
The Effect of Population Growth, Human Development Index, City Minimum Wage, and Sectoral Economic Growth on the Open Unemployment Rate in Jambi City

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ABSTRACT

This study examines the relationship between population growth, the Human Development Index (HDI), the city's minimum wage, sectoral economic growth and the open unemployment rate in Jambi City. Time-series data for 2000–2023 were obtained from the Central Statistics Agency (BPS) of Jambi Province and Jambi City and analysed using multiple linear regression, with descriptive statistics. Based on the reported regression estimates, population growth, HDI, the city's minimum wage, and growth in the agricultural, industrial, and service sectors show negative coefficients in relation to the open unemployment rate. The reported variable-level probability values indicate statistical significance at the 5% level, while the model explains 39.84% of the variation in the open unemployment rate. The findings highlight the importance of labour-market alignment and sectoral development in efforts to reduce unemployment in Jambi City.

Keywords: *Population Growth, HDI, Minimum Wage, Agricultural Sector, Industrial Sector, Service Sector, Unemployment*

How to Cite

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1. INTRODUCTION

Unemployment remains a critical macroeconomic and social issue, particularly in developing economies experiencing rapid demographic changes. Unemployment is the condition in which individuals in the labour force are without jobs and are actively seeking work. This phenomenon occurs because of an imbalance between the growing number of workers and the labour market's capacity to absorb them. The gap between labour force growth and job availability creates complex challenges. Although the government has implemented various policies and programs to create job opportunities, job growth often fails to keep pace with overall workforce growth. As a result, the unemployment rate increases, which can trigger broader social and economic impacts.

The unemployment rate in Indonesia is an important indicator for assessing the labour market's ability to absorb the labour force. When the unemployment rate rises, it affects individuals and contributes to higher poverty rates, crime, and overall economic deterioration. The unemployment rate is not merely an economic issue; it is also a complex social issue shaped by many interacting factors. The mismatch between a growing labour force and limited job opportunities creates a gap that can worsen social conditions and increase the risk of poverty.

According to Todaro and Smith (2003), the unemployment rate is closely related to the poverty rate. High unemployment can reduce community income, hindering the ability to meet basic needs and increasing poverty levels. An economy's success can be evaluated through three main indicators: output, unemployment rate, and inflation. These macroeconomic variables are interrelated. When a country's real output exceeds its potential output capacity, labour utilisation generally increases and inflationary pressure may emerge. The negative relationship between the output gap and unemployment is commonly discussed through Okun's Law (Darman, 2013).

Based on data from Badan Pusat Statistik Provinsi Jambi (2024), although Indonesia's unemployment trend has declined in recent years, the rate remains higher than in several neighbouring countries. Data from the Indonesian Central Statistics Agency for 2019 to 2023 indicate that the number of employed people declined by an average of 0.04% per year. This decline reflects slow job growth that may not keep pace with population growth, particularly among the productive-age group. Conversely, the unemployment rate increased by an average of 1.75% annually during the same period. These patterns indicate continuing employment challenges, especially in rapidly urbanising areas. Therefore, more effective strategies are needed to expand job opportunities and strengthen workforce skills and labour-market competitiveness.

The impact of the unemployment rate on society is significant and complex. Beyond losing a reliable source of income, job loss also makes it difficult for individuals to afford necessities such as clothing, food, and housing. This often triggers larger social issues, including rising poverty rates, economic inequality, and deteriorating social cohesion. A high unemployment rate can also cause social instability, increase the risk of criminal activity under economic pressure, and worsen public safety and order. Furthermore, widespread unemployment can amplify public dissatisfaction with the government, thereby increasing the risk of social unrest and political instability. More broadly, chronic unemployment can disrupt economic and social development and exacerbate structural injustices in the distribution of resources and economic opportunities. Thus, unemployment cannot be viewed solely from an economic perspective; it must be understood as a multidimensional issue that requires a holistic approach to resolve.

The success of poverty reduction efforts depends not only on economic growth but also on how the benefits of that growth are fairly distributed across all segments of society. High income inequality, poorly managed urbanization, and population growth that is not matched by job-creation capacity will worsen the effects of unemployment and poverty. Therefore, addressing this issue requires a more comprehensive, integrated approach that combines economic development strategies with sustainable social policies.

