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MEASURING THE PERFORMANCE OF DIGITAL BANK STOCKS IN INDONESIA WITH THE CAPITAL ASSET PRICING MODEL (CAPM)

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ABSTRACT

In general, when investors make investments, they certainly take into account the risks and returns from their investments, including investments in digital bank shares. To achieve profits from investments, CAPM (Capital Asset Pricing Model) can be used to predict stock performance. This is because CAPM is useful for determining stocks that are efficient and provide profits for investors. Because each digital bank stock has different performance, the CAPM that suits these conditions is CAPM SML (securities market line). This research uses a sample of 8 digital banks that have conducted an IPO (initial public offering) on the capital market. The research results show that of the 8 digital bank shares, 7 digital bank shares showed efficient stock performance and were able to provide profits. The 7 digital banks are AGRO, AMAR, ARTO, BABP, BBHI, BBYB, and BKSW. Meanwhile, one digital bank share, namely BACA, is the only bank whose shares are inefficient or have poor performance.

Keywords: Risk; return; stock performance; capm; sml

INTRODUCTION

The capital market is a place where companies that need funds and investors who have funds meet. So the capital market is a means to sell and buy shares (Jogiyanto, 2019), (Musodik, Sari, & Fitriani, 2021),(Maulana, 2023), and (Kurniawan & Sari, 2023). Currently, world civilization has entered a new era marked by the rapid growth of information technology which is commonly referred to as the industrial revolution 4.0. The banking industry has undergone major changes as a result of the adoption of various technologies in the financial services sector. Consumer behavior that is so massive in using digital media is accelerating the shift in the banking industry to form digital banking (Maulidya & Afifah, 2021).

Regulations on digital banks in Indonesia follow the same guidelines as conventional commercial banks as outlined in POJK No. 12/POJK.03/2021 concerning Commercial Banks. Based on POJK No.12/POJK.03/2021, a Digital Bank is a bank incorporated in Indonesia that provides services and conducts business through electronic means, except for its head office, or with a small number of physical offices.

In its development, the digital bank also conducted an initial public offering (IPO). As a digital bank that offers its shares on the capital market, investors will certainly consider the returns and risks of the digital bank's shares (Turlinda & Hasnawati, 2021). This strategy of considering returns and risks is often used by investors in making decisions regarding stock transactions on the capital market (Sukardi, 2020) and (Santoso *et al*., 2023).

The method commonly used in investment decision making to select assets (stocks) that match the investor's risk profile and achieve the desired investment return is CAPM (Capital Asset Pricing Model). The CAPM model is a financial model that uses systematic risk or market risk to indicate the expected return of a particular financial asset such as bonds or stocks (Urwah, Farida, & Faozi, 2024).

CAPM is useful for determining effective stocks and effective money management to get the greatest profit (Kurniawan & Sari, 2023). To get an idea of stocks that have individual returns (R_i) greater than the expected return rate, it can be estimated using the securities market line (SML). This is in accordance with the statement of (Bodie, Kane, & Marcus, 2014) that the Securities Market Line (SML) can be used to determine which stocks are efficient and inefficient for investors in making stock investment decisions.

Research on measuring risk and stock returns is often conducted by many researchers. However, considering the latest developments in the digital banking industry, the purpose of this study is to determine efficient and inefficient stocks based on the risk and return of digital bank stocks. The contribution of this study is expected to contribute to investors in choosing digital bank stocks.

THEORETICAL FRAMEWORK AND EMPIRICAL STUDIES

Stock Invesment

In making investments, investors cannot be separated from speculation. Speculation is a state of various assets (stocks) with different assets (stocks) with the desire to make a profit, starting from current profits to some future period (Sa'adah & Hidayat, 2024). If a security contains vulnerabilities or dangers that must be faced by the fund owner (investor), then that is a risk that must be faced by the investor (Bodie *et al*., 2014).

According to Tandelin (2017) investment is a commitment of a predetermined amount of money or other resources that are made at this time with the aim of obtaining a profit in a predetermined amount in the future. While stocks reflect ownership in a company that issues shares (Sa'adah & Hidayat, 2024). There are two types of stocks, namely preferred stocks and common stocks. Preferred stocks are stocks that combine the characteristics of bonds and common stocks. This is because preferred stocks offer ownership rights in addition to providing fixed income, such as bonds. In contrast, common stock is a security that shows ownership of a company by its shareholders (Jogiyanto, 2019).

