

# 2. Effect Of Liquidity, Capital Adequacy And Net Interest Margin On Credit Risk With Its Impact On Profitability

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**EFFECT OF LIQUIDITY, CAPITAL ADEQUACY AND NET  
INTEREST MARGIN ON CREDIT RISK WITH ITS IMPACT  
ON PROFITABILITY**

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**ABSTRACT**

Prior literature had distinguished between bank specific variables, which is also known as internal factors, and macro variables or what is known as external factors. Several prior studies examine different bank specific variables and provide mixed findings. The diversity of research results is due to geographical differences, banking systems and differences in research period which are influenced by macro conditions. The purpose of this research is to examine the effect of liquidity, capital adequacy and net interest margin on credit risk and how credit risk able to influence profitability. Data collection uses secondary data based on purposive sampling technique of conventional commercial banks listed on the Indonesia Stock Exchange for the period 2016 – 2020 with 43 samples obtained. The results show that bank profitability is influenced by the amount of credit risk measured by NPL where NPL is influenced by several factors including capital adequacy and Net Interest Margin with significant negative effect. Meanwhile liquidity did not show any significant effect but has positive direction with on credit risk. Furthermore, credit risk has significant negative effect on profitability.

*Keywords: Loan to Deposit Ratio, Capital Adequacy Ratio, Non Performing Loan, Return on Asset, Bank Specific Variables*

**1. INTRODUCTION**

As the Covid-19 pandemic has not ended, a number of financial services company in the country have slumped. The recent economic recession has revealed the importance and vital role of banking in driving the national economy as an intermediary institution that provides financing for consumption and production activities. Meanwhile, the main challenge in banking today is how to maintain credit quality so it does not end up with high Non Performing Loans (NPL). Credit risk is considered an important issue that can cause financial instability and threaten business continuity.

The high ratio of NPL has an impact on the inability of banks to cover operational costs and their obligations to provide deposit interest rates and the level of bank capital adequacy. The bank's inability to pay its obligations will reduce customer confidence and will also have an impact on the decline in bank profitability.

To prepare a cushion if a bank suffers a loss due to an increase in NPL, the bank must prepare a capital adequacy that is able to cover credit quality deterioration. During the Covid-19 pandemic, data from the Financial Services Authority (OJK) recorded a sloping trend in bank lending. As a result, the ability of banks to generate profits tends to decline and is reflected in the Net Interest Margin (NIM) ratio which is lower than the pre-pandemic level.

Based on the background described above, the author is interested in studying the relationship between the financial ratios mentioned above and is expected to be able to see the effect of bank specific variables so that the results of this study can be used as empirical

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evidence of the concepts of liquidity, capital adequacy and Net Interest Margin on credit risk and how much influence credit risk has on profitability.

This research will be divided into 5 sections with the first part is introduction then part 2 for literature review, part 3 for research methods, part 4 for results research and part 5 for conclusion research.

## 2. LITERATURE REVIEW

Researchers have previously identified various elements that influence NPL. However, the relationship between NPL and these factors remains unclear. Some researchers concluded that these factors had a positive relationship, while others rejected the results.

### 2.1 Effect of Liquidity on Credit Risk

Makri et al. (2014) showed that Loans To Deposit Ratio (LDR) did not show a significant effect on the NPL ratio in 14 of the 17 Eurozone countries. This is in contrast to Ahmad & Bashir (2013) in their research using Pakistani bank data which states that when the moral hazard hypothesis is tested using the LDR, it gives a significant positive relationship with NPL. This indicates that an increase in bank lending compared to third party funds (TPF) has increased bank NPLs because when LDR is low, banks are more likely to start lending to low - quality borrowers and not following standard loan allocation practices, which leads to growth in NPLs. In addition, Ganić (2014) examines the effect of bank-specific determinants on credit risk realization in commercial bank portfolios in Bosnia and Herzegovina where LDR has a weak impact on credit risk. This shows that there is no significant relationship between LDR and credit risk.

