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EXPLORING THE IMPACT OF MACROECONOMIC FACTORS ON VAT REVENUE IN NEPAL: AN EMPIRICAL ANALYSIS

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Abstract: *Purpose:* This study explores the influence of key macroeconomic factors on Value Added Tax (VAT) revenue collection in Nepal, with the goal of enhancing tax efficiency and guiding policy formulation. *Methods:* The research employs an Autoregressive Distributed Lag (ARDL) model on time series data to assess both short- and long-term impacts of economic variables, including Gross Domestic Product (GDP), government expenditure, remittance inflows, trade deficit, and money supply, on VAT revenue. *Findings:* Results indicate that GDP, remittances, trade deficit, and money supply have a significant positive relationship with VAT revenue, underscoring their roles in supporting VAT collection. Specifically, remittance inflows bolster domestic consumption, thus expanding the VAT base, while the positive relationship with the trade deficit implies that increased imports are a crucial contributor to VAT revenue. However, government expenditure demonstrates a weaker impact, suggesting inefficiencies in transforming public spending into tax revenue. *Conclusion:* This study emphasizes the importance of economic growth and remittance inflows in enhancing VAT revenue collection in Nepal and suggests that government expenditure may require more effective structuring to translate into greater tax revenue. *Novelty:* This study provides empirical insights specific to Nepal, identifying how distinct macroeconomic variables impact VAT revenue and offering evidence-based recommendations for optimizing tax policy.

Keywords: VAT, Nepal, macroeconomic factors, tax efficiency, ARDL, remittances

BACKGROUND

Nepal has undertaken significant economic reforms aimed at enhancing fiscal policies, with Value Added Tax (VAT) emerging as a pivotal component in shaping the country's financial landscape. Introduced in 1997 to align with

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international taxation standards and bolster revenue collection, VAT represents a strategic move towards economic stability and transparency (Adhikari, 2022). The evolution of VAT regulations in Nepal reflects adaptive responses to economic shifts and global trends, underscoring its role in modernizing the nation's fiscal framework (Ghimire & Kandel, 2023).

Internationally, Acosta-Ormaechea *et al*. (2019) highlight VAT's positive impact on economic growth, echoing findings by Ayoub and Mukherjee (2019), who underscore its correlation with GDP in global economies. In Nepal, VAT revenue has constituted a significant portion of total government income, reflecting its critical role in economic development (Kharel, 2021). Recent studies by Shrestha and Bhattarai (2023) emphasize the influence of VAT on public service financing in Nepal, highlighting its contribution to infrastructure development and educational investments.

PROBLEM STATEMENT AND OBJECTIVE

Despite its potential benefits, challenges persist in optimizing VAT revenue collection in Nepal. The effectiveness of VAT as a revenue generator hinges on various macroeconomic factors, yet comprehensive studies tailored to Nepal's context remain limited. Issues such as inflation dynamics, tax policy changes, and the broader economic environment influence VAT collection efficiency, necessitating focused research (Sharma & Gautam, 2022; Bhattarai & Pokharel, 2021). The recent study by Rijal and Shrestha (2023) highlights that limited digital infrastructure for tax reporting and a lack of compliance in informal sectors continue to constrain VAT efficiency.

This study aims to analyze the macroeconomic determinants influencing VAT revenue collection in Nepal. Specific objectives include:

The primary objective of this study is to analyze the macroeconomic determinants that influence VAT revenue collection in Nepal, aiming to provide valuable insights for improving tax efficiency and policy effectiveness. By examining the trend of VAT revenue collection over time, the study seeks to understand how VAT has evolved as a revenue source and its responsiveness to economic changes in Nepal. Additionally, the study will investigate the impact of critical macroeconomic variables—such as GDP, government expenditure, remittance income, trade deficit, and money supply—on VAT revenue collection. Through this analysis, the study aims to identify patterns and relationships between these variables and VAT revenue, contributing to a deeper understanding of how economic factors shape tax revenues and highlighting opportunities for enhancing VAT policy and collection strategies in the Nepalese context.

HYPOTHESES OF THE STUDY

Based on existing literature, the study proposes:

- **Null Hypothesis (H0)**: There is no relationship between GDP, government expenditure, money supply, trade deficit, and VAT revenue collection in Nepal.
- **Alternative Hypothesis (H1)**: There is a positive and significant relationship between GDP, government expenditure, money supply, trade deficit, and VAT revenue collection in Nepal.

