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Impact of tourism revenues and inflation on economic growth: An empirical study on GUAM countries

Teymur Sarkhanov[a] ✉ | **Alig Baghirov**[bc]

[a]Azerbaijan State University of Economics (UNEC), Department of Economics and Business Administration, Baku, Azerbaijan.
[b]Research Center for Monetary Economics and Financial Technology, Azerbaijan State University of Economics (UNEC), Baku, Azerbaijan.
[c]Istanbul University, Economics Department, Turkey.

Abstract The aim of this study is to investigate the relationship between tourism income, consumer price index (CPI), and GDP per capita in Georgia, Ukraine, Azerbaijan, and Moldova (GUAM). The study covers annual data for the period 1995-2019. The method of long-run evaluation of the Pedroni cointegration coefficient was used as a research method. The results showed that, in general, growth in tourism revenues has a positive effect on GDP per capita, while the effect of CPI is negative. Along with this, it was found that the relationship of variables in the GUAM countries is different. In Georgia, there is a statistically significant long-run effect between GDP per capita, tourism income, and CPI. It is estimated that the growth of tourism income increases GDP per capita in all countries. However, the effect of the CPI on GDP per capita in Georgia and Azerbaijan is positive, but in Moldova and Ukraine, it is negative.

Keywords: tourism revenues, economic growth, inflation, GUAM, Pedroni's long-run cointegration test

1. Introduction

Tourism is becoming an increasingly important industry in many countries worldwide. Foreign exchange income from travel sales to international tourists has a special place in the country's GDP and has a positive influence on the balance of payments. Tourism, unlike other goods exported from the country, is regarded as an "invisible export" or "smokeless industry" because almost nothing is exported during the provision of tourism services, with the exception of souvenirs. As a result, the role of tourism in a country's economy can be assessed in relation to economic activity, the national currency, and the country's position in the world market. In general, tourism's share of the balance of payments plays an important role in shifting from a negative to a positive balance (Selamzade, 2020).

In particular, developing countries have designed policies to seriously develop the tourism industry in recent years. According to the United Nations World Tourism Organization's (UNWTO) most recent data, approximately 250 million international arrivals were recorded in the first five months of 2022. This means that the industry has recovered nearly half (46%) of its prepandemic 2019 levels, compared to the 77 million tourists expected between January and May 2021, when the COVID-19 pandemic impacted tourism in all countries (UNWTO, 2022).

With the positive contribution of this industry, many countries worldwide are taking steps to develop and promote the tourism industry. Currently, tourists include untouched natural environments, history, health, and sports tourism among their options, in addition to "sun, sea, and sand" tourism. Additionally, lower travel costs encourage more tourists to visit Asia and the Pacific, the Near East, and especially the Chinese. The governments of these countries also support this sector. The growth of the tourism industry necessitates substantial investment funds. Such mutual funds are still scarce in many developing countries. Many countries require foreign direct investments to fund economic development initiatives. The countries of the former Soviet Union, whose economies are in dire need of export earnings, also have some potential to participate in this market. It is expected that the economic changes reflected in the GDP figures will affect the development of tourism.

The study of the impact of tourism growth on the economic performance of a country is a widespread topic in modern scientific discourse. The main reason for including tourism revenue and the CPI in the analysis of this study is to determine the sensitivity between tourism revenue, CPI, and GDP per capita in the GUAM countries, which are unique objects of study. The existence of certain problems of competitiveness in industrial markets is forcing these countries to look for other directions of exports, including international tourism. Such studies can provide valuable guidance to those designing regulations to support economic growth and tourism in these countries.

2. Literature Review

Numerous studies show that increasing countries' income from tourism benefits their GDP per capita. Govdeli and Direkci (2017) conducted a study in 2017. It was studied for 34 OECD countries between 1997 and 2012 using the Pedroni and Cao cointegration tests to determine the long-run relationship between tourism revenue and economic growth. The results of a panel cointegration analysis show that an increase in tourism revenues has a long-run positive impact on economic growth.

A study in Azerbaijan examined this relationship using causation and cointegration tests using data from 1990 to 2014. The existence of a unidirectional causal relationship between tourism income and GDP was confirmed by the results of a causal relationship test, and these results confirmed the existence of a long-run relationship between tourism income and GDP (Salikhova and Akbulaev, 2016).

