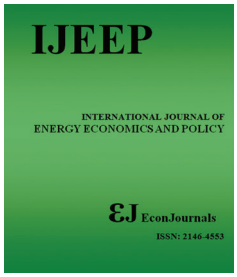

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Does Oil Prices Impact Sectoral Stock Market Prices? Evidence from Emerging Economies

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ABSTRACT

This study investigates the effect of oil price (OPs) shocks on stock market prices (SMPs) of 48 listed companies in all sectors of the Muscat Stock Exchange (MSX) in the Sultanate of Oman. The analysis is based on monthly data collected from three main sectors (Finance, industry, and service) listed in MSX and intermediate international oil prices from 2009 to 2020. An alternative asset pricing model is used based on the Arbitrage Pricing Theory (APT). The model evaluated the correlation between independent factors, including oil price, interest rate, industrial production, and stock returns as the dependent variable. The analysis shows that oil price volatility has a notable positive effect on stock market prices across all sectors of listed companies on the (MSX) in the Sultanate of Oman. These findings may provide insight to policymakers to continue taking appropriate action during oil price shocks and for investors to take their decisions properly. The current study contributes to the existing literature by examining the impact of oil price shocks on stock prices in the Sultanate of Oman, GGC, and the Middle East, addressing a gap in the research.

Keywords: Oil Prices, Stock Prices, Security Market, Sectors, Oman
JEL Classifications: F36

1. INTRODUCTION

The fluctuation in oil prices (OPs) in the last century has attracted the attention of both academicians and practitioners to conduct much research. Many economists have studied the volatility between oil prices (OPs) and macroeconomic factors. Moreover, it is established that the economy has been affected by OPs shocks regarding increased production costs and the prices of goods and services. (Filis et al., 2011). Many authors (Saorsky, 2012; Blanchard and Gali, 2007; Park and Ratti, 2008; Caporale et al., 2022, Driesprong et al., 2008) have paid more attention to the nexus between OP shock and stock market prices (SMPs) since this relationship has recently been considered a rich field of research in many specializations. Therefore, oil prices have a direct nexus with stock market returns and also impact essential variables such as production costs, inflation rates, exchange rates, and economic growth. It has been argued that changes in OP impact firm profitability, as production costs, dividend payments, and SMPs will be affected (Ziadat and McMillan, 2022). It has been realized that using oil in the production process by companies affected negatively is earnings as the result of rising oil prices. Many recent studies have examined the effect of OP validity on stock returns (SRs). The findings of these studies confirm that oil price shocks significantly impact SMPs (Jones, 1996). Most recent studies have analyzed the association between Ops and SMPs in many different sectors (Hamilton, 2003; Lee and Ni, 2002; Davis and Haltiwanger, 2001; Mandal and Datta, 2024; Al-Fayoumi, 2023; Shen et al., 2024).

In addition, (Basher and Sadorsky, 2006; Ojeyinka and Aliemhe (2023) conclude that the risk related to the rise of OPs has an impact on SMPs, and the nexus between OPs shocks and SMPs has been confirmed. Previous studies have shown mixed results, and some studies have revealed positive results between OPs

shock and SMPs. Other studies have provided strong evidence that the rise in OPs has a negative impact on SMPs, while some studies have documented no significant link between these two variables. For example, the link between the volatility of OPS and SMPs has been investigated by (Khamis et al., 2018) in importing countries such as Turkey, Tunisia, and Jordan. The study found no significant impact of OPs changes and SRs in these countries. In their latest articles, (Caporale et al., 2022) analyze the influence of exchange rates on OPs and their impact on sectoral SRs in BRICS-T nations. The finding reported that, except for India, the OPs positively affect the energy sectors of all BRICS-T countries. The results in industrial sectors showed a negative relationship for all countries except Turkey; also, a negative association is documented in the financial sectors of Brazil, Russia, India, and South Africa (Zhu et al., 2016), which tested the link between OPs shocks and Chinese SRs. The study confirmed that the impacts of OPs shocks on Chinese SRs present asymmetric features.

A comprehensive study was conducted in the United States and 13 European countries (Kang and Ratti, 2013) to test the impact of OPs shocks on SMPs. They conceded that the OPs shock has a positive effect on SRs in exporting countries and a negative impact on oil-importing countries.