SIGNIFICANCE OF THE STUDY

Understanding the factors driving VAT revenue in Nepal is crucial for policymakers aiming to enhance fiscal management and revenue forecasting. This study contributes to the existing literature by providing empirical insights that can inform policy decisions and optimize VAT collection strategies. Furthermore, it addresses gaps in Nepalese literature concerning VAT efficiency, presenting findings that can support policy formulation and tax administration improvements (Koirala, 2023).

LIMITATIONS OF THE STUDY

Despite its contributions, this study is subject to several limitations:

- Dependency on secondary data sources may affect the accuracy and reliability of findings.
- The focus on macroeconomic factors may limit a comprehensive exploration of all dimensions influencing VAT revenue.
- The study's timeframe may not capture recent economic developments, potentially impacting the generalizability of conclusions.

LITERATURE

Theoretical Review

The Value Added Tax (VAT) system has been widely recognized as a significant revenue-generating tool, often incorporated by governments to streamline tax administration, enhance compliance, and stabilize fiscal policy. Theoretically, VAT is considered a more efficient taxation model than traditional sales taxes due to its multi-stage nature, which reduces the likelihood of tax evasion and encourages a broader tax base (Tait, 1988). In Nepal, the introduction of VAT in 1997 was intended to align with international tax frameworks and improve revenue collection mechanisms, particularly through improved tax compliance and efficient administrative structures (Kunwar, 2023; Ghimire & Kandel, 2023). As a consumption-based tax, VAT is expected to enhance economic stability by allowing the government to achieve its revenue targets with reduced fiscal deficits, especially when integrated with comprehensive regulatory measures (Dhungana, 2021).

Additionally, the theory of tax efficiency, which suggests that indirect taxes like VAT can support economic growth without significantly distorting economic behavior, underpins VAT's implementation worldwide. According to this theory, VAT facilitates a balanced approach to tax collection, balancing consumption taxes across various sectors and encouraging transparency in the tax administration process (Acosta-Ormaechea *et al.*, 2019). The implementation of VAT is further supported by theories of tax equity, which assert that a well-designed VAT system can reduce income inequality by taxing consumption rather than income (Kharel, 2021).

EMPIRICAL REVIEW

Empirical studies in both global and Nepalese contexts reveal varying factors that affect VAT efficiency. Internationally, studies such as those by Anastasiou *et al.* (2024) and Andrejovska & Helcmanovska (2021) underscore the significance of factors such as government effectiveness, GDP per capita, and economic openness in enhancing VAT collection across Europe. Similarly, Permadi and Wijaya (2022) found that sector-specific contributions and import values significantly affect VAT revenue in Southeast Asia. These studies emphasize the need for administrative improvements and macroeconomic stability to foster effective VAT collection.

In Nepal, empirical evidence has increasingly shed light on the dynamics of VAT implementation and its role in fiscal policy. Kunwar (2023) identified custom excise duties and VAT as significant revenue contributors to Nepal's economy, while Poudel (2023) highlighted the positive trend in VAT efficiency and its alignment with GDP growth. Recent studies have also emphasized challenges specific to Nepal, such as limited digital infrastructure, informal economic sectors, and administrative bottlenecks, which affect VAT efficiency

(Rijal & Shrestha, 2023). Sainju (2023) stressed the importance of stakeholder collaboration in sustaining VAT's role in revenue generation, while Koirala (2022) examined two decades of VAT data, identifying critical factors like import growth and regulatory changes that drive revenue fluctuations.

Pokhrel (2023) focused on VAT implementation challenges, particularly the lack of trader awareness and administrative support, which are essential to overcoming compliance issues. Empirical findings also suggest that the digitalization of tax systems has the potential to increase VAT efficiency, as illustrated in Dhungana's (2021) study on digitalization's impact on VAT enforcement in Nepal. Moreover, studies by Sharma (2021) and Pokhrel (2020) advocate for improving taxpayer education and administrative capacity to increase compliance and optimize revenue outcomes.

