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Determinants of Educated Unemployment in Java from 2016 to 2022

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ABSTRACT

Statistical survey data of each province in Java indicates that the number of educated unemployed individuals holding a high school or university diploma is higher than that of lower-educated unemployed individuals. The increase in the number of educated unemployed individuals suggests that the government has not been successful in increasing job opportunities and establishing an effective education system to compete in the workforce. A significant increase happened in 2020 due to Covid-19 pandemic, leading to numerous dismissals. This research aims to discover the factors influencing educated unemployment in Java using Fixed Effect Model (FEM) panel data analysis, which comprises cross-sectional data from six provinces in Java and time series data spanning from 2016 to 2022. The results of the research show that education level variable (average years of schooling) has a negative and insignificant influence on educated unemployment, provincial minimum wage has a negative and significant influence on educated unemployment, GRDP has a positive and insignificant influence on educated unemployment, foreign direct investment has a positive and significant effect on educated unemployment, local direct investment has a positive and significant influence on educated unemployment, and Covid-19 pandemic has a positive and significant influence on educated unemployment in Java from 2016 to 2022.

Keywords: Education Level, Educated Unemployment, Foreign Direct Investment (FDI), Gross Regional Domestic Product (GRDP), Local Direct Investment

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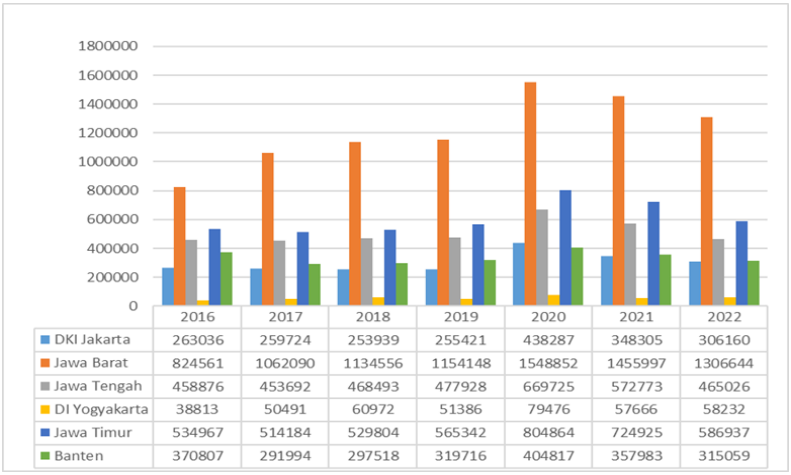
INTRODUCTION

Java is the largest island in the world by population. The Java region is approximately 128.297 square kilometers in area and has a population of over 140 million. This indicates that approximately half of the country's population is located in Java. Also, Java is the center of government, education, industry, and the economy. This causes competition among seekers of jobs to be tougher. This increases the unemployment rate in Java to over 7%.

The cluster with the highest unemployment rate in Java is comprised of high school graduates. This contrasts with the large number of prestigious schools and colleges in Java that are said to have the potential to produce more competent human resources for employment. Realizing that unemployment is a very complex problem (Hendrayanti & Fauziyanti, 2021). However, what is happening is the opposite; the rate of unemployment among educated people is also highest. The total number of people educated but unemployed in Java in recent years is as follows.

Image 1.1. The Number of Educated Unemployed Individuals in Java from 2016 to 2022



	2016	2017	2018	2019	2020	2021	2022
DKI Jakarta	263036	259724	253939	255421	438287	348305	306160
Jawa Barat	824561	1062090	1134556	1154148	1548852	1455997	1306644
Jawa Tengah	458876	453692	468493	477928	669725	572773	465026
DI Yogyakarta	38813	50491	60972	51386	79476	57666	58232
Jawa Timur	534967	514184	529804	565342	804864	724925	586937
Banten	370807	291994	297518	319716	404817	357983	315059

Image 1.1 demonstrates that the percentage of unemployed high school and college graduates in Java is typically higher during the 2016/2022 season. The province with the greatest number of educated unemployed individuals is West Java from 2016 through 2022, and in 2020, during the Covid-19 crisis, its population was the greatest, having reached 1.548.852 individuals. Meanwhile, Yogyakarta has the lowest percentage of educated unemployed individuals in Java from 2016/2022. Educated unemployment can occur because of the mismatch between education plans and available jobs, which sometimes necessitates an employee with a higher education level to have a lower education level (overeducation) (Safuan & Nazara, 2005).

