

## INTERACTION DETERMINING FACTORS FROM REGENCY / CITY REGION IN EAST JAVA

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<i>Info article</i>	<i>Abstract</i>
<p><i>Article history:</i> Received 19 January, 2020 Revised 20 January, 2020 Accepted 22 January, 2020 Available online 22 January 2020</p> <p><b>Keyword:</b> <i>Economic; development; poverty</i></p> <p>JEL Classification ; A10; F16; P36; R11</p>	<p><i>This study aims to calculate the strength of interaction between regions and determine the variables determining the level of interaction between regions. This research was conducted in the area of East Java province with the object of 39 regencies and cities using the variable mileage, educational facilities, and health facilities. The data used are secondary data sourced from the Central Statistics Agency of East Java, meanwhile the analytical tool used is gravity analysis and regression analysis, with the regression model used is panel data regression, the Random Effect model. The results showed that the areas in the interaction category were weak, namely the southern part of East Java, the western part and the eastern part while those in the interaction category were in the middle eastern part of Java. Category of regions with strong interaction are Gerbang kertosusila and surrounding areas. From the random effect model regression analysis it is known that the distance, education and health facilities variables together influence 95% of the level of interaction between regions and the most dominant variable is the distance between regions which has a regression coefficient of -62480222. Health facility variable has a significant positive effect while education facility variable has no effect on interactions between regions. Therefore, in order for equitable development to be realized immediately, the distance between regions must be shortened by improving the quality of roads, construction of new roads and toll roads, especially in the southern, eastern and eastern parts of Java.</i></p>

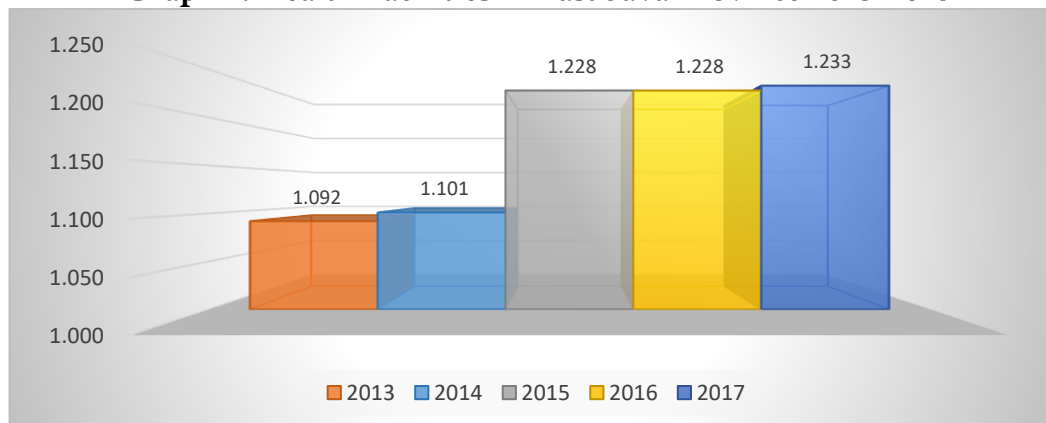
### INTRODUCTION

The issue of regional inequality is currently the focus of government attention because this regional inequality has an impact on income inequality or community welfare. Nationally, development inequality can be proven by the uneven distribution of Indonesia's Gross Domestic Product, which is almost 58% concentrated in Java. In the social and economic sphere, it is clear the difference between the western and eastern regions of Indonesia or between urban and rural areas. Inequality can also be seen in the indicator of Indonesia's Gini ratio in March 2015 based on the Central Statistics Agency's record of 0.41. March 2017 amounted to 0.393 and March 2018 recorded 0.389. The Gini ratio for urban areas in March 2018 was 0.401 while the Gini ratio for rural areas in March 2018 was 0.324. At the end of the 2015-2019 Medium Term Development Plan (RPJM) which means that the implementation will end in 2019 various government strategies to reduce inequality have been implemented in various ways such as infrastructure development, meeting basic community needs including access to education, health, housing, water