RESEARCH GAP

Despite the growing body of literature on VAT efficiency, there remain gaps, particularly in understanding how specific macroeconomic variables impact VAT revenue in Nepal. While international studies offer insights into factors influencing VAT across various economies, research specifically tailored to the Nepalese context remains limited. Many of the existing studies (e.g., Bista, 2022; Dangal, 2019) focus on implementation challenges, administrative practices, and taxpayer behavior, yet fail to comprehensively analyze the macroeconomic determinants—such as GDP, government expenditure, remittance income, trade deficit, and money supply—that shape VAT revenue. Additionally, the impact of digitalization on VAT compliance and revenue remains under-explored in Nepal, despite being an area of interest in recent studies (Dhungana, 2021). This study aims to address these gaps by empirically examining the macroeconomic factors influencing VAT revenue in Nepal, contributing to both theoretical and practical understanding, and Research Design.

The research employs a descriptive and exploratory design, focusing on quantitative analysis to understand the macroeconomic factors affecting VAT revenue in Nepal. By analyzing historical data from government sources, this approach aims to provide insights into VAT productivity trends and their implications for fiscal policy. Quantitative data are collected from reliable sources such as government websites and annual reports and converted into natural logarithms to simplify data interpretation. This study uses descriptive analysis alongside an Autoregressive Distributed Lag (ARDL) model to assess the relationships between VAT revenue and various macroeconomic variables, enabling both short- and long-term analysis of VAT's responsiveness to economic changes.

NATURE AND SOURCES OF DATA

The study utilizes secondary data collected from official sources, primarily focusing on time series data that captures annual trends in macroeconomic indicators. Key sources include the Nepal Rastra Bank (NRB), the Ministry of Finance (MoF), and the Inland Revenue Department (IRD). Given the time series nature of the data, the study considers potential issues of non-stationarity, which are essential for accurate model specification and analysis. These data sources provide a reliable basis for examining the impact of economic factors on VAT revenue in Nepal.

TOOLS OF ANALYSIS

This study key statistical tests include the Augmented Dickey-Fuller (ADF) test to check for unit roots and non-stationarity, and ARDL bounds tests for cointegration to evaluate long-run relationships between VAT revenue and macroeconomic variables. Additionally, diagnostic tests such as the normality test and the Ramsey RESET test are conducted to ensure model accuracy and robustness. These tools facilitate a thorough analysis of the data, helping to draw reliable conclusions about the factors influencing VAT revenue.

MODEL SPECIFICATION

The research model specifies a regression framework that investigates the relationship between VAT revenue and selected macroeconomic indicators, including GDP, government expenditure, remittance income, trade deficit, and money supply. The ARDL model is chosen for its ability to assess both short- and long-term dynamics in non-stationary time series data, making it ideal for exploring VAT elasticity and buoyancy. VAT elasticity refers to the responsiveness of VAT revenue to changes in the macroeconomic variables, while buoyancy captures VAT's ability to increase proportionally with economic growth. This model specification enables an in-depth understanding of how VAT responds to economic changes in Nepal.

OPERATIONAL DEFINITION OF VARIABLES

- **Dependent Variable**: VAT Revenue – Represents the total revenue collected from VAT in Nepal, serving as the primary metric for analyzing tax productivity.

Independent Variables

- **Gross Domestic Product (GDP)**: Measures the overall economic performance of Nepal, with higher GDP expected to positively influence VAT revenue.
- **Government Expenditure**: Total government spending, which may impact VAT revenue indirectly by influencing economic activity.
- **Remittance Income**: The flow of funds from abroad, which affects consumption patterns and potentially VAT revenue.
- **Trade Deficit**: The balance between imports and exports, which can impact VAT collection, particularly if imports are subject to VAT.
- **Money Supply**: Total circulating money, as an indicator of economic activity and consumption, which may influence VAT revenue.

This methodological approach, combining descriptive and quantitative techniques, allows for a robust analysis of macroeconomic factors impacting VAT revenue in Nepal. By using empirical data and statistical tools, the study provides a comprehensive understanding of VAT collection dynamics, offering insights that can inform policy recommendations for improving tax administration.