The Sultanate of Oman's economy has depended entirely on the oil industry, which is vital to the country's economy. The statistics in 2016 showed that the total oil production per day was 943,000 barrels. The oil and gas reserve was 5.3 million barrels, while 24.3 trillion cubic feet of gas was reported (Alshubiri et al., 2020).

Authors, investors, and politicians are still interested in the relationship between OPs validity and SMPs due to the lack of unanimity on the outcomes. Research interest in this issue has been growing; however, the number of studies remains limited (Dutta et al., 2017). Many studies have been conducted to explore the effect of changes in OPs on SMPs during the last two decades. Most of these studies have been conducted in wealthy nations. The aim in objectives of This study examines the connection between operational performance shocks in 48 publicly traded companies across all sectors of the Muscat Securities Market (MSX) in Oman. Limited research exists on the relationship between operational performance and stock market performance in this context.

The contribution of this study to the literature is that it fills this gap and shows and investigates the effect of OPs on SMPs in MSX listed companies. The results of this research will help policymakers controlling monetary and fiscal policies and managers and investors in Oman and other export oil countries to consider appropriate operational and strategic plans. The study is structured as follows: the next section provides a theoretical framework that examines studies assessing the relationship between OP validity and SMP and discusses the varying results of this association. This paper outlines the data sources, sample selection process, study variables, and developed models. Three different forms of analysis were used to estimate the models. The conclusion will eventually be described.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The literature reviews present oil price fluctuations and explain the relationship between Ops and SMPs for previous empirical studies to understand the relationship and explain firm performance measurement. Various authors and experts have studied the correlation between oil price shocks and macroeconomic factors following the oil price shocks 1973-1974 and 1979-1980 (Masih et al., 2011). The author (Yan, 2012) in 1997, the Asian financial crisis significantly affected the global economy and oil demand. This, combined with the recovery of oil exports and the gradual increase in production in Iraq, led to a continuous drop in international petroleum prices, reaching historically low levels of 10 dollars per barrel in 1998. From 2004 to 2008, oil prices jumped from $36.1 to 94.5 in 2008, dropped in 2010 to $61.1, and increased again in 2012 to $107.5. The price decreased again to below $45. Based on this fluctuation in oil prices, the stock market return could be a valuable measure to reflect the impact of OPs shocks on the economy (Jones et al., 2004).

Over the past 20 years, there has been notable volatility in operating profits. The prices surged from $60 per barrel to a peak of $100 in 2008, then plummeting to below $50 in 2015 and 2017. The volatility of oil prices affects importing and exporting countries' economies differently, despite being sold on a global market. (Global Network for Advanced Management, 2017). Crude oil prices have been volatile, exceeding $50 in 2018-2019 and dropping much below $40 in 2020 owing to the COVID-19 pandemic. Several experts have analyzed how variations in OPs impact stock performance. Hamilton (1983) studied the impact of oil price shocks on US businesses and found that cycles have significantly influenced research on the macroeconomics of OPs shocks. Sadorsky (2012) explored the effects of OPs variations and volatility on SMPs, finding that fluctuations influence stock market returns in OPs.

On the issue of volatility, as reported by (Masih et al., 2010), volatility is a crucial factor in examining the association between OPs and SRs in the context of the Korean market. In addition, the results of Faff and Brailsford (1999) demonstrated a notable positive correlation between the oil and gas industries and a negative correlation in the paper, packaging, and transport industries in Australian equity returns. The study emphasized responsiveness to oil price determinants and market returns. Banerjee et al. (2023) examined the relationship between OPs variations and SMPs in the UAE using monthly data from the Abu Dhabi stock index from 2006 to 2019. The results indicated a high correlation between organizational performance shock and strategic management practices. As derived from the literature, many researchers have examined the impact of OPs changes on SMPs in developed countries. For example, Jones and Gautama (1996) conducted a study in four developed countries, the US, Canada, Japan, and England, to assess the link between changes in oil prices and market stock returns and found significant effects of the changes in OPs on the four countries' SMPs. In the same view, the study documented by (Basher et al., 2016) confirmed that the strong association between OPs changes and SMPs reflects

the strong robustness of the influence of OPs on SRs. The study also reported a more significant impact on developing countries' oil markets because they depend on energy more than developed countries, which use this source more efficiently.

