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## Spatial Analysis of Unemployment Level in Java Island in 2023

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### **Abstrak**

*Unemployment is one of the problem economy the largest in the world. In Indonesia, the number of unemployment reached 7.86 million people. Java Island is island with the highest Open Unemployment Rate (TPT) reaching 4.60 million people or equivalent with 58.52%. Areas with level unemployment highest located in the provinces of Banten, West Java and DKI Jakarta. This is become suspicion beginning existence regional influence so that need done analysis spatial. The method used in study This is analysis spatial with use Geographically Weighted Regression (GWR) method with a linear regression model, as well as method regression spatial for know factor determinant main. Data used originate from the Central Statistics Agency (BPS) and includes variable index development human, level participation work, level education, minimum wage and density residents in each province and district or cities in Java Island. Research results show that there is pattern unemployment that is clustered in several areas, especially in the areas urban with density high population and moderate industry experience change structural. The main factors that contribute to level unemployment is limited access to quality education and opportunities work that is not evenly distributed. Findings This can become runway for government in to design policy more employment effective and based territoriality for reduce unemployment in a way sustainable.*

**Keywords:** Analysis, Spatial, Unemployment

### **1. Introduction**

Unemployment is one of the main issues in economic development, especially in developing countries such as Indonesia (Todaro & Smith, 2015). The Open Unemployment Rate (Tingkat Pengangguran Terbuka/TPT) is an indicator used to show the proportion of the labor force that does not have a job but is actively seeking employment (BPS, 2023). Java Island, as the center of economic and governmental activities and the most populous region in Indonesia, contributes a large share of the national labor force. Nevertheless, the distribution of TPT in this region indicates the presence of inequality between provinces and districts/cities (BPS, 2023).

Spatial regression is a statistical method used to model phenomena influenced by certain factors while considering spatial or locational effects (Anselin, 1988). This method is a development of multiple linear regression that incorporates spatial dependence and spatial heterogeneity in the data (LeSage & Pace, 2009). Economic development policies implemented by the Indonesian government aim not only to improve living standards but also to reduce unemployment across different social groups (Sukirno, 2016). Variations in the open unemployment rate reflect regional labor market performance and the quality of human resources (Todaro & Smith, 2015). Human capital plays a crucial role in reducing unemployment, alongside the role of local governments in implementing effective economic policies to stimulate growth (Becker, 1993).

According to the Central Statistics Agency (BPS), individuals who do not have a job but are actively seeking employment or preparing a business are classified as unemployed (BPS, 2023). Several factors are believed to influence the TPT on Java Island, including the Human Development Index (HDI), population size, Labor Force Participation Rate (TPAK), average years of schooling (RLS), and district/city minimum wage (UMK) (BPS, 2023).

Unemployment problems on Java Island are also driven by skill mismatches, unequal access to education, and technological changes, which exacerbate regional disparities (World Bank, 2020). Spatial factors such as geographical location, infrastructure availability, urbanization levels, and industrial distribution further contribute to unemployment inequality, making spatial analysis essential for identifying high- and low-unemployment areas and formulating more effective and equitable employment policies (Anselin, 1988).