Several factors can influence the number of educated people who are unemployed, including the average number of years of schooling, the provincial minimum wage, the GRDP, foreign investment, local investment, and the COVID-19 pandemic. Education has the greatest association with educated unemployment because the higher the education level, the greater the employment opportunity, which will reduce the number of educated unemployed individuals (Fitri & Junaidi, 2016).

In human capital theory, education is considered one of the human expenditures that entail the planting of knowledge and skills intended to enhance the quality of human resources. In reality, the attempt to increase the number of educational facilities in Indonesia in order to achieve equality in education is not accompanied by an improvement in the quality of its graduates. This facilitates the increase of both young and educated people looking for jobs (Bachtiar, 2004).

Another factor that affects the number of educated unemployed people is the minimum wage, which is said to be inversely proportional to the local unemployment rate. Additionally, research by Anjarwati and Juliprijanto (2021) revealed that wages have an effect on the educated unemployment rate. This is in agreement with the labor demand theory. An increase in the wage decreases the demand for labor and leaves available jobs, this increases the unemployment rate (Bianchi et al., 2021) state that Covid-19 may increase the difficulty of the labor market due to lockdowns which slow down demand and supply of labor.

According to Todaro and Smith (2011), the increase in GRDP will lead to a change in people's consumption patterns in order to satisfy their needs. What occurred in 2020 is not consonant with the theory, as the public's purchasing power was reduced due to the Covid-19 pandemic, this led to a decrease in their daily consumption patterns.

Direct investment from abroad and local sources, as well as educated unemployment, are all aspects of economic importance that affect the educated population. A theory by Harrod-Domar suggests that there is a connection between investment and unemployment: investments not only affect the demand for labor but also increase the capacity for production. By increasing production, the demand for labor will also increase, this will hopefully bring in educated individuals that are unemployed.

Based on the descriptions above, the author is interested in observing the issue of educated unemployment among high school and college graduates, as well as the conditions of educated unemployment in Java, all of which are accomplished through the identification of factors that influence the problem. As a result, the subject of this research is "Determinants of Educated Unemployment in Java from 2016-2022".

LITERATURE REVIEW

Labor Market Concept

The labor market is a place where jobseekers and employers meet. The participants in the labor market are business owners in need of labor, job seekers, and mediators or third parties that facilitate the connection between business owners and job seekers. According to the classical assumption, an economy based on the strength of market mechanisms will always reach equilibrium. The labor market, according to the classical assumption, is considered a product market where if the price of labor (wage) is flexible, labor demand will equal labor supply. Meanwhile, a theory by Keynes states that in reality, the labor market does not align with the classical assumption. Workers have unions that will fight for their wages so they won't decrease. A wage decrease will decrease people's purchasing power, which will affect a decrease in prices.

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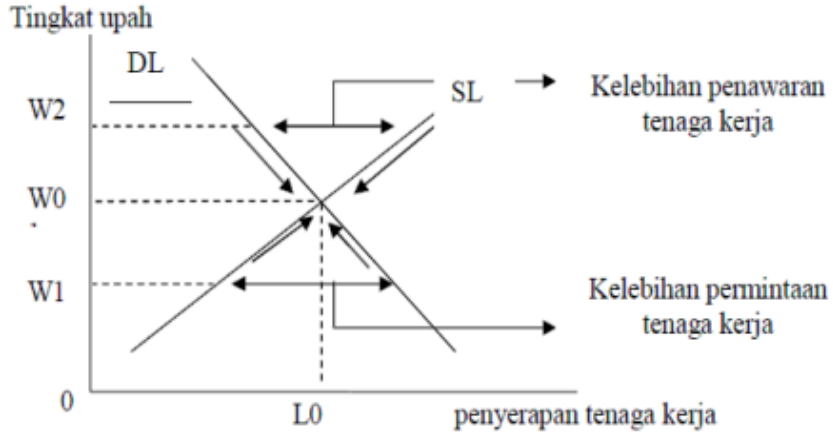
Image 1.2 Labor Demand and Supply Equilibrium Curve



Source: Nicholson (2008).