In another study, Elyasiani et al. (2011) investigated the relationship between OPs shocks and SRs in Kuwait, in which 9 out of the 13 sectors showed a significant impact of OPs changes and SMRs. They pointed out that the industries have shown a different sensitivity to OPs changes based on the differences in their oil consumption. Their recent paper (Khan et al., 2021) empirically explored the impact of OPs and macroeconomic factors on SMRS in Pakistan. The result showed that OPs, have a positive effect on remittance inflow and foreign direct investment exert while a negative impact on the development of the Pakistan stock market on exchange rate exert was documented (Al-Maadid et al., 2016), confirmed that the crude OPs shocks have impacted significantly industry stock market returns in chains markets, the study used a quantile regression technique to investigate this association. Their results indicate that. Their study (Dutta et al., 2017) reveals a significant positive correlation between OPs and realised SMPs uncertainties in Saudi Arabia, Kuwait, the United Arab Emirates (UAE), and Qatar, even when considering global stock market uncertainty. The results from GCC confirmed a highly favorable correlation between SMPs and Ops (Al-Maadid et al., 2016). Ojeyinka and Aliemhe (2023) examined the relationship between oil price components and stock market returns in various sectors in Nigeria. The findings provide evidence of a robust and enduring link between these two variables; however, some evidence shows no significant negative or symmetric impact of OPs on SMPs.

For example, Oboh et al. (2020) used the VAR-based technique to investigate the relationship among OPs, exchange rates, and SMPs performance in Sub-Saharan Africa. The results indicated a one-way connection between crude OPs and shares and a two-way connection between crude Ops and exchange rates. Cheikh et al. (2018) investigated the impact of fluctuations in Ops on Gulf Cooperation Council (GCC) SMPs through the application of nonlinear smooth transition regression (STR) models. Empirical findings indicate that (GCC) stock markets do not exhibit uniform responses to fluctuations in oil prices. In the same context, (Ben Douissa and Azrak, 2023) they assessed the link between the contagion impact of OPs validity and stock market prices in (GCC) from 2016 to 2021. The findings did not report any association between the two variables except for the Dubi financial market.

In emerging countries (Nejad et al., 2016) studied the correlation between OPs volatility and Tehran stock exchange performance from 2003 to 2014. The Tehran Stock Exchange was trending because of a great shock in OPs. Apergis and Miller (2009) conducted a study in eight industrialized countries' Stock Market Platforms (SMPs)–Australia, Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States-to examine the effects of structural oil price shocks on their stock markets. The study found minimal indication that OPs shocks substantially influenced SMPs. Faff and Brailsford (1999) noted that rising oil prices negatively affect industries such as paper and packaging, banks, and transportation. However, some industries can mitigate the impact by passing on extra costs to customers, thus reducing the negative effect on their profitability. In G5+ countries using Parkinson's proximal realized volatility (Mohammed et al., 2023), the impact of OPS shock on SMPs is evaluated. The results of the study revealed a strong significant relationship between the two variables, and the Russian-Ukrainian war has a significant impact on the energy crisis worldwide.

According to (Sadorsky, 2012) research, which analyzed the relationship between oil price shocks and stock market returns in the US economy, there was evidence of a negative impact of such shocks on real stock returns, as well as on interest rates and industrial production. Ferderer (2010) also suggests that some of the asymmetric relationships between oil price changes and output growth found in previous studies can be attributed to the economy's response to oil price volatility.

As derived from the above literature, the link between OPs shocks and SMPs has shown a mixed picture: while many studies have reported a positive relationship between the two variables, other studies have documented a negative effect of OPs shocks and SMRs. Furthermore, some studies have not proved the impact of Ops changes and SMRs significantly.

The current study sought to explore the impact of OPs on SMPs in listed companies in all sectors of the Muscat Stock Exchange. To our knowledge, no study has yet been conducted to investigate this issue in Oman. We argue that different studies explain the mixed findings regarding the impact of changes in oil prices on stock market prices. Therefore, we propose the following hypothesis:
H0: There is a varied association between OPs and OMPs in 48 listed companies in all sectors of the (MSX) in the Sultanate of Oman.