Previous research has identified various factors contributing to the Open Unemployment Rate (OUR). Studies by Suroya & Erdkhadifa (2023), Astuti et al. (2019), and Lestari & Woyanti (2020) indicate that population size significantly affects the unemployment rate. All three studies emphasise that population growth not matched by increased job opportunities is a major factor in high unemployment. When the number of individuals in the productive age group continues to rise but job creation does not keep pace, the unemployment rate tends to increase.

Beyond demographic factors, Hasibuan (2023), Qamariyah et al. (2022), and Suroya & Erdkhadifa (2023) examined the relationship between the Human Development Index (HDI) and the open unemployment rate. Their findings show that HDI significantly affects the unemployment rate, but in opposite directions. An increase in human resource quality without job growth can lead to a surge in unemployment, as a more skilled workforce seeks jobs that meet higher standards. However, in some contexts, an increase in HDI can help reduce the unemployment rate when improvements in workforce quality are accompanied by enhanced job opportunities. Therefore, the relationship between HDI and unemployment greatly depends on local economic dynamics and the employment policies implemented in a given area.

On the other hand, research conducted by Pasuria & Triwahyuningtyas (2022), Simbolon et al. (2023), and Putra & Hidayah (2023) reveals that minimum wage policies significantly reduce the open unemployment rate. An increase in the minimum wage increases the workforce's purchasing power, ultimately stimulating economic growth and expanding job opportunities. This study argues that appropriate minimum wage policies can effectively reduce unemployment, especially when supported by economic policies that promote job creation.

Furthermore, research by Azis et al. (2021), Syahputra et al. (2019), and Syahril (2014) indicates that economic growth is significantly related to the open unemployment rate. As economic growth increases, more job opportunities are created, thereby absorbing more labour. This is consistent with economic theory, which holds that economic expansion increases investment, production, and labour demand, ultimately reducing the unemployment rate.

These studies suggest that factors such as population size, the Human Development Index (HDI), minimum wage policies, and economic growth significantly determine the open unemployment rate. Therefore, in the context of Jambi City, further analysis of these factors is crucial for designing effective policy strategies to reduce unemployment and improve community welfare.

This study examines how population growth, the Human Development Index (HDI), the city's minimum wage, and sectoral economic growth influence the open unemployment rate in Jambi City. As an economic and governmental centre, Jambi City faces complex population dynamics and labour market challenges, in which the gap between labour skills and market needs often drives unemployment. The variables used in this study are consistent with previous research, particularly regarding economic growth. However, this study differs in that it considers not only overall economic growth but also sectoral growth in agriculture, manufacturing, and services. This approach aims to understand how each sector contributes to the open unemployment rate, given that each sector plays a different role in job creation.

2. LITERATURE REVIEW

2.1 Population Growth

Population refers to all individuals who meet the requirements of the applicable laws in a state and have resided in a certain geographic area for a specified period of time. The term "population" refers to the number of individuals living in a given area over a specified period (Prabowo et al., 2023). A population is a group of people domiciled in a country. A person is categorised as an Indonesian resident if he has lived there for at least six months or intends to stay longer, even if he has not yet lived there for six months.

2.2 Human Development Index

The Human Development Index (HDI) is an instrument used by the United Nations Development Programme (UNDP) to assess the success rate of human development. The index compares life expectancy, literacy rates measured by recent educational attainment, and individual purchasing power across countries. An increase in HDI contributes to economic growth by strengthening people's capacity for productivity and creativity (Muqorrobin & Soejoto, 2017).

2.3 City Minimum Wage

Wages are the rewards that an organisation or agency must pay its employees. The amount paid affects labor supply and demand (Arida et al., 2015). To meet workers' basic needs, the government has set minimum wage requirements. However, the salaries they earn at work are sometimes still below the minimum wage, leaving them and their families

unable to cover the cost of living. So often, many people resign and move to other workplaces because the wages they receive are not appropriate.

