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## MACROECONOMIC IMPACT OF CRUDE OIL PRICES ON INDIAN ECONOMY

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### ABSTRACT

Energy is the backbone for the development of any Economy. Due to rising economic growth and development in India, the demand and desire of the people have multiplied for the different sources of energy like petrol, diesel, gas, kerosene, etc. which has bound the Indian Economy to import more than one-third of its total consumption. Rising demand for the petroleum products lead the Indian economy to face twin issues of mounting trade imbalance and persisting inflation. The prices of oil and inflation are often seen as being connected in a cause and effect relationship. As oil prices moves up or down, inflation follow in the same direction. The increasing oil prices lead to economic slowdown and credit availability which are great threats to the country's economy. Rising oil prices also affect the cost of production. Whenever the price of crude oil tends to rise, the cost of production also rises causing a decrease in supply which ultimately leads to inflation. The present paper seeks to investigate the Macroeconomic impact of crude oil price fluctuations on different economic indicators of India like GDP, Inflation Rate(WPI), Import of Crude Oil, Exchange Rate, Forex Reserve, Oil and Non-Oil Trade Balance etc. by using Correlation Matrix and growth rate. The result shows that crude oil price has positive relationship with Inflation, Gross Domestic Product, Forex Reserve, oil and non oil trade balance while it has negative relationship with import of crude oil and exchange rate. As far as growth rate is concerned, crude oil price, oil and non-oil trade balance has negative growth rate while rest indicators have positive growth rate during recent years of the study period.

### KEYWORDS

crude oil prices, inflation, gdp, import of crude oil, exchange rate, forex reserve, oil and non-oil trade balance.

### INTRODUCTION

For any developing country, efficient, reliable and competitively priced energy supplies are prerequisites for accelerating economic growth and the strategy for energy development is an integral part of the overall economic development strategy. Efficient use of resources and long-term sustainability always remain core objective of economic planning. Sustainability would take into account not only available natural resources and issues related to ecological balance but also established delivery mechanisms, technological constraints, economic equity and self-reliance. India, being the 7<sup>th</sup> largest country with the area of 3.29 million square Kilometer and 2<sup>nd</sup> largest in population of over 1.2 billion, accounts about 17.2% of the world population. The country has to produce about one trillion worth of GDP to fulfill the requirements of its huge population. In order to produce this one trillion-dollar worth of output, India needs 2.5 million barrels of oil per day. This is 4.4 percent of total world demand for oil consumption. The growth rate of demand for oil is around 6.8 percent (FICCI Report 2012). This demand is fulfilled by importing nearly 80% of its crude oil from OPEC nations and rest comes from the domestic oil production. Such a huge demand exerts influence on the growth and inflation levels in India. Despite the domestic prices being affected by International oil market, the sharp increase in International oil prices has not been fully transmitted into the domestic prices in India. The administrated price mechanism had shielded the economy from the impact of oil shocks. The government of India has given up the administrated price mechanism in oil sector and given oil companies the power to decide the price of petrol in the country which has alienated the public from the government and linked the domestic oil prices with international oil prices.

India needs to sustain at more than 8 percent economic growth rate over the next two decades, if it wants to eradicate poverty and meet its human development goals. With high economic growth rates and over 17 percent of the world's population, India is a noteworthy consumer of energy resources. Despite the global financial crisis, India's energy demand continues to rise. Oil is the 2<sup>nd</sup> largest source of energy after coal in the world. In 2013, India (3.7 million barrels per day or 1.5 billion barrels per year) is the fourth largest oil consuming country in the world after America (19 million barrels per day or 6.9 billion barrels per year), China (10.5 million barrels per day or 3.8 billion barrels annually) and Japan (4.5 million barrels per day and over 1.6 billion barrels per year). According to a report released by an apex industry body ASSOCHAM, Since the domestic output has failed to keep pace with demand, more than half of India's total export earnings went into buying petroleum, particularly, crude oil imports in 2011-12, seriously impacting the country's overall economy.