### 2.2 Effect of Capital Adequacy on Credit Risk

Makri et al. (2014) shows that there is a negative correlation between Capital Ratio (Bank capital and reserves to total assets) and NPL. Makri et al. (2014) also explained that generally, risky credit portfolios are characterized by high NPLs (equivalent to high credit risk). Both at the theoretical and empirical levels as mentioned by Boudriga et.al (2009) and Fiordelisi et al (2010), the relationship between risk and capital ratio is ambiguous. On the one hand, it is argued that a low capital ratio increases the NPL. On the other hand, it is supported that banks with high Capital Adequacy Ratios (CAR) engage in high risk activities, create risky loan portfolios, and therefore high NPL levels. This is also reinforced by the research results of Khan et al. (2020) which states that banking capital plays an important role in banking success. The results of his research also show that there is a negative relationship between banking capital and NPL in the banking sector in Pakistan during the period 2005-2017. On the other hand, Ahmad & Bashir (2013) in their research stated that the bank's NPL did not increase due to a decrease in bank capital.

Us (2017) states that the capital adequacy (regulatory capital or capital requirement) of a bank is an important determinant of NPL. The results of his research reveal that the NPL ratio of the Turkish banking sector is significantly affected by CAR before the crisis and there is also a positive relationship between bank risk and capital adequacy. This is in line with Trencă & Bozga (2018) which researched 70 commercial banks from 13 high-income countries in Europe that CAR, which is determined as the ratio between capital and total assets, has a positive effect on bank lending. The results of Gila-Gourgoura & Nikolaidou (2017) research also support this research by stating that CAR has a positive effect on NPL, implying that high-capitalization banks report high NPLs in Spain.

### 2.3 Effect of Net Interest Margin on Credit Risk

Research in the past 10 years has mostly discussed the relationship or influence of NIM with Profitability directly, but several previous researchers are known to discuss the

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relationship or influence of NIM with NPL, one of which is Das & Gosh (2007) stated that “Net interest margins could also impinge on problem loans. A decrease in margins can prompt banks to adopt ‘gamble for resurrection’ strategies, resulting in the creation of a loan portfolio with higher probability of default in the future. The higher ex-post credit risk may be anticipated by the bank by charging an ex-ante risk premium in the interest on the loan.”

Espinoza & Prasad (2010) who researched the Gulf Cooperation Council (GCC) region consisting of 6 Arab countries namely Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, & the UAE concluded that “NIM had a positive effect on problem loans” and “higher interest rates increase NPLs (although the effect is not significant)”.

### 2.4 Effect of Credit Risk on Profitability

Ahmad & Bashir (2013) provide a significant positive relationship between NPL and Return On Asset (ROA), indicating that NPL has a significant effect on ROA. The explanation for the positive relationship between NPL and ROA is that in order to increase short-term earnings, bank management misrepresents investors regarding future profitability and positive return prospects. As a result, investors began to borrow from banks and invest in less profitable projects. This resulted in the inability of investors to repay loans, resulting in the growth of NPLs which in turn reduced bank performance and profitability. Meanwhile, Kirui (2014) states that the effect of NPL on the profitability of commercial banks in Kenya is negative and shows that capital adequacy and operational cost efficiency affect the profitability. In essence, this study informs that simply reporting an increase in earnings and an increase in NPL can be misleading and that financial ratios have an important meaning for improving the understanding of financial performance. In conclusion, NPL reduces the profitability of commercial banks in Kenya from 2004 to 2013.

Makri et al. (2014) show that ROA does not show a significant effect on the NPL ratio in 14 of the 17 Eurozone countries. This is in contrast to Gulati et al. (2019) in his research which states that higher ROA indicates better profit prospects for growth and resilience to shocks, and should therefore be associated with lower credit risk. Ghosh (2015) argues that highly profitable banks have less incentive to engage in high-risk activities. Thus, bank profitability is negatively correlated with credit risk. This argument is also supported by Khan et al. (2020) which states that there is a negative relationship between ROA and NPL in the banking sector in Pakistan during 2005 - 2017. Bank profitability is strongly influenced by the increase in number of NPLs.