Stock Return

Return is a consequence of a business. Investors will choose investments with high returns (Maulana, 2023) dan (Saleh, Hendriani, & Fajri, 2024). Tandelin (2017) stated that return is a variable that inspires capital owners to dare to bear the risks of the business they do. Return can be a return that has occurred (actual return) or that is expected to occur (Jogiyanto, 2019). Stock return is the rate of return or profit obtained from an investment and the risks associated with that investment (Hasan, Pelleng, & Mangindaan, 2019).

Risk Free Return

The rate of return on a risk-free financial asset is known as the risk-free rate of return. Since the rate of return on investment in the risky asset sector must be greater than the return on investment in non-risky assets, this rate of return is the basis for determining the minimum rate of return (Jogiyanto, 2019).

The estimated basis used for the risk-free return rate is the interest rate given by the central bank, namely the Bank Indonesia Certificate (SBI) 7 Day Reverse Revo. The SBI 7 day reverse revo is basically the same as the SBI rate. The only difference is that the SBI rate has a term of 12 months, while the SBI 7 day reverse revo has a shorter term, which is only 7 days. According to Tia Ichwani & Ratna Sari Dewi (2021), Bank Indonesia issued the SBI 7 day reverse revo reference with the aim of strengthening the effectiveness of monetary policy and can quickly influence the money market, banking, and the real sector.

Beta

Stock risk is the possibility of a difference between the expected return and the actual return (Hasan *et al*., 2019) dan (Saleh et al., 2024). The measure of stock risk in CAPM is indicated by Beta. Beta is the tendency of a stock to move with the market. Beta is an

indicator of systematic risk (Brigham & Houston, 2019). The greater the beta of a stock, the greater the risk contained in the stock (Negara, 2023).

Beta determines the amount of additional expected return for individual securities. All investors will form a perfectly diversified market portfolio. For a perfectly diversified portfolio, non-systematic risk tends to disappear and the relevant risk is only systematic risk measured by beta (Jogiyanto, 2019).

Beta for the market portfolio is 1. This means that a security with a beta of 1 indicates that the risk of the security is the same as the risk of the market portfolio. Securities with a beta of more than 1 indicate that the security has a greater systematic risk than the risk of the market portfolio (Tandelin, 2017) and (Arifuddin & Firdaus, 2024).

Capital Asset Pricing Model (CAPM) Model

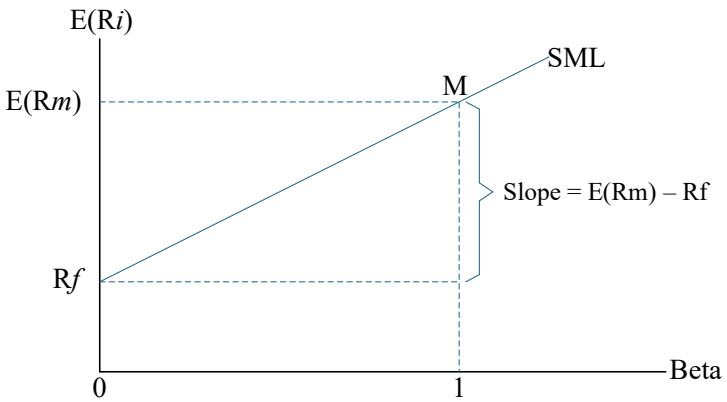
Techniques to measure the performance of a security properly and effectively, you can use the CAPM model (Negara, 2023), (Naufal, 2025), and (Hilman & Koesrindartoto, 2023). CAPM is a model that connects the expected return from the risk of an asset in a balanced economic situation (Musodik et al., 2021), (Bodie *et al*., 2014), and Tandelin (2017). CAPM is a prediction of a collection of assets at equilibrium returns to a risky asset (Jogiyanto, 2019).

.The CAPM model describes the relationship between the risk of a security and the expected return of a portfolio (Arifuddin & Firdaus, 2024), and (Yusri, Dewi, & Pentina, 2025). In addition, investors can also determine the price of risky assets and can be used to determine which risks cannot be diversified in a portfolio (Jogiyanto, 2019).

