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The Impact of China-Pak Economic Corridor (CPEC) on Pakistan Stock Exchange (PSX)

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ABSTRACT

Purpose: The study aims to find out the impact of CPEC project on volatility and growth of Pakistan stock exchange PSX-100. The CPEC is a significant subset and southern corridor of (SREB) which consists of three economic corridors (Rana, 2015). The investment in CPEC projects not only accelerates Pakistan and Chinese economy but also anticipated to have significant effects on Pakistan stock exchange PSX. **Design/Methodology/Approach:** The methodology of event study proposed by Bremer and Sweeney (1991). The methodology of Cox and Peterson (1994) used to identify the effects of events related to CPEC projects and stock market returns. **Findings:** The results indicated that the volatility of PSX-100 has low in post CPEC as compared to pre CPEC era showing a positive effect of CPEC on PSX in the form of stable PSX 100 returns in post CPEC announcement era. **Implications/Originality/Value:** The results of this empirical study provide important implications to overseas investors, corporations and regulators.

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1. Introduction

In 2013, Chinese president Xi Jinping has announced a bigger regional vision of connecting Asia with Europe, Middle East and Africa known as "One Belt One Road" (OBOR) and Pakistan signed an MOU with china for the developmental project of CPEC (Ranjan, 2015; Benthany, 2015). China-Pakistan Economic Corridor (CPEC) holds a significant portion of this initiative and the step towards actualization of this project was officially implemented in 2015 when Chinese president visit Pakistan and announce a \$46 billion investment commitment for CPEC and signed. 51 agreements (Khan, 2015). CPEC consists of mega projects related to energy, road infrastructure, improvements in existing railroads along with development of new ones and optical fiber (OHK, 2015). CPEC is expected to strengthen

Pakistan and Chinese economy by speeding up both economies' growth.

CPEC which is the southern corridor of second developmental proposal of China (SREB) will be consisting of road and rail infrastructure. It will start from Guangzhou, that is the third largest city of China and passes from the western area of China and finally after passing from Xinjiang unite the Kashgar city of China with Pakistan's Khunjarab Pass. From this place the China will connect its southern corridor with the Gawadar port which provides China a way forward to the Indian's ocean, Arabian and Persian Gulf (Rana, 2015; Sahgal, 2015).

Its impact on economy can be measured by volatility in stock exchange of Pakistan (Ghani and Sharma, 2018). According to (Economy Watch, 2019), stock market returns are the earnings that business person earns by investing into the stock market. Stock market returns can be in the form of direct profits or in the form of dividends and bonuses that are awarded by the company to its shareholders on the scheduled time. Further the website expresses that Return through the stock market can be earned through dividends awarded by companies by the fixed period of time due on announcement. Company offers dividend from the amount of profit they earn to their shareholders. Dividend is treated as the primary source of earning profit from Stock Markets. Another source, in the secondary market, shareholder can generate profit by purchasing shares at a lower price and selling them at higher in the stock market. The returns in the stock market are not fixed. The returns vary according to the market conditions and its risk in the trading. It can be positive or negative which depends on various internal as well as external factors of locally or globally or both. The Stock market volatility represents the amount of vagueness or insecurity with respect to changes in stock value. In case of lower volatility, stock's value does not swing intensely.

Very few academic studies have examined the effects of CPEC on stock market performance. (Bahoo, Saeed, Iqbal & Nawaz, 2018) has studied the impact of CPEC on stock market by taking four economic factors including trade, investment, energy and infrastructure and found that CPEC has positive impact on stock market. Sharma & Ghani, 2018 has studied the effects of CPEC on shareholders wealth by using standard event methodology and taking three key events of CPEC. On the basis of average and cumulative stock's returns, they found a significant positive impact of CPEC agreement on KSE 100 index. Yeung, Pang and Aman, 2019 has examined the impact of CPEC on Pakistan and Shanghai stock exchange by using the methodology of event studies and found that the initial announcement has stronger and positive effects on the PSX than the subsequent announcements. Moreover, they found that the announcement short term effects are more significant in the PSX than the Shanghai stock exchange. The reason for the difference occurs due to the size of the economies of Pakistan and China. As per our best knowledge, very few studies have been conducted to examine the effects of CPEC announcements on stock exchange and market returns. So, this study is proposed to find the pre and post CPEC announcements effects on PSX 100 index volatility by using the methodology of event study proposed by Bremer and Sweeney (1991). The methodology of Cox and Peterson (1994) used to identify the effects of events related to CPEC projects and stock market returns.

