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Tax Revenues Determinants: Empirical Study Based on World, Regional, and Income Levels of Data

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Abstract

Tax revenue in many countries is influenced by many factors. Many research had been done to determine which factors affect tax revenue with different data sample. This research contribution is to complete them. By using panel data of 134 countriesfrom 2002 to 2018 this research analyze the impact of share of agriculture in GDP, share of industry in GDP, share of service in GDP, per capita income, inflation rate, exchange rate, trade opennes, urban population, government effectiveness, political stability, quality of regulation, control of corruption, rule of law, and voice and accountability to tax revenue. This research also uses another panel data model based on different regional and income classifications. The result is that in overall countries model, all variables except inflation rate and control of corruption have significant effect to tax revenue. Different results also found in different models based on regional and income classification.

Keywords
tax; determinants; tax ratio

I. Introduction

Taxes have the main function as a tool or source in optimally increasing the amount of income to the state treasury (budgetair function) as well as a tool to achieve the desired goal, or other goals related to the lives of many people (regular function) so that the achievement of tax revenue becomes a matter which is very important to ensure the achievement of these two tax functions (Mardiasmo, 2016). The large contribution of tax revenue to state revenue makes failure to meet tax revenue targets can cause the budget deficit for that year to widen. This results in an increase in the amount of state financing that must be met by the government.

The low tax revenue of a country can be caused by the existence of a tax gap, namely the difference between the tax that should be paid and the amount of tax that is actually paid(Slemrod, 2007). The Center for Budget Studies of the House of Representatives of the Republic of Indonesia (DPR RI) explained that one of the indicators used to measure a country's tax performance is the tax ratio. . He also explained that the definition of the tax ratio is the comparison between total tax revenue and Gross Domestic Product (GDP) in the same period. GDP is the total value of goods and services produced by a country's economy, minus the value of goods and services used in production.

Based on data from the Organization for Economic Cooperation and Development (OECD) on the comparison of the ratio of tax revenues of several countries to GDP (Tax-to-GDP ratios) of several countries in the world in 2007, 2014, and 2015. Mexico has the lowest tax ratio in the range of 15 up to 20%, while Denmark has the highest tax ratio in the range of 45 to 50%. The two countries have quite different tax ratios. Several European countries, such as Denmark, France, and Austria, have a high tax ratio of over 40%. This

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value exceeds the average tax ratio of OECD member countries, which ranges from 30 to 35%. However, different conditions are experienced by countries in the Asia Pacific region. Based on the data published by the OECD for 2018 tax revenues, the majority of countries have a comparative value of tax ratios that are lower than the OECD average, which is below 34.3%. Southeast Asian countries even have tax ratios below 15%, namely Singapore 13.2%, Malaysia 12.5%, and Indonesia 11.9%. This condition is inversely proportional to the value of the tax ratio of European countries which is in the range of 30% to 50%.

Indonesia in 2014 - 2020 even experienced a decrease in the ratio of tax revenue to GDP. The decline was from 12.5% in 2012 to 11.4% in 2018 based on data compiled by the International Money Fund (IMF). Even though there was an increase in nominal tax revenues, compared to Indonesia's GDP the ratio is still quite low, even below Singapore, Malaysia and Thailand. The high and low tax ratio is influenced by several factors. Many previous studies have been conducted regarding the independent variables that affect the tax ratio. Chelliah et al. (1975) in his research concluded that the percentage of income in the agricultural sector in GDP has a negative and significant impact on the ratio of taxes to GDP.

However, Rodríguez (2018) explains that due to the relationship between the government and citizens, tax revenue and its composition are not only influenced by economic factors, but also by social and political factors. it becomes important to study other factors that have the potential to affect tax revenue. On this matter, the research of Syadullah and Wibowo (2015) using good governance indicators as an independent variable concludes that control over corruption, accountability, and political stability of a country has a negative and significant effect on the tax ratio.

Previous research has been able to identify various factors that influence tax ratios in various countries with various methods and data samples. The results of Chaudhry and Munir's research (2010) in their research entitled Determinants of Low Tax Revenue in Pakistan examines the factors that influence tax revenue in Pakistan with time-series data from 1973 to 2009. The results show that openness, money supply, foreign aid, and political stability have a significant positive impact on tax revenues. Dependence on the agricultural sector, foreign aid, and low literacy index have led to a decline in tax revenue in Pakistan.