drinking, sanitation and other services to improve the quality of life of the community, the provision of People's Business Credit as an effort to increase productivity and create new business fields for the community and the allocation of Village Funds to improve village infrastructure, increase the potential of villages that encourage increased community income and strengthen connectivity and accessibility between regions. Other efforts undertaken are to prioritize the development of the Eastern Indonesia region which includes a large investment strategy in the field of infrastructure especially for improving transportation and improving connectivity between regions as well as the development of growth centers in areas outside Java and border areas and underdeveloped areas. The development of these growth centers is an effort to reduce the gap between Western Indonesia and Eastern Indonesia. East Java experiences a different condition from the national level. If nationally the Gini ratio has decreased over the past seven years, East Java has experienced an increase in the last five years, which means that income inequality is even higher. Inequality in East Java also occurs between urban and rural areas. Urban areas have higher inequality than rural areas. In addition to inequality between urban and rural areas inequality in East Java also occurs between economic sectors. Based on the record (Central Statistics Agency, 2018), the manufacturing sector dominates its contribution to GRDP in East Java (29.9%), while the large and retail trade sectors rank second with a contribution of 18.47% and third are the agricultural sector, forestry and fisheries 12.37%. Infrastructure or facilities and infrastructure have a very strong relationship to social welfare and environmental quality that results in the economic growth of a region. This is evidenced by indications that regions or regions that have a well-equipped infrastructure system usually have a high level of social welfare and environmental quality as well as good economic growth (Department of Public Works, 2006).

Infrastructure development and infrastructure facilities in all fields continue to be carried out by the provincial government such as education, economic and health facilities. Below you can see the development of health facilities in East Java in the last five years.

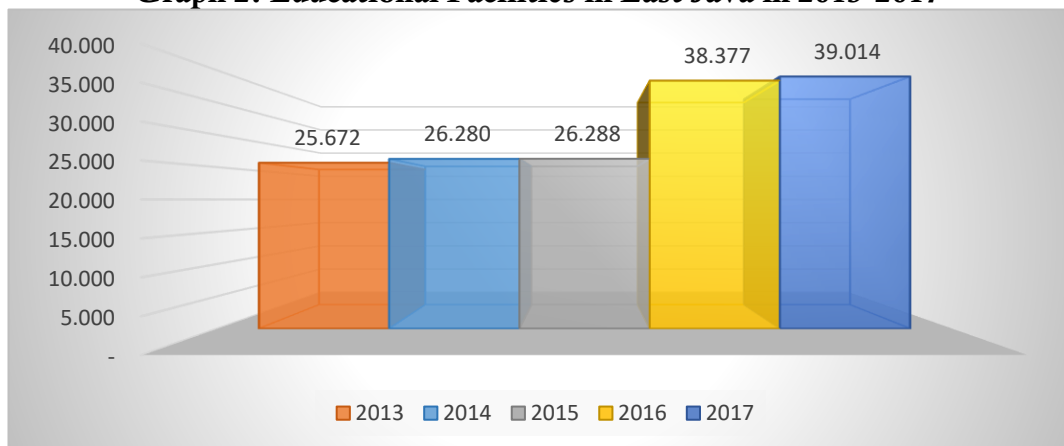
**Graph 1. Health Facilities in East Java Province 2013-2017**



Source: BPS East Java 2019, data processed 2019

The construction of health facilities continues to be carried out with the aim of realizing community welfare. At present health facilities in East Java Province continue to grow until 2017, meaning that health quality assurance in East Java Province is really being considered. Not only health facilities, educational facilities are also highly considered by the government of East Java, this can be shown in the graph of increasing educational facilities as follows:

