include: education, income, location, limited access to health, finance and other public services (Nurwati, 2008).

Leleury conducted some of the previous studies where this study aims to provide innovations regarding mapping poverty characteristics in Maluku Province using Biplot analysis so that the diversity of poverty characteristics and correlations between poverty characteristic variables in each district / city in Maluku Province can be known so that government programs in alleviating poverty are more targeted. Based on the study's results, it was found that districts / cities in Maluku Province with similar characteristics are divided into 4 groups. Group I is Buru and South Buru Regency, group II is SBB and SBT Regency, group III is Southeast Maluku Regency, Aru Islands, MTB and MBD, while group IV is Central Maluku Regency, Tual city and Ambon city. The most dominant poverty characteristic in Maluku Province is the literacy rate. Literacy rates and school enrollment rates influence each other and are positively correlated. While the labor force participation rate is negatively correlated with per capita expenditure.

Other research was conducted by Ramadan et al (2020) In this study, development studies are not only focusing on the factors that cause poverty, but also begin to identify all aspects that can make poverty. This study was conducted to determine the mapping of poverty characteristics in each district/city in Bangka Belitung Islands Province using Biplot Analysis. The results of the analysis show that the districts of Bangka, West Bangka and Central Bangka are in the same quadrant or other words

the three districts have similar characteristics of poverty that are pretty close. Other districts that have similar poverty characteristics are Belitung Regency and Pangkalpinang City. While Bangka, South Bangka and East Belitung are each in different quadrants, the two districts do not have similar poverty characteristics that are close enough to other districts.

Other studies were also conducted by Anuraga (2015) In this study, it was explained that, Biplot Analysis aims to demonstrate a matrix by overlapping vectors that represent the vectors of the matrix column. Biplot is carried out by deciphering the singular value or *Singular Value Decomposition* (SVD). SVD aims to describe the singular value of matrix Y, a matrix X of size n x p that has been corrected with *Mean* and then generated matrix G and H. The results of factor analysis are known that three main factors are formed that represent the variable of origin, namely with a total diversity that can be explained is 71.427%. Biplot results for factor 1 are Jombang, Bangkalan, Blitar, Jember, Tuban, Madiun, Lumajang, Nganjuk, Sumenep, Trenggalek, Sampang, Pamekasan, and Probolinggo districts where the percentage of households that have purchased raskin rice (X3) is relatively high. Tulungagung, Magetan, Lamongan, Pasuruan, Ngawi, Bojonegoro, Situbondo, Ponorogo, Pacitan, Bondowoso districts have relatively high characteristics of the percentage of poor people aged 15 years and over who work in the agricultural sector (X2) and the relatively high percentage of poor households who receive JAMKESMAS services (X15). Biplot results for a combination of factors 2 and 3 can be seen that Sampang, Banyuwangi, Bojonegoro, Pasuruan, Probolinggo, Situbondo, Bondowoso, Jember districts have similar characteristics in terms of the percentage of poor people aged 15 years and over who did not finish elementary school (X5) which is relatively high. Conformity (*goodness of fit*) in Biplot factor 1 of 0.6712 or 67.12%, Biplot of factor 2 and 3 of 0.7935 or 79.35%.

Based on the background description above, the researcher is interested in conducting a research entitled **Poverty Characteristic Mapping in Lampung Province Using Biplot Analysis**. This study aims to determine the mapping of poverty characteristics in Lampung Province using Biplot Analysis.

METHODS

The type of research used in this study is a type of applied research. Applied or *applied research* deals with practical realities, applications, and development of science produced by basic research in real life. Applied research serves to find solutions to specific problems. The primary purpose of applied research is problem solving so that research results can be used for human interests either individually or in groups or for industrial or political purposes and not for scientific insight alone (Sukardi, 2003). In other words, applied research is a type of research whose results can be directly applied to solve the problems faced. This research examines the merits of scientific theories and knowing empirical relationships and analysis in specific fields. The implications of applied research are expressed in general formulations, not recommendations in the form of direct action.