Then using data sourced from the Worldwide Governance Indicators, Syadullah and Wibowo (2015) conducted a study with panel data of ASEAN countries from 2003 to 2012. The result is that control over corruption, accountability, and political stability has a significant negative impact on revenue. tax. In addition, it can also be concluded that law enforcement and the quality of regulations have a positive impact on tax revenue. Kemal's research (2007) concludes that regulatory simplification, tariff rationalization, institutional strengthening, and better management of good governance can reduce tax evasion so as to increase revenue. Ehrhart (2009) in his research using panel data of 66 developing countries in the period 1990 to

Based on the several studies conducted, it can be concluded that many studies are still based on groups of countries in certain regions and in certain economic classes. In addition, the data used on average are quite old under 2010 and no one has regressed all variables in one model at once. Therefore, this study aims to fill the gaps with relevant variables and with more complete and up-to-date data.By knowing the influence of the factors that affect tax revenue, so that countries can carry out the right strategy in order to maximize tax revenue in their country in order to maintain fiscal sustainability. . The impact is that tax revenue increases and can maximize fiscal space in the state budget,

which of course has an impact on reducing budget and financing deficits so that it is expected to improve the welfare of the world's population due to the increase in a country's budget allocation.

II. Review of Literature

2.1Tax Theory

Mangkoesoebroto (2001)defines tax as a levy which is the prerogative of the government where the levy is based on the law and the collection can be forced on tax subjects where there is no direct remuneration that can be demonstrated for its use. In addition, Andriani (2000) defines tax as a contribution to the state (which can be imposed) owed by the taxpayer, with payments in accordance with applicable regulations, non-performance that can be directly appointed, and the purpose is to finance expenses. generally related to the task of the state to organize the government.

2.2Tax Ratio and Tax Gap

The Tax Ratio is the ratio between the amount of tax revenue and the GDP of a country(Setiabudi, 2017). Nufransa Wira Sakti in Media Finance (2019) explained that the tax ratio can describe the level of tax compliance. In addition, the tax ratio can also reflect the ability of the government to reabsorb GDP to be further realized in tax revenues that will be reused to meet the needs of the community. The World Development Index (WDI) published by the World Bank calculates the tax ratio based on all central government tax revenues, but excludes fines, penalties and most social security contributions. The tax returns and corrections are deducted from tax revenue(Setiabudi, 2017). Just like the World Bank, the IMF calculates tax ratios based on tax receipts from personal and corporate income, property taxes, taxes on goods and services, and taxes on international trade. Meanwhile, social contributions, grants, and other sources of income are excluded from the calculation of the tax ratio. This is as shown in the IMF's World Revenue Longitudinal Data.

2.2 Hypothesis Development

a. The Effect of the Contribution of the Agricultural Sector in GDP on Tax Revenue

The calculation of GDP with the production approach divides GDP into three sectors namely Agriculture, Industry, and Services. The agricultural sector in general has the smallest percentage compared to the other two sectors and does not contribute a large enough nominal to tax revenue . Especially for agricultural products for staple foods such as rice, sugar, and others which some countries get tax-free facilities. This is in line with research conducted by Chelliah, et al. (1975) who concluded that the agricultural sector had a significant negative impact on tax revenues. Chaudhry and Munir (2010) have the same opinion, namely Pakistan's excessive dependence on the agricultural sector causes the country's tax revenue to be low, so that countries that tend to depend on the agricultural sector have lower tax revenues.

H1: The contribution of the Agricultural Sector in GDP has a significant negative effect on Tax Revenue.

b. The Effect of the Contribution of the Industrial Sector in GDP on Tax Revenue

The second sector is Industry. Industry sector according to World Bank contribute to GDP from mining, manufacturing, construction, electricity, water and gas. The manufacturing sector, as one part of the industry, according toChaudhry and Munir

(2010)easier to tax than the agricultural sector because entrepreneurs have better accounting records than farmers so that the manufacturing sector has a significant positive impact on tax revenue. These results are also supported by the results of research by Muhammad and Ahmed (2010) which also showed positive results. Tait, et al. (1979) examined the mining sector, which is also part of the industry, with significant results and a positive impact on tax revenue.