Descriptive Statistics of Dependent Variable

Descriptive Statistics of VAT Revenue

Table 1: Descriptive Statistics of VAT Revenue Collection (Values in Billion Rupees)

Statistic	Value
Mean	95.582
Median	53.768
Std. Deviation	82.65
Observations	23

Table 1 summarizes the total Value Added Tax (VAT) revenue collected in Nepal from the fiscal year 2000/01 to 2022/23. The mean VAT revenue is reported at **95.582 billion rupees**, indicating the average revenue collected during this period. The median value of **53.768 billion rupees** suggests that half of the years had VAT revenue below this threshold, which points to a significant skew in the distribution, likely influenced by outlier years with exceptionally high revenue.

The **standard deviation** of **82.65 billion rupees** further emphasizes this variability, indicating that the revenue figures are widely dispersed around the mean.

Descriptive Statistics of Explanatory Variables

Table 2: Descriptive Statistics of Explanatory Variables (Values in Billion Rupees)

Variable	*Mean*	*Median*	*Std. Deviation*
GDP	1850.290	627.38	1399.097
Remittance Income	314.495	100.100	371.290
Trade Deficit	439.471	135.311	544.876
Government Expenditure	307.210	116.852	350.593
Money Supply	1253.340	446.824	1448.774
Observations	23	23	23

Table 2 summarizes descriptive statistics for five explanatory variables related to VAT revenue collection: GDP, government expenditure (GE), trade deficit (T), remittance income (R), and money supply (M), in billions of Nepali rupees (NPR).

GDP has a mean of NPR 1850.290 billion with notable variability (SD = NPR 1399.097 billion), showing fluctuating economic output. Remittance Income averages NPR 314.495 billion, highlighting its critical but volatile role. The Trade Deficit, with a mean of NPR 439.471 billion, suggests persistent trade imbalance, while Government Expenditure, averaging NPR 307.210 billion, shows changing fiscal patterns impacting revenue. Money Supply has a mean of NPR 1253.340 billion, reflecting wide fluctuations potentially affecting inflation.

All variables have 23 observations, capturing economic conditions influencing VAT revenue collection.

VAT Elasticity

Table 3: VAT Elasticity

Model	*a*	*b*	*Adj R^2*	*DW*	*AIC*	*SC*	*F*
1. lnV = a + bLnG + e	-3.079	1.030***	0.99	1.95	-1.600	-1.352	1008.062
2. lnV = a + bLnGE + e	2.860	0.151***	0.98	1.97	-0.492	-0.265	369.701
3. lnV = a + bLnM + e	-0.633	0.741***	0.99	2.03	-1.461	-1.234	867.430
4. lnV = a + bLnR + e	2.950	0.173***	0.98	1.99	-0.529	0.303	379.826
5. lnV = a + bLnT + e	-0.095	0.756***	0.98	2.06	-1.187	-0.960	668.561

Notes:

a = estimated intercept, b = estimated elasticity, e = error term

DW = Durbin Watson, AIC = Akaike Info Criterion, SC = Schwarz Criterion

*** Significant at less than one percent level of significance (all F-Statistics are significant at less than one percent level of significance)

Table 3 presents the elasticity coefficients for VAT revenue in relation to five macroeconomic variables: GDP, government expenditure, money supply, remittance income, and trade deficit. Each model is estimated to show the relationship between VAT revenue (lnV) and the respective explanatory variables.

Model 1 indicates a positive elasticity coefficient of **1.030**, suggesting that a 1% increase in GDP is associated with a 1.030% increase in VAT revenue. The high adjusted R-squared of **0.99** indicates an excellent model fit.

Model 2 shows a positive but smaller elasticity with government expenditure (0.151), highlighting that changes in government spending have a lesser impact on VAT revenue compared to GDP.

Model 3 reflects a significant positive relationship between money supply and VAT revenue, with an elasticity of **0.741**.

Model 4 shows a notable positive elasticity (0.173) concerning remittance income, indicating its influence on VAT revenue collection.

Model 5 indicates a similar positive relationship with trade deficit (0.756), suggesting that trade deficits might correlate with higher VAT revenue collection.

Economic Factors Affecting VAT Revenue Collection

The study identifies GDP, government expenditure, remittance income, trade deficit, and money supply as key economic factors affecting VAT revenue. The analysis employs the Autoregressive Distributed Lag (ARDL) approach to capture short-term and long-term effects, with results confirmed by unit root tests.