Data Types and Sources

The research data used in this study is secondary data, namely data on the poverty characteristics of districts / cities in Lampung Province in 2021 sourced from BPS Lampung, published. The object of this research is the Regency / City in Lampung Province as follows:

1) West Lampung Regency
2) Tanggamus Regency

3) South Lampung Regency
4) East Lampung Regency
5) Central Lampung Regency
6) North Lampung Regency
7) Way Kanan District
8) Onion Bone District
9) Pesawaran District
10) Pringsewu County
11) Mesuji County
12) West Onion Bone District
13) West Coast District
14) Metro City
15) Bandar Lampung City

Research Variables

The data variables used in this study are as follows:

1) The number of dependent expenses (X1) is the number of dependency expenses by district/city in Lampung Province 2021;
2) The illiteracy rate (X2) is the percentage of people aged 15 years and over who are unable to read and write according to districts/cities in Lampung Province 2021;
3) No longer in school (X3), which is the percentage of male and female residents aged 7-24 years who are no longer in school according to districts/cities in Lampung Province 2021;
4) The highest diploma owned (X4) is the percentage of male and female residents aged 15 years and over and the highest diploma owned is an elementary school diploma by district/city in Lampung Province 2021;
5) Sick and untreated population (X5), which is the percentage of people who are sick but do not seek treatment due to self-medicating according to districts/cities in Lampung Province 2021;
6) Women who do not use birth control tools (X6), namely the percentage of women who have been married aged 15 – 49 years and have never used birth control tools according to districts / cities in Lampung province 2021;
7) Building ownership status (X7), namely the percentage of households and ownership status of occupied residential buildings is contract/lease by district/city in Lampung Province 2021;
8) Floor area per capita (X8), which is the percentage of households per capita floor area ≤ 7 m2 by district/city in Lampung Province 2021;
9) Types of building materials (X9), namely the percentage of households and the primary building materials of the broadest house walls are wood or logs according to districts / cities in Lampung Province 2021; and
10) Defecation facilities (X10) are the percentage of households that do not have defecation facilities according to districts/cities in Lampung Province 2021.

Data Analysis Techniques

The data analysis technique that will be carried out in this study is Biplot analysis with the following contents:

1. Singular *value decomposition*
   - Compile observation data in the form of an $X^{*\,matrix}$;
   - Standardization of Matrix X^* into matrix X with the help of *Minitab Software;*
   - Transpose (rows into columns) matrix X into matrix X';
   - Calculate matrix $X'X$;
   - Calculates the eigenvalue of $X'X$; and chooses the 2 largest eigenvalues;

- Find the matrices *U*, *L*, and *A*;
- The biplot approach can be used to visually present the X data matrix to calculate the biplot feasibility measure of the two largest eigenvalues when the value is large enough (70%).

2. Biplot analysis
   - Compose the G row matrix and the H column matrix;
   - Create a biplot image based on gi row vector and hj column vector where x-axis is the first principal component and y-axis is the second principal component;
   - Interpretation of images.

Research Flowchart

One of the most essential things in conducting research is to create a research design. Research design guides researchers to determine the direction of the research process concisely, precisely, and correctly by the expected goals. The stages of research carried out in this study are as follows:

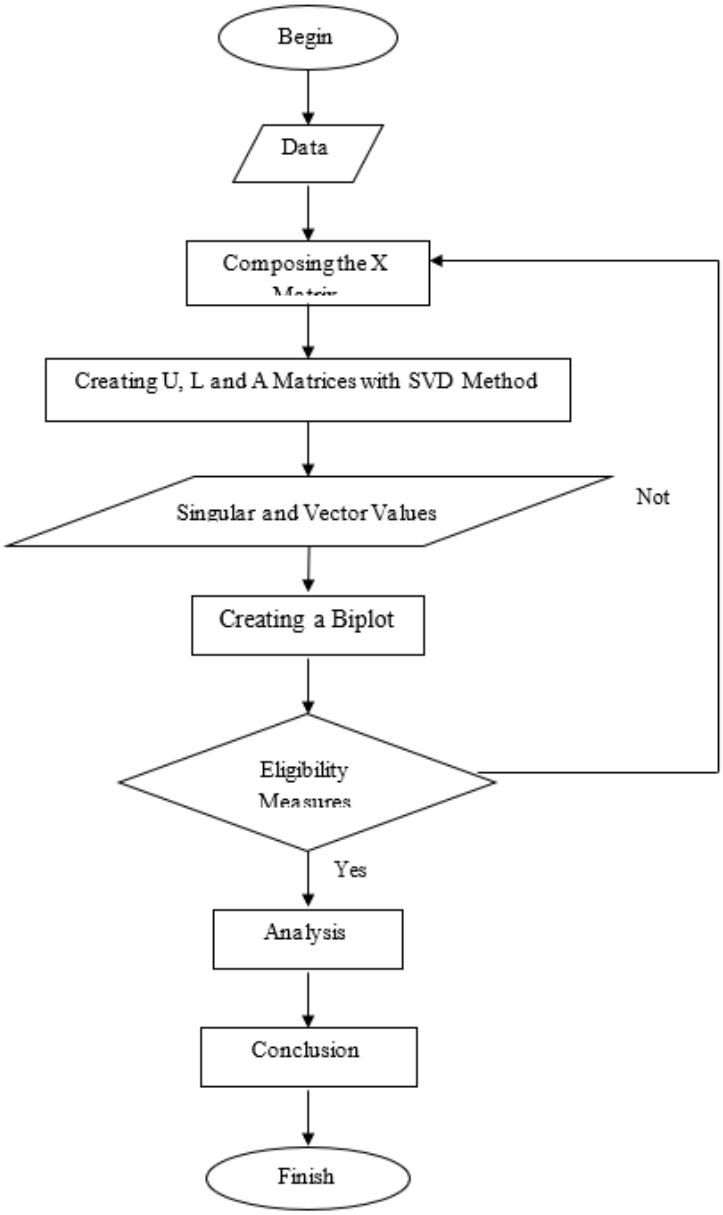


Figure 3. 1 Research Flowchart

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RESULTS AND DISCUSSION

Based on the biplot analysis procedure, results are obtained in the form of a biplot as shown below:

Table 4. 1 *Output Poverty Characteristics Data on SAS Studio software*

No	Province	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
1	West Lampung	45.76	2.42	34.65	32.22	74.78	20.77	2.73	5.01	55.82	8.29
2	Tanggamus	50.06	3.16	33.29	30.56	56.71	28.04	1.73	0.27	28.26	11.17
3	South Lampung	51.14	3.58	27.36	25.91	61.45	30.50	1.86	3.24	4.67	3.42
4	East Lampung	49.54	3.90	28.12	26.38	69.98	27.45	2.09	0.00	7.08	0.00
5	Central Lampung	49.06	3.45	27.71	26.11	45.65	21.14	1.39	1.33	5.97	1.86
6	North Lampung	50.91	1.52	30.47	28.11	66.24	25.41	2.94	0.00	21.49	0.00
7	Right Way	52.02	3.10	31.62	28.19	61.11	27.21	1.03	3.17	31.14	4.55
8	Onion Bones	50.20	1.76	34.44	28.20	53.17	22.19	2.35	3.61	23.37	2.52
9	Offering	50.49	3.02	30.46	27.16	45.09	32.54	2.67	2.71	11.98	7.77
10	Pringsewu	49.98	2.41	26.99	26.72	75.80	22.45	2.11	1.45	3.81	4.83
11	Mesuji	53.90	3.22	27.80	36.13	66.08	19.40	0.59	1.20	30.59	0.52
12	Western onion bones	48.13	5.09	35.12	27.36	71.17	23.07	0.38	0.49	12.97	0.00
13	West Coast	53.58	1.59	31.00	33.90	60.65	26.03	4.79	8.29	37.17	8.38
14	Bandar Lampung	44.26	0.76	23.00	13.80	55.70	39.77	20.40	8.97	5.22	1.27
15	Metro	42.98	0.53	25.20	16.25	64.26	32.31	8.05	0.00	1.97	0.00

Singular values and variance accounted for

Singular Values	Percent	%
63.6160	62.03	62.03

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Singular Values	Percent	%
35.2166	19.01	81.03
27.7996	11.84	92.88
12.8300	2.52	95.40
11.8873	2.17	97.57
8.4704	1.10	98.67
7.2567	0.81	99.47
4.1178	0.26	99.73
3.6017	0.20	99.93
2.1205	0.07	100.00

OBS/VARS ratio:	0.682675	Scale:	1

Biplot Factor Type

Symmetric

Biplot coordinates

	DIM1	DIM2
OBS West Lampung	4.9080	0.7689
OBS Tanggamus	1.2358	-1.3025
OBS South Lampung	-1.7369	0.3308
OBS East Lampung	-1.2570	1.8472
OBS Central Lampung	-1.7329	-1.7683
OBS North Lampung	0.4349	0.7849
OBS Right Way	1.5091	-0.5718
OBS Onion Bone	0.5725	-1.3598
OBS Offering	-1.1701	-2.6765
OBS Pringsewu	-1.3189	2.8669
OBS Mesuji	1.8941	0.6736
OBS Western Onion Bone	-0.2833	1.9856
West Coast OBS	2.4157	-1.1023
OBS Bandar Lampung	-2.8559	-1.3293
OBS Metro	-2.6151	0.8526
VAR X1	0.5316	-0.2163
VAR X2	0.0512	0.1661

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	DIM1	DIM2
VAR X3	1.1910	-0.1325
VAR X4	2.1543	0.1253
VAR X5	1.3586	5.4974
VAR X6	-1.4992	-1.1584
VAR X7	-0.9618	-0.7125
VAR X8	0.2405	-0.7632
VAR X9	7.1712	-1.2368
VAR X10	0.8768	-0.9622