H2: The contribution of the Industrial Sector in GDP has a significant positive effect on Tax Revenue.

c. The Effect of the Contribution of the Service Sector in GDP on Tax Revenue

The service sector in general has an equivalent proportion of industry in the composition of GDP.Muhammad and Ahmed (2010) concluded in his research that the service sector has a significant positive impact on tax revenue. The same research results were also produced by Piancastelli (2001). This is the opposite of the research resultsChaudhry and Munir (2010)where the results are negative and insignificant.Service according to the definition of the World Bank is any action or activity that can be offered by one party to another without physical form and does not result in ownership of anything.

H3: The contribution of the service sector in GDP has a significant positive effect on tax revenue.

d. The Effect of Per capita Income on Tax Revenue

The consumption theory described earlier states that consumption tends to increase when the level of income received also increases. The increase in consumption levels will increase the source of tax revenue from value added tax and corporate income tax for producing goods/services consumed. This is in line with the results of research by Lotz and Morss (1970) which showed significant results that income per capita has a positive impact on tax revenue. Tanzi V., in Quantitative Characteristics of the Tax System of Developing Countries. The Theory of Taxation for Developing Countries (1987) and Ansari (1982) also show similar results. However, the research of Teera (2002) andChaudhry and Munir (2010) shows the opposite result.

H4: Income Per Capita significantly positive effect on Tax Revenue.

e. Effect of Inflation Rate on Tax Revenue

Inflation is an indicator in measuring the rate of price change.According to Samuelson and Nordhaus (2001) inflation is caused by two things, namely Demand-Pull Inflation and Cost-Push Inflation.. Chaudhry and Munir (2010) in their research on Pakistan showed insignificant positive results on the effect of inflation on tax revenue. This study is different from the results of research by Mahdavi (2008) and Ghura (1998) where inflation has a negative effect on tax revenue. High inflation indicates the weakness of a country in maintaining price stability (Rodríguez, 2018). The impact is a decrease in the level of public consumption which leads to a decrease in tax revenues from VAT and PPh.

H5: LevelInflation has a significant negative effect on Tax Revenue.

III. Research Method

This study uses secondary data in the form of data bank information displayed by the World Bank and IMF, along with other sources in the period 2002 to 2018. The data can be accessed in general throughwww.databank.worldbank.organdwww.data.imf.org. The country sample selection used in this study was carried out using purposive sampling method. This method is part of the non-probability sampling method, in which the sample selection is not random or has been carried out based on the research objectives so that certain criteria are determined by the researcher. By using this method, the criteria must be determined in advance by the researcher in order to select the sample.

IV. Result and Discussion

4.1 Descriptive Statistical Analysis

Descriptive statistical analysis aims to provide general information on the data that is the research sample without the aim of drawing conclusions. This analysis provides an overview of the average value (mean), standard deviation (standard deviation), the average deviation distance, variance (variance), sum (sum), distance (range), kurtosis, skewed distribution (skewness), and the value of maximum and minimum(Ghozali, 2013). The results of descriptive statistical analysis on the dependent variable and the independent variable are as shown in Table 1.

Table 1. Descriptive Statistics of Dependent and Independent Variables

var.	mean	median	Min	Max	Std. Dev.	Amount
ACC	0.077544	0.054249	-2,12443	1.800992	0.9264	2.278
AGRI	10,90286	6.804683	0.03021	79.04236	11.11522	2.278
CORR	0.077261	-0.22638	-1.72225	2.469991	1.019947	2.278
EFF	0.124723	-0.026375	-2.07849	2.436975	0.976205	2.278
EXCH	668.0147	8.75	0.179092	40864.33	2646,032	2.278
PCI	13693.04	5085,168	173.7961	118823.6	18893.41	2.278
ENG	26,77131	25.09961	3.243096	74.11302	11.17664	2.278
INF	50,20549	3.373453	-58.58636	102629.8	2150,192	2.278
LAW	0.063627	-0.132475	-1.81344	2.100273	0.981724	2.278
OPEN	89.96371	77,48442	16,14108	442.62	58,49654	2.278
POL	-0.031689	0.018272	-2.81004	1.755193	0.918497	2.278
REG	0.159803	-0.02204	-1.85785	2.260543	0.925502	2.278
SERV	54,42985	54,636	17,86371	91.92164	11.38793	2.278
URB	59,62622	60.2985	14.24	100	21.04553	2.278
TAXGDP	18,22693	17.70516	1.991688	53.32792	7.976266	2.278