Cetin (2019) which examined the relationship between NPL and the profitability of European Union (EU) member banks stated that the relationship between NPL and ROA of selected EU member countries was negative for the period between 2005 - 2015. Morina (2020) has also analyzed several determinants of credit risk at commercial banks in Kosovo using regression analysis for a data set spanning a time series of 7 years (2012 - 2018). From the results of his research including credit interest rates and bank profitability (ROA) have the largest and most significant influence on credit risk, namely NPL as a measure of credit risk. This is also concluded by Ganić (2014) who examines the effect of bank-specific determinants on the realization of credit risk in the portfolio of commercial banks in Bosnia and Herzegovina with the result that the variable is negatively and significantly correlated with credit risk.

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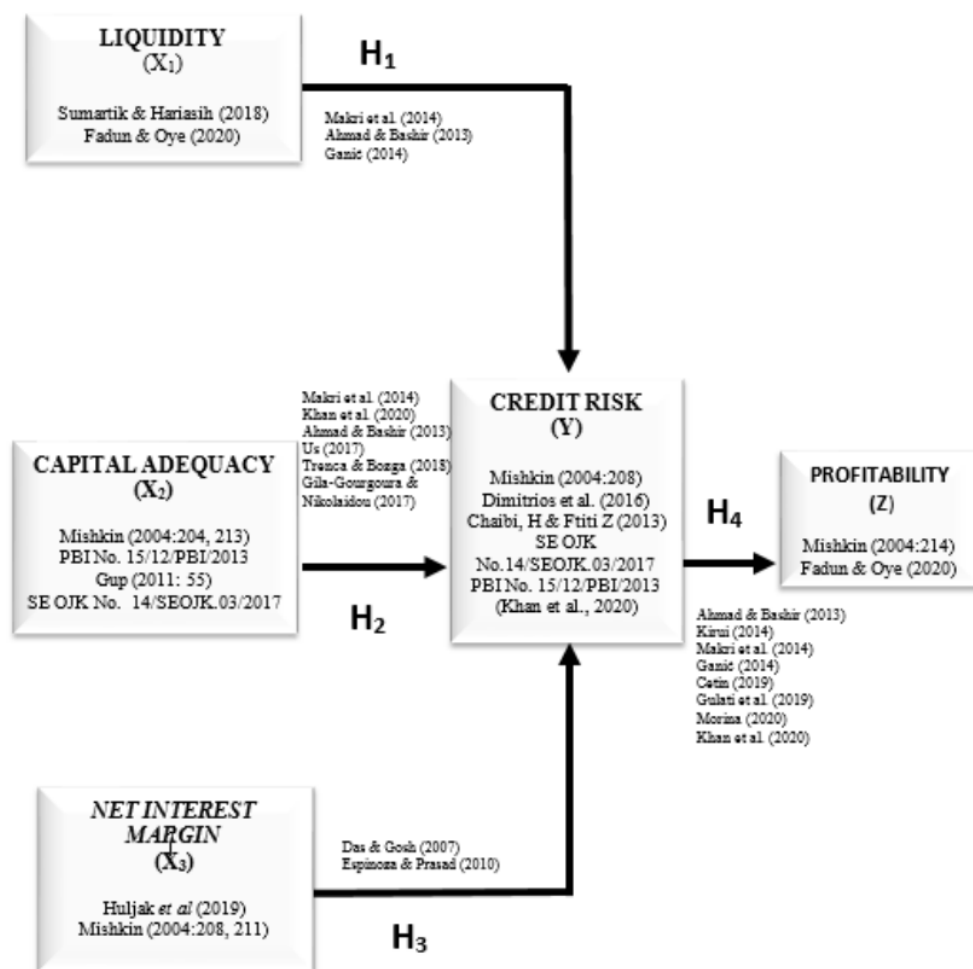