The rest of the paper consists of four sections. Section 1 explains, Literature Review which includes GARCJ and stock market volatility, OBOR, CPEC impact on other sectors. Further three sections comprised of research methodology, research analysis, results and finally conclusion and future recommendations.

2. Literature Review

2.1 GARCJ and Stock volatility

Engle (1982) has proposed GARCH patterns which have been used by various researchers to examine conditional variances and volatility in earlier research. (Attari & Safdar, 2013) used this pattern to examine the volatility of stock market and macroeconomic variables. It has also been used by Ahmed & Suliman, (2011) to study market volatility. GARCH patterns can also be used to study market volatility

based on impact of an event or an announcement.

Beta parameter ought to be invariant for that time period when constantly aggravated returns are figured. Progressively, be that as it may, the experimental confirmation demonstrating the change in each stock with the change in beta with the shift in the differencing interim (Hawawini, Cohen, Maier, Schwartz, & Whitcomb, 1993). (McCord & Tole, 1977) found that a high volatility fund, as measured by the slope of the relapse line (beta), is relied upon to accomplish higher rates of return when the market is up and greater negative rates of return when the market is down than would a fund with a lower beta. (Ali, Rafiq, & Gul, 2015) T-Bills are treated as the economic kit to sustain and retain liquidity in country. Liquidity has its own effect on business system and which makes it an important factor in the macroeconomic landscape. Treasury bills from SBP or Government performs dual function of maintaining the liquidity as well as it helps to control and make inflation low. Authors have considered macroeconomic variables to be more important in influencing offer rates and bid rates of treasury bills. The paper applied Risk Averse Preferred Habitat model (Heuson, 1998) by using term premiums as explained variables. The macroeconomic variable authors have chosen are price stocks, money supply, CPI and Prime rate. Authors have used theoretical framework and designed hypothesis. Data collected from secondary sources like, State Bank of Pakistan, IMF, World Bank, and PSX. Prime rate KIBOR is found to be the most major determinant of Treasury bills and rest of other variables found insignificant. (Nyawata, 2012) Study is about the role of Central Banks whether they should use T-Bills or Central Banks for irksome liquidity in the banking system. As being recognized the reason for using treasury bills by Central Banks, the research concludes T-bills are the best option to be utilized because of the macroeconomic favors for the economy as a whole. Author concluded that while making decision to choose T-bills, following suggestions should be keep in mind: a) Operational Independence of the Central Banks; b) Market Development; c) Strengthening the implementation of the monetary policy.

(Hussain, Zaman, & Ahmad, 2015) investigated the association between stock market returns and macroeconomic variables with reference to Pakistan. Authors have used the monthly observations from January 2001 to June 2011. To check the instability of stock returns, authors have applied heteroscedasticity. New impact cure graph describes that with negative shocks leads to high risks as comparison of positive shocks on the same degree. Researchers have concluded though ARDL model that stocks market instability rely on macroeconomic variables as are inflation. REER and oil prices. Whereas, supply of money and industrial output negatively impact the stock market.

2.2 China Pakistan Economic Corridor (CPEC)

OBOR (One Belt One Road) as it consists of transport and related infrastructure. CPEC's is part of overall OBOR initiative. Total projects are of 54 billion USD, but overall worth is about \$900 bn and more than 20 countries are contributors in China Pakistan Economic Corridor. OBOR consist of multiple corridors including following

- China and Pakistan (China Pakistan Economic Corridor (CPEC))
- China Myanmar Thailand Corridor

CPEC is treated as the game changes for Pakistan as well as for the region as well. Overall CPEC comprises of following main projects:

- Gwadar Port (Estimated Cost US \$800 Million)
- Energy Projects (24) (Estimated Cost US \$ 34.4 billion) Thermal and Renewable
- Infrastructure (4 projects) (Estimated Cost US \$ 9.8 billion)
- 30 Special Economic Zones (SEZ)

The total estimated time for the completion of CPEC is 15 years. Analysis predicted that CPEC will boost Pakistan's GDP by 2% or above and GDP growth rate by 5% (IMF). Because of higher exports

Balance of Payment will be accretive. FDI will increase due to import of heavy machineries to approximation of 10% or more (Hashmey, 2016).