The relationship between tourism revenue in Nepal and economic growth was examined using causal analysis and Johansen's cointegration tests. As a result, it has been calculated that in the short run, there is a bidirectional causal relationship between tourism revenue and economic growth (Dhunge, 2015).

A study of the relationship between these indicators in Iran between 1960 and 2005 also revealed that there is a significant causal relationship between tourism income and GDP (Tayebi et al., 2009).

Pablo-Romero and Molina (2013) summarized numerous articles on this topic and concluded that the main factor influencing this relationship is the degree of specialization of the country in tourism (Pablo-Romero and Molina, 2013)

A study conducted in 21 countries in the Asia-Pacific region using the Dumitrescu and Herlin causality test found a short-run bidirectional causality between economic growth and international tourism income. The application of the Westerlund ECM Panel and Pesaran & Smith's average group estimator showed that there is a long-run bidirectional relationship, in which economic growth of 1% leads to an increase in tourism revenues of 0.49% (Bogha and Erkishi, 2019).

In most countries, tourism represents a positive impetus for economic growth. By increasing the demand for local goods, tourism creates additional opportunities for the growth of household incomes and tax revenues and thus plays an important role in poverty reduction. In addition, factors of production and environmental quality determine the efficiency of the tourism sector (Li et al., 2018). Another study found that the development of tourism in the long run has a positive effect on both economic growth and employment in Pakistan (Manzoor et al., 2019). Seghir (et al., 2015) and others also found a mutually causal relationship between tourism spending and economic growth in a survey of 49 countries. The existence of such relationships is confirmed in other studies (Lanza et al., 2005; Balaguer and Cantavella-Jordá, 2002).

A study conducted in Turkey between 1985 and 2015 found that there was a negative relationship between CPI and tourism income, as expected (Dinç and Rüştü, 2017). Huseynli (2022), using the example of Morocco and South Africa, proved that inflation negatively affects economic growth. However, the impact of inflation on tourism revenue growth has been overlooked.

The DOLS and FMOLS processing of panel data from the 20 countries that sent the most tourists to Turkey between 1995 and 2011 showed that there is a significant negative relationship between CPI and international tourism receipts (Özcan, 2015).

3. Materials and Methods

This study uses data from the GUAM countries (international tourism income, CPI, and GDP per capita) from 1995 to 2019. Panel analysis of time series was carried out using STATA 2017 and E-Views. Table 1 shows the abbreviated names, definitions, units, and origins of the variables.

Table 1 Variables.

Symbol	Description	Unit	Source
GDPC	Gross Domestic Product (GDPC) per capita	Million (fixed 2015 USD)	World Bank
TR	International tourism revenues	(current US dollar $)	www.data.worldbank.org
CPI	Consumer Price Index	(2010 = 100) (%)	

A balanced panel data study with 75 observations for all countries and series was established in our study, and the descriptive statistical values of the logarithmic data of the variables are shown in Table 2 below.

Table 2 Descriptive statistics of the variables.

Variables	Observations	Mean	Std. dev.	Min	Max
GDPC	75	7754.22	463.367	6940	8614
TR	75	5923.47	1534.556	3497	8660
CPI	75	4.182	0.930	0.265	5.668

This study used a multiple linear regression model to determine the individual and total effects of the factors included in the analysis. The multiple linear regression model formula used to determine which of the independent variables included in the analysis most effectively determines the dependent variable is presented below:

$$Y_{it} = b_{0it} + b_{1it}X_{1it} + b_{2it}X_{2it} + \cdots \ldots \ldots + b_{kit}X_{kit} + u_{it}\ i = 1, \ldots, N; t = 1, \ldots, N \quad (1)$$

or briefly

$$Y_{it} = b_{oit} + \sum_{k-1}^{K} b_{kit}X_{kit} + u_{it}\ i = 1, \ldots, N; t = 1, \ldots, N \quad (2)$$

Here, Y_{it} and X_{kit}, respectively, are the dependent and independent variables for each i; b_{oit} and u_{it} are fixed effects and error terms. All data are converted to logarithmic form. The model is formulated as a logarithmic transformation of factors affecting GDP per capita.

$$logGDPC_{it} = b_0 + \mathrm{b}_1 logTR_{it} + \mathrm{b}_2 logCP\dot{\mathrm{I}}_{it} + u_{it} \quad (3)$$

Here, $b_1, and\ \mathrm{b}_2$ are international tourism revenues and CPI coefficients, respectively.