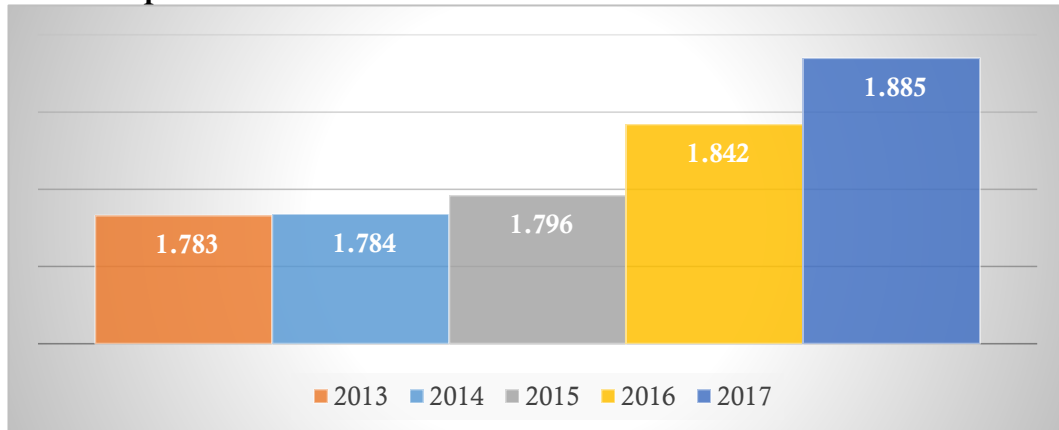
**Graph 2. Educational Facilities in East Java in 2013-2017**



Source: BPS East Java 2019, data processed 2019

In 2017 educational facilities in East Java have reached 39,014. This facility covers schools from kindergarten to tertiary level. This means of education continues to grow from year to year. The addition of educational facilities will be able to increase people's access to knowledge so as to improve the quality of human resources, which in turn can increase productivity and regional economic growth. The economic facilities developed by the East Java government can be seen in the development of a number of markets, both traditional and modern. The market is a means of driving the community's economy. With the market, community products can be immediately sold in the market and not piled up in production centers so that the economic value of these product products will increase. Market facilities are identical to the trade sector. This trade sector is a sector that has a major contribution in increasing the Gross Regional Domestic Product (GRDP) in East Java Province. Market facilities are very important in driving the economy of a region. (Putra, Mulhadi, 2017) in his research concluded that regions that have sectoral advantages but weak space support must be strengthened by adding economic, social service facilities so that the area's accessibility is better. The development of available market facilities in East Java Province from year to year can be seen in the following graph:

**Graph 4. Number of Market Facilities in East Java in 2013-2017**



Source: BPS East Java 2019, data processed 2019

The construction of these facilities in addition to increasing interaction between regions can also drive the regional economy. Policies to reduce inequality between regions cannot be effective if the construction of facilities and infrastructure is not well distributed between regions or between regions and it is difficult to interact as a result of geographical location so that it is difficult to reach. Therefore connectivity between regions must be improved so that economic transactions between regions can be effective and economic costs can be reduced. The determination of the area as a growth center that can encourage other regions must be done with careful calculation. The distance or distance between regions is not the only major factor that can affect the level of interaction between regions. As research (Apriliani & Bendesa, 2018) in the Denpasar region concluded that the determination of an area as the center of the hinterland is not determined by distance but is determined by the availability of facilities and infrastructure of an area. For this reason, a study is needed on what factors can determine interactions between regions so that they can be used as a policy in regional development and development. The difference between this research and previous research is that it is located in the research location and the variables used to determine interactions between regions in East Java. While the renewal of this study is that researchers took the object of research in all districts / cities in East Java, namely 39 district / city governments, which previously researched by taking 39 districts / cities in East Java had never been studied.

This study aims to calculate the magnitude of the level of interaction between regions and determine several factors that can determine the level of interaction between regions, so that developed regions can contribute to regions that are not yet advanced and not vice versa as is the case today. natural resources, human resources and other resources for the benefit of more

developed regions. If there is good connectivity between regions, even distribution of progress between regions and between economic sectors will work better.