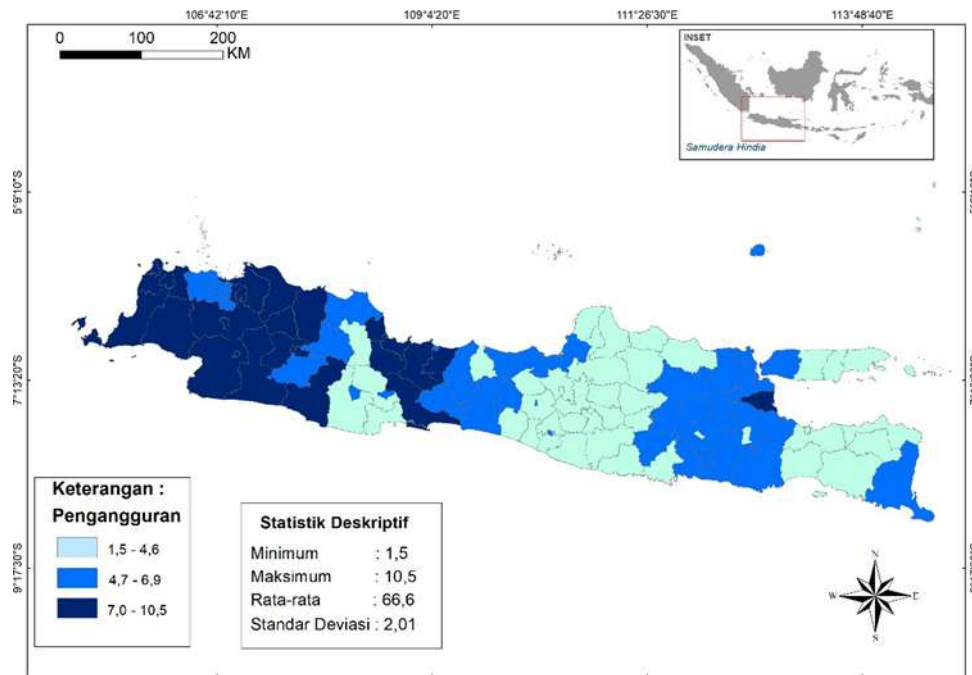


Figure 1: Distribution pattern of Open Unemployment Rate according to regency or cities in Java Island 2023

Figure 1 shows that the average open unemployment rate (TPT) on Java Island reaches 6.66 percent. The open unemployment rate in the western part of Java Island, such as DKI Jakarta, Banten, and West Java, tends to be higher compared to the eastern region. This condition is closely related to the rapid pace of urbanization in the western region of Java Island, particularly in the Jabodetabek area, which attracts migrants from various regions seeking employment opportunities, thereby intensifying labor market competition (BPS, 2023; Todaro & Smith, 2020). When the number of job seekers exceeds the availability of employment opportunities, unemployment levels tend to increase, especially when accompanied by a mismatch between labor skills and industrial needs (ILO, 2022).

Furthermore, the western region of Java Island relies heavily on the industrial and service sectors as the main drivers of its economy. Economic slowdowns, automation, and industrial restructuring in these sectors can significantly contribute to rising unemployment rates (World Bank, 2020). In addition, economic growth that is not sufficiently inclusive and labor-absorptive further exacerbates the persistence of unemployment (Sukirno, 2016).

Research conducted by Eka Amalia and Liza Kurnia Sari (2019) demonstrates that the distribution pattern of TPT on Java Island is uneven, with unemployment predominantly concentrated in the western region. This finding aligns with the present study, which positions TPT as the dependent variable and employs the Human Development Index (IPM), Regional Minimum Wage (UMK), and Labor Force Participation Rate (TPAK) as independent variables, consistent with previous empirical studies (Amalia & Sari, 2019).

This study aims to provide a comprehensive overview of TPT conditions on Java Island in 2023 and to analyze the factors influencing its spatial variation. To achieve this objective, the study employs a spatially explicit analysis based on district and city administrative boundaries. Unlike conventional non-spatial regression models, spatial analysis enables the identification of local variations and regional clustering of unemployment patterns (Anselin, 1988). Consequently, the study adopts the Geographically Weighted Regression (GWR) approach, utilizing kernel functions and goodness-of-fit criteria to identify dominant local determinants of open unemployment, which is crucial given the broad socioeconomic impacts of unemployment if left unaddressed (Fotheringham et al., 2002).

Based on explanation about development regression that takes into account factor geographical, namely regression weighty geographic (geographically weighted regression), as well as importance monitor level unemployment open Because the impact that can expand to other sectors if no handled, research This will focus on analysis spatial

model formation. Spatial model This will built with use kernel functions and criteria the goodness of the model, which is purposeful for measure and identify suspected factors influential to level unemployment open.

## 2. Research Methods

Location Theory merupakan teori ekonomi yang membahas bagaimana dan mengapa aktivitas ekonomi seperti industri, pertanian, dan jasa tersebar secara geografis dalam suatu wilayah. Dalam konteks Tingkat Pengangguran Terbuka (TPT), teori ini membantu menjelaskan perbedaan spasial tingkat pengangguran antarwilayah akibat variasi lokasi, aksesibilitas, dan struktur ekonomi regional (Isard, 1956; Weber, 1909).

Teori ekonomi klasik yang dikemukakan oleh Adam Smith, David Ricardo, dan Jean Baptiste Say berargumen bahwa pasar tenaga kerja akan selalu menuju keseimbangan melalui mekanisme harga, khususnya upah. Apabila terjadi pengangguran, penurunan upah akan mendorong perusahaan untuk kembali menyerap tenaga kerja, sehingga pengangguran terbuka tidak akan berlangsung lama (Smith, 1776; Ricardo, 1817; Say, 1803). Namun, dalam realitas ekonomi modern, pengangguran terbuka sering kali bersifat persisten akibat adanya hambatan struktural dan institusional seperti ketidaksesuaian keterampilan, rigiditas upah, serta ketimpangan pembangunan wilayah (Todaro & Smith, 2015).