Recently, it has become increasingly important to study the macroeconomic dynamics in the context of developing nations especially India, due to three main reasons- **Firstly**, India is one of the countries that are being projected for fastest growth in consumption of fuel corresponding to their growth in gross domestic product (GDP) (EIA, 2013). **Secondly**, Given the drastic policy change in India with the deregulation of oil pricing, it is critical to understand the impact of oil price shocks on economic and investment activities in the country and **Thirdly**, Oil import constitutes more than one-third of the total imports value (ESI, 2013) in India which is struggling with high current account deficit (CAD). A value-at-risk analysis report suggested that with every \$10 increase in oil prices, CAD would rise by 0.4 percentage points.

This paper investigates how oil price fluctuations impact India's economy through various channels- impact on the real sector variables of growth and inflation, impact on the external sector variables, i.e. net imports and exports, exchange rates and foreign exchange reserves.

The theoretical framework of the study is captured in Fig. 1. The flow chart depicts how an oil price fluctuation affects the overall economy through the various macroeconomic indicators, monetary policy and investment variables.

### OBJECTIVE OF THE STUDY

The main objective of this study is to investigate the macroeconomic impact of crude oil price fluctuations on selected economic indicators of India including GDP, Inflation Rate (WPI), Import of Crude Oil, Exchange Rate, Forex Reserve, Oil and Non-Oil Trade Balance or on Economy.

### REVIEW OF LITERATURE

**Mohammad Shaidan Shaari and et.al (2012)** finding shows that the co- integration between all variables exists at 5 percent significance level in the long run. But in the short run only crude price affected the inflation. Their finding shows that variation in the crude oil price changes the inflation. This finding will contribute to Malaysian government in making policy to control the petrol prices to fight against inflation.

**Ibrahim Tuhiran and et.al (2012)** found out that oil price movements is the second important factor after the financial crisis for any country. As oil price rises there is an apparent depreciation of the local currency against the US dollar and the co-movements have increased during the study period. One of the reasons of co-movement is that emerging economies have recovered more quickly than developed countries from the crisis.

**Hassan and Zaman (2012)** conclude a weak/negative and significant relation between oil prices and trade balance both in short run and long run in the context of Pakistan's economy.

**Ademola Ojebiyi and et.al (2011)** investigated that there is a weak relationship between exchange rate and oil price as there are other factors that bring about changes in oil price other than the exchange rate. The activities of OPEC pricing policy and oil speculators also have come to greatly affect the price of crude oil. The results convey that there are other factors that affect the change in oil price apart from the exchange rate. Crude oil price changes are very sensitive to the events around the world and tensions in the oil producing nations.



**Syed Abul Basher and et.al (2010)** studied that oil price responds to movements in exchange rates and higher oil prices affect the exchange rates in the short run. Positive oil shock leads to immediate drop in the trade weighted exchange rate. These results are consistent with the prediction from a demand and supply model for the oil market. Oil prices respond positively to positive shock in emerging stock markets while responding negatively to the falling market.

**Ozale and Pekkurnaz (2010)** found that in the short term, an unexpected increase in oil prices causes the change in the current account ratio to fall even after controlling for output gap and exchange rate in the Turkish economy.

**Jin (2008)** showed that sharp increase in the international oil price and violent fluctuation of the exchange rate are generally regarded as factors discouraging economic growth. He submitted that oil price increase, ceteris paribus, should be considered positive in oil exporting countries and negative in oil importing countries.

**Mehrara & Oskui (2007)** studied the macroeconomic fluctuations in four oil-exporting countries –Indonesia, Iran, Kuwait and Saudi Arabia by using a structural VAR approach. They found that oil price shocks are shown to be the main source of output fluctuations in Saudi Arabia and Iran. But in Kuwait and Indonesia, output fluctuations were mainly found due to aggregate supply shocks.

**Alotaibi (2006)** examines the volatility of oil price, real exchange rate and price level in the members of Persian Gulf Cooperation Council. By using SVAR model, he concludes that real shocks do not affect oil price and nominal shocks do not affect either oil price or GDP.

**Olomola and Adejumo (2006)** investigated the effects of oil price shocks on inflation, output, real exchange rate and money supply in Nigeria within a VAR framework. They found no substantial role of oil price shocks in explaining movements in output and inflation in short run, but on the long run money supply and real exchange rate are significantly affected following a shock to oil prices.