3. DATA AND METHODOLOGY

3.1. Data Collection

To achieve the research goals, we utilize monthly data from three main sectors (financial, industrial, and service companies) that are listed on the MSX exchange. The data covers the period from January 2009 to December 2020. The data on foreign operations were gathered from the Energy Information Administration (EIA) website, while the stock market returns in the Sultanate of Oman were translated to US dollars and obtained from the MSX in order to examine their correlation. Additionally, data on interest rates is obtained from Oman's central bank. The data were utilized to assess the correlation between the performance of OPs and SMPs in Oman.

3.2. Methodology

The main objective of this research is to examine how OPs affect SMPs. Previous studies have recognized that fluctuations in oil prices play a crucial role in impacting stock market values (Basher and Sadorsky, 2006; Arouri et al., 2011; Ben Douissa and Azrak, 2023). No previous research has been conducted on this topic in the context of the Sultanate of Oman.

An Arbitrage Pricing Theory (APT) model was used to analyze the correlation between Oman's oil and stock market prices.

The essential principle of APT, as stated by Bodie et al. (2005), is that market prices should be rational to eliminate arbitrage opportunities. Roll and Ross (1980) emphasized that the price relationship is the main conclusion of APT and will be the foundation of our empirical examination. The model was adjusted to fit the data gathered in this study.

The model estimates stock returns using OPs, interest rates, and industrial production as explanatory variables that adjust to their equilibrium following a change in the independent variables. This can be mathematically stated as

$$SI = at+a\ OPt+a2\ IP_2 + b\ IR_3+\varepsilon_1 \quad (1)$$

Where
SI at is a constant for SMRs a
OP_1 is the Oil price 1 OP
IP_2 is the industrial production 2 IP
IR_3 is the interest rate 3 IR
εOne is the change in price with a mean of zero.

Thus, this study makes use of the following VAR System Model, as shown in equation 2 below:

$$SI = \beta 0 + \beta 1OPt\text{-}1 + \beta 2OPt\text{-}1 + \beta 3OPt\text{-}1 + ut \quad (2)$$

Where the explanatory variables are the first differenced with their own lag, βi is the coefficient matrix, and ut is the error term.

Three methods of analysis were performed to estimate the models, following Roll and Ross (1980). Initially, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were conducted to confirm the stationarity of the chosen variables. Johansen's (1990) co-integration test was used to determine the long-term link between variables. Finally, the Level Coefficients and Error Correction Model Estimation test was conducted. After verifying the cointegrating relationship, the subsequent step calculates the long-term, short-term, and error correction terms.

Table 1: ADF unit root test

	ADF test-statistics		Critical value	Critical value
	Level	first difference at	1% at 5%	
LnMSX	−1.547668	−9.478932	−4.063233	−3.460516
Lnip	−3.052394	−11.83344	−4.063233	−3.460516
Lop	−1.664511	−7.319399	−4.063233	−3.460516

4. RESULTS AND DISCUSSION

4.1. Unit Root Test

The Augmented Dickey-Fuller (ADF) test is used to assess if a variable is stationary. Stationarity must always be verified and satisfied when studying time series data. Non-stationary variables can lead to inaccurate regression results and incorrect outcomes. The outcomes of the Augmented Dickey-Fuller test indicate that all the variables chosen for examination in this study are non-stationary in their original state; however, they become stationary once they have been differenced. Even if the variables are nonstationary, VAR's DE trending, differentiating, and cointegrating approaches can render the system inactive. Therefore, VARS should be studied at different levels rather than via differencing, as differencing discards vital information. The unit root test result presented in Table 1 indicates that all the variables are non-stationary at the level and become stationary when first differenced.

4.2. Johansen Co-Integration Test

After confirming that the variables were l, the Johansen co-integration test was conducted. The Johansen cointegration study helped comprehend two or more stochastic time-series cointegration. The VAR model employs the Johansen test to ascertain the number of cointegrating vectors. Before proceeding, it is essential to determine a suitable number of lag orders to identify the cointegration order. The lag order was determined based on the results obtained in Table 2. Table 2 depicts all approaches advocating for one lag order selection.