Penelitian yang dilakukan oleh Dia Camartya dan Anneke Iswani Achmad (2022) menunjukkan adanya hubungan yang signifikan antara wilayah kabupaten/kota dengan tingkat pengangguran terbuka berdasarkan pendidikan tertinggi yang ditamatkan di Provinsi Jawa Barat tahun 2019. Penelitian ini relevan dengan studi yang dilakukan penulis karena sama-sama menggunakan TPT sebagai variabel dependen dan tingkat pendidikan sebagai variabel independen (Camartya & Achmad, 2022).

Sementara itu, penelitian Rendra Erdkhadifa (2021) menemukan bahwa secara global variabel persentase penduduk usia kerja 15 tahun ke atas berpengaruh signifikan terhadap TPT, dengan nilai goodness of fit ( $R^2$ ) sebesar 66,5%. Hasil analisis menggunakan metode Geographically Weighted Regression (GWR) dengan fungsi pembobot adaptive bisquare menunjukkan nilai AIC, AICc, dan BIC paling optimal dibandingkan fungsi pembobot lainnya (Erdkhadifa, 2021).

Penelitian ini menggunakan pendekatan kuantitatif dengan metode analisis spasial. Data yang digunakan merupakan data sekunder yang bersumber dari Badan Pusat Statistik (BPS) tahun 2023 untuk enam provinsi di Pulau Jawa, yaitu DKI Jakarta, Banten, Jawa Barat, Jawa Tengah, DI Yogyakarta, dan Jawa Timur. Metode GWR digunakan untuk menganalisis hubungan antara TPT dan faktor sosial ekonomi secara lokal pada setiap kabupaten/kota, sehingga menghasilkan koefisien regresi yang berbeda antarwilayah sesuai dengan karakteristik geografisnya (Fotheringham et al., 2002).

## 3. Results and Discussion

Unemployment Rate (TPT) varies between region and period time, influenced by conditions economic, social, and policy applicable employment. In Indonesia, especially on the island of Java, there are difference significant in TPT between area urban and rural, as well as between centres economy with areas that are still not enough developing. Factors like change in economy macro including crisis economy, development sector industry, and progress technology Iso contributes to TPT fluctuation. Open Unemployment Rate (TPT) influenced by a number of aspects, both related with characteristics power Work and also situation economy. Here This is a number of factors the main one who participated determine the magnitude TPT figures. TPT distribution patterns in 2023 in the district or cities in Java Island can see dai image 2

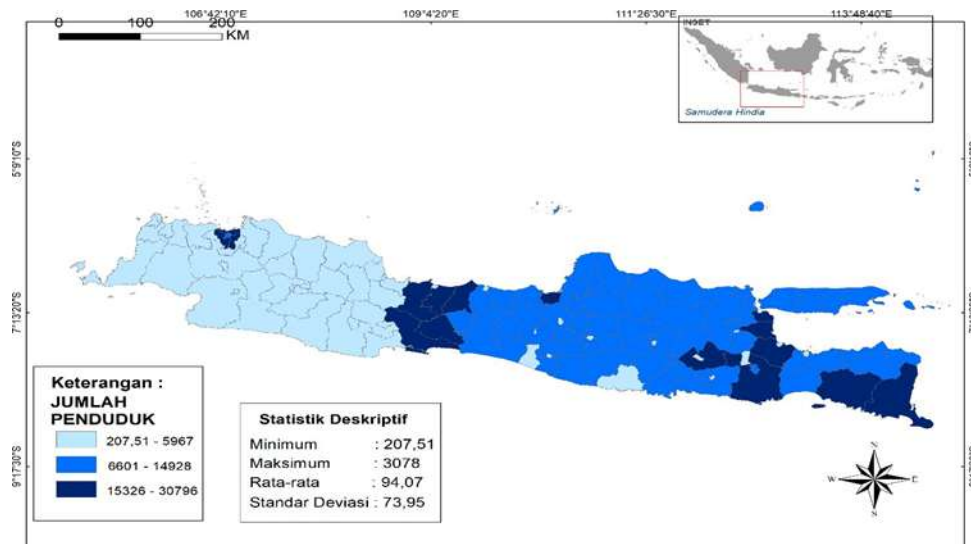


Figure 2: Distribution pattern Amount Resident according to regency or cities in Java