Source: Edited by the author based on the results of EViews

4.2 Selection of Regression Model

Before regressing the panel data, identification and selection of the right model is carried out among the common effects model (CEM), fixed effect model (FEM), and random effect model (REM). After the best model is known, then the classical assumption test analysis is carried out so that the selected model really gives the best estimated result.

The value of Prob>F is used as the basis for determining the results of the Chow test. The value of Prob>F which is smaller than (0.05) causes H1 to be accepted and the selected model is a fixed effect model. Vice versa, if Prob>F is greater than (0.05) then H1 is rejected and the model chosen is common effect. The results of the Chow test for all regions and income levels show that the value of Prob > F is smaller than the alpha value of 0.05. Then there is a rejection of H0 and H1 is accepted so that the more appropriate model is FEM.

The Hausman test results for the entire model show that the majority have a Prob > F value less than 0.05 so that H0 is rejected and H1 is accepted. So the best model used is the fixed effect model. However, for the Sub-Saharan Africa Region, the value of the Hausman test results shows an amount greater than alpha 0.05 so that H1 is rejected and the random effect model.

The Hausman test cannot be carried out for the South Asia Regional model and the Middle East and North Africa Regional model because in the random effect model the number of cross-sections must be more than the number of variables. The South Asia Region consists of 6 countries which are smaller than the number of variables, namely 14 and the Middle East and North Africa Region also experiences the same thing because it only consists of 12 countries so that in both models it is concluded using FEM as the results of the Chow test.

The test results show the Breusch and Pagan value of 0.0000 or below the 0.05 alpha level. It can be concluded that H0 is rejected and H1 is accepted so that REM is used as a regression model for the sub-Saharan African region.

4.3 Coefficient of Determination R2

In this study, the authors use the R-squared value as a measure in assessing the coefficient of determination with values ranging from 0 to 1. A value that is closer to 1 indicates the better the independent variables in the research model when explaining variations on the limited dependent variable. This is as revealed by Ghozali (2013) that a small R-squared value indicates the limited ability of the independent variables in explaining the variation of the dependent variable. He added that the coefficient of determination can be measured how far the model's ability to explain the variation of the dependent variable. The weakness of R-squared is that it is biased towards the number of independent variables where each addition of one independent variable in the model will result in the value of R-squared increasing without regard to the significance of the effect of these variables on the dependent variable, so to overcome this, researchers are recommended to use Adjusted R-squared (Ghosali and Ratmono, 2013). The adjusted R-squared value has taken into account the number of data samples and the number of variables used. The results of the coefficient of determination test (R2) and as shown in table 2.

Table 2. Test Results of the Coefficient of Determination (R2)

Regional/Revenue Level	Obs	Dependent Variable	Independent Variable	R2 value	Adj R2
Whole Country	2278	TAXGDP	AGRI, IND, SERV, PCI, OPEN, INF, EXCH, URB, ACC CORR, EFF,	0.947672	0.94406
Low Income Countries	255			0.855155	0.83721
Lower Middle Income Countries	646			0.925036	0.9186
Upper Middle Income Countries	595			0.925813	0.919291

High Income Countries	782	REG, LAW, POL	0.943562	0.93895
East Asia and Pacific Region	255		0.923693	0.914239
South Asia Region	102		0.95199	0.940866
Europe and Central Asia Region	714		0.920844	0.914227
North America, Latin America and the Caribbean	425		0.96413	0.960599
Middle East and North Africa Region	204		0.960514	0.954968
Sub-Saharan Africa Region	578		0.387506	0.372275

Source: Edited by the author with EViews 9

Based on Table 2, the coefficient of determination for the model with a sample of the whole country is 0.9476. These results indicate that the overall ability of the independent variables in explaining tax revenue is 94.76%, while the remaining 5.24% is explained by other variables not included in this equation. The adjusted R2 value is not too different from the value 0.9440 or the overall ability of the independent variables in explaining tax revenue after adjustment is 94.4%

The model with the distribution of samples based on regional and income level has a coefficient of determination that ranges from 0.3875 to 0.9641. The sub-Saharan Africa region with a random effect model has a coefficient of determination of 0.3875 or that the independent variable is able to explain tax revenue of 38.75%, while the rest is influenced by other variables. The highest value is North America, Latin America, and the Caribbean where the coefficient of determination is 0.9641 and after adjusting for adjusted R2 it is 0.9605.