In Image 1.2, the vertical line W represents the wage rate, and the horizontal line represents the employment rate. SL is supply, DL is demand, W0 or W equilibrium is the balance point between labor supply and demand. The condition when the number of individuals offering their labor to work as the number of demanded labor is located at W0 or wage equilibrium. Therefore, in this condition, there is no excess supply of labor or excess demand for labor because, at the wage equilibrium rate W0, all potential workers are at full employment. At the higher wage rate W2, labor supply is higher than labor demand, leading to competition in getting a job, which contributes to the decrease of the wage rate near point W0. Conversely, if the wage rate is low W1, labor demand will exceed the existing supply, causing competition in acquiring labor. This will increase the wage rate towards W0.

Educated Unemployment

Educated unemployment occurs when an individual, having graduated from high school or above, seeks employment but has not secured it yet. According to Mankiw (2003), educated unemployment is defined as an individual who is seeking employment or is not currently working but holds at least a high school diploma or its equivalent. In a developing country like Indonesia, high school and college graduates are not exempt from the risk of unemployment. Central Statistics Agency stated that unemployment in Indonesia has increased and dominated by people at age 20-29 years (Muhtar & Lutfi, 2021). The presence of educated unemployment indicates a decrease in human resource productivity and the government's failure to utilize human resources.

Human Capital Theory

The human capital theory developed by Becker (1965) states that the most important investment for improving the quality of human resources is training. Investments in human resources significantly contribute to increased productivity through education and training. The primary concept of the human capital theory, according to Todaro and Smith (2011), is an important investment component in boosting economic productivity. Fitz-Enz (2000) states that human capital comprises three factors: (1) personal attributes or traits exhibited in a job, such as intelligence, energy, positive attitude, and commitment; (2) a person's capacity to learn, encompassing intellect, imagination, creativity, or talent; and (3) the motivation to share information and knowledge, reflecting the drive to achieve goals.

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Job Search Theory

The job search theory is a method used to describe the unemployment problem from the supply perspective, focusing on an individual's decision to participate in the labor market based on their characteristics. The basic assumption of this theory is a risk-neutral individual referring to expected net income and the reservation wage for consideration in accepting or refusing a job. According to Borjas (2016), the job search theory also describes an individual's decision not to work to secure the best job offer, which means they prefer to stay unemployed for a longer period to secure a higher-paying job. Perfect information is required to identify which company offers the highest salary, and the job search process is not needed. This is not possible; an individual will be unemployed for a certain period to search and secure the best job or a job with the highest salary (Kaufman & Hotchkis, 2000).

RESEARCH METHOD

This research uses the data panel analysis method to examine the influence of the independent variables: Education Level (the average years of schooling for individuals aged 15 years or older), provincial minimum wage, gross regional domestic product (GRDP), foreign direct investment, local direct investment, and Covid-19 pandemic on the dependent variable—the number of educated unemployed individuals in Java from 2016 to 2022. This research uses secondary data from Badan Pusat Statistik, and the research sample is all educated unemployed individuals holding a high school diploma or higher in six provinces in Java, which are DKI Jakarta, West Java, Central Java, DI Yogyakarta, East Java, and Banten.

The econometric model used for the estimations in this research is:

$$Y_{i,t} = \beta_0 + \beta_1 X_{1i.t} + \beta_2 X_{2i.t} + \beta_3 X_{3i.t} + \beta_4 X_{4i.t} + \beta_5 X_{5i.t} + \beta_6 D_{6i.t} + e_{it}$$

There is a difference in the data units of educated unemployed individuals (millions of individuals), provincial minimum wage (millions of rupiah), gross regional domestic product (billions of rupiahs), foreign direct investment (millions of dollars), and local direct investment (billions of rupiah) with education level data unit, which has indicators of the average years of schooling of people aged 15 years or older (percentage) and dummy variable Covid-19. Therefore, the model needs to be transformed to natural logarithm. The regression equation, after being transformed to natural logarithm, is as follows:

$$\log(Y_{i,t}) = \beta_0 + \beta_1 X_{1i.t} + \beta_2 \log(X_{2i.t}) + \beta_3 Log(X_{3i.t}) + \beta_4 Log(X_{4i.t}) + \beta_5 Log(X_{5i.t}) + \beta_6 D_{6i.t} + e_{it}$$

