Portfolio Analysis of Financial Institutions in Nepal

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Abstract

In this paper we empirically investigated risk return dynamics of the financial institutions that were selected from the Nepal Stock Exchange for the period of 2016-2022. The objective of this study is to analyze the portfolio of different FIs based on the return and risk parameters using ex-post returns data. This study employed financial and statistical tools to draw the conclusion. The beta values show that commercial banks' share prices are more volatile than the prices of development banks and finance companies. The alpha coefficients reveal that share prices of all commercial banks and development banks are found overvalued and couple of finance companies is undervalued. The results of correlation coefficient offer a scope of diversification in the Nepalese stock market.

Keywords: return, risk, portfolio, diversification, beta

Introduction

An individual or an organization is eager to expect some reward from investing cash. Such outcome or earning from investing cash is called as return. Basically, return is based on future whereas investment is done at present. Return can be regarded as generation of cash flow also known as future value of expected cash flows from potential investment. Thus, these cash flows are earnings generated by past investment and is paid for uncertainty of return is known as return. Likewise, making an investment in any project does not ensure any return or there may be variability of cash inflows in the future, can be regarded as risk of the investment. Khan and Jain (2004) stated that the rate of return on an asset/investment for a given period, say a year, is the annual income received plus any change in market price, usually expressed as a percent of the beginning market price. The variability of the actual return from the expected returns associated with a given asset/investment is defined as risk. The greater the variability, the riskier the security (e.g. shares) is said to be. The more certainty of the return from an asset (e.g. T-bill), the less the variability and, therefore, the less risk are.

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The investment return is defined as the after-tax increase in the value of the initial investment. The increase in value can come from two sources: a direct cash payment to the investor or an increase in the market value of the investment relative to the original purchase price (Cheney & Moses, 1992).

Risk is only result that an asset will make future returns uncertain; loss or gain. For this reason, higher the uncertainty greater is the return. Likewise, greater the losses greater is the deterioration in the asset (investment). This study is based on market securities and refers to the cash and bank account generated by investment in such securities. Low risk refers to the investment in T-bill, certificates of deposits (CDs). Likewise, high risk refers the investment made in securities issued by financial institutions (i.e. banks).

Portfolio is a variety of investments (two or more assets) made by an individual or company. This is a scrutiny of apparatuses included in a mixture of investments to find out rational overall return from the securities. The only objective to make portfolio analysis is to identify better way of allocation of resources to increase the amount of profit from the securities. This can be regarded as securities portfolio.

Bannier, Bofinger and Rock (2023) define the return effects of CSR in conjunction with its risk-reducing aspects for a large sample of US firms. As prior studies have established the risk-reducing capabilities of firms' sustainable behavior, the higher risk for 'unsustainable' firms should be compensated by higher returns.

Chakole (2022) defines risk return analysis assists the investor in selecting investments depending on his preferences and age. This type of research reveals information regarding the risk and return performance of various investment options. The financial status and success of investment channels are correlated in this article, which focuses on market swings and their relationships to prices. However, while no single method can be said to be sufficient for analyzing and interpreting investments, they can assist the investor in defining trends to some extent.

Bello (2021) explains the study used continuous wavelet tools to evaluate the co-movement of market returns in four countries. The paper utilized the market indexes in these four countries and used four wavelet tools-wavelet spectrums; wavelet coherency, partial wavelet-coherency and phase difference to evaluate the co-movement. While the wavelet coherency explored the link between equity markets in two countries, the link did not disentangle the effect of other counties.

Xiao (2021) describes among the three models, the CAPM model is obviously more in-depth and extensive than the q-factor model and the Fama & French 5-factor model, and the application and research in all walks of life are also more in-depth. The CAPM model has a solid mathematical foundation and is easy to implement under theoretical conditions.

Kandel (2018) elucidates that commercial banks are very much risky with fluctuated rate of return. From the findings of beta coefficient of each sample bank, the common stock of NABIL seems very much volatile than NIBL stock. The required rates of return of both stocks are overpriced. Further, both banks have high proportion of unsystematic risk which can be minimized from internal management.