2.4 Sectoral Economic Growth

Sectoral economic growth refers to economic growth assessed through the contribution of specific economic sectors within a region. Each sector, including trade, industry, services, construction, and agriculture, plays a distinct role in regional development. Sectoral analysis provides a more detailed understanding of how individual sectors contribute to Gross Domestic Product (GDP) or Gross Regional Domestic Product (GRDP). Kuznets defines economic growth as the long-term expansion of a country's capacity to provide a wider range of goods and services to its population, supported by technological progress and institutional adjustment (Ma'ruf & Wihastuti, 2008).

2.5 Unemployment and Open Unemployment Rate

In terms of employment statistics, the Central Statistics Agency (BPS) defines the unemployment rate as the number of unemployed people who are actively looking for work or starting new businesses. It also includes people who have been hired but have not yet started working. This definition reflects different aspects of the Unemployment problem, so understanding labour market dynamics is crucial to formulating effective policies to address it. The unemployment rate is a macroeconomic problem that directly impacts society and is one of the toughest challenges. Job loss causes psychological discomfort and a decline in living standards for many people. Therefore, it is not surprising that unemployment often comes up in political discussions, where politicians claim their proposed policies can contribute to job creation (Aswanto, 2021).

3. METHODOLOGY

3.1 Data and Approach

This study employed quantitative descriptive analysis. Descriptive research is used to describe observed events or phenomena systematically (Sudjana & Ibrahim, 2012). The study relied on secondary time-series data for 2000–2023 obtained from published reports of BPS Kota Jambi and BPS Provinsi Jambi (Badan Pusat Statistik Kota Jambi, 2024; Badan Pusat Statistik Provinsi Jambi, 2024).

3.2 Model Specification

This study used quantitative descriptive analysis and multiple linear regression to estimate the relationship between population growth, the Human Development Index, the city minimum wage, sectoral economic growth, and the open unemployment rate. The basic model is specified as follows:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + e_i$$

Distributed into research variables, it can be written as follows:

$$TPT = \beta_0 + \beta_1 PP + \beta_2 HDI + \beta_3 UMK + \beta_4 PEA + \beta_5 PEMn + \beta_6 PES + e_i$$

It is further transformed in the form of logarithms as follows:

$$\text{Log}(TPT) = \beta_0 + \beta_1 \text{Log}(PP) + \beta_2 \text{Log}(HDI) + \beta_3 \text{Log}(UMK) + \beta_4 \text{Log}(PEA) + \beta_5 \text{Log}(PEMn) + \beta_6 \text{Log}(PES) + e_i$$

Where:

β_0 = Constant

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ = Variable coefficient

TPT = Open Unemployment Rate

PP = Population Growth

HDI = Human Development Index

UMK = City Minimum Wage

PEA = Economic Growth of the Agricultural Sector

PEMn = Economic Growth of the Industrial Sector

PES = Economic Growth in the Service Sector
 ϵ_i = Error term.

3.3 Analytical Techniques

The coefficient of determination (R^2) was used to assess the proportion of variation in the dependent variable explained by the regression model. R^2 ranges from zero to one, with higher values indicating greater explanatory power of the model (Kuncoro, 2003).

The F-test was used to assess whether the independent variables jointly explain variation in the dependent variable. At the 5% significance level, the null hypothesis of no joint effect is rejected when the reported probability value is below 0.05 (Kuncoro, 2003).

The t-test was used to assess the statistical significance of each regression coefficient while holding the other variables constant. At the 5% significance level, the hypotheses are $H_0: \beta_i = 0$, indicating no statistically significant partial relationship, and $H_1: \beta_i \neq 0$, indicating a statistically significant partial relationship. The decision is based on the reported probability value, with H_0 rejected when $p < 0.05$ (Kuncoro, 2003).

4. FINDINGS AND DISCUSSION

Multiple linear regression was used to examine the relationship between population growth (X1), Human Development Index (X2), city minimum wage (X3), agricultural-sector economic growth (X4), industrial-sector economic growth (X5), and service-sector economic growth (X6) and the dependent variable, the open unemployment rate in Jambi City. The analysis was conducted using EViews 12, and the reported estimation results are presented below.