Where:

Log Y	: Educated unemployment
β_0	: Constant coefficient
β_1, 2, 3, 4	: Regression/slope coefficient estimator
X1	: Education level (average years of schooling of people aged 15 years or older)
Log (X2)	: Provincial minimum wage
Log (X3)	: Gross Regional Domestic Product (GRDP)
Log (X4)	: Foreign direct investment
Log (X5)	: Local direct investment
D6	: Dummy variable during Covid in 2020 (1) and other years (0)
e_it	: Error term or confounding variable/residual variable

The steps in analyzing the panel data are as follows: (1) Estimation of the best model on panel data regression with Common Effect or Pooled Least Squares, Fixed Effect Model (FEM), and Random Effect Model (REM) approach, (2) Conduct a selection test for the best panel data regression model using the Chow Test, Hausman Test, and Lagrange Multiplier Test, (3) Conduct classical assumption tests, and (4) Conduct a hypothesis test.

RESULTS

The purpose of panel data regression model selection is to choose the best and most suitable model among the three panel regression models: Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM) using Chow test, Hausman test, and Lagrange Multiplier test. Here are the results of panel regression model selection based on those three tests:

Table 1. Regression Model Selection Results

No.	Test	Test Result	Conclusion	Chosen Model
1	Chow test	Prob = 0,0000	Between FEM and CEM, FEM is chosen.	*FEM (Fixed Effect Model)*
2	Hausman test	Prob = 0.0000	Between FEM and REM, FEM is chosen.	
3	Lagrange Multiplier test	Prob = 1,0000	Between CEM and REM, CEM is chosen.	

Based on the summary of regression model selection test results using Chow test, Hausman test, and Lagrange Multiplier test, it can be concluded that the best chosen-model is Fixed Effect Model.

Table 2. Data Panel Regression with Fixed Effect Model Method Results

Educated Unemployment	Coef	Std Error	P>|z|
Average years of schooling	-.0299368	.1012817	0.768
Provincial minimum wage	-.6129805	.131455	0.000
GRDP	.1284666	.1216378	0.291
Foreign Direct Investment	.6087928	.0931308	0.000
Local Direct Investment	.3392405	.1409388	0.016
COVID	.747801	.1680275	0.000
C	-.1073453	.0606702	0.077

Note: R^2 = 0.8580 (p < .01) **p < .01

The regression equation in this research is as follows.

$$Y = - 0{,}1073 – 0{,}0299\ (X1) – 0{,}6130\ (logX2) + 0{,}1285\ (logX3) + 0{,}6088\ (logX4) + 0{,}3392\ (logX5) + 0{,}7478\ (X6)$$

Based on the table above using data panel regression with fixed-effect model approach, it can be observed how independent variables (average years of schooling, provincial minimum wage, gross regional domestic product, foreign direct investment, local direct investment, and Covid-19 pandemic) influence the dependent variable (educated unemployment) in Java as follows. First, average years of schooling on educated unemployment average years of schooling has no positive and significant influence on educated unemployment, as indicated by p-value of 0.786 < 0.05, which means the value of average years of schooling does not affect the value of educated unemployment.