**RESEARCH METHODS**

The object of this research is the Regency / City area in East Java, which amounts to 39 Regency and City Governments. The data used are secondary data sourced from BPS East Java and the analysis tool used to measure interactions between regions is used Gravity analysis with the following calculations:

$$I_{AB} = C \times \frac{P_A \times P_B}{(d_{AB})^2} \dots\dots\dots (1)$$

- IAB = Strength of interaction between region A and Region
- BC = Constant (value = 1)
- PA = Residents of region A
- PB = Residents of area B
- (dAB) 2 = Distance between region A and region B

Regression analysis is used to determine the determinants of the level of interaction between regions. According to (Widarjono, 2007) to estimate model parameters with panel data, there are three techniques (models) that are often used. The regression model used is as follows:

$$Y = a + b1 X1 + b2 X2 + b3 X3 + e \dots\dots\dots (2)$$

- Y = Interaction between regions
- X1 = Distance between regions
- X2 = Educational Facility (number of SD-PT schools)
- X3 = health facilities (hospitals and health centers)

The regression model used is panel data with the Random Effect Model (REM). In the Random Effect method that is by adding a disturbance variable (error terms). In REM there are intercepts between different regions and the coefficient of regression (slope) between regions is different.

**RESULT AND DISCUS**

Based on the results of the Chow test analysis using eviews 10, it shows as follows:

**Table 1. Chow Test Test**

Redundant Fixed Effects Tests

Effects Test	Statistic	d.f.	Prob.	
Cross-section F	14.546990	(30,59)	0.0000	
Cross-section Chi-square	197.889833	30	0.0000	
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.89E+08	6.90E+08	1.143299	0.2560
X1_Jarak_Tempuh	-58350567	12246714	-4.764590	0.0000
X2_Sarana_Pendidikan	-856839.6	530785.9	-1.614285	0.1100
X3_Sarana_Kesehatan	1.08E+08	12426345	8.705173	0.0000
R-squared	0.553769	Mean dependent var		2.01E+09

Adjusted R-squared	0.538728	S.D. dependent var	2.97E+09
F-statistic	36.81616	Durbin-Watson stat	0.377311
Prob(F-statistic)	0.000000		

Sumber: data diolah eviews 10. 2019

**Tabel 2. Hasil Uji Hausman Test**

Correlated Random Effects - Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.	
Cross-section random	4.900312	3	0.1792	
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
X1_Jarak_Tempuh	62480221.	62940905.	702658124779915.	0.9861
X2_Sarana_Pendidikan	474021.	289378.	25655444049.	0.2490
X3_Sarana_Kesehatan	281251922.	97343526.	20962366647458	0.2040
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.35E+09	5.93E+09	-1.238288	0.2205
X1_Jarak_Tempuh	-62480222	31602710	-1.977053	0.0527
X2_Sarana_Pendidikan	474021.5	408166.8	1.161343	0.2502
X3_Sarana_Kesehatan	2.81E+08	1.46E+08	1.927238	0.0588
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.946857	Mean dependent var	2.01E+09	
F-statistic	31.85486	Durbin-Watson stat	2.615946	
Prob(F-statistic)	0.000000			

Sumber: data diolah eviews 10. 2019

### 1. East Java Economy

East Java is a province that has very good economic growth. East Java's economic growth until the first quarter of 2019 of 5.51% was above the national economic growth rate of only 5.05%. East Java does have a fairly high level of economic growth but in terms of equity it is lacking (Nuraini, 2017). In the framework of accelerating the distribution of development at this time the government of East Java is accelerating the construction of the southern crossing road that crosses Trenggaleh, Tulungagung, Jember and Banyuwangi.

With this infrastructure development, it is expected that development disparities between the southern part of eastern Java, the central part, the northern part, the western part and the eastern part will decrease. Construction of toll roads has been carried out in various regions or regions in East Java which is expected to be able to improve connectivity between regions so that it will create equity between regions. Economic and social facilities play an important role in influencing the development of a region. As a study (Priyadi,

2017) which concluded that in the analysis of the geographical concentration of the area that is the center of growth has a facility that is evenly distributed.