Security Market Line (SML)

Bodie *et al*., (2014) and (Jogiyanto, 2019) explain that the Security Market Line (SML) describes the trade-off between the risk and expected returns of each security). The CAPM model is represented graphically by the security market line or Security Market Line (SML).

Figure 1. Security Market Line (SML)



Source: Jogiyanto, 2019.

Note:
E(Ri) : Expected rate of return
Rf : Risk-free rate of return
Rm : Market rate of return of market portfolio
Beta : Individual security risk

Based on the Figure above, it shows that the increase in risk or beta of an individual security is a source of increasing the expected return of the security individually. Beta shows how much additional profit is expected for a single security (Kennedy & Yanis, 2019) and (Jogiyanto, 2019).

Stock Performance Grouping

Hasan *et al*., (2019) and Arifuddin & Firdaus (2024) grouped company stocks based on their performance as follows: 1). Efficient (Good). The choice taken by investors is to take or buy efficient stocks. The efficient stock condition shows that the individual stock return (R_i) exceeds the anticipated return ($E(R_i)$), dan 2). Inefficient (Bad). The choice taken by investors is to sell shares before the offering cost falls. The inefficient stock condition shows that the individual stock return (R_i) is lower than the anticipated return ($E(R_i)$).

RESEARCH METHODS

Research Design

This study uses a quantitative descriptive analysis method. This is done because quantitative data will be calculated and then analyzed descriptively. This study uses secondary data from the Indonesia Stock Exchange. The companies selected as samples are: 1). Stock prices of 8 (eight) digital banking companies whose data is available from 2020 to 2023, 2).. The shares of the digital banks were actively traded from 2020 to 2023, and 3)/. Composite Stock Price Index (IHSG) from 2020 to 2023.

Research Sample

This study uses a sample of digital banking companies listed on the Indonesia Stock Exchange. Until the end of 2023, the number of digital banks listed on the Indonesian IDX consists of 8 banks, namely: Bank Rakyat Indonesia Agroniaga Tbk. (AGRO), Bank Amar Indonesia Tbk. (AMAR), Bank Artos Indonesia Tbk. / Bank Jago (ARTO), Bank MNC Internasional Tbk. (BABP), Bank Capital Indonesia Tbk. (BACA), Allo Bank Indonesia / Bank Harda Internasional Tbk. (BBHI), Bank Yudha Bhakti Tbk. (BBYB), and Bank QNB Indonesia Tbk. (BKSW).

Stock Return and Market Return

Stock return as a result of stock investment is an actual return whose data is arranged monthly. To calculate the actual return of a particular digital bank stock (R_i), according to (Jogiyanto, 2019) the formula is:

$$R_i = \frac{P_t - P_{t-1}}{P_{t-1}}$$

Note:
R_i = Individual stock return
P_t = current period stock price
P_{t-1} = previous period stock price

The market return rate is calculated based on the Indonesia Composite Index (ICI) return. To determine the market return (R_m) according to (Jogiyanto, 2019) and (Saleh *et al*., 2024) the formula is:

$$R_m = \frac{ICI_t - ICI_{t-1}}{ICI_{t-1}}$$

Note:
R_m = Market return
ICI_t = current period ICI
ICI_{t-1} = previous period ICI

To determine the average return of digital bank stocks or R(i) using the arithmetic mean method:

$$R(i) = [R_1 + R_2 + ... + R_n] / n$$

This arithmetic mean is then used to calculate the average return of the company's stocks and the average return of the ICI (Jogiyanto, 2019).

Stock Beta (β)

In CAPM analysis with SML beta is useful for measuring the risk of single securities (Jogiyanto, 2019). Beta (β) of shares as a measure of the systematic risk of a share against changes in stock market prices. Beta can be calculated using the slope between market returns and company stock returns (Turlinda & Hasnawati, 2021) and (Saleh *et al.*, 2024).

β = Slope (Y,X)

Note:
Y = Stock return

X = Market return (ICI return)

Risk-free (R_f) return

The risk-free return rate (R_f) is determined using the BI 7 Days reverse revo rate (BI7DRR) interest rate data. BI 7 days RR is an interest rate determined by BI for short-term fund placements from banks in Indonesia in the period 2020 to 2023.