Second, provincial minimum wage on educated unemployment provincial minimum wage has a negative and significant influence on educated unemployment, as indicated by p-value of 0.000 < 0.05 and negative path coefficient of -0.6130, which means the higher the provincial minimum wage, the higher the educated unemployment and vice versa, the lower the provincial minimum wage, the lower the educated unemployment. Third, GRDP on educated unemployment GRDP does not have a positive and significant influence on educated unemployment, as indicated by p-value of 0.291 < 0.05, which means the value of GRDP does not affect the value of educated unemployment. Fourth, foreign direct investment on educated unemployment foreign direct investment has a positive and significant influence on educated unemployment, as indicated by p-value of 0.000 < 0.05 and positive path coefficient of 0.6088, which means the higher the foreign direct investment, the higher the educated unemployment and vice versa, the lower the foreign direct investment, the lower the educated unemployment. Fifth, local direct investment on educated unemployment local direct investment has a positive and significant influence on educated unemployment, as indicated by p-value of 0.016 < 0.05 and positive path coefficient of 0.3392, which means the higher the local direct investment, the higher the educated unemployment and vice versa, the lower the local direct investment, the lower the educated unemployment. Sixth, covid on educated unemployment Covid has a positive and significant influence on educated unemployment, as indicated by p-value of 0.000 < 0.05 and positive path coefficient of 0.74768, which means the higher the local direct investment, the higher the educated unemployment and vice versa, the lower the local direct investment, the lower the educated unemployment.

Coefficient of Determination (R2)

The test result of the coefficient of determination is 0.8580 or 85.80%, indicating that the influence of the independent variables (average years of schooling, provincial minimum wage, gross regional domestic product, foreign direct investment, local direct investment, and Covid-19 pandemic) on the dependent variable (educated unemployment) is 85.80%, meanwhile, 14.20% is influenced by other variables not included or discussed in this research.

Classical Assumption Test

The assumption test in panel regression analysis includes multicollinearity, heteroscedasticity, and autocorrelation assumptions. If the panel regression model is estimated by using OLS model (the chosen fixed effect or common effect during regression model selection), the classical assumption must be met. If the regression model is estimated by using GLS model (chosen random effect during the regression model selection), the classical assumption can be avoided or is allowed to not be met. (Gujarati, 2012).

Multicollinearity Test

Multicollinearity test is conducted by seeing the correlation value between free variables. In this test, all free variables are declared not to experience multicollinearity if the correlation value between variables is smaller than 0.9.

Table 3. **Multicollinearity Test Results**

	Lama_s-h	UMP	PDRB	PMA	PMD	Covid
Lama sekolah	1.0000					
UMP	0.8084	1.0000				
PDRB	0.0654	0.4403	1.0000			
PMA	0.1236	0.3356	0.6229	1.0000		
PMD	0.0748	0.4358	0.8610	0.6433	1.0000	
Covid	0.0527	0.1010	0.0082	-0.0883	0.0421	1.0000

Based on the multicollinearity test results between the free variables in the table above, the multicollinearity value of the free variables is all lower than 0.9, indicating that there is no multicollinearity in the regression model.

Heteroscedasticity Test
Heteroscedasticity test can be conducted by using the Breusch-Pagan test. In this test, a model is considered to contain heteroscedasticity if the Chi-Square probability is < 0.05, whereas if the Chi-Square probability is > 0.05, the model does not contain heteroscedasticity.

Heteroscedasticity Test Results

Modified Wald test for groupwise heteroskedasticity in fixed effect regression model.

HO: sigma(i)^2 = sigma^2 for all i

chi2 (6) = 27.58
Prob > ch12 = 0.0001

Based on the heteroscedasticity test results in Table 4 above, the Chi-Square probability value is 0.0000 < 0.05, which means there is heteroscedasticity in the regression model.

Autocorrelation Test
Autocorrelation test can be conducted by using the Run Test. In this test, a regression model is considered not to contain autocorrelation if its significance value is > 0.05.

Autocorrelation Test Results
Wooldridge test for autocorrelation in panel data.

HO: no first-order autocorrelation
F (1, 5) = 157.292
Prob > F = 0.0001

Based on the autocorrelation test results in the table above, the probability value of the LM test is not significant, 0.0004, indicating that there is autocorrelation in the regression model.

Based on the results of classical assumption tests above, it can be concluded that the regression model does not meet the heteroscedasticity and autocorrelation assumptions, which means the estimation of panel regression model must be done by using estimation technique with heteroscedasticity and autocorrelation correction.