## **2. Interaction Between Regions**

The strength of interaction between regions is the ease of movement of people, goods, services, ideas and information between one region and another. Therefore interaction between regions involves two things namely accessibility and connectivity. Accessibility is actually a measure of the ease with which a location (land use) interacts with other locations or is a measure of how easily a location can be achieved. In this case means accessibility concerns how a location can be achieved by involving the calculation of distance, travel time, costs to reach that location and taking into account the completeness and quality of existing facilities and infrastructure. Thus in order to increase accessibility between regions, infrastructure must be available that can be in the form of roads, bridges, transportation of sufficient quality, both in terms of quantity and sufficient quality and good land use arrangements. If accessibility between regions is getting better, it will be able to improve all aspects of community life such as increasing mobility of people between regions, increasing the mobility of regional natural resources, increasing the mobility of regional production results which will impact on the progress of the economy, increasing community knowledge and skills and culture.

In (Bintarto and Suprastopo, 1987) interaction between regions is a process that is reciprocal and has an influence on behavior. Either through direct contact or not directly. Meanwhile connectivity (connectedness) related to transportation or communication network problems can be measured in two ways: first, the measurement of connectivity of the entire network that is how much the entire internal network as a whole can be connected. Second, measuring the connectivity of individual places (nodes) in the network. So it is a measurement of the degree to which an individual is connected to another individual's place in one network.

Thus connectivity and accessibility are the convenience of each individual, the ease of goods and the ease of information can move from one location to another. From an economic standpoint, this transfer must be supported by infrastructure in the form of transportation (land, sea, air) and telecommunications networks. This connectivity and accessibility is also a measure of how an infrastructure and network can reduce the friction between regions. The two terms connectivity and accessibility are often used interchangeably but actually these two terms have a slight conceptual difference.

Research (Liestiani, 2006) examines accessibility using variable availability of public transportation, distance, travel costs, and road conditions. In this study, the effect of accessibility on the service area of Puskesmas in Magelang City was examined. While the results of the study (Muhamad Magribi, 2004) concluded that an increase in accessibility variables would significantly increase variable income, mobility, population density and activity

density. Locations with better access tend to have higher population densities. Different from Based on the theory of gravity the magnitude of attraction between two regions (spatial interactions) is proportional to the population of the two regions and inversely proportional to the distance between the two regions. So if the population of the two regions increases, the interaction between the two regions will also be greater / stronger and vice versa if the population of the two regions will be less then the interaction of the two regions will be smaller / weaker. The strength of the interaction between the two regions is also influenced by the distance factor. Distance factor has a inverse relationship with the strength of interaction. The greater / greater the distance between the two regions, the level of interaction will be lower / smaller, and vice versa if the lower / closer the distance between the two regions, the higher / greater the level of interaction. Based on (Muta'ali, 2015) states that the centralized index can show the strategic value of the region by looking at the geographical location of the region, which is characterized by ease of access and the number of links and transportation that gather in the region. This means that the more complete the availability and number of facilities, the higher the hierarchy of a center. The results of gravity calculations for several districts and cities in East Java are as follows:

**Table 3. Gravity Between Regencies / Cities in East Java (Strong Gravity Category)**

City / Regency	City / Regency	Gravity
Surabaya	Sidoarjo	11.866.594.446
Surabaya	Mojokerto	1.316.427.759
Surabaya	Pasuruan	1.281.881.785
Surabaya	Lamongan	151.845.178.583
Surabaya	Bangkalan	3.559.984.708
Surabaya	Gresik	11.401.357.900
Jombang	Mojokerto	1.530.849.193
Lamongan	Gresik	2.094.945.984
Nganjuk	Kediri	2.088.758.123
Nganjuk	Malang (Kota)	3.997.531.521
Tulungagung	Kediri	1.674.783.829
Tulungagung	Blitar	1.092.129.104
Malang	Pasuruan	1.367.347.965
Probolinggo	Pasuruan	1.219.245.970
Jember	Bondowoso	1.824.803.134

Source: BPS East Java, data processed 2019

Table 3 above illustrates the urban and regency areas where gravity is strong between regions and the surrounding area. In East Java the characteristics of regions with strong gravity are dominated by growth centers that have industries, ports and airports which in this region are destination areas for population migration from the surrounding areas.