Figure 1 : Conceptual Outline Chart

Source : Self Proceed

**3. DATA AND RESEARCH TECHNIQUE ANALISYS**

*Table 1 : Presentation of Variables*

Variable	Dimention	Symbol	Definition
Liquidity (X <sub>1</sub> )	<i>Loans To Deposit Ratio</i>	LDR	Total amount of third party loans Total amount of third party funds
Capital Adequacy (X <sub>2</sub> )	<i>Capital Adequacy Ratio</i>	CAR	Total capital Risk-weighted assets
Margin (X <sub>3</sub> )	<i>Net Interest Margin</i>	NIM	Interest income - interest expenses average earning assets.
Credit Risk (Y)	<i>Non Performing Loan</i>	NPL	Total amount of bad debt Total loan in the bank's portfolio.
Profitability (Z)	<i>Return on Asset</i>	ROA	Net Income Average total Asset

Source : Self Proceed except definitions from Bank Indonesia’s policy and circular letter from Financial Services Authority (OJK)

Based on the criteria that have been determined in non-probability sampling with purposive sampling technique, a sample of 43 banking sector companies with the period 2016 – 2020 is obtained. The panel data procedure shown is based on 43 companies and 5 periods (43 x 5) and 215 total observed data has been obtained.

In this study, author use path analysis, a form of multiple regression statistical analysis that is used to evaluate causal models by examining the relationships between a dependent variable and two or more independent variables. By using this method, it can be estimated both the magnitude and significance of causal connections between variables. The regression equation model systematically can be formulated as follows :

$$NPL_{it} = \alpha + \beta_1 LDR_{it} + \beta_2 CAR_{it} + \beta_3 NIM_{it} + U_i + \varepsilon_{it}$$

$$ROA_{it} = \alpha + \beta_3 NPL_{it} + U_i + \varepsilon_{it}$$

where  $NPL_{it}$  is the NPL ratio of bank  $i$  at time  $t$ ;  $LDR_{it}$  is the LDR-specific variable matrix for bank  $i$  at time  $t$ ;  $CAR_{it}$  is the CAR variable matrix for bank  $i$  at time  $t$ ;  $NIM_{it}$  is the NIM variable matrix for bank  $i$  at time  $t$ ;  $\alpha$  is an intercept term;  $\beta_1$ ,  $\beta_2$  and  $\beta_3$  are the corresponding regression coefficient vectors.  $U_i$  is the unobserved bank-specific effect and  $\varepsilon_{it}$  is the term idiosyncratic error, both of which follow i.i.d. processes with a mean of 0 and variances  $\sigma_U$  and  $\sigma_\varepsilon$ , respectively. The subscripts  $i$  and  $t$  range from 1 to  $N$  and 1 to  $T$ , where  $N$  is the number of banks and  $T$  is the number of periods in the data set.

There are four hypotheses in this study :

- H<sub>1</sub> : Liquidity affects Credit Risk.
- H<sub>2</sub> : Capital Adequacy Affects Credit Risk
- H<sub>3</sub> : Net Interest Margin affects Credit Risk
- H<sub>4</sub> : Credit Risk Affects Profitability

**4. RESULT AND DISCUSSION**

Analysis of the results of this research will be in the form of outlines in table 2 to table 6.

**4.1 Descriptive Statistics**

The descriptive statistics of the variables used in this empirical analysis are presented in Table 2

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Table 2. Descriptive Statistics of Regression Equation Model

Variables	Mean	Min	Max
<i>LDR<sub>it</sub></i>	91.9%	38.8%	466.8%
<i>CAR<sub>it</sub></i>	26.3%	9.0%	148.3%
<i>NIM<sub>it</sub></i>	4.9%	0.2%	19.3%
<i>NPL<sub>it</sub></i>	3.6%	0.0%	22.3%
<i>ROA<sub>it</sub></i>	0.7%	-15.9%	4.1%

Source : Self Proceed

NPL<sub>it</sub> ranges from 0.0% to 22.3%. Variables LDR<sub>it</sub> presents a minimum of 38.8% and a maximum of 466.8%. In addition, the variables CAR<sub>it</sub> record their values range from 9% to 148.3%. NIM<sub>it</sub> range between 0.2% to 19.3%. The variables ROA<sub>it</sub> record lowest values range from -15.9% to 4.1%.

**4.2 Verification Analysis**

Verification analysis is used to prove the research hypothesis. Data processing with path analysis using AMOS 20 software.