Aliu, Pavelkova and Dehning (2017) describe portfolio management still remains as a science that does not give clear answers on the portfolio construction. Arranging a portfolio that would generate excess return on the investments seems to be more an art than a science. The results show that the rising number of companies from 10 to 37 reduces the risk level, when we move from portfolio A to portfolio B. In contrast, when we move from portfolio B (37 companies) to the portfolio C (47 companies), risk level has increased in spite that the number of securities in portfolio C average correlation went up. The study results conclude that investing in portfolio C delivers lower risk than investing in portfolio A.

Gorbunova (2016) explains market price rating demonstrates risk and return of equity securities, assesses their investment potential, which depends not only on the country's economic state but on the market activities of joint stock companies on the stock market.

The main objective of this study is to analyze the portfolio of different FIs based on the return and risk parameters using ex-post data.

Financial Institution (FI) is a category of organization that basically serves as depositing money from depositor and lends money to the borrower and gives investment products manually or electronically for making earnings for its survival. In Nepal, previously many commercial banks, finance companies and development banks have been emerged; some of them have gone through merger due to poor management and became 20 commercial banks, 17 finance companies and 17 development banks due to merger process (as of mid-July 2023). Among them, 10 FIs have been introduced which comes under the study area.

Literature Review

Lee, Cheng and Chong (2015) made a study on "Markowitz Portfolio Theory and Capital Asset Pricing Model for Kuala Lumpur Stock Exchange: A Case Revisited". The objectives of the study were to examine whether CAPM is valid to forecast the behavior of the each individual stock and its return as well as its validity in the portfolio with stocks and evaluation of the suitability of Markowitz model to evaluate the performance of the Malaysia investment portfolio. The method used to fulfill the objective is to framework of 2010 to 2014 using weekly data of 60 companies. OLS unbiased estimator, autocorrelation and heterodasticity problems are to be conducted to test the validity of the model. This study found that managers can use CAPM as a proxy to estimate their stock return and diversify the portfolio to reduce the unsystematic risk to enable them to execute the right policy in their management in order to maximize profit at the same time increase shareholder wealth maximization. It is concluded that CAPM is reasonable to be the indicator of stock prices in Malaysia as well as in portfolio basket. It proves that there is linearity in CAPM but unique risk and systematic risk do not need to be captured and Markowitz portfolio diversification to reduce the unsystematic risk.

Masum, Chowdhury, and Azad (2013) performed a research entitled "Risk-return analysis of three asset portfolio using Islami banks (IB) - Evidence from Dhaka Stock Exchange (DSE)". The objective of the study was analyzing performance of Shahjalal Islami Bank Ltd. at micro level. The method applied under the study was ninety three listed companies of DSE are selected from a total of 544 companies. Ratio analysis, Individual stock analysis and Portfolio analysis have done using data between 2005 and 2011. A three-stock portfolio analysis has been made compiling three financial industries namely; Banking, Insurance and Financial Institutions. This study found that SJIBL has high return and low risk characteristics. Portfolio result depicted that combination of IB stock in portfolio investment can accelerate portfolio return and can reduce risk. This also concluded that the risk level of IB is the combined effect of the three. Portfolio analysis supports the statement that deposit holders are replaced by equity holders, interest payments to depositors are converted into profit and loss sharing, and loan to customer are transformed into capital participation.

Bogdan, Baresa, and Ivanovic (2010) conducted a research entitled "Portfolio analysis based on the example of Zabreb Stock Exchange". The objectives of the study were to analyze the portfolio and assess its risks that are relevant in making the decisions about investments. For this, the systemic risk of individual stocks within the portfolio and

the systemic risk of the given portfolio and explain its importance through regression analysis, analyze the securities with the highest and lowest systematic risk. This study found that increase or decrease of each stock it will lead to rise or fall of the other stock especially among those where coefficient of correlation is set out more. With a combination of stocks that have low or negative correlation reduce risk, especially with the negative correlation where there are conflicting price movements. Low correlation helps diversification, when the correlation is perfectly positive diversification is not effective. Thus, it concluded that for evaluation of portfolio risk and some of its shares, based on historical data. This determined correlation, yields, risks with emphasis on systematic risk of the portfolio and individual stocks.