**Brown and Yucel (2002)** conclude that the supply side channel best explains the inverse relationship between oil and output and the positive relationship between oil and inflation.

**Kling Hamilton (1983)** found a significant negative relation between quarterly oil price changes and future GDP growth in the United States. He also found that all but one of the US recessions since World War II have been preceded, typically with a lag of three quarters, by a dramatic increase in the crude oil price.

### CRUDE OIL AND INDIA: AN OVERVIEW

India is heavily dependent on coal for about half of its primary commercial energy consumption while the other half being dominated by oil and gas put together. As the Indian hydro carbon industry is currently passing through a challenging phase, increasing concern for energy security, increasingly stringent environmental regulations, emergence of natural gas and soaring crude oil and natural gas prices have thrown up both challenges and opportunities to the Indian oil and gas industry. However, the crude oil prices fall dramatically in the International oil market since June, 2014. As everyone knows Crude oil prices play a very significant role in the economy of any country. India's growth story hovers around the import of oil as India imports more than 70% of its crude requirements. Any negative change in the crude oil price has an immediate positive impact on the increment in the GDP and IIP. Falling of crude oil price reduces the trade deficit and hardens the rupee against the dollar. Moreover, lower crude price may facilitate room to the Reserve Bank of India in adopting growth centric approach while reviewing monetary policy. It is estimated that a fall of USD 10 in crude could reduce the Current Account Deficit by roughly 0.5 percent of GDP and the fiscal deficit by around 0.1 percent of GDP.

Oil prices have already fallen by 60 percent from their 2014 peak. Back in June 2014, the price of Brent crude was at USD 115 per barrel (June 23, 2014). In the last one year, Brent has weakened by nearly 54.04 percent. The fall in prices is largely due to an oversupply situation, triggered by rising US shale oil exploration and decreasing demand by European countries and China due to slow economic growth. Currently, US oil output levels are at their highest in almost 30 years. The oil drilling boom in the US has increased crude production by over 70 percent since 2008.

Investment bank Nomura estimated that the windfall up to a level of USD 40 can potentially boost growth by up to 0.4 percent in the current financial year. Also, a recent research report says that a 10 percent decline in oil prices could reduce retail inflation (CPI) by around 0.2 percent and push up the gross domestic product (GDP) growth by 0.3 percent. But on the other hand, analysts are also highlights the potential downside of lower oil prices. According to them, many oil projects will face shutdown if black gold retains current levels or slides further. Around USD 2 trillion is now involved in oil exploration business and the companies are trying hard to shelve their production cost. It is going to be very tough for the companies to continue production under these circumstances. There will be either production cuts or the company might declare bankruptcy when production becomes unviable for a long period. Besides oil companies, many oil exporting countries like Russia and OPEC states, are also relying upon high crude prices, and we should therefore expect to see a surge in economic meltdown, bankruptcies and sovereign defaults.

### RESEARCH METHODOLOGY

**Sample-** The data are spread over a decade from 2005-06 to 2014-15 on different macroeconomic indicators of the country. The data collected from various sources like Ministry of Petroleum and Natural Gas, RBI's report, forbes.com, worldbank.org, opec.org, inflationdata.com, cmie.com etc. constituted the basis of study.

**Variables-** The following macro-economic indicators were analyzed through appropriate statistical technique: Crude Oil Price, Growth Rate of Gross Domestic Product, Inflation Rate (WPI), Imports of crude oil, Exchange Rate, Forex Reserves of India, Oil and Non-Oil Trade Balance.

**Methodology-** In order to study the impact of crude oil prices fluctuations on other macroeconomic variables, growth rate of all the variables was calculated and further to find out the relationship between all the variables Correlation Matrix was generated.

### PERCENTAGE GROWTH IN MACROECONOMIC INDICATORS OF INDIA

According to officially declared figures from the Ministry of Petroleum and Natural Gas, Crude oil production in India recorded a growth of 11.85 percent in 2010-11 as compared with previous year's 0.54 percent and continued to fall till -0.60 percent in 2012-13. Import of crude oil has fallen to 2.72 percent as compared to 19.95 percent in 2009-10. Petroleum refinery production has shown a growth of 2.18 percent in 2011-12 as compared to 18.12 percent growth in 2009-10.