2.3 Impact of CPEC on Different Sectors of Stock Exchange

Investment in Pakistan stock exchange and Shanghai stock exchange influenced by announcement of 54 billion USD by Chinese president for the implementation of CPEC (Wolf, 2016). Impact of CPEC on the different sectors of Pakistani economy has discussed below:

2.4 CPEC Impact on Banking Sector

Governor State Bank of Pakistan, Ashraf Mehmood said Chinese and Pakistan banks will work together to achieve their “financial mix” for the ease of availability of funds for investors under CPEC (SBP Annual Report, 2016). (Hashmey, 2016) \$45 billion USD is usual to be financed through Chinese banks to Pakistan. Whereas, deposits of local banks are predicted to grow by 90 billion USD and their loans about 54 billion USD and loans to CPEC by local banks of Pakistan are 9 billion USD. Big banks of Pakistan especially HBL and UBL are expected to gain from CPEC. Habib bank of Pakistan as its MOU with industrial and Commercial Bank China and also is going to open its branches in China as well. Also ICBC has signed MOU with United Bank of Pakistan to use their banking expertise in Pakistan. (International, CPEC to Attract Banking Sector: SCB Chief, 2016) Bill Winters, SCB CEO announced to double their business due to the CPEC announcement. He stated that CPEC has huge potential to attract more investment and can benefit the banking industry as well.

2.5 CPEC impact on Cement Sector

Due to CPEC announcement, lots of construction work has been started which gave a boom to the cement industry of Pakistan (News, Aug 8, 2016). Experts/Analysts have predicted that China Pakistan Economic Corridor will boost cement demand by 1.5 to 3.0 million tons per annum. As internationally, the main ingredient's cost of Coal in the cement production has been decreased by \$50 per ton and decrease in electricity charges portrays a favorable picture for the boost of cement industry. In the first half of 2016, cement industry witnessed 15-16% growth of about 2 million tons and for the second half of 2016, experts have predicted that cement production will grow by 10 to 15% that is 4 million tons. Domestic market growth is also witnessed for cement, it is due to because of more private housing and commercial constructions, well maintain security and government spending on infrastructure and development. (Admin, 2016) According to CEO of Luck Cement Mr. Muhammad Ali Tabbba, “CPEC is not a three but a ten year project and it's not just road connectivity, there are Special Economic Zones, new industries, shifting of industries from China to Pakistan. As per capita level rises, people would demand more housing, more institutions, new schools, colleges, hospitals, because the buying power will increase which leads to higher demand of cement”. He further added that his company planned to increase their cement production from 7.5 million tons to 15 million tons by 2020. Lucky cement has invested \$200 million for their new plant to meet their future needs.

2.6 CPEC impact on Automobile Sector

(International Auto Industry Eyes Production of 0.5 Million Units in Five Years, 2016). Now, the production of auto industry of Pakistan is about to 225,000 units of per year. Thereafter, the CPEC announcement, it is grown up by 500,000 units to the next five years. PAAPAM chairman gave example of motorcycle industry which witnessed boom of twenty two times growth from 87,000 units to 21,000,000 units. (Iqbal, 2016) Author concluded that OBOR, once continue its operations, the main receiver of CPEC should be the automobile industry. The cheap labor and Chinese Automobile companies can come to start its local production in Pakistan. The Government of Pakistan has worked to give huge tax concessions to Chinese companies to work in Gwadar, and will received tax exemptions up to 40 years. Representative from Foton group with Finance Minister and showed their keen interest in investing Pakistani auto industry. Another Chinese partner to German's BMW Brilliance China Auto said that Chinese automobile companies are planning to invest in Pakistan and has designed plan to install assembly Plants there. It will benefit to explore more as it will provide easier access to local

market than operating it from China.