4.4 Simultaneous Significance Test (F Statistics Test)

Simultaneous significance test was conducted to assess whether all independent variables simultaneously affect the dependent variable. This test according to Ghozali (2013) is called the overall significance test of the observed and estimated regression lines. This test is determined by looking at the Prob (F-statistic) value on EViews where if the value is less than the alpha significance level = 0.05, then H1 is accepted and H0 is rejected and vice versa. The results of the F statistical test are shown in table 3 below.

Table 3. Simultaneous Significance Test Results (Statistical Test F)

Regional/Revenue Level	Obs	Prob value (F-statistic)	Conclusion
Whole Country	2278	0.0000	H1 Accepted
Low Income Countries	255	0.0000	H1 Accepted
Lower Middle Income Countries	646	0.0000	H1 Accepted
Upper Middle Income Countries	595	0.0000	H1 Accepted
High Income Countries	782	0.0000	H1 Accepted
East Asia and Pacific Region	255	0.0000	H1 Accepted
South Asia Region	102	0.0000	H1 Accepted
Europe and Central Asia Region	714	0.0000	H1 Accepted
North America, Latin America and the	425	0.0000	H1 Accepted

Caribbean			
Middle East and North Africa Region	204	0.0000	H1 Accepted
Sub-Saharan Africa Region	578	0.0000	H1 Accepted

Source: Edited by the author with EViews 9

Based on the table above, it can be concluded that with sample data for the whole country or with regional sample data and different incomes, the Prob value (F-statistic) is all worth 0.0000. This means that H1 is accepted and H0 is rejected or the independent variable simultaneously affects the dependent variable, namely tax revenue.

4.5 Individual Parameter Significance Test (Test Statistical t)

Ghozali (2013) explained that this test was conducted to show how much influence the individual independent variables had in explaining the variation of the dependent variable. The next thing to do is look at the Prob value in the regression results in EViews on each variable and then compare it with the significance level used. This study uses an alpha of 5 percent or 0.05 as the level of significance. If the Prob value of a variable is less than a significance level of 0.05, then H0 is rejected and H1 is accepted. So that the variable partially has a significant influence on the dependent variable. And vice versa when the Prob value of a variable is greater than the alpha level 0,

Table 4. One-tailed Probability Value of Overall Data and Based on Income Level

MODEL:	**ALL**		**LOWMID**	**UPMID**	**LOW**	**HIGH**
	Coefficient	*One-tailed*	*one-tailed*	*One-tailed*	*One-tailed*	*One-tailed*
C	1.561851	0.0000	0.0000	0.0000	0.0020	0.0000
ACC	0.060369	0.0003	0.0036	0.2057	0.0139	0.0234
AGRI	-0.021912	0.0000	0.0019	[0.0001]	0.0000	0.0000
CORR	0.027043	0.0825	0.0662	0.0112	0.0101	0.3082
EFF	-0.03872	0.0228	0.2940	0.0300	0.0043	0.4528
EXCH	0.00000624	0.0067	0.0250	[0.0236]	[0.0051]	[0.0000]
ENG	[-0.191841]	[0.0000]	0.0929	0.0000	[0.0033]	0.0000
INF	0.00000117	0.1614	0.2758	0.0585	0.4701	0.2275
LAW	-0.135261	0.0000	0.0026	0.0133	0.0330	0.0136
OPEN	0.001372	0.0000	0.0013	[0.0000]	0.0000	[0.0074]
PCI	[0.052835]	[0.0000]	[0.0000]	0.0027	[0.0000]	0.0067
POL	0.032933	0.0002	0.0058	0.0000	0.4067	0.4566
REG	0.042933	0.0101	0.0894	0.0086	0.0204	0.4609
SERV	-0.014255	0.0000	0.0001	[0.0000]	0.0026	0.0000
URB	[0.56943]	[0.0000]	0.0222	[0.0002]	0.0099	0.0041
Dependent Var.		[TAX GDP]	[TAX GDP]	[TAX GDP]	[TAX GDP]	TAX GDP
R2		0.9477	0.9250	0.9258	0.8552	0.9436
Prob(F-statistics)		0.0000	0.0000	0.0000	0.0000	0.0000