According to the cross-dependency test, economic integration between countries has increased as a result of the rapid expansion of economic cooperation, and the economic dependence of countries on each other has increased as economic integration has increased. Economic shocks and mobility in one country are expected to affect other countries or units to varying degrees (Demez, 2021). Therefore, cross-country dependencies should be taken into account when analyzing panel data models. If the dependence on the cross-section is not considered, then serious errors in the estimation results can occur (Chudic, Pesaran, 2013). It is critical to test both the variable and the model and determine if there is a cross-dependency between units (Ugur, 2021). In cases of cross-sectional independence, first-generation tests should be used to analyze panel data. In cases of cross-dependence, second-generation tests should be used (Aydin and Turan, 2020). There are many tests - Breusch–Pagan (1980) LM_{BP}, Pesaran (2004) scaled LM, Pesaran (2004) CD tests - in the literature that can be used to determine the cross-sectional relationship.

Pesaran and Yamagata (2008) used a slope uniformity test based on DELTA tests to determine the homogeneity of the slope coefficient in the cointegration equation.

Then, the CIPS panel unit root test was used to determine whether the variables were stationary at the level or at the first difference.

3.1. GUW panel cointegration test

After stationarity tests of the variables under consideration, the next step is to examine the possibility of a long-run relationship (Köksel and Yilmaz, 2021). The Gengebach, Urbain, and Westerlund Panel Cointegration Test, a second generation Panel Cointegration Test that allows heterogeneity and cross-sectional dependence and takes lag lengths into account, will be used in this study (Tatoglu, 2020). The model below was used to calculate the Gengenbach, Urbain, and Westerlund panel cointegration test with error correction.

$$\Delta \mathrm{Y_i} = \mathrm{d}\delta_{y.x_i} + \mathrm{a}_{y_i}\mathrm{y}_{\mathrm{i},-1} + \omega_{\mathrm{i},-1}\mathrm{y_i} + \sigma_{\mathrm{i}}\mathrm{y_i} + \varepsilon_{y.x_i} = \mathrm{a}_{y_i}\mathrm{y}_{\mathrm{i},-1} + g_i^d\,\lambda_{\mathrm{i}} + \varepsilon_{y.x_i} \quad (4)$$

As shown in Equation 13, the first stage of the test involves estimating the model's OLS for each unit and testing the $H_0: \hat{a}_{y_i} = 0$ hypothesis with the t test. a_{y_i}'s OLS estimator and variance are as follows:

a_{y_i} OLS estimator $$\hat{a}_{y_i} = \frac{\mathrm{y}_{\mathrm{i},-1}\, M_{g_i^d}\, \Delta\, \mathrm{y_i}}{\mathrm{y}_{\mathrm{i},-1}\, M_{g_i^d}\, \Delta\, \mathrm{y}_{\mathrm{i},-1}} \quad (5)$$

and a_{y_i} variance $$\sigma^2_{\mathrm{a}_{y_i}} = \frac{\sigma^2_{\hat{a}_{y,x_i,}}}{y'_{\mathrm{i},-1}\, M_{g_i^d}\, \mathrm{y}_{\mathrm{i},-1}} \quad (6)$$

Thus, $$t_{c_i} = \mathrm{t}_{\mathrm{a}_{y_i}} = \frac{\hat{a}_{y_i}}{\sigma_{\hat{a}_{y_i}}} \quad (7)$$

For the calculated panel statistics, the null and alternative hypotheses of the GUW panel cointegration test can be expressed as follows:

$\mathrm{H}_0: p > 0{,}1$ There is no cointegration relationship
$\mathrm{H}_1: p < 0{,}1$ There is a cointegration relationship

The critical values for the 1%, 5%, and 10% significance levels of the GUW test were 1.67, 1.96, and 2.56, respectively (Gengenbach et al.,2016).