3. Research Methodology

The Bremer and Sweeney (1991) proposed methodology has been adopted to examine the events effects. The methodology of Cox and Peterson (1994) also used to identify the effects of events related to CPEC projects and stock market returns. Events with actual dates have been taken as a sample. Long and short term event windows of 41 days has been used (-20, +20), 21 days (0, +20), 11 days (-5, +5), 6 days (0, -5), 5 days (-2, +2), 3 days (0, +2), (-1, +1) and 2 days (0, +1) The event windows are used to assist and compare before and after situation in the event to draw a conclusion of the particular study.

$$\text{Pakistan stock returns} = \text{LN} (\text{CI/PI})$$

The current adjustment at close of market (PSX) which are divided by previous adjustment at close of market (PSX). The Standard Deviation takes place and indicates the value of PSX returns from starting level of LN before the start of event window.

$$\text{S.D} = \text{R1: RI} (\epsilon w)$$

The S.D meant for Standard Deviation and RI is the first value of PSX returns. The RI (ϵw) is the sign of RI (market return value of PSX before event window). This is the measure of the ratio in between the values occurring in this rang and Standard Deviation which is deviation the data from its standard. ER is an estimate of the expected returns of the data.

$$\text{ER} = \text{Average} \left(\frac{\text{RI: RI}(\epsilon w)}{\text{RI: RI}(\epsilon w)} \right)$$

The expected return ratio of the PSX between the first value of PSX returns and also the first value in the event window. The ratio of the PSX between the second value of PSX returns and also the second value in the event window. Thereafter, the selection of Meta event AR can be calculated.

$$\text{AR (Abnormal Return)} = \text{Actual returns} - \text{ER (expected returns)} \quad \text{T-Stat} = \frac{\text{AR of every day in event window}}{\text{S.D}}$$

$$\text{AAR} = \frac{\text{AR}}{\text{Number of days in Event Window}} \quad \text{T-Stat} = \frac{\text{AAR}}{\text{S.D}}$$

Hydro China Dawood Wind Farm(Gharo, Thatta) Estimated Cost (US \$ Million) 112.65 and UEP Wind Farm (Jhimpir, Thatta), Estimated Cost (US \$ Million) 250		
Financial Closed (FC) achieved on March 27, 2015		
Event Window	(-20, +20)	(0, +20)
AAR	-0.00074	0.004049
Sig	-0.0927	0.489582
Event Window	(-5, +5)	(0, +5)
AAR	-0.00084	0.003482
Sig	-0.1028	0.421025
Event Window	(-2, +2)	(0, +2)
AAR	-0.00744	-0.00524
Sig	-0.90561	-0.56654
Event Window	(-1, +1)	(0, +1)
AAR	-0.02446	-0.02982
Sig	-2.97332	-3.22611
Sachal Wind Farm (Jhimpir, Thatta), Estimated Cost (US \$ Million) 134		
Financial Closed (FC) achieved on December 18, 2015		
Event Window	(-20, +20)	(0, +20)
AAR	-0.00221	-0.00303

Sig	-0.24055	-0.32291
Event Window	(-5, +5)	(0, +5)
AAR	-0.00127	-0.00171
Sig	-0.13565	-0.1818
Event Window	(-2, +2)	(0, +2)
AAR	0.000892	-0.00497
Sig	0.095291	-0.53764
Event Window	(-1, +1)	(0, +1)
AAR	-0.00075	-0.00706
Sig	-0.08011	-0.76333
Suki Kinari Hydropower Station, Naran, Khyber Pukhtunkhwa, Estimated cost (1707 US \$Million)		
Financial Close achieved on 31st December 2016		
Event Window	(-20, +20)	(0, +20)
AAR	0.001709	-0.00054
Sig	0.223035	-0.07354
Event Window	(-5, +5)	(0, +5)
AAR	0.003071	0.002687
Sig	0.414219	0.364937
Event Window	(-2, +2)	(0, +2)
AAR	0.0038	0.004652
Sig	0.515775	0.503201
Event Window	(-1, +1)	(0, +1)
AAR	0.006494	0.009023
Sig	0.881073	0.976052
CPHGC 1,320MW Coal-Fired Power Plant, Hub, Balochistan, Estimated Cost (US \$ Million) 1912.2		
Ground breaking ceremony held on 21 March 2017		
Event Window	(-20, +20)	(0, +20)
AAR	-0.00226	-0.00255
Sig	-0.32152	-0.36987
Event Window	(-5, +5)	(0, +5)
AAR	-0.00208	-0.00267
Sig	-0.30136	-0.38765
Event Window	(-2, +2)	(0, +2)
AAR	0.001232	0.000283
Sig	0.178861	0.030657
Event Window	(-1, +1)	(0, +1)
AAR	0.002582	0.001679
Sig	0.374737	0.181676
300MW Imported Coal Based Power Project At Gwadar, Pakistan		
LOI was issued on 26th May 2017		
Event Window	(-20, +20)	(0, +20)
AAR	-0.00285	-0.007
Sig	-0.38878	-0.91821
Event Window	(-5, +5)	(0, +5)
AAR	-0.00576	-0.01553