*The [ ] sign indicates the LOG transformation

Source: Edited by the author with EViews 9

Table 5. One-tailed Probability Values by Region

MODEL:	**EAPC**	**EUCA**	**LNAC**	**MENA**	**SOA**	**SSA**
	One-tailed	*One-tailed*	*One-tailed*	*One-tailed*	*One-tailed*	*One-tailed*
C	0.0000	0.0000	0.0000	0.0149	0.0003	0.0000
ACC	0.4132	0.0018	0.0011	0.0132	0.0000	0.2689
AGRI	[0.0000]	[0.0000]	[0.0000]	0.0000	0.0000	0.0000
CORR	0.0096	0.3913	0.0004	0.0216	0.12014	0.3448
EFF	0.0249	0.4709	0.1410	0.4257	0.0005	0.3504
EXCH	[0.0011]	0.0099	0.1001	0.0000	0.0000	[0.0163]
ENG	[0.0179]	0.0000	0.0000	0.3900	0.0001	[0.0004]
INF	0.0219	0.1919	0.0148	0.2406	0.0039	0.3223
LAW	0.0969	0.0002	0.0003	0.0473	0.0107	0.0086
OPEN	[0.292]	[0.0000]	[0.0000]	0.0012	0.2503	0.0000
PCI	0.0000	0.0001	[0.0000]	[0.1764]	0.0000	[0.0000]
POL	0.0942	0.0018	0.0017	0.12011	0.4517	0.2261
REG	0.0135	0.0008	0.4814	0.1105	0.0132	0.0127
SERV	0.0000	0.0000	0.0000	[0.0231]	[0.0183]	[0.0000]
URB	0.0011	0.0007	0.0001	0.0266	0.0000	[0.2752]
Dependent Var.	TAXGDP	TAXGDP	TAXGDP	TAXGDP	[TAXGDP]	[TAXGDP]
R-squared	0.9237	0.9208	0.9641	0.9605	0.9520	0.3875
Prob(F-statistics)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

*The [ ] sign indicates the LOG transformation

Source: Edited by the author with EViews 9

IV. Conclusion

Based on the results of testing and discussion, it can be concluded that in the overall country model, the variables of the Agricultural Sector Contribution to GDP, Industrial Sector Contribution to GDP, Service Sector Contribution to GDP, Per Capita Income, Currency Exchange Rate, Trade Openness, Urban Population, Effectiveness Government, Political Stability, Quality of Regulations, Law Enforcement, and Freedom of Opinion and Government Accountability have a significant influence on tax revenue. the inflation rate variable has no significant effect on the overall country model, but on the regional model of North America, Latin America, and the Caribbean; East Asia and Pacific; and South Asia. Likewise, the corruption control variable which is not significant in the overall model, but in the East Asia and Pacific Region; North America, Latin America and the Caribbean; and Middle East and North Africa inflation variable is significant to tax revenue.

In the overall country model, the variables of Income Per Capita, Currency Exchange Rate, Trade Openness, Urban Population, Political Stability, Regulatory Quality, and Freedom of Opinion and Government Accountability have a positive effect on tax revenue, which means that an increase in these variables can increase tax revenue. a country. The contribution of the agricultural sector to GDP, the contribution of the industrial sector to GDP, the contribution of the service sector to GDP, government effectiveness, and law

enforcement has a negative effect. Even so, there are variations in the direction of influence where in certain models the variables of the Contribution of the Industrial Sector, Government Effectiveness, and Law Enforcement also have a positive impact on tax revenue.

Therefore, it can be concluded that the effect of each variable on tax revenue may differ from one model to another due to differences in income levels and regional locations of the country. The results of this study complement the previous studies related to the determinants of tax revenue. Some results confirm previous studies with the same conclusion, but there are also some differences in results on certain variables.

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