3.2. Long-run Pedroni cointegration test

Panel cointegration estimators are used to determine the direction and degree of long-run relationships (cointegration). This study used the DOLSMG (Pedroni, 2001) and Pedroni's second-generation long-run cointegration test. This estimate is based on Eq. 8 (Pedroni, 2001).

$$y_{\mathrm{i,t}} = \mu + \beta \mathrm{X}_{\mathrm{i,t}} + \mathrm{u}_{i,t} \quad (8)$$

The dynamic least squares (DOLS) method is used to estimate the model in Eq. 9. As shown in Equation 17, the calculated values for each part are then combined with the Pesaran and Smith MG approximations to yield the overall panel value (Kiliç et al, 2021).

$$\hat{\beta}_{\mathrm{DOLSMG}} = N^{-1}\left[\sum_{i=1}^{N}\left(\sum_{t=1}^{T}(Z_{i,t}Z_{i,t}^{i})\right)^{-1}\right]\left(\sum_{t=1}^{T}\left(Z_{i,t}\,\bar{Y}_{i,t}\right)\right) \quad (9)$$

In this case, $Z_{i,t}$ is $Z_{i,t} = (X_{i,t}, \bar{X}_i, \Delta X_{i,t-k,} \dots \dots \Delta X_{i,t+k,})$ for $\bar{Y}_{i,t} = Y_{i,t} - \bar{Y}_i$ is an explanatory vector.

This is the average of the $\hat{\beta}_{\mathrm{DOLSMG}} = N^{-1}\sum_{i=1}^{N}\hat{\beta}_{\mathrm{DOLS,i}}$ and t statistics, and the transformed carpet is $t_{\hat{\beta}_{\mathrm{DOLSMG}}} = N^{-1}\sum_{t-1}^{T} t_{\hat{\beta}_{\mathrm{DOLS,i}}}$ (Alev and Erdemli, 2019). Thus, the model equation takes on a new form, as shown in Eq. 10 (Tatoğlu, 2017).

$$(t_{\hat{\beta}_{\mathrm{DOLS,i}}} = (\hat{\beta}_{\mathrm{DOLS,i}} - \beta)(\sigma_i^{-2}\sum_{t-1}^{T}(X_{i,t} - \bar{X}_i)^2)^{1/2} \quad (10)$$

4. Results and Discussion

The LM tests developed by Breusch and Pagan (1980), the scaled LM test, and the CD test developed by Pesaran (2004) were used to determine if there was a cross-dependency between the countries chosen as a criterion, both in terms of variables and as a model. In addition, a slope uniformity test was used to determine whether the model under consideration is homogeneous or nonhomogeneous. Cross-dependency tests are presented for both variables and the model, as well as tests for homogeneity between variables in the model (Table 3).

Table 3 Cross-Sectional Dependence and Slope Homogeneity Test Results.

Cross-Sectional Dependence Tests in terms of variables			
Variables	Breusch–Pagan LM	Pesaran scaled LM	Pesaran CD
GDP	126.8476*	34.8860*	11.2503*
TR	88.3844*	23.7823*	9.1369*
CPI	137.612*	37.9931*	11.7258*
Cross-Sectional Dependence Tests in terms of model			
Model	65.7839*	17.2581*	-2.3486*
Homogeneity Tests in terms of Model			
DELTA Test		$\hat{\Delta}$	$\hat{\Delta}_{adj.}$
Model		10.696*	11.670*

Note: * indicates the 1% significance level.

As a result, it was estimated that cross-sectional dependence between countries had a 1% level of significance in terms of both variables and the model. The model should be further analyzed with second-generation tests based on the estimation results of these tests. Delta and Delta adj. were tested at 1%, 5%, and 10% of the significance levels for this model. The results of homogeneity tests allow us to classify our model as a second-generation heterogeneous model. That is, the 2nd generation homogeneous tests can be used to estimate the analyses that will be performed in the following stages. Furthermore, the graph results were evaluated to see if this pattern is stable and/or stable-trending. The model should be further analyzed with second-generation tests based on the estimation results of cross-sectional dependence tests. According to the graphic analysis results shown in Figure 1, the model was found to be stable and devoid of trends. Using the CIPS test and the results of cross-sectional dependency tests, heterogeneity tests, and graphic analysis, it was determined whether the variables were stationary at the level or at the first difference. Table 4 shows the trend-free CIPS test results by variables and model.

Table 4 CIPS panel unit root test results.