Island 2023

Java Island has population the largest in Indonesia, accommodating more from 55% of the population national although only covers about 7% of the total area of the country. Cities big such as Jakarta, Surabaya, Bandung, and Yogyakarta experienced surge amount rapid population growth, influenced by urbanization, currents enter resident from other areas for look for work or to go through education, as well as growth resident experience consequence height number birth compared to death. Viewed dai map above show that province with amount resident the most located in the provinces of Jakarta, West Java and East Java and the city of with amount resident the most are in East Jakarta reaching 3.07 million people. The area with density very high population, such as Jakarta, Bandung, and Surabaya, show variation pattern unemployment, where level unemployment Can low and also relatively tall depends on factors social economy and opportunities available work. While that, concentration high unemployment usually found in the area with amount resident currently until low or in areas that are still not enough develop in a way economy.

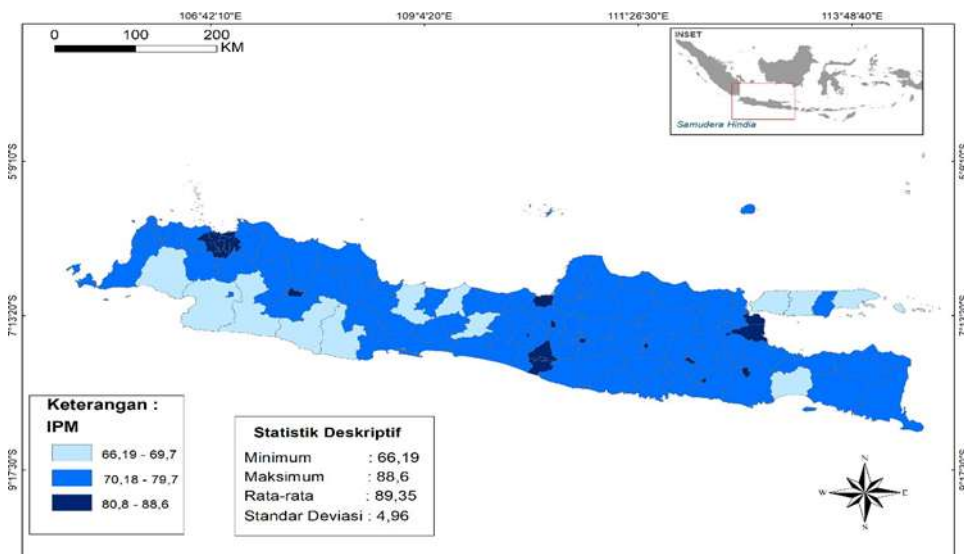


Figure 3: Distribution pattern of HDI according to regency or cities in Java Island 2023

Human Development Index (HDI) assesses quality development man through three aspects main, namely: level education (measured) from the average and expected length of schooling), degree health (seen from number hope

alive), and level welfare economy (based on per capita income). Regions with High Human Development Index (HDI), generally be in the cities big such as Jakarta, Bandung, and Surabaya, tend to own level unemployment open (TPT) which is lower, indicating existence connection positive between quality development humans and absorption power work. On the other hand, the area with low HDI usually face level more unemployment high, which is likely due to limitations access to education, services health, and adequate income. However, the pattern This No always consistent in a way spatial, because there are regions with moderate HDI However experiencing high TPT consequence factors local like availability field work and structure sector the industry.

However, a phenomenon also emerged paradoxical, where the region with level education tall precisely experience unemployment high open. This is Can due to the height hope public to type desired job, such as reluctant working in the informal sector or accept low wages. The region with the highest HDI is Yogyakarta City at 88.61 percent, while the lowest HDI is in Sampang Regency at

66.19 percent. The average HDI in Java is 89.35 percent with IPM diversity. Can be seen from Figure 3 that the majority of HDI in Java Island has a moderate HDI.

