

Research Field : Industrial Engineering

ExtendedAbstract:

ROADMAP OF MAINSTAY INDUSTRY DEVELOPMENT IN ORDER TO REDUCE INCOME DISPARITY, STUDY CASE: BOJONEGORO DISTRICT

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Abstract-Bojonegoro is one of the districts in east java which becomes district of producing oil and gas, and it is one of the biggest in Indonesia. That resource has a major impact on regional income which is reflected in the Gross Domestic Product (GDP). This study aims to provide a mainstay industry development roadmap as an input for the government in implementing the Regional Medium-term Development Plan (RPJMD) Bojonegoro district by considering 27 sub-district data from 2011 to 2014. Multivariate and AHP method approach in this research. Regression modeling is used to determine the influential industry to GDP as the basis for program preparation of roadmap strategy. This research also use clustering method to determine the potential regions of the development industry, and Analysis Hierarchy Process (AHP) and Focus Group Discussion (FGD) is used to determine prioritization and time schedule of the roadmap. The roadmap that had been built shows that the sector industry that statistically significant to GDP is the mining industry, agricultural, production of fish, manufacturing, and trade. The research also found that the main priority industries in Bojonegoro is an agricultural sector
Key word-GDP, PDRB, Clustering, Regression, AHP, Roadmap

INTRODUCTION

Bojonegoro is one of the districts which have a lot of resources. One of them is oil and gas. The existence of oil and gas had a major impact on Regional Domestic Product (GDP). The number of GDP Bojonegoro 2013 is 32.783,33 million rupiah, 42,05% from mining sector contribution. In another side, Bojonegoro had a lot of potential industries. If that condition not is offset by the development of other industries, the income gap between regions can happen. This research aims to provide a mainstay industry development roadmap as anticipation of disparity in Bojonegoro. By using clustering,

regressing modeling, and AHP a roadmap is composed. Regression modeling used to determine the sector industry which significant effect to GDP and as a hierarchy to built a strategy program in the roadmap. Clustering used to determine place or location of the development program and AHP used to determine prioritization program as input in scheduling the roadmap. Another research about economic disparity had been done before by using cluster hierarchy [1] and Gelotis and Chletsos [2] by using composite index, factor dan cluster analysis. Ascani Andrea [3] doing research about development regional economic.

METHOD

Clustering is a method aims to group object based on similar characteristics of these objects [4]. Formula for euclidean distance to make group is

$$D(X, Y) = \sqrt{\sum (X_i - Y_i)^2}$$

Clustering method that used in this research is hierarchy cluster with average linkage methods (between groups methods) [5].

$$d_{(i,j)k} = \text{average}(d_{ik}, d_{jk})$$

Spatial dependency conducted to determine whether the dependent variable showed significant clumping [6].

$$y_i = f(y_i), \quad i = 1, \dots, n; j \neq i$$

$$I_{Ms} = \frac{n}{S_0} \frac{\sum_{i=1}^n \sum_{j=1}^n W_{ij} (x_i - \bar{x})(x_j - \bar{x})}{\sum_{i=1}^n (x_i - \bar{x})^2} [7]$$

Value index moran's I is -1 and 1. If $I > I_0$ it's mean data significant positive spatial autocorrelated, and if $I < I_0$ data show significant negative spatial autocorrelated.

Regression modeling is one method to minimizing the sum of squared errors or deviations that are usually used to estimate parameters of the simple linear regression model [8].

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \varepsilon$$

Where Y is response variable (dependent), X_1, X_2, X_n is independent variable. Robust regression modeling with

M-estimation is done to address no normal residual because outlier. The estimate of parameters is

$$\hat{\beta} = (X^T W X)^{-1} X^T W Y$$

Analysis Hierarchy Process is a decision-making method that describes the problems of complex multi-criteria into a hierarchy by using participants of the expert as the object survey questionnaire [9].

Steps to building a roadmap are defined program industry, define output program, set stages of work, set execution time, budget plan, executor, and location. [10]

RESULT

Clustering of mining industry by using variable the mining contribution to GDP and allocated village funding (a), clustering of agricultural by variable rice production and contribution agricultural sector on GDP (b), clustering fishing sector by variable production of fish and fish cultivation (c), clustering of manufacturing by variable contribution manufactur on GDP and amount of business (e), and clustering of trade by variable contribution trade on GDP dan amount of trade (d) are shown in this table.

Group	Sub district
3 cluster	Cluster 1 Other sub district
	Cluster 2 Kapas
	Cluster 3 Ngasem
2 Cluster	Cluster 1 Other sub district
	Cluster 2 Kapas

(a)

Group	Sub district
3 Cluster	Cluster 1 Other sub district
	Cluster 2 Temayang
	Cluster 3 Baureno, Kanor
2 Cluster	Cluster 1 Other sub district
	Cluster 2 Temayang

(c)

Group	Sub district
3 cluster	Cluster 1 Other sub district
	Cluster 2 Sugihwaras, Kedungadem, Kanor
	Cluster 3 Baureno
2 Cluster	Cluster 1 Other sub district
	Cluster 2 Baureno

(d)

ity and outlier data. Because of that insignificant model, regression robust are used to determine industry that influences GDP,

the model is as follows

$$Y = 32.576,69 + 1,0077X_1 + 1,0531X_2 - 184,231X_3 + 1,5538X_4 + 1,1782X_5$$

Where the parameter was significant to GDP are mining industry, agricultural, fishing sector, manufacture, and trade with coefficients determination 75,63%.

HP are built based on model regression. Where the models show that the mining industry, agricultural, fishing sector, manufacture, and trade are significant to GDP. The program on hierarchy model built based on the significant sector on GDP that is such five aspects. The strategy of each aspect's industries based on Regional

Medium-term Development Plan (RPJMD). The result of AHP shows that agricultural is the major priority of mainstay industry in Bojonegoro. The agricultural sector is the major priority which 29% weight value, the manufacturer is 21%, trade is 20%, fishing is 18%, dan mining industry is 12%. The result of AHP showed agricultural was the priority sector because it was sustainability sector than the other.

The results of analysis cluster, regression, and AHP are used to arrange a roadmap mainstay industry in Bojonegoro. The first step to arrange a roadmap is determined the program based on the regression model. Secondly set the major priority of an industry. The major priority industry is agricultural. Thirdly, arrange the priority strategy of agriculturally based on RPJMD and from the result of priority AHP. Then, the time schedule set based on FGD with the experts by considering weight from AHP analysis, budgetary fund, and time limit. The location of the program based on cluster analysis.

The judgment of this roadmap based on actual data with scientific methodology the other while roadmap based only on judgmental stakeholder and documentary process. The final result of this research is a table of roadmap development mainstay industry in Bojonegoro.

CONCLUSION

The result of this research shows that Bojonegoro has many potential industries such of agricultural, mining industry, fishing, manufacture, and

trade. With this roadmap hopefully can provide feedback for the government to implementation RPJMD in other to achieve regional economy equality.

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