As far as the growth rate of selected Macroeconomic indicators are concerned, it is calculated with the help of data collected from the various sources including Ministry of Petroleum & Natural Gas (GOI), Reserve Bank of India (RBI) etc. and presented in Table-1. The price of crude oil shows a variation in growth during the study period as it fell from 42.12 percent in 2005-06 to a negative growth rate of -20.24 percent in 2014-15. After 2005-06, crude oil price was highest i.e. 111.65\$/barrel in 2011-12 with the growth rate of 31.50 percent in the same year. Gross Domestic Product (GDP) also shows a decreasing growth rate over the study period of time. It fell to 5 percent in 2012-13 as compared to 9.48 percent in 2005-06 and then rose to 7.2 percent in 2014-15. Growth rate of inflation, import of crude oil, exchange rate, forex reserve, oil and non-oil trade balances indicate fluctuations during the study period. These indicators vary from time to time. Over the study period of time, inflation rate was highest in 2010-11 while it was lowest in 2014-15. Likewise, growth rate of import of crude oil was highest in 2009-10 and lowest in 2011-12. Exchange rate was highest i.e. 61.14Rs/\$ in 2014-15 but growth rate was highest in 2008-09 and it was 14.11 percent during the study period. Forex reserve shows highest growth rate in 2007-08 and oil and non oil trade balance shows highest growth rate in 2011-12 and 2005-06 respectively. Highest negative growth rate in oil and non-oil trade balance was in 2014-15.

TABLE 1: PERCENTAGE GROWTH IN MACROECONOMIC INDICATORS OF INDIA

Year	Crude Oil Price	GDP	Inflation Rate	Imports of Crude Oil	Exchange Rate	Forex Reserve	Re-Oil Trade Balance	Non-Oil Trade Balance
2005-06	42.12	9.48	4.5	3.69	-1.46	7.14	41.43	168.24
2006-07	12.10	9.57	6.6	12.17	2.28	31.37	18.52	52.78
2007-08	26.88	9.32	4.7	9.12	-11.14	55.50	33.86	77.31
2008-09	5.45	6.72	8.1	9.12	14.11	-18.64	28.95	40.33
2009-10	-16.52	8.59	3.8	19.94	3.27	10.74	-10.86	-3.06
2010-11	21.97	8.91	9.6	2.73	-3.88	9.23	9.40	6.85
2011-12	31.50	6.69	8.9	-2.65	5.15	-3.42	53.42	55.92
2012-13	-3.50	5	7.4	2.73	13.53	-0.80	10.21	-3.01
2013-14	-2.27	6.6	6	4.97	11.20	4.16	-6.82	-58.23
2014-15	-20.24	7.2	2	7.61	1.06	12.29	-95.07	-90.18

Source: Growth rate Calculated by collecting the data from various government sources including -\*Ministry of Petroleum & Natural Gas (GOI)