The strongest interaction is the Surabaya and Lamongan regions because these two regions are regions with adequate harbor support for economic development in East Java. Lamongan with PT Lamongan Integrated Shorabase, ASDP Lamongan port, ASDP Paciran and the Brondong archipelago fishing port are the centers of economic activity that will connect the East Java region with several regions in Indonesia and abroad.

While the port in Surabaya called Tanjung Perak Port is supported by the port of Lamong bay which is the most sophisticated port in the world and is also the center of economic activity that will connect East Java with other regions in Indonesia and abroad. Gresik is also a region with strong interactions because Gresik is also supported by the presence of the Gresik port that supports industrial growth in East Java and is also a means of interaction with the islands of Bawean, Madura and other regions. Sidoarjo is also the center of industrial activity in support with the Juanda International Airport which is a center of community activity to carry out social, economic, cultural and other activities both at home and abroad.

Likewise, the regions around Surabaya, Gresik and Sidoarjo have strong gravity as a result of activities in the three regions including Bangkalan, Malang, Pasuruan, Mojokerto, Jombang, Kediri and Nganjuk. Other regions in East Java whose gravity is in the medium category are regions in the western part such as Madiun, Ngawi, Magetan and Ponorogo in the southern part of East Java such as Trenggalek and Tulungagung and eastern East Java such as Lumajang and Probolinggo plus Pamekasan and Sampang (Sampang see table 4).

**Table 4. Gravity Between Regencies / Cities in East Java (Medium Gravity Category)**

City / Regency	City / Regency	Gravity
Madiun	Magetan	741.985.618
Madiun	Ngawi	551.014.034
Madiun	Ponorogo	703.246.720
Tulungagung	Trenggalek	697.699.875
Malang (Kab)	Surabaya	904.124.798
Probolinggo	Lumajang	566.045.579
Sampang	Pemakasan	759.254.911

Source: BPS East Java, data processed 2019

The regions listed in table 4 are areas with agricultural characteristics and do not have adequate economic, social, transportation and health facilities, so they are not a destination area or as a center for other regions to carry out socioeconomic activities. East Java regions with weak gravity include areas such as Banyuwangi, Bondowoso, Jember, Tuban, Bojonegoro, Nganjuk and Pacitan (see table 5).

**Table 5. Gravity Between Regencies / Cities in East Java (Weak Gravity Category)**

City / Regency	City / Regency	Gravity
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Surabaya	Probolinggo	63.786.435
Surabaya	Jombang	486.088.122
Lamongan	Bojonegoro	372.475.413
Lamongan	Tuban	411.096.801
Madiun	Nganjuk	285.226.342
Pacitan	Ponorogo	79.123.751
Nganjuk	Jombang	285.226.342
Malang	Jombang	227.997.724
Situbondo	Bondowoso	424.755.149
Jember	Banyuwangi	353.759.330
Sumenep	Pemakasan	345.075.213

Source: BPS East Java, data processed 2019

Geographically these regions are areas that have great distances to the growth centers, namely Surabaya, Lamongan and Sidoarjo, Gresik, Malang and Pasuruan. This region is also still lacking in the construction of social, economic, health and transportation facilities.

### 3. Determinants of Interaction Between Regions

Determination of factors that influence interactions between regions using panel data regression analysis can generally use one of three calculation methods, namely the Pooled Least Square (PLS) or Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM).