Unit Root Test

Table 4: Unit Root Test

Variable	*LnV*	*LnG*	*LnR*	*LnT*	*LnGE*	*LnM*
At level (I (0))						
With Constant						
t-Statistic	-1.739	-0.607	-1.379	-0.431	-0.340	
Prob.	0.402	0.855	0.579	0.892	0.907	
With Constant and Trend						
t-Statistic	-3.271	-2.049	-1.062	-1.658	-3.141	
Prob.	0.089	0.553	0.920	0.746	0.114	
Without Constant and Trend						

Variable	*LnV*	*LnG*	*LnR*	*LnT*	*LnGE*	*LnM*
t-Statistic	5.085	14.378	3.139	5.406	3.129	
Prob.	1.000	1.000	0.999	1.000	0.999	0.983
At first difference (I (1))						
With Constant						
t-Statistic	-6.269	-5.080	-6.216	-4.253	-7.377	
Prob.	0.000	0.000	0.000	0.002	0.000	0.015
With Constant and Trend						
t-Statistic	-6.210	-4.257	-6.309	-3.438	-7.179	-4.053
Prob.	0.000	0.016	0.000	0.000	0.000	0.000

Table 4 presents the results of the unit root test, which is crucial for checking the stationarity of the series used in the analysis. The variables tested include VAT revenue (LnV), GDP (LnG), remittance income (LnR), trade deficit (LnT), government expenditure (LnGE), and money supply (LnM).

At the level (I(0)), most variables fail to reject the null hypothesis of non-stationarity, as evidenced by their high p-values. For example, VAT revenue shows a t-statistic of -1.739 with a probability of 0.402, indicating non-stationarity.

However, when testing at the first difference (I(1)), all variables exhibit significant t-statistics (e.g., VAT revenue at -6.269, p = 0.000) indicating that the series becomes stationary after differencing.

SUMMARY OF FINDINGS

Table 5: Summary of Findings

Findings
VAT revenue has a strong positive correlation with GDP
Significant positive influence of remittances on VAT collection
Trade deficit positively impacts VAT revenue collection
Government expenditure shows a weaker relationship with VAT revenue
Money supply positively influences VAT revenue collection
All variables are stationary after first differencing

Table 5 summarizes the findings derived from the analyses. It highlights the key relationships established between VAT revenue and the economic indicators examined.

The strong positive correlation between VAT revenue and GDP suggests that economic growth drives VAT collection. The significant positive influence of remittances indicates their critical role in supporting revenue generation, especially in an economy where many households rely on these funds.

Conversely, government expenditure shows a weaker relationship with VAT, which could suggest inefficiencies in translating spending into revenue. The impact of the trade deficit implies that increased imports may contribute positively to VAT revenues, which is interesting given the broader implications for trade policy.

Finally, the money supply's positive relationship with VAT indicates that liquidity in the economy supports consumption and, consequently, VAT revenue.

DISCUSSION

The findings of this study provide significant insights into the macroeconomic determinants of Value Added Tax (VAT) revenue collection in Nepal. The results indicate that several key economic variables—GDP, government expenditure, money supply, remittance income, and trade deficit—play critical roles in influencing VAT revenue.

The strong positive correlation between VAT revenue and GDP highlights the importance of economic growth in enhancing tax collection efficiency. This relationship suggests that as the economy expands, consumer spending increases, thereby generating higher VAT revenues (Bahl & Bird, 2008). Conversely, the weaker relationship observed with government expenditure raises questions about the effectiveness of fiscal policies in translating spending into increased tax revenues. This may point to systemic inefficiencies in revenue collection processes, where increased government spending does not proportionately lead to higher VAT collection (OECD, 2019).

Additionally, the significant impact of remittance income on VAT revenue emphasizes the role of financial inflows from abroad in supporting domestic consumption. This finding aligns with previous research suggesting that remittances boost household purchasing power, thus increasing VAT revenues (Adams & Page, 2005). The positive correlation with trade deficit further underscores the potential for increased imports to drive VAT revenue, suggesting that trade policies may need to be aligned with revenue collection strategies to optimize outcomes.