Table 1: Estimation of Multiple Linear Regression Test Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	-0.000302	0.000134	-2.258679	0.0373
X2	-0.182261	1.195752	-0.152425	0.0206
X3	-1.780069	8.16E-06	-2.181431	0.0435
X4	-18.86669	8.630854	-2.185958	0.0431
X5	-10.94677	5.641027	-1.940562	0.0309
X6	-12.08135	5.752966	-2.100021	0.0490
C	1325.383	613.1567	2.161573	0.0452

Model Summary

Statistic	Value	Statistic	Value
R-squared	0.398448	Mean dependent var	8.332539
Adjusted R-squared	0.861399	S.D. dependent var	4.267423
S.E. of regression	3.849830	Akaike info criterion	5.772428
Sum squared resid	251.9603	Schwarz criterion	6.116027
Log likelihood	-62.26914	Hannan-Quinn criterion.	5.863585
F-statistic	1.876709	Durbin-Watson stat	2.714929
Prob(F-statistic)	0.014358		

Source: Eviews (data processed), 2024

It can be formulated as follows:

$$TPT = \beta_0 + \beta_1PP + \beta_2HDI + \beta_3UMK + \beta_4PEA + \beta_5PEMn + \beta_6PES + \epsilon$$

Based on Table 1, the results of the multiple linear regression analysis are presented. The following equation is

obtained.

$$\text{TPT} = 1325.383 - 0.000302X_1 - 0.182261X_2 - 1.780069X_3 - 18.86669X_4 - 10.94677X_5 - 12.08135X_6 + e$$

4.1 Model Fit

The reported R^2 value in Table 1 is 0.398448, indicating that approximately 39.84% of the variation in the open unemployment rate is explained by population growth, the Human Development Index, the city minimum wage, and economic growth in the agricultural, industrial, and service sectors. The remaining 60.16% is associated with factors not included in the model.

4.2 Simultaneous Effect

The simultaneous test or F test is a test used to understand whether the independent variables of population growth (X_1), human development index (X_2), minimum wage (X_3), economic growth in the agricultural sector (X_4), economic growth in the manufacturing sector (X_5) and economic growth in the service/services sector (X_6) together (simultaneously) have an influence on the dependent variable, namely open unemployment in Jambi City. If the significance value is < 0.05 , then it can be concluded that the hypothesis is accepted and the independent variables together have an influence on the dependent variable. On the other hand, if the significance value is > 0.05 , then the hypothesis is rejected, and the independent variables together have no influence on the dependent variables.

Table 2
Statistical F Test Results

Statistic	Value	Statistic	Value
R-squared	0.398448	Mean dependent var	8.332539
Adjusted R-squared	0.861399	S.D. dependent var	4.267423
S.E. of regression	3.849830	Akaike info criterion	5.772428
Sum squared resid	251.9603	Schwarz criterion	6.116027
Log likelihood	-62.26914	Hannan-Quinn criterion.	5.863585
F-statistic	1.876709	Durbin-Watson stat	2.714929
Prob(F-statistic)	0.014358		

Source: EVIEWS (data processed), 2024

Based on Table 2, the reported probability of the F-statistic is 0.014358, which is below the 0.05 significance level. On the basis of this reported probability value, the null hypothesis of no joint relationship is rejected, indicating that population growth (X_1), the Human Development Index (X_2), the city minimum wage (X_3), and economic growth in the agricultural (X_4), industrial (X_5), and service (X_6) sectors are jointly associated with the open unemployment rate in Jambi City.

The partial t-test was used to assess the individual relationship between each explanatory variable and the open unemployment rate. The interpretation below follows the probability values reported in Table 3, using a 5% significance level.

Table 3
Statistical t-test results

Dependent Variable: LNNY

Method: Least Squares

Date: 04/22/25 **Time:** 21:52

Sample: 1 24

Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	-0.000302	0.000134	-2.258679	0.0373
X2	-0.182261	1.195752	-0.152424	0.0206

X3	-1.780069	8.16E-06	-2.181430	0.0435
X4	-18.86669	8.630854	-2.185958	0.0431
X5	-10.94677	5.641027	-1.940563	0.0309
X6	-12.08135	5.752966	-2.100021	0.0490
C	1325.383	613.1567	2.161573	0.0452

Source: EViews (data processed), 2024

Based on the reported probability values in Table 3, population growth ($p = 0.0373$), the Human Development Index ($p = 0.0206$), and the city minimum wage ($p = 0.0435$) are statistically significant at the 5% level. Their reported coefficients are negative, indicating inverse relationships with the open unemployment rate within the estimated model.