The three methods are very different from each other. Testing using the OLS method usually does not pay attention to individual dimensions (cross section) and time (time series). In this study the selection of the best model is CEM or FEM then it is performed by the Chow test with the criteria if Probability >  $\alpha$  then the chosen model is CEM and if probability <  $\alpha$  then the selected model is FEM. Because the probability value <  $\alpha$  ( $0.0000 < 0.05$ ), it can be concluded that FEM is more appropriate than CEM.

Meanwhile, to choose the right model between FEM and REM the Hausman test is used. If probability >  $\alpha$ , then REM is the selected model and vice versa if probability <  $\alpha$  then FEM is the selected model. The Hausman test results show that the probability value is  $0.1792 > \alpha$  ( $0.05$ ) thus REM is more precise than FEM.

The next step is the Lagrange Multiplier test to find out if REM is better than CEM. The determination criterion is if probability >  $\alpha$  then CEM is the selected model and if probability <  $\alpha$  then REM is the selected model. The Lagrange test results show that the probability value is  $0.0000$  or <  $\alpha$  ( $0.05$ ), so the best method is REM (Random Effect Model).

The random effect model regression shows the following results:

$$Y = -7,35 - 62480222 X_1 + 474021,5 X_2 + 2,81 X_3 + 8,5 \dots \dots \dots (3)$$

Based on the value of R squared of 0.95. This shows that the three variables namely Mileage, Education Facilities and Health Facilities together (95%) affect the gravity between Regions. Distance Variable ( $X_1$ ) has the most significant and dominant negative influence on gravity between regions, which

means that the farther the distance between one region and the other the weaker the interaction between the two regions and this will result in lagging social and economic progress in the region that. Educational facilities (X2) have a non-significant positive effect on interregional gravity, while health facilities (X3) have a significant positive effect on interregional gravity.

Facility development including infrastructure plays an important role in the growth of a region, such as a study conducted by the ASEAN Study Center of Ambon Patimura University which concluded that infrastructure development and connectivity can lead to multiplier effects, one of which is for the ability of corporate competitiveness and investment excellence, and can be a stimulus for open. In addition (Sudaryadi, 2007) revealed that the infrastructure of a region can have an influence on increasing community access to resources so as to increase the productivity of existing resources which in turn can encourage economic growth.

## CONCLUSION

Kekuatan interaksi antar wilayah Kabupaten dan Kota di Provinsi Jawa Timur berbeda-beda. Wilayah Jawa Timur yang interaksi antar wilayahnya lemah yaitu Banyuwangi, Bondowoso, Jember, Tuban, Bojonegoro, Nganjuk dan Pacitan. Wilayah dalam kategori interaksi sedang adalah Madiun, Ngawi, Magetan dan Ponorogo Trenggalek dan Tulungagung serta Jawa Timur bagian timur seperti Lumajang dan Probolinggo ditambah Pamekasan dan Sampang. Wilayah yang interaksinya kuat adalah wilayah Gresik, Bangkalan, Mojokerto, Surabaya, Sidoarjo, Lamongan (Gerbangkertosusila) ditambah Mojokerto, Pasuruan, Malang, Kediri, Blitar dan Bondowoso.

Jarak tempuh antar wilayah sangat mempengaruhi kekuatan interaksi antar wilayah, demikian pula dengan ketersediaan fasilitas kesehatan memiliki pengaruh yang signifikan terhadap kekuatan interaksi antar wilayah. Fasilitas pendidikan tidak berpengaruh terhadap kekuatan interaksi antar wilayah. Oleh sebab itu agar interaksi antar wilayah dapat merata maka perbaikan kualitas jalan, pembangunan jalan baru ataupun jalan tol perlu dipusatkan pada wilayah-wilayah yang masih lemah interaksinya seperti Jawa Timur bagian selatan, timur dan sebagian barat karena dengan perbaikan atau pembangunan jalan akan berdampak pada tingginya mobilitas sumberdaya yang dapat meningkatkan perekonomian wilayah.

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