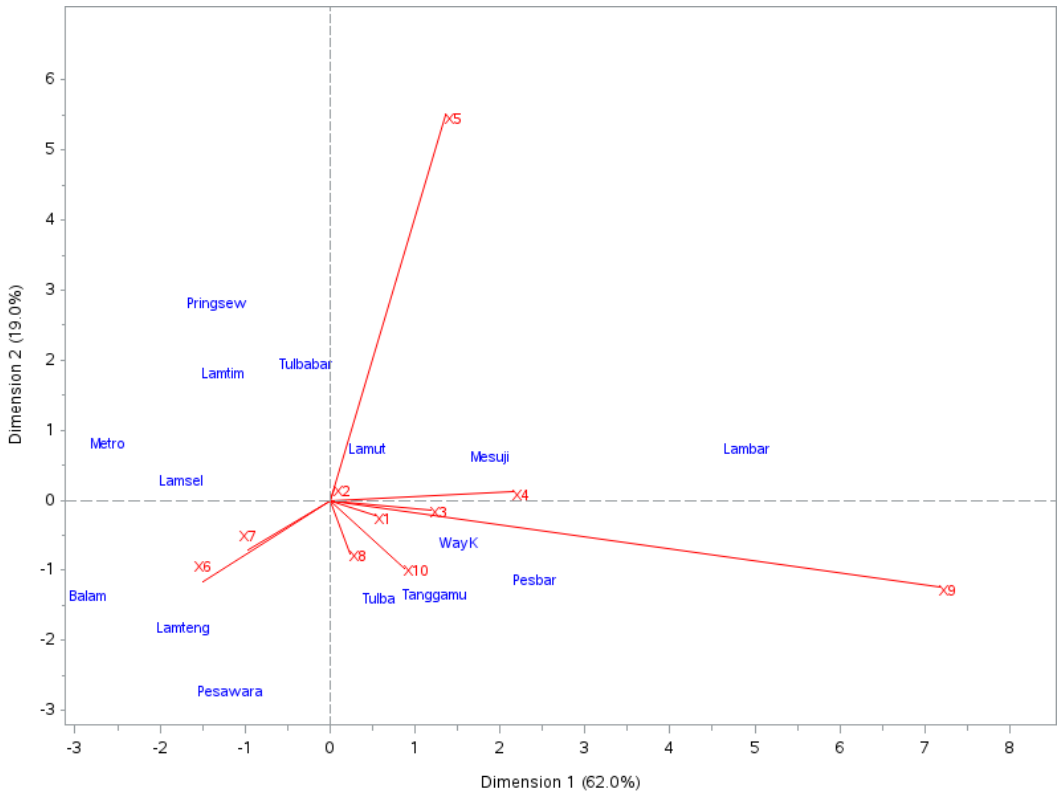

Figure 4. 1 Output Biplot Analysis On software *SAS Studio*

Discussion

From the graph, it can be seen that the districts of North Lampung, Mesuji and West Lampung have similar characteristics of poverty in illiteracy rate (X2), the highest diploma owned (X4) and the sick and untreated population (X5) are high. The districts of South Lampung, East Lampung, Pringsewu, Tulang Bawang Barat and Kota Metro form their own groups, meaning they have no resemblance to any variable because the object is opposite to the direction of the variable vector. Central Lampung, Pesawaran and Bandar Lampung districts correlate with women who do not use family planning tools (X6) and high building ownership status (X7). The districts of Way Kanan, Pesisir Barat, Tulang Bawang and Tanggamus have similarities in the number of dependents (X1), No longer in school (X3), per capita floor area (X8), and high defecation facilities (X10).

There are differences from the ten characteristics/modifiers because the vector lengths are relatively different. Characteristics/modifiers in sick and untreated populations (X5)

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and types of building materials (X9) have a slightly higher diversity than other characteristics/modifiers, meaning that the characteristics/modifiers in the 15 districts/cities vary relatively widely. The narrower the angle formed between the two characteristics/modifiers, the more positive the correlation height, as in the characteristics/modifiers of women who do not use birth control tools (X_6) and Building ownership status (X7) have a reasonably high positive correlation. Meanwhile, if the angle is blunt (in the opposite direction) then the correlation is negative, as in the characteristics / variables in sick and untreated residents (X5) and women who do not use birth control tools (X_6) or women who do not use birth control tools (X6) and types of building materials (X_9). The closer an object is to the direction a modifier points to, the higher the value of that modifier for that object. Whereas if the direction is opposite, then the value is low. The districts of Tulang Bawang, Pesisir Barat, Tanggamus and Way Kanan are provinces that have a characteristic level of dependent burden (X1), no longer attending school (X3), per capita floor area (X8) and high defecation facilities (X10). Bandar Lampung, Central Lampung and Pesawaran have characteristics/modifiers of women who do not use family planning tools (X_6) and high building ownership status (X_7). The closer the location of two objects, the more similar the properties indicated by the values of the characteristics / modifiers. Tulang Bawang, Pesisir Barat, Tanggamus and Way Kanan have similar characteristics. Metro, South Lampung, East Lampung, Tulang Bawang Barat, and Pringsewu form groups based on similar characteristics/modifiers.