Barber and Odean (2000) conducted a study on "Trading Is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors". The objective of the study was to shed light on the investment performance of common stocks held directly by households. A set of data containing 78,000 household (primary data) trading activities for six year period ending 1997 was performed. The study found that the average household earns an annual return of 16.4 percent, tilts its common stock investment toward high-beta, small value stocks, and turns over 75 percent of its profitability annually. Overconfidence can explain high trading levels and the resulting poor performance of individual investors. Our central message is that trading is hazardous to household wealth. The conclusion made by the study was the returns earned on common stock investments by 66,465 households at a large discount brokerage firm for the six years. The bid-ask spread and commissions paid by these investors earned by these households are poor. The poor performance of the average household can be traced to the costs associated with this high level of trading.

Adhikari and Jha (2016) performed research to aware investors about the potential portfolio alternatives to achieve their peculiar risk-return need through robust optimization portfolio model. Markowitz mean-variance method applied under the study to reach portfolio model from the data from 2010 to December 2014. The study found that there is a high return, but the investor's willingness to gain this is tested through the high magnitude of minimum risk and most of stocks are highly correlated to each other; the lack of diversification opportunity and significantly high volatility even at global minimum variance level. This study concluded that mean-variance optimization is applicable in Nepal.

This study further analyzes alpha coefficient for under or over-priced stock along with to identify whether there is always high-risk high-return and or low-risk low-return

relationship. Arguably, this research attempts to figure out the possibility of low-risk high-return.

Methodology

This research is purely taken from historical data, or say, secondary data covering fiscal years from 2016 to 2022 (seven fiscal years). It is a part that portraits the information from the FIs annual reports or electronics media regarding common stock and its basics. Correlational research design has been adopted in this research work to figure out risk-return of the securities and optimal portfolio selections.

NEPSE's index is taken as population where all FIs common stocks are included as measure of index. Among listed shares of all FIs, four commercial banks, three development banks, and three finance companies are taken as a sample using convenient sampling method. Thus, the sample FIs are: Himalayan Bank Ltd (HBL), Nabil Bank Ltd (Nabil), Prabhu Bank Ltd (PBL), Sunrise Bank Ltd (SBL), Garima Development Bank Ltd (GDBL), Kamana Bikas Bank Ltd (KBBL), Muktinath Bikas Bank Ltd (MNBBL), Goodwill Finance Ltd (GFL), Manjushree Finance Ltd (MFIL), and Pokhara Finance Ltd (PFL).

Financial tools (nominal return, expected return, and required return) and statistical tools (average, standard deviation, alpha, beta, and correlation) have been employed to draw the conclusion.

Results

Table 1 represents the descriptive statistics of the returns data of sample financial institutions in which maximum, minimum, average return along with standard deviation of the returns of sample financial institutions have been shown. Annual return is the difference between year-end stock price and beginning price plus cash and stock dividend from FY 2015/16 to 2021/22.

Table 1

Descriptive Statistics

	N	Minimum	Maximum	Average return	σ
HBL_{HPR}	7	-.39	.88	-.0314	.44160
$NABIL_{HPR}$	7	-154.60	126.40	-21.8214	105.61141
PBL_{HPR}	7	-.53	1.13	.0900	.58949
SBL_{HPR}	7	-.45	.98	.0629	.54996
$GDBL_{HPR}$	7	-.34	1.51	.2259	.61669

$KSBBL_{HPR}$	7	-.51	3.13	.3464	1.25331
$MNBBL_{HPR}$	7	-.59	1.38	.1858	.76622
GFL_{HPR}	7	-.37	3.79	.5545	1.48247
$MFIL_{HPR}$	7	-.65	3.31	.6837	1.42982
PFL_{HPR}	7	-.47	3.43	.3791	1.37139
NI_{HPR}	7	-.49	1.75	.2871	.77402
Valid N (listwise)	7				

Required Rate of Return

Systematic risk is major part for its required rate of return. Thus, greater is the systematic risk, the greater will be the required return and can be derived by CAPM model. Symbolically,

$\bar{R}_i = R_f + (\bar{R}_m - R_f)\,\beta_i$

Where, $\bar{R}_i$ = Required return

R_f = 9.85 % *(Based on 364 days T-bill as at 11 July 2022)*

$\bar{R}_m$ = 28.71 % (using NEPSE data)

β_i = 0.29 (beta of HBL stock)

Thus, required rate of return for Security HBL is;