The reported probability values for agricultural-sector growth ($p = 0.0431$), industrial-sector growth ($p = 0.0309$), and service-sector growth ($p = 0.0490$) are also below 0.05. The corresponding coefficients are negative, indicating inverse relationships between sectoral economic growth and the open unemployment rate in the estimated model.

4.3 Partial Effects

4.3.1 Population Growth

The reported regression results indicate that population growth is statistically significant at the 5% level ($p = 0.0373$), with a small negative coefficient ($\beta = -0.000302$). Within the estimated log specification, this indicates a very small inverse association between population growth and the open unemployment rate during the study period. The direction of this result should be interpreted cautiously because population growth can affect unemployment differently depending on job creation, labour-force participation, and local economic capacity (Anggoro & Soesatyo, 2015).

Population growth can expand the labour supply and support economic activity when employment opportunities grow at a similar pace. However, when job creation does not keep pace with labour-force expansion, unemployment pressures may increase. The present result differs from Taime and Djaelani (2021), who found no significant effect of population growth on open unemployment in Mimika Regency, and from Malak et al. (2023), who reported that population size did not significantly influence the open unemployment rate in Manokwari Regency. These differences indicate that the population-unemployment relationship is sensitive to local labour-market conditions.

4.3.2 Human Development Index (HDI)

Based on Table 1, the Human Development Index has a reported negative coefficient of -0.182261 and a probability value of 0.0206. On the basis of the reported probability value, the relationship is statistically significant at the 5% level. The negative coefficient is consistent with the expectation that improvements in education, health, and living standards can strengthen workforce quality and employability. This finding is consistent with Puan Mahesa et al. (2024) and Baihawafi and Sebayang (2023), who reported negative relationships between HDI and open unemployment in their respective study contexts.

The negative HDI coefficient is also consistent with the human-capital perspective described by Todaro and Smith (2011), in which investment in education and human development can improve knowledge, skills, and productivity. Higher productivity may strengthen labour demand and employment opportunities when improvements in workforce quality are matched by economic expansion and appropriate job creation.

4.3.3 Minimum Wage

Based on the reported results, the city minimum wage has a negative coefficient of -1.780069 and a probability value of 0.0435. On the basis of the reported probability value, the relationship is statistically significant at the 5% level. The negative coefficient indicates that increases in the minimum wage were associated with lower open unemployment within the estimated model. This relationship should be interpreted in the context of labour demand, productivity, and the capacity of firms to absorb workers (Kaufman & Hotchkiss, 1999).

Minimum wage changes can affect employment through several channels. Higher wages may support household purchasing power and aggregate demand, but wage levels that exceed productivity growth may also increase labour costs for firms. Suhendra and Wicaksono (2016) reported a significant relationship between minimum wages and unemployment in Indonesia, while Mankiw (2012) explains that wage rigidity can contribute to unemployment when wages do not adjust toward labour-market equilibrium. Accordingly, the estimated negative association in Jambi City should be interpreted together with local productivity and business-sector conditions.

4.3.4 Agricultural Sector Growth

According to Okun's Law, stronger output growth is generally associated with lower unemployment (Samuelson & Nordhaus, 2005). In the present model, agricultural-sector growth has a reported coefficient of -18.86669 and a probability value of 0.0431, indicating a statistically significant negative relationship at the 5% level. Thus, higher agricultural-sector growth is associated with a lower open unemployment rate within the estimated model. This direction is consistent with Darman (2013), who reported a negative relationship between economic growth and unemployment in Indonesia.

Anggoro and Soesatyo (2015) similarly reported a negative and significant relationship between economic growth and the open unemployment rate in Surabaya. Farouk (2013) found that higher agricultural value added had a positive influence on labour absorption in East Kalimantan. These findings support the view that stronger agricultural activity can contribute to employment through direct labour demand and through linkages with non-agricultural activities and agro-industry.