CONCLUSION

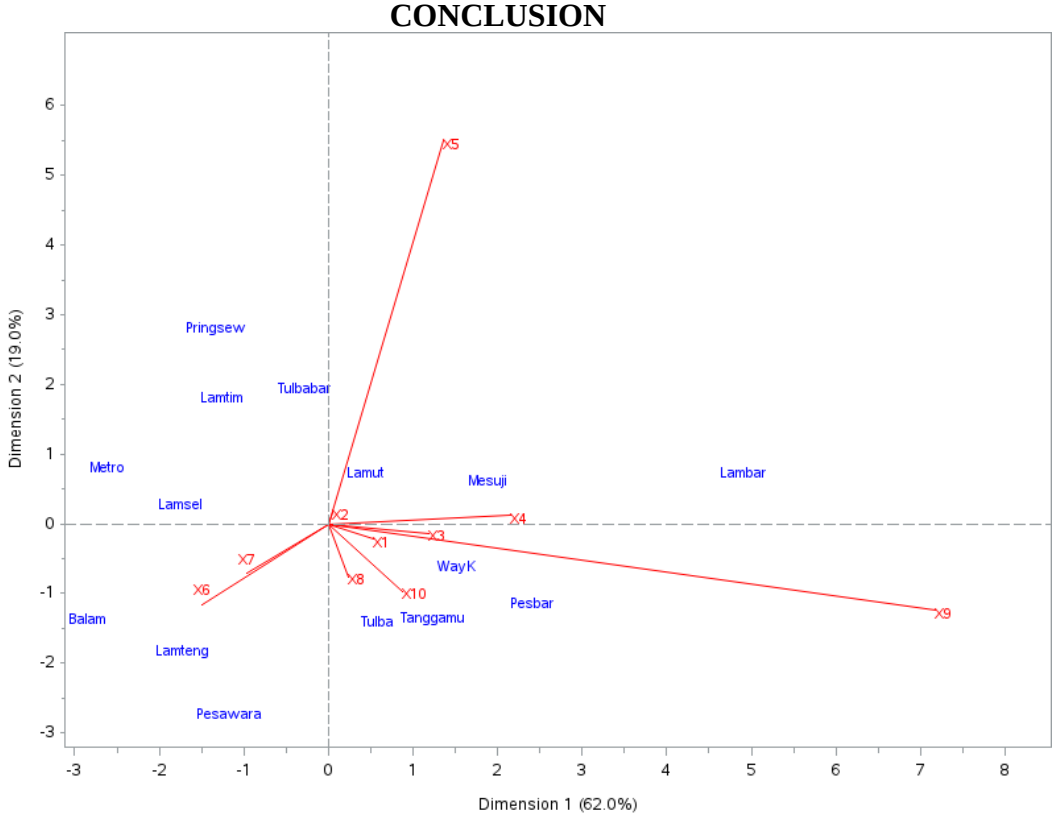

Figure 5. 1 Output Biplot Analysis On software *SAS Studio*

The conclusion of mapping the characteristics of poverty in Lampung Province using Biplot Analysis in this study is that the biplot graph shows that there are 4 parts of the region, namely Quadrant I of North Lampung, Mesuji and West Lampung Districts have similar poverty characteristics in illiteracy rates (X_2), the highest diploma owned (X4) and high sick and untreated residents (X5). Quadrant II of South

Lampung, East Lampung, Pringsewu, Tulang Bawang Barat and Metro City forms their group, meaning it does not resemble any variable because the object is opposite to the direction of the variable vector. Quadrant III of Central Lampung, Pesawaran and Bandar Lampung City correlates with women who do not use family planning tools (X_6) and high building ownership status (X7). Quadrant IV of Way Kanan, Pesisir Barat, Tulang Bawang and Tanggamus districts have similarities in the number of dependents (X1), No longer attending school (X3), per capita floor area (X8), and high defecation facilities (X10).

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