**4.2.1 Data Normality Test**

The normality test result can be seen in the following table.

Table 3. Early Data Normality Test

Variable	Min	max	skew	c.r.	kurtosis	c.r.
<b>X3</b>	,220	19,300	2,015	12,060	7,986	23,902
<b>X2</b>	9,010	148,280	3,651	21,858	16,956	50,749
<b>X1</b>	38,760	466,780	5,781	34,605	41,028	122,798
<b>Y</b>	,000	22,270	2,870	17,181	13,791	41,278
<b>Z</b>	-15,890	4,130	-2,809	-16,817	11,496	34,409
<b>Multivariate</b>					133,128	116,656

Source : Self Proceed

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From table 3 it can be seen that the critical ratio (c.r) value obtained from the normality test on each variable is greater than 5. Because the critical ratio value of the five variables is greater than 5, it can be concluded that the data of the five variables does not meet the normality requirements. In order for the data to be normally distributed, data reduction was carried out by removing outliers. After the outlier data as many as 42 data pairs were removed, the results of the normality test were obtained as shown in Table 4 as follows.

Table 4. Final Data Normality Test

Variable	Min	max	skew	c.r.	kurtosis	c.r.
<b>X3</b>	,220	9,300	,015	,079	,113	,303
<b>X2</b>	9,010	46,490	1,239	6,655	1,842	4,946
<b>X1</b>	38,760	137,770	-,222	-1,191	1,542	4,139
<b>Y</b>	,030	8,540	,822	4,414	,496	1,332
<b>Z</b>	-3,360	4,000	-,453	-2,433	1,146	3,077
<b>Multivariate</b>					5,434	4,271

Source : Self Proceed

From table 4 it can be seen that after as many as 42 outlier data pairs were removed, the critical ratio (c.r) value obtained from the normality test on each variable was less than 5, and had met the normality requirements.

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### 4.2.2 Correlation Analysis

Based on the results of processing using Pearson correlation, the correlation between the independent variable and the dependent variable is obtained as follows.

Table 5. Correlation coefficient between variables

	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	Y
X <sub>2</sub>	-0,096			
X <sub>3</sub>	0,169*	0,253*		
Y	-0,006	-0,251*	-0,331*	
Z	0,090	0,247*	0,685*	-0,561*

\*significant correlation at 5% error rate

Source : Self Proceed

From table 5, it can be seen that the correlation between liquidity and credit risk is negative at 0.006. This means that liquidity has a very weak relationship with credit risk. Then the correlation between capital adequacy and credit risk is negative at 0.251. This means that capital adequacy has a weak relationship with credit risk. Furthermore, the correlation between net interest margin and credit risk is negative at 0.331. This means that net interest margin has a weak relationship with credit risk. Finally, the correlation between credit risk and profitability is negative at 0.561. This means that credit risk has a fairly strong relationship with profitability.

### 4.2.3 Path Analysis

Based on the results of data processing using AMOS 20 software, the path coefficients of each independent variable on credit risk and their impact on profitability are as follows.

Table 6. Path Coefficient of Each Independent Variable on Credit Risk and its Impact on Profitability

Structure	Path	Coefficient	CR	p-value	R Square
First	X <sub>1</sub> => Y	0,026	0,270	0,712	0,119
	X <sub>2</sub> => Y	-0,177	-2,475	0,012	
	X <sub>3</sub> => Y	-0,295	-4,117	0,000	
Second	Y => Z	-0,561	-8,895	0,000	0,315

Source : Amos Output Appendix

Through the value of R Square, it can be seen that liquidity (X<sub>1</sub>), capital adequacy (X<sub>2</sub>), and net interest margin (X<sub>3</sub>) simultaneously have an effect of 11.9% on credit risk. Then credit risk (Y) has an effect of 31.5% on profitability (Z). Visually, the path diagram of the independent variable on credit risk and its impact on profitability can be described as follows.