According to (Turlinda & Hasnawati, 2021), R_f is calculated using the following formula:

$$R_f = \frac{P_1 \, X \, R_1 + P_2 \, X \, R_2 + \cdots + P_n \, X \, R_n}{P_1 + P_2 + \ldots + P_n}$$

Note:

P1, P2, Pn = Period 1, Period 2, Period n

R1, R2, Rn = Return 1, Return 2, Return n

Expected return

According to (Hilman & Koesrindartoto, 2023), the calculation of expected return is by using the CAPM formula as follows:

$$E(R_i) = R_f + \beta \, (R_m - R_f)$$

Note:

$E(R_i)$ = Expected return

R_f = Risk-free return

β = Slope as a measure of stock risk

R_m = Market return or return from the ICI.

Security Market Line (SML)

SML as a form of CAPM is used to provide a visual depiction of the relationship between expected returns and stock risk (beta). So that each stock will be seen how much risk and return it has. In addition, it also shows how the difference between stock returns and expected returns.

Data Analysis Techniques

As a quantitative data research, the data analysis techniques used in data processing are as follows:

1. Calculating the actual return of each stock (R_i).
2. Calculating the market return with the ICI proxy (R_m).
3. Determining the amount of risk-free return (R_f).
4. Calculating the beta (risk) of each stock (β).
5. Determining the expected return [$E(R_i)$]

6. Creating an SML (Security Market Line) Image. Creating an SML line that connects stock risk with the stock return level. This SML image can also visually show the difference between stock returns (R_i) and expected returns [($E(R_i)$].
7. Determining efficient and inefficient stocks. The measure for determining efficient and inefficient stocks is by using the difference between actual stock returns (R_i) and expected returns [($E(R_i)$] with the following provisions: If $R_i < E(R_i)$ means bank stocks are inefficient and If $R_i > E(R_i)$ means bank stocks are efficient. The difference between R_i and $E(R_i)$ is what is then called Alpha.

RESULTS AND DISCUSSIONS

Data Description

The following is a data description of the ICI (Indonesia Composite Index), digital bank stock prices, and the BI 7 Days RR interest rate.

Table 1: Description of IHSG and BI 7 days data

DESCRIPTION	ICI	BI 7 Days
Minimum	4.538,93	3,50%
Maximum	7.272,80	6,00%
Mean	6.317,25	4,40%
Standard deviation	784,00	0,96%

Source: Processed data, 2020-2023

Table 2: Description of AGRO, AMAR, ARTO, and BABP stock price data

DESCRIPTION	AGRO	AMAR	ARTO	BABP
Minimum	98,00	171,00	735,00	50,00
Maximum	2.500,00	520,00	17.950,00	444,00
Mean	794,38	300,94	6.965,94	117,15
Standard deviation	669,77	62,84	5.421,27	84,78

Source: Processed data, 2020-2023

Table 3: Description of BACA, BBHI, BBYB, and BKSW stock price data

DESCRIPTION	BACA	BBHI	BBYB	BKSW
Minimum	115,00	58,00	224,00	63,00
Maximum	790,00	7.075,00	2.630,00	234,00
Mean	276,21	2.169,19	800,29	122,60
Standard deviation	150,57	2.016,95	647,72	44,35

Source: Processed data, 2020-2023

The table above shows that the highest ICI was 7,272.80 which occurred on December 1, 2023. For the lowest IHSG index was on March 1, 2020, which was 4,538.93. Then for the average figure during 2020 to 2023 was 6,317.25 with a standard deviation of 784.00.

The description of the stock price data and the highest average stock price of digital banks was obtained by ARTO, which was 17,950 and 6,965.94. While the lowest stock prices were observed by BABP, BBHI and BKSW.

Stock Return (R_i) of Digital Banks.