$\bar{R}_i = R_f + (\bar{R}_m - R_f)\,\beta_i$ = 9.85 % + (28.71 % – 9.85%)*0.29 = 22.92 percent

Table 2

Required Rate of Return for BFIs

HBL	Nabil	PBL	SBL	GDBL	KSBBL	MNBBL	GFL	MFIL	PFL
22.92	22.52	22.49	20.79	22.67	37.01	26.64	43.61	40.78	39.65

Total Risk (Systematic and Unsystematic Risk)

Total risk consists of systematic risk (unavoidable) and unsystematic risk (avoidable). Mathematically,

$\sigma^2_{ei} = \sigma^2_i - \beta^2_i\,\sigma^2_m$

Where, σ^2_i = Variance of security i

β_i = Systematic risk of security i

σ^2_m = Market variance

σ^2_{ei} = Unsystematic risk

Table 3

Summary of Avoidable Risk (Percent)

BFIs	HBL	Nabil	PBL	SBL	GDBL	KSBBL	MNBBL	GFL	MFIL	PFL
(σ^2_{ei})	(66.77)	111.53	33.52	28.71	35.26	149.66	58.20	167.29	204.39	11.24

Unsystematic risk of -66.77 percent is the representation of risk that can be avoided by HBL security and so on for other sample BFIs' securities as shown in Table 3.

Portfolio Expected Returns ($\bar{R}_p$)

Portfolio is a combination of securities invested. The sum of product between weight and average returns for the given period is portfolio expected return. Summary of portfolio between two securities are depicted as follow:

Table 4

Two Assets Portfolio Expected Returns ($\bar{R}_p$) (Percent)

($\bar{R}_{PBL, SBL}$)	($\bar{R}_{PBL, KSBBL}$)	($\bar{R}_{PBL, MNBBL}$)	($\bar{R}_{PBL, GFL}$)	($\bar{R}_{PBL, MFIL}$)	($\bar{R}_{PBL, PFL}$)
7.35	(2.03)	16.86	0.64	40.47	24.32
($\bar{R}_{SBL, GDBL}$)	($\bar{R}_{SBL, MNBBL}$)	($\bar{R}_{GDBL, MNBBL}$)	($\bar{R}_{KSBBL, MFIL}$)	($\bar{R}_{GFL, MFIL}$)	
17.05	16.12	21.95	37.00	64.11	

These portfolios consisted of FY 2015/16-2021/22 between BFIs' securities. Highest expected portfolio return was 64.11 percent between GFL and MFIL securities. Similarly, PBL and MFIL have the second highest expected portfolio return i.e. 40.47 percent. The lowest return from the portfolio of KSBBL and PBL has negative by 2.03 percent. Among the various combinations of securities, all other portfolios have been ignored due to negative return from asset and or the negative weight (or the weight more than one) of the asset. Thus, eleven portfolios have been presented in above Table 4.

Portfolio Standard Deviation (σ_p)

Measurement of portfolio standard deviation is given by;

Table 5

Portfolio Standard Deviation: Two Assets Portfolio (σ_p) (in percent)

$\sigma_{p\ (PBL, SBL)}$	$\sigma_{p\ (SBL, GDBL)}$	$\sigma_{p\ (SBL, MNBBL)}$	$\sigma_{p\ (PBL, MFIL)}$
51.38	52.18	71.69	98.60
$\sigma_{p\ (PBL,PFL)}$	$\sigma_{p\ (GDBL, MNBBL)}$	$\sigma_{p\ (KSBBL, MFIL)}$	$\sigma_{p\ (GFL, MFIL)}$
97.46	29.67	125.10	112.58

Table 5 represents portfolio standard deviation; PBL and SBL securities have lowest portfolio total risk i.e. σ_p which is 51.38 percent with 7.35 percent portfolio return. Similarly, KSBBL and MFIL has the highest portfolio standard deviation with 125.10 percent along with portfolio expected return of 37.10 percent.

Beta Portfolio (β_p)

Beta portfolio measures the systematic risk; it is the sum of the product between weight and beta coefficient of securities in portfolio.