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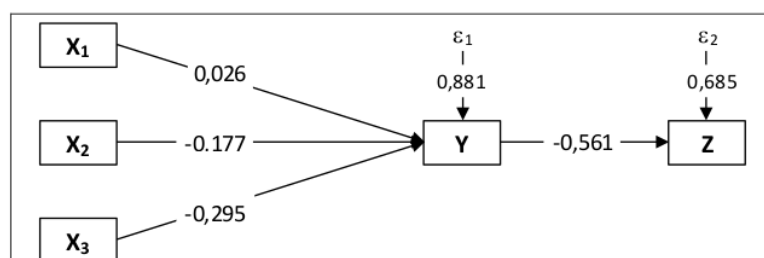


Figure 2. Path Diagram of Research Results

### 4.2.4 Hypothesis Testing

After calculating the path coefficient of the independent variable on credit risk, then hypothesis testing is carried out to test the significance of the effect of the independent variable on credit risk.

Tested with statistical hypotheses as follows :

Ho :  $\rho_{YX1} = 0$  There is no significant effect between the independent variable and the dependent variable.

Ha :  $\rho_{YX1} \neq 0$  There is an effect between the independent variable and the dependent variable.

#### 4.2.4.1 Effect of Liquidity on Credit Risk

Based on the summary of the results in table 6, it can be seen that the critical ratio value of the influence of liquidity on credit risk (0.370) is smaller than  $t_{table}$  (1.96) and the probability value (0.712) is greater than 0.05. Because the probability value is greater than 0.05, then at an error rate of 5% it was decided to reject Ha. The results of this test indicate that liquidity has no effect on credit risk in banking companies listed on the Indonesia Stock Exchange.

#### 4.2.4.2 Effect of Capital Adequacy on Credit Risk

Based on the summary of the results in table 6, it can be seen that the critical ratio value of the effect of capital adequacy on credit risk (2.475) is greater than  $t_{table}$  (1.96) and the probability value (0.013) is less than 0.05. Because the probability value is less than 0.05, then at the 5% error rate it was decided to accept Ha. The results of this test indicate that there is a significant effect of capital adequacy on credit risk in banking companies listed on the Indonesia Stock Exchange. The path coefficient is negative, indicating that the higher the capital adequacy, the lower the credit risk for banking companies listed on the Indonesia Stock Exchange.

#### 4.2.4.3 Effect of Net Interest Margin on Credit Risk

Based on the summary of the results in table 6, it can be seen that the critical ratio value of the net interest margin on credit risk (4.117) is greater than  $t_{table}$  (1.96) and the probability value (0.000) is less than 0.05. Because the probability value is less than 0.05, then at the 5% error rate it was decided to accept Ha. The results of this test show that there is a significant effect of net interest margin on credit risk in banking companies listed on the Indonesia Stock Exchange. The path coefficient is negative, indicating that the higher the net interest margin, the lower the credit risk for banking companies listed on the Indonesia Stock Exchange.

#### 4.2.4.4 The Effect of Credit Risk on Profitability

Based on the summary of the results in table 6 above, the critical ratio value of the influence of credit risk on liquidity (8.895) is greater than  $t_{table}$  (1.96) and the probability value (0.000) is less than 0.05. Because the probability value is less than 0.05, then at the

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5% error rate it was decided to accept Ha. The results of this test indicate that there is a significant effect of credit risk on profitability in banking companies listed on the Indonesia Stock Exchange. The path coefficient with a negative sign indicates that the lower credit risk will increase the profitability of banking companies listed on the Indonesia Stock Exchange

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### 5. CONCLUSION

This study identifies the relationship between liquidity, capital adequacy and net interest margin on credit risk and its impact on profitability at banks listed on the Indonesia Stock Exchange for the period 2016 – 2020 using path analysis method with the conclusions of this study are: 1) Liquidity (LDR) did not show any significant effect but has positive direction with credit risk (NPL). 2) Capital Adequacy (CAR) has a significant negative effect on credit risk (NPL) so the higher the capital adequacy, the lower the credit risk. 3) Net Interest Margin (NIM) has a significant negative effect on credit risk (NPL) so the higher the NIM, the lower the credit risk. 4) Credit risk (NPL) has a significant negative effect on profitability (ROA) so lower credit risk will increase the profitability.

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