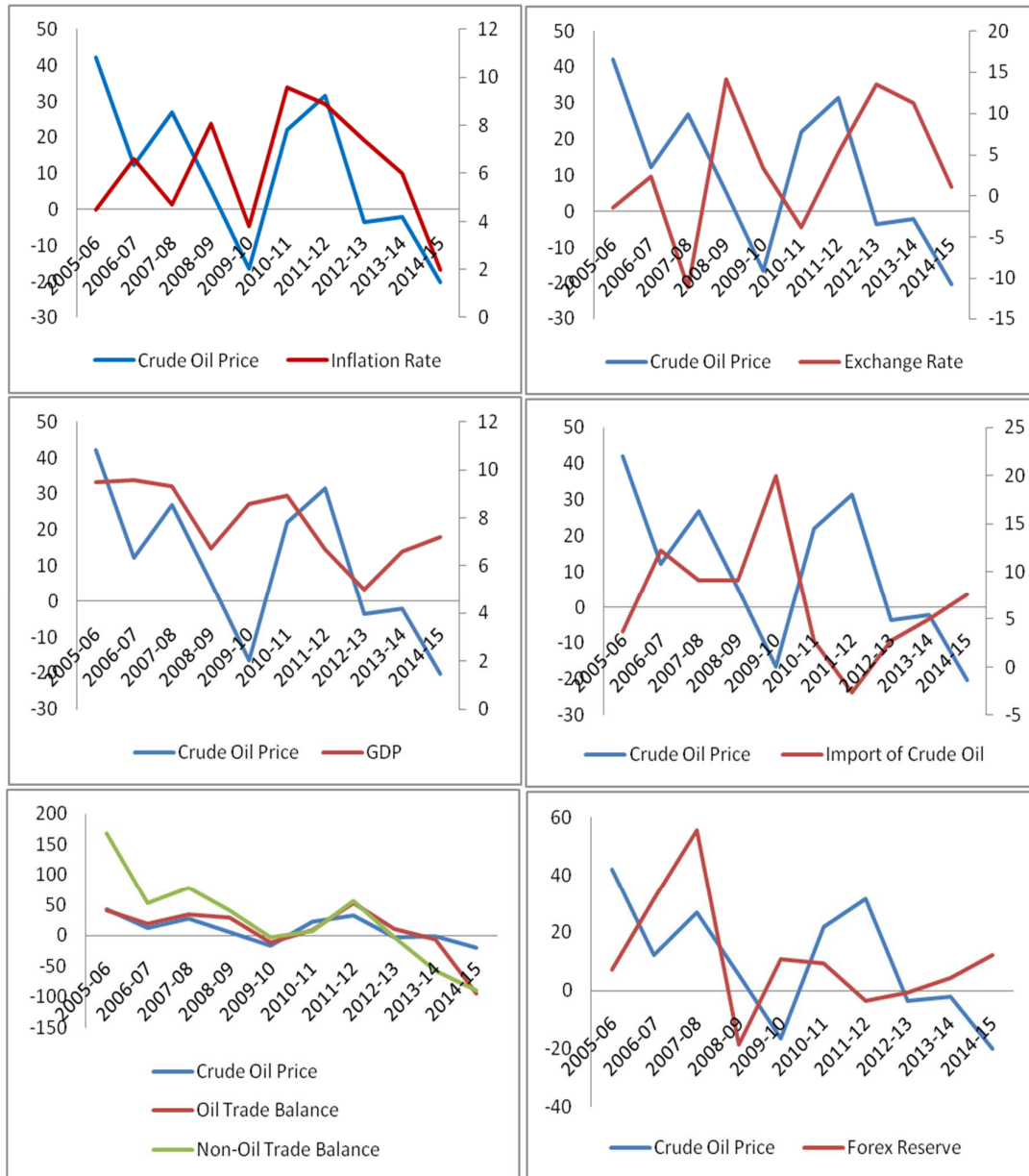
\*Reserve Bank of India (RBI).

Notes

- 1) All variables are in percentage terms.
- 2) Growth rate in 2005-06 is calculated with the help of previous year data.

Figure-1 showing the impact of crude oil price fluctuations on Macroeconomic indicators. The figure is indicating that inflation rate and exchange rate contradict the crude oil price in initial year and then start moving with the movement of crude oil price. Import of crude oil price is negatively related to the crude oil price. It means as the prices of crude oil increase, imports of crude oil decrease. GDP growth rate does not vary much with the variations in crude oil price. Forex reserve is fluctuating with the crude oil price fluctuations while oil and non-oil are moving in the same direction.

FIGURE 1: TRENDS IN GROWTH RATE OF SELECTED MACROECONOMIC INDICATORS OF INDIA



Source: Table-1

TABLE 2: CORRELATION MATRIX

	Crude Oil Price	GDP	Inflation Rate	Imports of Crude Oil	Exchange Rate	Forex Reserve	Oil Trade Balance	Non-Oil Trade Balance
Crude Oil Price	1	0.4336	0.4147	-0.5210	-0.4409	0.1805	0.7951	0.8503
GDP		1	-0.2400	0.3957	-0.7990	0.6422	0.1720	0.5113
Inflation Rate			1	-0.5201	0.2912	-0.3882	0.6176	0.1737
Import of Crude Oil				1	-0.1024	0.3158	-0.2949	-0.1361
Exchange Rate					1	-0.7936	-0.0355	-0.3444
Forex Reserve						1	-0.0124	0.1689
Oil Trade Balance							1	0.7989
Non-Oil Trade Balance								1

Source: Calculated with the help of Table-1.