Variables	Level		First Differences
GDPC	-2.113		-3.440*
TR	-2.069		-4.771*
CPI	-1.579		-3.505*
Critical Table values	-2.21	-2.33	-2.57

Note: ***i**ndicates the 1% significance level.*

According to this, all variables are nonstationary at level and become stationary at the first difference. The GUW test (Dural and Sarioglu, 2020) is chosen to detect cointegration between variables. This is a second-generation heterogeneous test that allows you to determine if the model includes long-term cointegration when all variables are stationary in the first derivative and accepts cross-sectional results. The results of the GUW panel cointegration test are shown in Table 5.

The results show that international tourism income, CPI, and GDP per capita have a long-term cointegration relationship. Pedroni's long-run score was used after taking into account the results of the GUW panel cointegration test, the results of the

cross-dependency tests, and the homogeneity tests. This test can be evaluated by subtracting the variable cross-section means and applying the DOLS score to the converted model units and the Pedronian (2001) DOLSMG score to the entire panel. The results of the long-term assessment of Pedroni cointegration by country and model are shown in Table 6.

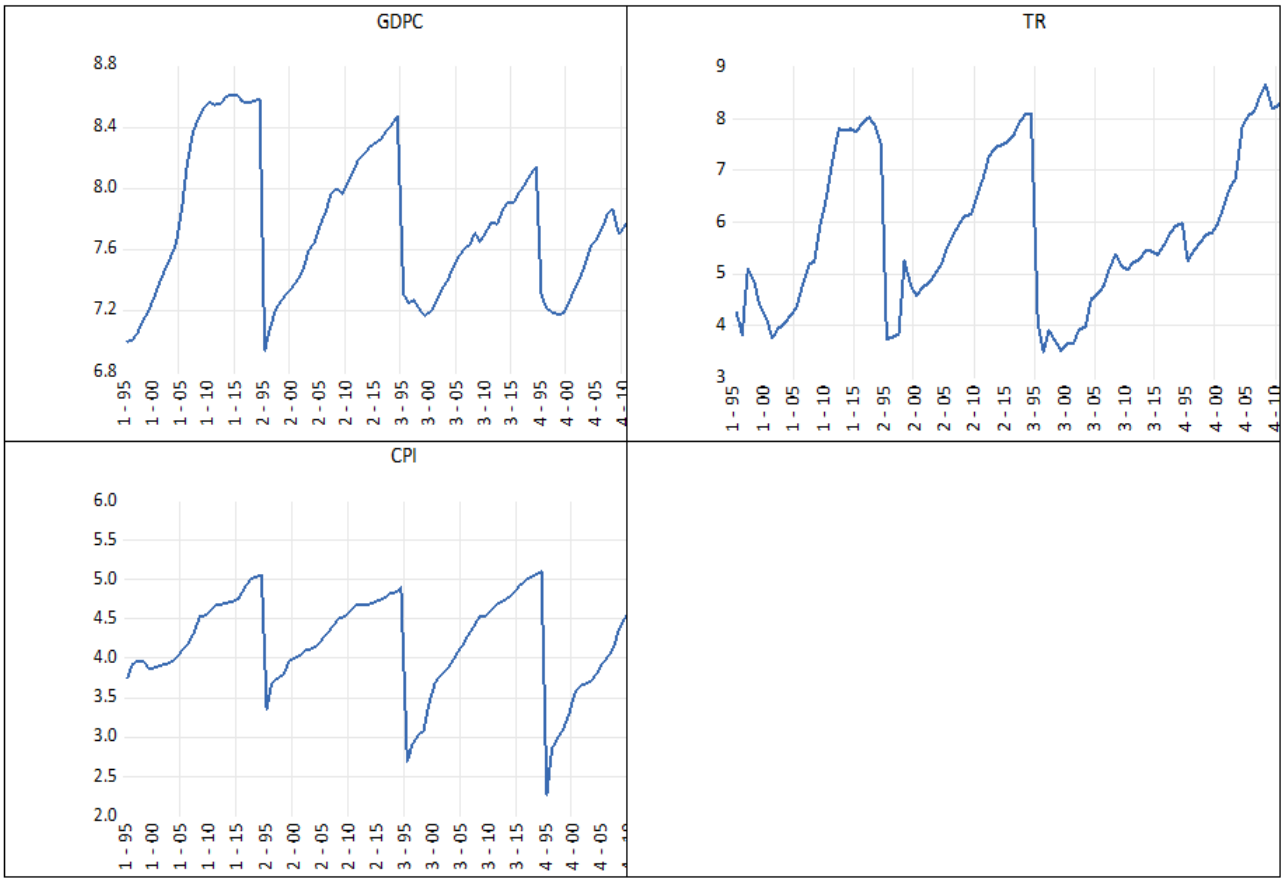

Figure 1 CIPS test and the results of cross-sectional dependency tests.