The Johansen co-integration test was conducted after confirming that the variables were l and affirming the lag length. The Johansen cointegration study helped comprehend two or more stochastic time-series cointegration. From Table 3, it is evident that there is no cointegration among the chosen variables. Hence, the VAR model determines the relationships among the chosen variables.

4.3. VAR Granger Causality Test

The VAR estimates show that the chosen variables (lnMSX, lnip, and lnop), Muscat stock index indices, index of industrial production, and oil price do not have any association. To determine whether there is a causal relationship between the three variables, additional testing is required to determine whether ln MSX causes lnip or lnop or whether these variables result in each other. This issue has been resolved using Granger and Sims' causality test

Table 2: Lag order determination criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	−84.32813	NA	0.001734	2.156250	2.244933	2.191831
1	139.4067	425.3725*	8.64e-06*	−3.145845*	−2.791112*	−3.003522*
2	146.9902	13.85627	8.96e-06	−3.110870	−2.490087	−2.861804
3	150.2964	5.796009	1.03e-05	−2.970282	−2.083449	−2.614473
4	159.9302	16.17520	1.02e-05	−2.985930	−1.833047	−2.523378
5	162.0605	3.419031	1.22e-05	−2.816308	−1.397375	−2.247014
6	164.1711	3.231095	1.46e-05	−2.646200	−0.961218	−1.970163
7	167.9352	5.483517	1.69e-05	−2.516919	−0.565887	−1.734139
8	173.8724	8.209428	1.86e-05	−2.441294	−0.224211	−1.551771

*Indicates lag order selected by the criterion, LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion

Table 3: Findings of Johansen test of Co-integration

Hypothesis No. of CE (s)	Trace Statistics	0.05 Critical value	Prob.**	Max-Eigen Statistics	0.05 Critical value	Prob.**
None	12.78191	29.79707	0.9013	7.076642	21.13162	0.9508
At most 1	5.705269	15.49471	0.7300	5.341021	14.26460	0.6983
At most 2	0.364248	3.841465	0.5462	0.364248	3.841465	0.5462

Notes:*Denotes rejection of the hypothesis at the 0.05 level,**MacKinnon-Haug-Michelis (1999) P-values

Table 4: VAR granger causality/block erogeneity Wald tests

Dependent variable: LNMSX			
Excluded	**Chi-square**	**df**	**Prob.**
LNIP	0.062031	1	0.8033
LNOP	2.414830	1	0.1202
All	2.471729	2	0.2906
Dependent variable: LNIP			
Excluded	**Chi-square**	**df**	**Prob.**
LNMSX	0.036210	1	0.8491
LNOP	0.742076	1	0.3890
All	0.758632	2	0.6843
Dependent variable: LNOP			
Excluded	**Chi-square**	**df**	**Prob.**
LNMSX	0.037714	1	0.8460
LNIP	0.009458	1	0.9225
All	0.050578	2	0.9750

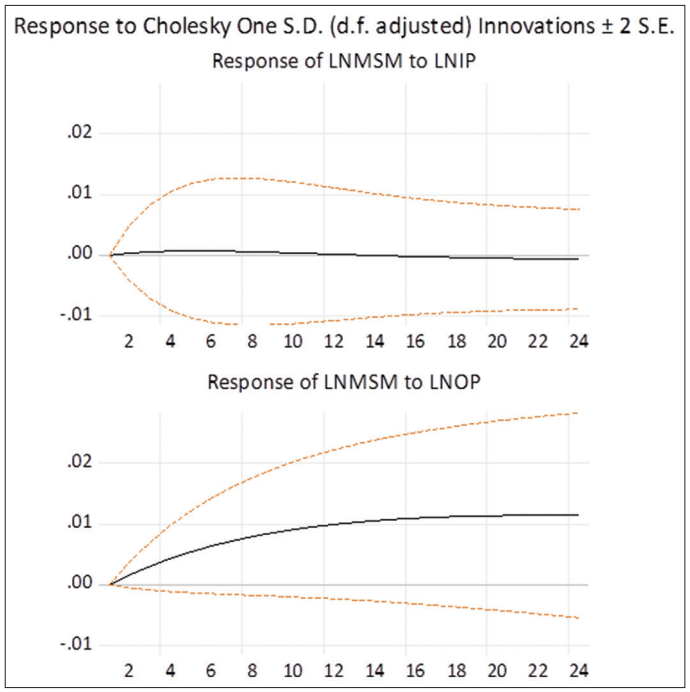
methodology. The output presented in Table 4 clearly shows that none of the variables selected for the study have causal relationships with each other. As for all the variables, the P > 0.05. This is similar to the findings of (Adetunji Babatunde et.al, 2013; Guliman, 2015). However, a study by Fatima and Hassan, 2022) discovered correlations between stock and oil prices in both the short and long terms.