Table 6

Beta Portfolio (β_p)

Securities	β_p	Securities	β_p
(PBL, SBL)	0.62	(SBL, GDBL)	0.65
(SBL, MNBBL)	0.83	(PBL, MFIL)	1.18
(PBL, PFL)	1.15	(GDBL, MNBBL)	0.71
(KSBBL, MFIL)	1.45	(GFL, MFIL)	1.69
1.0≤ Defensive 1.0 > Aggressive			

The portfolio containing the security of PBL and SBL is most defensive portfolio having β_p just 0.62. Similarly, portfolios consisting of (SBL, MNBBL), (SBL, GDBL) and (GDBL, MNBBL) are also defensive securities due to beta portfolio are less than one. On the other hand, other portfolios are aggressive securities due to beta portfolio more than one.

Portfolio Required Rate of Return ($\bar{R}_p$)

The required rate of return is the hurdle rate an investor will seek BFI securities for reparation for a given level of risk associated with holding the portfolio securities. Thus, $\bar{R}_i = R_f + (\bar{R}_m - R_f)\ \beta_p$, Where, $\bar{R}_i$ = Required return, R_f = 9.85 %, $\bar{R}_m$ = 28.71 % and β_p = 0.003

Thus, portfolio required rate of return for Securities PBL and SBL is;

$\bar{R}_i = R_f + (\bar{R}_m - R_f)\,\beta_p = 9.85 + (28.71 - 9.85)*0.62 = 21.54$ percent

Thus, the portfolio required rate of return for security of PBL and SBL is 21.54 percent. Summary of other BIFs' required rate of returns are presented in the table below:

Table 7

Summary of Portfolio Required Rate of return of BFIs (%)

Securities	$\bar{R}_{ij}$	Securities	$\bar{R}_{ij}$
(PBL, SBL)	21.54	(SBL, GDBL)	22.11
(SBL, MNBBL)	25.50	(PBL, MFIL)	32.10
(PBL, PFL)	31.54	(GDBL, MNBBL)	23.24
(KSBBL, MFIL)	37.20	(GFL, MFIL)	41.72

From table 7 portfolio required rate of return 41.72 percent for the portfolio consisting of GFL and MFIL securities; highest among the portfolios whereas the lowest 21.54 percent for PBL and SBL. Second highest required rate of return consists of the securities KSBBL and MFIL which provides 37.20 percent.

Portfolio Expected Rate of Return ($\bar{R}_p$ - Three Assets Model)

It is an assumption that the expected return of a portfolio from three assets that will generate a return is derived by multiplying the mean of an anticipated return based on its weights in a portfolio and their expected return. The summary of expected return on portfolio and its calculation are presented below;

$$\bar{R}_p = W_i \times \bar{R}_i + W_j \times \bar{R}_j + W_k \times \bar{R}_k$$

Table 8

Summary of Portfolio Expected Return from Three Assets (percent)

Portfolios	$\bar{R}_P$
PBL, SBL, GDBL	12.73
GDBL, GFL, MFIL	49.00
KSBBL, GFL, MFIL	52.98
GDBL, MNBBL, PFL	26.32
SBL, KSBBL, PFL	26.36

Portfolio expected return from the combination of assets, that is, KSBBL, GFL, and MFIL securities has the highest return which amounted to 52.98 percent whereas the lowest portfolio return was 12.73 percent with the combination of PBL, GDBL and

GDBL securities. Second highest portfolio expected return was 49.00 percent with the combination of the assets of GDBL, GFL and MFIL securities. Second lowest portfolio return stood 26.32 percent of the combination of GDBL, MNBBL and PFL.

Portfolio Standard Deviation (σ_p - Three Assets Model)

Standard deviation of a portfolio measures the amount that the returns deviate from its mean. In other words, the deviation from investment from the average return is standard deviation. The results of standard deviation of three-asset portfolio is shown in table 9:

Table 9

Summary of Portfolio Standard Deviation (σ_p)

Portfolio	σ_p
PBL, SBL, GDBL	48.63
GDBL, GFL, MFIL	114.34
KSBBL, GFL, MFIL	135.42
GDBL, MNBBL, PFL	80.38
SBL, KSBBL, PFL	101.93

Portfolio consisting securities KSBBL, GFL and MFIL has the highest standard deviation that is this portfolio has highest total risk with 135.42 percent and has the lowest risk of 48.63 percent portfolio consisting of PBL, GDBL and SBL securities.