Table 5 GUW Panel Cointegration Test Results.

Panel EC-test	T-bar	P value*
Model	-3.420	<=0.01

Table 6 Pedroni Prediction Test Results.

	Countries	TR		CPI	
		Beta	t-stat	Beta	t-stat
1	Azerbaijan	0.2219	2.471**	0.7808	-3.536*
2	Georgia	0.08156	16.61*	0.03968	1.879***
3	Moldova	0.07399	1.77 ***	-0.5657	-4.22*
4	Ukraine	0.03433	3.426*	-0.5071	18.08*
Model		0,1029	12.23*	-0.4535	-11.98*

Note: *, **, *** indicate significance levels of 1%, 5% and 10%, respectively.

The DOLSMG method was used to estimate the long-term relationship between international tourism income, CPI, and GDP per capita (Table 6). According to DOLSMG's findings, international tourism revenue and CPI have a long-run impact on GDP per capita. While other variables remain unchanged, a 1% increase in international tourism revenue increases GDP per capita by 0.1029%, and a 1% increase in CPI reduces GDP per capita by 0.4535%.

The study found a positive and significant relationship between international tourism income and GDP per capita, while the consumer price index and GDP per capita have a negative correlation. The positive impact of tourism on growth in the GUAM countries is consistent with the findings ща Gövdeli and Direkci (2017), Dhunge (2015), Salihova and Akbulaev (2016), Bogha and Erkishi (2019), Lanza et al. (2005), Balaguer and Cantavella-Jordá (2002), and others.

The results obtained when examining the effect of CPI on GDP per capita are similar to those obtained by Dinç and Rustu (2017), indicating that an increase in CPI had the opposite effect on GDP per capita. According to the DOLS estimation results, the effect of changes in international tourism revenues on GDP per capita was statistically significant for all countries.

5. Final considerations

This study used Pedroni's long-term cointegration test to examine the long-term relationship between variables in terms of models and countries. The DOLSMG estimation method was used to assess the relationship between income from international tourism, GDP per capita, and the consumer price index.

While other variables remain constant, a 1% increase in international tourism revenues raises GDP per capita in Georgia, Moldova, Azerbaijan, and Ukraine by 0.22, 0.08, 0.074, and 0.034%, respectively. According to the findings, Georgia had the highest share of international tourism revenues in GDP per capita among GUAM countries. Tourism revenue is estimated to account for a significant portion of Georgia's GDP. Ukraine had the worst performance. Despite its large size and sandy sea beaches, its tourism revenue contribution to GDP has been low.

The weak results in Ukraine can be partly explained by the tense political environment in the region. When Azerbaijan and Moldova are examined, the share of tourism income in GDP is not high. Although Azerbaijan has a wide, sandy Caspian Sea coast and the potential for all types of tourism to be active throughout the year, such as in the city of Gedebey, the share of tourism revenues in GDP is not high, and the share of the increase in tourism revenues in GDP is three times lower when compared to Georgia. It has been proposed to prepare the necessary policy and economic plan for the development of the so-called smoke-free industries in Moldova and Azerbaijan.

While the effect of other variables remains constant, a 1% increase in the CPI increased Azerbaijan's and Georgia's GDP per capita by 0.7808% and 0.03968%, respectively, while Moldova's and Ukraine's GDP per capita decreased by 0.5657% and 0.5071%, respectively.

The lack of studies on these hypotheses and methods in the four GUAM countries will be a source for future researchers. Regional cooperation among these countries, as well as the development of long-run strategies for sustainable tourism, should be prioritized to have a further positive influence on economic development. It has been suggested that countries should determine tourism development policies, as all four countries have access to the sea and large touristic potential.

Ethical considerations

Not applicable.

Conflict of Interest

The authors declare no conflicts of interest.

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