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DISCUSSION

The Influence of Education Level on Educated Unemployment

Education level, represented by average years of schooling, has no positive and significant influence on educated unemployment. This occurrence is attributed to educated unemployment not solely arising from the lack of formal education, but also the lack of non-formal educations and trainings tailored to the demands of the digitalization era. This research aligns with a theory by Todaro and Smith (2011) which states that the rate of educated unemployment encompasses less educated individuals willing to undertake any job to fulfil their needs, often in the informal sector. Meanwhile, educated unemployment individuals tend to seek professions aligned with their education, frequently opting for the formal sector to attain relatively higher job satisfaction (Todaro, 2011).

The Influence of Provincial Minimum Wage on Educated Unemployment

Provincial minimum wage has a negative and significant influence on educated unemployment. This implies that each increase in minimum wage will decrease educated unemployment rate in Java. This finding contradicts with Sumarsono's (2009) who concludes that there is a positive correlation between wage and unemployment because if wage increases, labor demand will decrease and unemployment will increase. Mankiw (2003) also explains that an increase in minimum wage will decrease the number of potential workers (particularly those lacking experience and education) which potentially will lead to increased unemployment. In this research, minimum wage is used by companies to hire educated workers seeking higher salary due to their heightened productivity. It's reasonable that when minimum wage increases, educated unemployment will decrease.

The Influence of GRDP on Educated Unemployment

GRDP has a positive and insignificant influence on educated unemployment in Java between 2016 and 2022. This suggests that the value of GRDP has no impact on the unemployment rate in Java. High economic growth apparently is not accompanied by a production capacity that prioritizes labor over technology, leading to a lower hiring rate for labor and a greater emphasis on capital. This also suggests that production activities will output and produce higher income that only prioritizes profitability, which will cause the demand for labor to be smaller and the number of educated unemployed persons to be higher. This finding is not in line with Okun's law, which states there is negative correlation between GRDP and educated unemployment, indicating that every decrease in GRDP will cause an increase in educated unemployment.

The Influence of Foreign and Local Direct Investment on Educated Unemployment

Foreign and local direct investment have a positive and significant influence on educated unemployment. This suggests that if there is an increase in investment, the number of educated unemployed individuals will also increase. This finding is not in line with Harrod Omar's theory which states there is a correlation between investment and unemployment, where investment not only creates labor demand but can also increase production capacity. This suggests that if production capacity increases, labor demand will also increase with the assumption of full employment. Investments in Java, whether foreign or local, are capital-intensive, rather than labor intensive. Companies tend to use more advanced technology and sophisticated equipment and robots in the production process to maximize profit. This will reduce job creation despite the many investments from local or abroad sources.

The Influence of COVID-19 Pandemic on Educated Unemployment

COVID-19 pandemic has a strong influence on educated unemployment in Java which keeps increasing with the increase of open unemployment rate. This aligns with research by Coibion et al (2020) in Setyanti and Finuliyah (2022), which states the number of people who lost their jobs due to Covid-19 pandemic is larger than the number of unemployed individuals not affected by Covid-19. Covid-19 pandemic also influences educated unemployment, where many new graduates with higher level of education have not secured a job due to lack of opportunity offered by companies. Companies also tend to decrease their number of employees with dismissal to decrease production costs. This aligns with research by Setyanti and Finuliyah (2022) which states that 23,28 percent of educated unemployed individuals lost their jobs due to Covid-19 pandemic, which caused a significant increase in the number of educated unemployed individuals in 2020.

CONCLUSION

Based on the results of the research that has been conducted, the following conclusions can be made. First, the education level variable (average years of schooling) has a negative and insignificant influence on educated unemployment in Java from 2016 to 2022. Second, provincial minimum wage has a negative and significant influence on educated unemployment in Java from 2016 to 2022. Third, GRDP has a positive and insignificant influence on educated unemployment in Java from 2016 to 2022. Fourth, foreign direct investment has a positive and significant influence on educated unemployment in Java from 2016 to 2022. Fifth, local direct investment has a positive and significant influence on educated unemployment in Java from 2016 to 2022. Sixth, Covid-19 pandemic has a positive and significant influence on educated unemployment in Java from 2016 to 2022.

Based on the results of the research, there is a need to address educated unemployment through work training programs that tailored to the digitalization development, so that educated unemployed individuals can enter the workforce more easily.

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DECLARATION OF CONFLICTING INTERESTS

The author (s) declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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