Under- and Over-valued Stocks

Alpha is the average return that cannot be clarified by common risk factors. As more and more factors are added to models that explain fund returns, ever less scope is left for measured alpha. If the alpha is positive the security is said to be undervalued or negative than is said to be overvalued or if it is zero than the stock is said to be properly valued with its systematic risk.

Table 10

Alpha Coefficients for BIFs Securities

Stock	HBL	Nabil	PBL	SBL	GDBL
A	-0.1840	-44.3409	-0.1340	-0.1458	-0.0015
	Overvalued	Overvalued	Overvalued	Overvalued	Overvalued
Stock	**KSBBL**	**MNBBL**	**GFL**	**MFIL**	**PFL**
A	-0.0228	-0.0805	0.1178	0.2765	-0.0168
	Overvalued	Overvalued	Undervalued	Undervalued	Overvalued

Among the BFIs' securities commercial banks, that is, HBL, Nabil, PBL, SBL, GDBL, KSBBL, MNBBL and PFL securities are overvalued and investors are willing to sell

the securities in the capital market. On the other hand, GFL and MFIL securities are undervalued, in turn, investors are willing to purchase the securities in the capital market.

Correlation Coefficient

It is a statistical measurement to know relationship among the variables such as DPS with MPS and EPS with MPS for the sample BFIs. The correlation coefficient lies between -1.0 and 1.0 indicating negative and positive relationship respectively among the variables. The correlation coefficient between returns of securities and NEPSE Index return is shown in table 12 below:

Table 11

Correlation Matrix

		NI_{HPR}	HBL_{HPR}	$NABIL_{HPR}$	PBL_{HPR}	SBL_{HPR}	$GDBL_{HPR}$	$KSBBL_{HPR}$	$MNBBL_{HPR}$	GFL_{HPR}	$MFIL_{HPR}$	PFL_{HPR}
ρ	NI_{HPR}	1.000										
	HBL_{HPR}	.500	1.000									
	$NABIL_{HPR}$	.871	.725	1.000								
	PBL_{HPR}	.876	.329	.737	1.000							
	SBL_{HPR}	.821	.894	.932	.674	1.000						
	$GDBL_{HPR}$	.858	.074	.632	.935	.486	1.000					
	$KSBBL_{HPR}$	.887	.080	.686	.880	.511	.973	1.000				
	$MNBBL_{HPR}$	.899	.785	.903	.724	.954	.613	.644	1.000			
	GFL_{HPR}	.936	.236	.803	.852	.640	.919	.977	.747	1.000		
	$MFIL_{HPR}$	.886	.390	.878	.765	.702	.795	.842	.724	.902	1.000	
	PFL_{HPR}	.890	.102	.724	.856	.530	.950	.992	.641	.986	.888	1.000

The correlation between NI and HBL has moderately positive relationship. Similarly, connection between Nabil and NI is strongly positive. All other sample securities have strong positively correlated with each other.

Conclusion

Commercial banks' share prices are found more volatile while development bank and finance companies' shares are not much volatile. Out of eight portfolios, four portfolios are found aggressive and the rest are defensive portfolios. Portfolio returns show that small-cap companies and mid-cap companies perform better than the commercial banks.

Require rate of return is the minimum rate of return that an investor is required to compensate for his investment. Thus, security for Nabil has the highest required rate of return and SBL has the lowest required rate of return among the samples i.e. due to

systematic risk associated with the security. Higher the systematic risk higher will be the required rate of return is crucial.

Risk is the possibility of loss of investment made by investor, thus, single asset has more risk than portfolio made asset. Based on results, the total risk of portfolios associated with return was found less than the total risk of individual assets. Results show that a diversification opportunity exists significantly in Nepalese capital market.

Results of alpha coefficients reveal that all the commercial banks and development banks shares are found overvalued stocks and therefore are risky stocks. Only a couple of sample finance companies is underpriced.

All the pairs show positive correlation between the returns. Out of 55 pairs of securities, only seven pairs have less than moderately positive correlation.

Implication

The main essence of this study is that Markowitz portfolio theory works properly in Nepalese capital market to reduce the risk of investment by keeping relatively higher rate of return. Portfolios of securities offer sufficient opportunities of diversification to Nepalese investors.

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