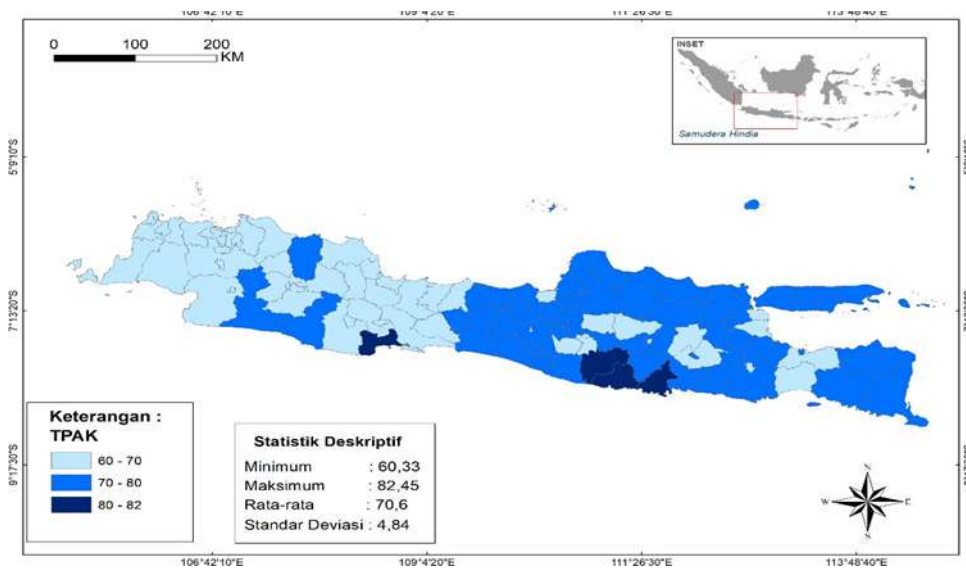


Figure 4: Distribution pattern of TPAK according to regency or cities in Java Island 2023

TPAK (Labor Force Participation Rate) refers to the percentage resident 15 years old to on those involved in activity economy, good with Work and also currently look for jobs. Figure 3 shows the highest TPAK in Java Island is in Wonogiri as much as 82.45 percent and the lowest located in Pandeglang of 60.33. In general, the average TPAK in Java Island is 83.27 percent. TPAK plays a role in determine level unemployment open (TPT), but the impact is greatly influenced by how much many and how much good quality field available jobs. Areas with level participation force high work (TPAK) Not yet Of course own level unemployment low open (TPT), because height participation the Can accompanied by with improvement amount unemployment if opportunity Work No sufficient.

There are also regional groups that have high TPAK and TPT, which indicates that although many active people look for jobs, availability field Work Still limited. While that, areas with low TPAK generally also shows low TPT, which is likely due to the proportion residents who do not including in force work, such as student, mother House stairs, or elderly. The increase in TPAK can interpreted as signal positive Because show increasing desire public for work. However, if no accompanied with creation field adequate work, things This precisely can cause improvement amount unemployment. Therefore that, effort lowering TPT does not Enough only with push participation force work, but also necessary accompanied by with development chance decent and sustainable work.

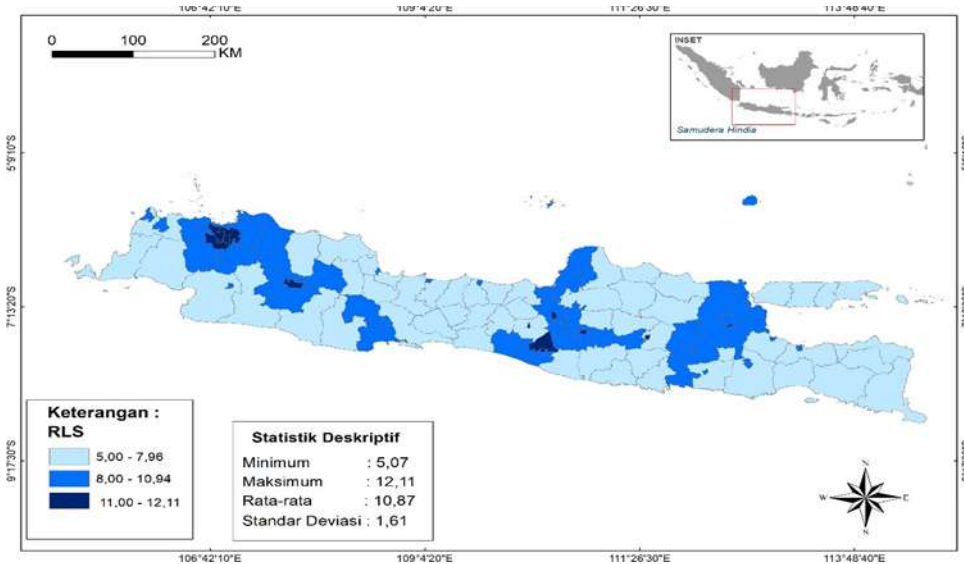


Figure 5: RLS distribution pattern according to regency or cities in Java Island 2023