4.4. Impulse Response

We use the impulse response function to determine the impact of industrial production and the oil price index on the Muscat Stock Exchange indices. The impulse response function (IRF) demonstrates how the dependent variable responds to shocks in the error term of the VAR model. The shocks impact the dependent variable, which consists of the Muscat Stock Exchange indices and independent variables, such as the industrial production index and oil price, in both the present and future eras. Cholesky decomposition is the decomposition method used. The impulse response function allows us to analyse how the dependent variable reacts to a one-standard-deviation shock, resulting in a time-dependent variable path. The goal is to attain the intended outcome by rigorously following the conventions of British English, including its spelling, terminology, and expressions.

Figure 1 depicts the IRF function used to comprehend the effects of unforeseen conditions on the study variables. The time horizon for the impulse response analysis is indicated on the x-axis of each graph. This study aims to determine the impulse response of a shock (one standard deviation, SD) to Muscat stock exchange indices, the index of industrial production, and the oil price series. The first graph depicts the response of the Muscat security indices to the innovation of the industrial production index. It can be observed from the figure that the Muscat security indices respond

Figure 1: Impulse response function



positively to a shock in the index of industrial output until the tenth period. After that, it stabilizes and becomes negative after the sixteenth period. The shock in oil prices leads to a positive response by the Muscat security indices, which increase positively from the zero-time period until the twenty-fourth period. The findings from the study are similar to a study (Nwude et al., 2021).

5. CONCLUSIONS AND IMPLICATIONS

Oil is the primary driving force of the global economy. This is a crucial criterion with significant economic and political implications worldwide. It is a fundamental aspect of human civilization and all other sources. It is among the most widely traded essential commodities globally. This study aims to analyze the influence of oil price fluctuations on the stock market prices of listed businesses across all sectors of the Muscat Stock Exchange (MSX) in Oman during the past two decades. Data were gathered from the banking, industrial, and service sectors of businesses listed in the MSX from 2009 to 2020. Arbitrage Pricing Theory (APT) is an asset-pricing concept. Stock returns are viewed as dependent factors in this model. At the same time, oil price, interest rate, and industrial production are regarded as explanatory variables that adjust to equilibrium following a change in independent variables. The empirical findings indicate that shocks and fluctuations in oil prices result in a positive reaction from the Muscat security indices, which exhibit a steady increase

from the initial to the twenty-fourth period. Simply put, there is a direct correlation between the changes in OPs and SMPs across all sectors of Oman's publicly traded companies.

The results provide valuable information on how new laws and regulations issued by the country have led to increased liquidity and the attraction of foreign investors. Additionally, they offer investment opportunities in the Muscat Stock Exchange owing to its stability and lower volatility than global markets. These findings could be helpful for politicians to make informed decisions during oil price shocks and for investors to make strategic choices in suitable settings. This study contributes to the current literature by examining the effects of OPs shocks on SMPs in the Sultanate of Oman, GGC, and the Middle-East region, which is an area with less research.

5.1. Limitation and Future Research Suggestions

This study investigates the association between oil price fluctuations and stock market prices from 2009 to 2020 in listed companies in Oman's Muscat Stock Exchange (MSX) sectors. The study used industrial production and interest rate as independent variables, whereas future research can use more variables such as inflation and GDP. Furthermore, future studies can examine the impact of oil price validity and stock returns in the GCC and Middle East and compare the relationship between these variables in export and import countries.

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