Sig	-0.76673	-2.03717
Event Window	(-2, +2)	(0, +2)
AAR	-0.00412	-0.01047
Sig	-0.54209	-1.13289
Event Window	(-1, +1)	(0, +1)
AAR	-0.00614	-0.00839
Sig	-0.80343	-0.90802
Sahiwal 2x660MW Coal-Fired Power Plant, Punjab Estimated Cost (US \$ Million) 1912.2		
Project Completed in 28th October 2017		
Event Window	(-20, +20)	(0, +20)
AAR	-0.00136	-0.00116
Sig	-0.12637	-0.1034
Event Window	(-5, +5)	(0, +5)
AAR	-0.00233	-0.0003
Sig	-0.20849	-0.02675
Event Window	(-2, +2)	(0, +2)
AAR	-0.00561	-0.00535
Sig	-0.5019	-0.57862
Event Window	(-1, +1)	(0, +1)
AAR	-0.0148	-0.01848
Sig	-1.32471	-1.9994
2x660MW Coal-Fired Power Plants At Port Qasim Karachi		
Second Unit Commercial Operation Date (COD) 25th April 2018		
Event Window	(-20, +20)	(0, +20)
AAR	-0.00101	-0.00306
Sig	-0.08547	-0.26148
Event Window	(-5, +5)	(0, +5)
AAR	-0.00187	-0.00384
Sig	-0.15857	-0.32836
Event Window	(-2, +2)	(0, +2)
AAR	0.001458	-0.00218
Sig	0.124278	-0.23618
Event Window	(-1, +1)	(0, +1)
AAR	0.000829	-0.00435
Sig	0.070733	-0.47081
Karot Hydropower Station Estimated Cost (US \$ Million) 1698.26		
Financial Close achieved on 22nd February 2017.		
Event Window	(-20, +20)	(0, +20)
AAR	-0.00222	-0.0017
Sig	-0.31335	-0.24304
Event Window	(-5, +5)	(0, +5)
AAR	-0.00321	-0.00189
Sig	-0.45299	-0.26954
Event Window	(-2, +2)	(0, +2)
AAR	-0.00326	-0.00183
Sig	-0.46438	-0.19842

Event Window	(-1, +1)	(0, +1)
AAR	-0.00085	-0.00129
Sig	-0.12087	-0.13932
Rahimyar Khan Imported Fuel Power Plant 1320 MW		
On April 28, 2017, the Cabinet Committee on Energy headed by Prime Minister Nawaz Sharif directed the Ministry of Water and Power to immediately initiate a process for inclusion of Rahim Yar Khan coal plant on the CPEC priority list with imported fuel		
Event Window	(-20, +20)	(0, +20)
AAR	0.000599	0.001048
Sig	0.08651	0.142708
Event Window	(-5, +5)	(0, +5)
AAR	0.002509	0.003376
Sig	0.347684	0.459878
Event Window	(-2, +2)	(0, +2)
AAR	-0.00632	-0.00745
Sig	-0.86229	-0.80581
Event Window	(-1, +1)	(0, +1)
AAR	-0.00923	-0.00959
Sig	-1.26086	-1.03698
Gwadar East-Bay Expressway		
Groundbreaking ceremony of Eastbay Expressway was held on 22nd November 2017 by Prime Minister		
Event Window	(-20, +20)	(0, +20)
AAR	-0.00131	-0.00175
Sig	-0.11724	-0.15673
Event Window	(-5, +5)	(0, +5)
AAR	-0.00266	-0.0034
Sig	-0.23837	-0.30409
Event Window	(-2, +2)	(0, +2)
AAR	-0.00276	-0.00229
Sig	-0.24708	-0.24748
Event Window	(-1, +1)	(0, +1)
AAR	-0.00024	-0.00332
Sig	-0.0212	-0.35955
Pilot Project Of Digital Terrestrial Multimedia Broadcast (DTMB)		
PC-1 of the Demonstration project approved by CDWP on 2nd May 2018.		
Event Window	(-20, +20)	(0, +20)
AAR	-0.00135	-0.00255
Sig	-0.11444	-0.22091
Event Window	(-5, +5)	(0, +5)
AAR	-0.00289	-0.00594
Sig	-0.2466	-0.5153
Event Window	(-2, +2)	(0, +2)
AAR	-0.00373	-0.00667
Sig	-0.32314	-0.72134
Event Window	(-1, +1)	(0, +1)