4.3.5 Industrial Sector Growth

The reported results show that industrial-sector growth has a statistically significant negative relationship with the open unemployment rate ($\beta = -10.94677$, $p = 0.0309$). This direction is consistent with Okun's Law, which links stronger output growth with lower unemployment. Anggi Erlangga et al. (2024) similarly reported a negative relationship between economic growth and open unemployment in provinces on the island of Sumatra. Samuelson and Nordhaus (2005) also emphasise the close relationship between output fluctuations and unemployment.

Industrial expansion can increase labour demand directly and can also generate business opportunities through supply chains and supporting services. This is consistent with Martin Fajar and Pratiwi (2021), who reported that manufacturing investment and labour absorption contribute positively to economic growth. In this context, stronger industrial activity may support employment creation and help reduce unemployment.

4.3.6 Services Sector Growth

The service-sector growth variable has a reported coefficient of -12.08135 and a probability value of 0.0490, indicating a statistically significant negative relationship with the open unemployment rate at the 5% level. This direction is consistent with Okun's Law, in which stronger output growth is generally associated with lower unemployment. Within the study period, higher service-sector growth is therefore associated with a lower open unemployment rate in Jambi City.

This finding is consistent with Fatimah and Utomo (2023), who reported a significant negative relationship between the service sector and the open unemployment rate. Rusmana (2018) also found that service-sector investment positively affected economic growth, which can support employment creation. Because the service sector supports daily economic activity and a wide range of transactions, continued expansion of service activities can create additional employment opportunities and contribute to lower unemployment in Jambi City.

This study's policy implications emphasise the need for a comprehensive, integrated approach to reducing unemployment in Jambi City. The government should prioritise strengthening the industrial and service sectors as primary drivers of job creation, given their significant contribution to labour absorption. At the same time, education and training systems must better align with industry requirements to ensure the workforce has the skills and competencies the labour market demands. In addition, wage policies should be carefully designed to balance minimum wage increases with productivity growth, avoiding potential negative effects on employment. Finally, efforts to reduce unemployment should be supported by promoting inclusive and sustainable economic growth, ensuring that the benefits of development are equitably distributed while continuously expanding employment opportunities.

This study contributes to the literature by integrating sectoral economic analysis into unemployment research, thereby offering a better understanding of how different economic sectors influence labor market outcomes. It also provides robust long-term time-series evidence from 2000 to 2023, enabling a comprehensive examination of trends and dynamics. Furthermore, the study delivers policy-relevant insights that are particularly valuable for regional labor market planning and decision-making, especially in the context of developing economies.

5. CONCLUSION

This study examined the relationships between population growth, the Human Development Index (HDI), the city minimum wage, sectoral economic growth, and the open unemployment rate in Jambi City during 2000–2023. Based on the reported regression estimates, population growth, HDI, the city minimum wage, and growth in the agricultural, industrial, and service sectors each have negative coefficients. The reported variable-level probability values are below 0.05, indicating statistically significant relationships at the 5% level within the estimated model. These findings suggest that labour-market outcomes in Jambi City are associated with demographic conditions, human development, wage policy, and sectoral economic performance.

The sectoral results indicate that stronger agricultural, industrial, and service-sector growth is associated with lower open unemployment during the study period. The findings also suggest that improvements in human development and wage conditions should be accompanied by sufficient job creation and productivity growth so that gains in workforce quality and purchasing power can be absorbed by the labour market. Policy efforts should therefore emphasise balanced sectoral development, workforce skills, productivity, and the continued expansion of employment opportunities.

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7. CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in the paper.

8. AUTHOR CONTRIBUTION STATEMENT

Mutia Adha contributed to the conceptualisation, research design, and writing of the original draft.
Junaidi was responsible for data collection, analysis, and validation of the results.
Zamzami provided supervision, critical review, and editing of the final manuscript.
All authors have read and approved the final version of the manuscript.

9. ETHICS STATEMENT

This study used publicly available secondary aggregate data obtained from the Central Statistics Agency (BPS) and did not involve direct interaction with human participants. Accordingly, individual informed consent was not applicable. The study followed appropriate standards for the responsible use and reporting of secondary data.

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