Stock return is the difference between the current month's stock price and the previous month's stock price divided by the previous month's stock price. The calculation of stock returns for each digital bank (in percentage) is presented in the following table:

Table 4: Stock Returns for AGRO, AMAR, ARTO, and BABP

Period	AGRO	AMAR	ARTO	BABP
Monthly	5,48%	1,08%	4,26%	2,36%
Annual	89,68%	13,70%	65,05%	32,25%

Source: Processed data, 2020-2023

Table 5: Stock Returns for BACA, BBHI, BBYB, and BKSW

Period	BACA	BBHI	BBYB	BKSW
Monthly	-0,35%	10,62%	5,57%	0,86%
Annual	-4,11%	235,56%	91,63%	10,76%

Source: Processed data, 2020-2023

Digital bank stock returns are calculated using the arithmetic method. Annual stock returns are the realized returns experienced by each digital bank. Annual returns can be obtained using the formula (1+monthly returns)^12-1. It can be seen that the average monthly stock return (R_i) during 2020 to 2023 is in the range of -0.35% to 10.62%. Meanwhile, the annual stock return is -4.11% to 89.68%.

Beta ICI and Digital Bank Stocks.

CAPM security market line (SML) uses beta (β) as a measure of systematic risk. Beta calculated here includes market return beta and stock return beta. Market return beta (beta R_m) is the slope between market returns and market returns themselves, so beta R_m (ICI) is 1 (one). Then the stock return beta (beta R_i) is done by using the slope function between the stock returns of each digital bank and the market return.

The beta risk figures for the shares of each digital bank are as follows:

Table 6: Digital Bank Stock Beta (β)

	AGRO	AMAR	ARTO	BABP
Beta	3,85	1,36	3,46	0,29
	BACA	**BBHI**	**BBYB**	**BKSW**
Beta	0,23	4,01	2,46	0,26

Source: Processed data, 2020-2023

It can be seen that the stock beta of BABP and BKSW banks has a beta below the market return beta (β R_m). Meanwhile, the stock beta of other digital banks is above the market return (β R_m), where the highest stock beta is owned by BBHI.

Market Return (R_m)

The calculation of market return is done by calculating the ICI return. The ICI return is a monthly return so that the monthly ICI return is equal to the difference between the ICI in month t minus the ICI_{t-1} and the result is divided by the ICI_{t-1}. Then to calculate the market return using the arithmetic return method, the results are as follows:

Table 7: Market Return (R_m)

DESCRIPTION	BKSW
Monthly return	0,52%
Annual return = *(1+0,52%)^12-1*	6,47%

Source: Processed data, 2020-2023

It can be seen that the market return figure or IHSG return (Rm) with an arithmetic approach results in 0.065 or 6.47% per year.

Risk-Free Return (R_f)

The risk-free return value is taken from the Bank Indonesia interest rate or BI 7 Day Reverse Repo Rate (BI7DRR).

Table 8: BI 7-DRR Rate 2020-2023 (R_f)

MONTH	2020	2021	2022	2023
January	5,00%	3,75%	3,50%	5,75%
February	4,75%	3,50%	3,50%	5,75%
March	4,50%	3,50%	3,50%	5,75%
April	4,50%	3,50%	3,50%	5,75%
May	4,50%	3,50%	3,50%	5,75%
June	4,25%	3,50%	3,50%	5,75%
July	4,00%	3,50%	3,50%	5,75%
August	4,00%	3,50%	3,75%	5,75%
September	4,00%	3,50%	4,25%	5,75%
October	4,00%	3,50%	4,75%	6,00%
November	3,75%	3,50%	5,25%	6,00%
December	3,75%	3,50%	5,50%	6,00%
Mean				4,40%

Source: Processed data, 2020-2023

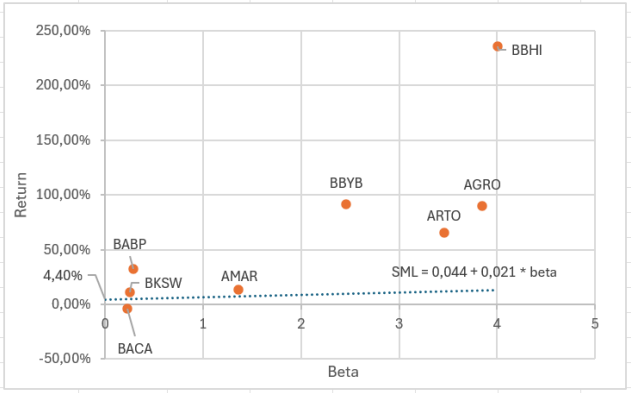
Graphical CAPM SML Analysis

Based on the results of the calculation of R_m, R_f, and beta, it can be stated that the CAPM model with SML for digital banks in Indonesia produces the following results:

$$\begin{aligned} SML &= R_f + [(R_m - R_f) * \beta] \\ &= 0.044 + [(0.065 - 0.044) * \beta] \\ &= 0.044 + (0.021 * \beta) \end{aligned}$$

The equation graphically forms the CAPM SML line as follows:

Figure 2: Digital Bank SML CAPM Model



Source: Processed data, 2020-2023

Based on the image above, it can be seen that there are 7 digital banks whose stock performance is above the SML line and only one digital bank whose stock performance is below the SML line, namely Bank Capital Indonesia Tbk. (BACA).