AAR	-0.0055	-0.00785
Sig	-0.47714	-0.8495
Expansion And Reconstruction Of Existing Line ML-1		
Commercial Contract for Preliminary Design signed on 15th May, 2017		
Event Window	(-20, +20)	(0, +20)
AAR	0.00193	0.000721
Sig	0.227462	0.088489
Event Window	(-5, +5)	(0, +5)
AAR	0.001521	0.00236
Sig	0.180078	0.289815
Event Window	(-2, +2)	(0, +2)
AAR	-7.3E-05	0.001444
Sig	-0.0086	0.156152
Event Window	(-1, +1)	(0, +1)
AAR	0.000438	-0.00016
Sig	0.053347	-0.01732

Table 1 indicates the test results of Event Financial Closed (FC) occurred on March 27, 2015 - Hydro China Dawood Wind Farm (Gharo, Thatta), Sachal Wind Farm (Jhimpir, Thatta), Suki Kinari Hydropower Station, Naran, Khyber Pukhtunkhwa, Karot Hydropower Station Estimated and Rahimyar Khan Imported Fuel Power Plant 1320 MW. The average daily abnormal returns (AR) around the -20 to +20, -5 to +5, -2 to +2 and -1 to +1 trading intervals at 1st event. The event was indicated at multiple days are highly significant at the significance level .05. The AAR abnormal average returns due to announcement of various events i.e CPHGC 1,320mw coal-fired power plant, HUB, Balochistan, 300mw imported coal based power project at Gwadar, Pakistan, Sahiwal 2x660mw coal-fired power plant, Punjab, 2x660mw coal-fired power plants at port Qasim Karachi to around various trading intervals are highly significant at .05 level of significance. The PSX-100 returns are highly significant and positive in reflection of abnormal returns over selective (-20, +20), (-5, +5), (-2, +2), (-1, +1) at level of trading intervals of the events. The Gwadar east-bay expressway, pilot project of digital terrestrial multimedia broadcast (dtmb) and expansion and reconstruction of existing line ml-1 have positive effects on expected cash flows of the PSX-100 returns.

4. Conclusion

This study focus to find that the growth rate of Pakistan stock exchange (PSX) stock market returns has been driven by CPEC factor. Study found that the stock market volatility has been reduced at time when Chinese president announced 54 billion USD investments for the implementation of CPEC project in Pakistan. We found that volatility has decreased in post CPEC compared to pre CPEC. In post CPEC era the volatility of Pakistan stock exchange (PSX) has been reduced and PSX market anticipated to become more stable in the long run. Pakistan stock exchange become more favorable and stable stock market to invest in for resident investors, overseas Pakistani, multinationals and corporations in post CPEC scenario. The result of CPEC announcement and other related events indicates the significance of trade agreements in OBOR developmental proposals. Furthermore, these agreements will provide landmark to invite other countries in the region i.e. India, Iran and other Central Asian states. The CPEC is actually the road map towards global perspectives. The South and central Asian region are less connected of the globe. The CPEC will open up the new avenues in between the South and central Asian region.

5. Limitations and Future Directions

This study has been conducted by taking data of only two years earlier than CPEC official announcement and two years after CPEC announcement. However most early harvest projects are expected to be completed by 2018. Future research needs to be carried out after early projects

completion and study its relation with the stock exchange volatility. A comparative stock market analysis could be carried out in future to study the impact on regional stock markets and their volatility.

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