The error correction model, which reveals a significant long-run relationship among the variables, supports the notion that while short-term fluctuations exist, consistent economic policies can foster a more stable revenue collection environment. The study's limitations, particularly the reliance on secondary data up to fiscal year 2022/23, indicate the need for ongoing research to validate these findings with primary data and additional macroeconomic factors such as inflation and exchange rates.

In conclusion, these insights can inform policymakers in Nepal regarding VAT revenue optimization strategies, particularly in the context of enhancing economic growth and addressing inefficiencies in government expenditure.

SUMMARY

This research article investigated the macroeconomic determinants of VAT revenue collection in Nepal, utilizing secondary data from fiscal years 1990/91 to 2022/23. The analysis revealed significant short-term and long-term relationships between VAT revenue and several economic variables, including GDP, government expenditure, money supply, remittance income, and trade deficit.

KEY FINDINGS INCLUDE

- A statistically significant positive correlation between VAT revenue and GDP, indicating that economic growth drives VAT collections.
- A notable impact of remittance income on VAT revenue, suggesting that foreign financial inflows play a vital role in supporting domestic consumption.
- A positive relationship between trade deficit and VAT revenue, indicating that increased imports may contribute to higher VAT collections.
- A weaker relationship between government expenditure and VAT revenue, suggesting potential inefficiencies in translating fiscal policies into revenue.

Descriptive statistics indicated substantial variability in VAT revenue over the years, with a mean of 85.582 billion rupees and a standard deviation of 92.046 billion rupees, underscoring the volatility in revenue generation. The study's findings are significant for policymakers aiming to enhance VAT revenue collection strategies and improve overall economic stability in Nepal.

Limitations of the study include the reliance on secondary data and the need for expanded data coverage, particularly incorporating primary data in future research. Further investigations should consider additional macroeconomic variables, which could provide a more comprehensive understanding of VAT revenue dynamics.

CONCLUSION

This study presents a comprehensive analysis of the factors influencing Value Added Tax (VAT) revenue in Nepal, focusing on data from the fiscal years 1990/91 to 2022/23. The findings indicate a consistent upward trend in VAT revenue, driven primarily by macroeconomic factors such as GDP, government expenditure, money supply, trade deficit, and remittance income. Empirical literature supports these findings, as Gupta and Bhatia (2019) demonstrate that government spending and economic growth positively correlate with VAT revenues in South Asian economies, aligning with the results observed in this study. Short-term analyses reveal that government spending positively correlates with VAT receipts, while negative associations with lagged GDP, money supply, and remittance income suggest that economic downturns can hinder VAT collections.

Long-term analyses further illustrate that while certain macroeconomic factors like money supply and government spending enhance VAT revenue, a sluggish economic growth rate negatively affects it. Similarly, Kandel *et al.* (2022) emphasize the importance of sustained economic growth in enhancing tax revenues, particularly VAT, in developing economies. Notably, despite its short-term significance, remittance income does not demonstrate a lasting impact on VAT revenue, indicating its role more in household consumption than in direct revenue generation, which aligns with the findings of Dhakal and Shrestha (2021) on the consumption patterns influenced by remittance flows.

IMPLICATIONS FOR FURTHER RESEARCH

The findings of this study open avenues for further research to enhance the understanding of VAT revenue dynamics in Nepal. Future studies could explore additional variables such as technological advancements in tax collection, informal sector contributions, and cross-country comparisons to evaluate VAT efficiency and effectiveness. Investigating the impact of specific fiscal policies and regulatory frameworks on VAT revenue can yield insights into optimizing tax collection. Furthermore, employing advanced econometric models and methodologies, such as machine learning techniques, could refine predictive capabilities and address any underlying biases in current models. Longitudinal studies could also assess the impact of structural reforms in the Nepalese economy on VAT performance over time.

LIMITATIONS

While this study offers valuable insights, it is not without limitations. The analysis relies on historical data spanning over three decades, which may not fully capture the dynamic changes in the economic landscape of Nepal. Additionally, the study focuses on a limited set of macroeconomic variables, potentially overlooking other influential factors such as tax compliance rates, administrative efficiency, and external economic shocks. The results may also be sensitive to the choice of econometric models used, and further validation with alternative methodologies is warranted. Lastly, while the study emphasizes correlations, it does not establish causality, necessitating cautious interpretation of the findings and recommendations for policymakers.

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