## DATA ANALYSIS AND INTERPRETATIONS

To find out the relationship between Crude Oil prices and other macroeconomic indicators, data sample of 10 years has been collected and Correlation Matrix Model is used. The main objective of this study is to find out the impact of crude oil price fluctuations on selected macroeconomic indicators.

**Correlation Matrix:** In the correlation matrix inter variables were obtained and presented in Table-3. A perusal of Table-3 during the study period indicated that crude oil prices had moderate degree of relationship with the GDP, inflation rate and high degree of relationship with oil and non-oil trade balance, but growth rate of forex reserve has not shown any inclination towards crude oil price. Further, it was noticed that import of crude oil exchange rate were negatively correlated with crude oil price. As regards intermediary correlations, inflation rate (WPI) has shown significant relationship with exchange rate (positive), oil trade balance and non-oil trade balance (positive) and forex reserve (negative). The correlation matrix further indicated that GDP growth rate were significantly related with forex reserve, import of crude oil, oil non-oil trade balance and negatively related with the exchange rate. Import of crude oil positively related with forex reserve while negatively related with the exchange rate, oil and non-oil trade balance. All the highly significant correlations in the correlation matrix are marked with \* and are self explanatory.

## SUGGESTIONS

As India is one of the largest oil importers in the world and the crude oil prices have fallen more than 60 percent since June, 2014 (Ministry Of Petroleum and Natural Gas, GOI report), the falling crude oil price may affect the Indian Economy in the following ways:

**Current account balance-** It may help in narrowing India's current account deficit - the amount India owes to the world in foreign currency. A fall in oil prices by \$10 per barrel helps reduce the current account deficit by \$9.2 billion, according to **Livemint report**. This amounts to nearly 0.43% of the GDP - a measure of the size of the economy.

**Inflation-** A rise or fall in oil prices leads to an increase or decrease in prices of all goods and services. Every \$10 per barrel fall in crude oil prices helps to reduce retail inflation by 0.2% and wholesale price inflation by 0.5%, according to a **Moneycontrol report**.

**Oil subsidy and fiscal deficit-** since the diesel was recently deregulated, the fall in oil prices will likely have less effect on the government's fiscal deficit. Moreover, the government still has to pay for previous under-recoveries. Any benefit from the fall will be offset by payments for the past under-recoveries.

**Rupee exchange rate-** The value of Rupee depends on its demand in the currency market which in turn depends on the current account deficit to a great extent. A high deficit means the country has to sell rupees and buy dollars to pay its bill which reduces the value of the rupee. A fall in oil prices is, thus, good for the rupee. However, the negative aspect is that the dollar strengthens every time the value of oil falls. This indicates negative benefits from a fall in current account deficit.

**Petroleum product export:** Besides the benefits of falling oil prices, it also has its downsides. Directly, it affects the exports of petroleum producers in the country. A fall in oil price may impact the economy, and hamper demand for its products.

## CONCLUSION

An effort has been made to find out the macroeconomic impact of crude oil price fluctuation on GDP, Inflation Rate (WPI), Import of Crude Oil, Exchange Rate, Forex Reserve, Oil and Non-Oil Trade Balance. This paper examined the effects of oil price by using growth rate and Correlation Matrix over the period of 2005-06 to 2014-15. As Indian Economy is a developing economy and it has to meet its huge oil demand, it satisfies the demand through more than 80 percent of import, due to which a change in the crude oil price affects other indicators of the economy. The data presented above indicates that the crude oil price has positive relationship with GDP, Inflation rate, Forex Reserve, oil and non-oil trade balance while negative relationship with import of crude oil and exchange rate. It means with the rise of crude oil prices; inflation rises but import of crude oil declines. Fluctuation of crude oil prices does not affect much the GDP and Forex Reserve. It is also examined that GDP has a positive relationship with import of crude oil, forex reserve, oil and non-oil trade balance. As far as growth rate of different factors are concerned it can be concluded from the data that trends in growth rate of crude oil prices followed by inflation rate, fell dramatically during the recent years. Further, fluctuations are also shown in other macroeconomic indicators.

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