RLS is size indicating how long, in count year, the average population at least 15 years old follow formal education. Figure 5 shows that the highest RLS is in the city of Yogyakarta at 12.11 percent and the lowest is in Sampang at 5.07 percent. The average RLS in Java Island is 10.87 percent, the high RLS in Jakarta is results from various factors, such as availability facilities and infrastructure complete education, stability supportive economy, high awareness public to mark education, as well as existence role active government area in support access education. Areas with High School Years Ratio (LSR) generally own level unemployment open (TPT) which is lower, because duration education contribute to the improvement skills and opportunities Work. On the other hand, the area with low RLS tend facing a more TPT high, due to limitations capabilities and access to chance Work. Even though Thus, the relationship This can varies in each region, because factors local like availability field work and conditions sector economy participate influence level unemployment.

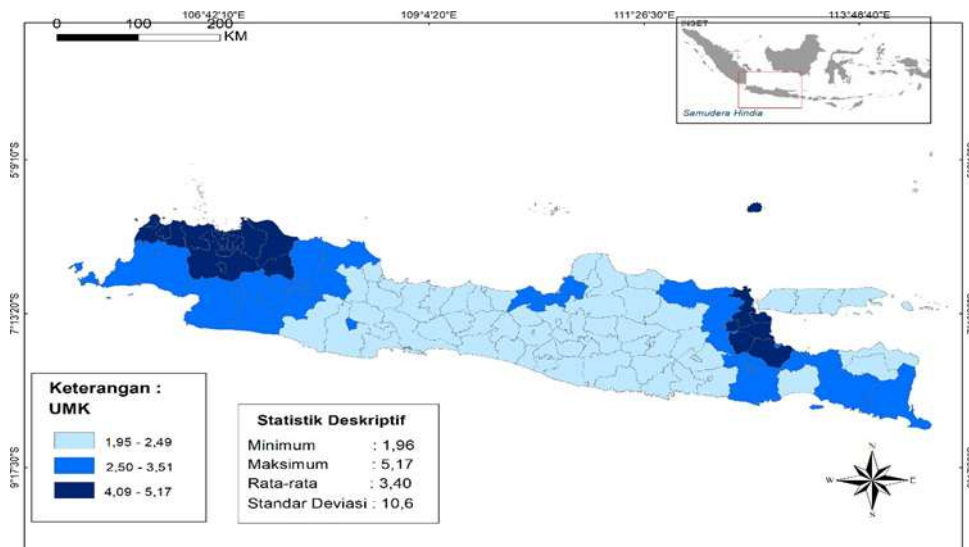


Figure 6: Distribution pattern of UMK according to regency or cities in Java Island 2023

District /City Minimum Wage (UMK) is provision from government area that determines amount minimum salary that must be paid to workers in the district area or city certain. On the island of Java, the MSE area is the highest in Karawang at IDR 5,176,179.07 and the region with the lowest UMK located in Banjarnegara amounting to RP1,958,170. The average UMK in Java Island is RP3,405,479.82, based on Figure 3, it can be seen that part big districts / cities in the western part of Java Island set relatively high UMK high. Areas with high District /City

Minimum Wages (UMK), such as in cities big, shows variation level unemployment influenced by ability sector industry in absorb power Work.

Some areas with high UMK precisely own level unemployment low open (TPT), things This usually happened in the area with sector strong industry and services. However, in the area with high UMK but sector the industry not enough developing, level unemployment tends tall Because company difficulty fulfils standard wages, so that postpone or reduce recruitment. While that, the area with low UMK sometimes have low TPT Because cost power more work cheap, though condition This can impact negative on quality work and welfare worker.

## Conclusion

Analysis results use Geographically Weighted Regression (GWR) method reveals that impact variables social economy to the Open Unemployment Rate (TPT) varies between regions. Factors like level education, HDI, number population, RLS and TPAK show significant influence only in some area certain, and not applicable in a way uniform throughout the island of Java. The findings This emphasize importance implementation policy countermeasures unemployment of a nature contextual and based territoriality. A number of districts / cities on Java Island form regional groups with a high Open Unemployment Rate (TPT), especially in areas that have density resident height, speed rapid urbanization, but limited field work in the formal sector. On the other hand, the areas with low TPT generally be in the area with structure more economy stable and balanced between formal and informal sectors. Therefore that, coping strategy unemployment in Java Island is necessary adopt approach based on spatial, strengthening Work The same inter-regional, as well as push equalization development infrastructure and centers economy new in a way comprehensive.

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