The 7 digital banks that have performance above the SML line include Bank Rakyat Indonesia Agroniaga Tbk. (AGRO), Bank Amar Indonesia Tbk. (AMAR), Bank Artos Indonesia Tbk. (ARTO), Bank MNC Internasional Tbk. (BABP), Allo Bank Indonesia or Bank Harda Internasional Tbk. (BBHI), Bank Yudha Bhakti Tbk. (BBYB), and Bank QNB Indonesia Tbk. (BKSW).

Analysis of Digital Bank Stock Performance

The following will present the results of digital bank stock performance compared to the expected return calculated using CAPM SML.

Table 9: Digital Bank Stock Performance Results

RISK FREE AND BANK	BETA	SML RETURN	ACTUAL RETURN	ALPHA
Rf	0	4,40%		
AGRO	3,850	12,40%	89,68%	77,28%
AMAR	1,356	7,22%	13,70%	6,49%
ARTO	3,463	11,60%	65,05%	53,46%
BABP	0,290	5,00%	32,25%	27,25%

BACA	0,229	4,87%	-4,11%	-8,98%
BBHI	4,005	12,72%	235,56%	222,84%
BBYB	2,460	9,51%	91,63%	82,12%
BKSW	0,257	4,93%	10,76%	5,83%

Source: Processed data, 2020-2023

Return SML is the expected return as a result of the estimated performance of digital bank shares. Actual return is the actual performance of digital bank shares following the beta risk conditions of each digital bank share. Alpha is the difference between the expected return and the actual return.

In Table 9, the digital banks with high beta are Bank BBHI and AGRO. The performance of both banks' shares is seen to be far above the expected return. Bank BBHI with an expected return of 12.72% actually has a stock performance of 235.56%. This is what makes Bank BBHI achieve the highest alpha, which is 222.84%.

Bank AGRO with a beta condition of 3.85 has an expected return of 12.40%. Furthermore, Bank AGRO's stock performance reached 89.69%. Bank AGRO's stock performance seems to exceed the expected return, which has a difference of more than 77.28%.

For digital banks AMAR, ARTO, and BBYB have betas of 1.356; 3.463, and 2.460. The three digital banks still have betas of more than 1. So the stock performance is still above the expected return. It's just that for the digital bank AMAR, because the actual return is only 13.70%, the alpha is low at 6.49%.

Beta shares below 1 were experienced by BABP, BACA, and BKSW. For Bank BABP, alpha is quite high because the bank also has a high actual return, which is 32.25%, so it still experiences excess performance or alpha of 27.25%. Bank BKSW also still has an alpha of 5.83% above the expected return.

However, this is different from the digital bank BACA which has the lowest beta and negative actual return. This condition results in BACA being the only bank whose stock performance is categorized as inefficient or bad.

CONCLUSION, SUGGESTION, AND LIMITATION

Digital banks with high systematic risk to IHSG returns (beta more than 2) are owned by digital banks BBHI, AGRO, ARTO, and BBYB, namely with systematic risk (beta) between 2.46 to 4.005. Meanwhile, digital bank AMAR has a systematic risk (beta) of 1.356, which means that if the market return increases/decreases by 1%, AMAR's stock performance will increase/decrease by 1.356%.

Digital banks BABP, BACA, and BKSW have systematic risk (beta) of less than 1, so the sensitivity of the stock returns of the three banks is also low. However, digital bank BACA has the lowest systematic risk, which is only 0.229.

Efficient digital bank stock performance is owned by 7 digital banks, namely: AGRO, AMAR, ARTO, BABP, BBHI, BBYB, and BKSW. Meanwhile, digital bank BACA is the only bank with inefficient stock performance.

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