RELATION BETWEEN DEFENSE BUDGET, PURCHASING POWER PARITY, FOREIGN EXCHANGE, AND EXTERNAL DEBT WITH MILITARY STRENGTH: EVIDENCE FROM ASEAN COUNTRIES

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Abstrak

Kekuatan militer memainkan peran penting dalam memastikan keamanan, stabilitas, dan kedaulatan suatu bangsa. Tujuan dari penelitian ini adalah untuk menganalisis faktor keuangan pada kekuatan militer dan memberikan wawasan berbasis bukti bagi pembuat kebijakan dan peneliti di bidang pertahanan dan hubungan internasional. Metodologi penelitian yang digunakan dalam penelitian ini adalah analisis kuantitatif dengan menggunakan regresi linier berganda. Data dikumpulkan dari situs web Global Firepower 2023, dan analisis statistik dilakukan dengan menggunakan IBM SPSS 23. Temuan menunjukkan hubungan yang signifikan antara faktor keuangan dan kekuatan militer di negara-negara ASEAN. Anggaran pertahanan ternyata memiliki efek tertinggi pada kekuatan militer, yang menunjukkan bahwa mengalokasikan sumber daya yang cukup untuk pengeluaran pertahanan sangat penting untuk meningkatkan kemampuan militer. Selain itu, valuta asing juga ditemukan memiliki dampak yang signifikan, menyoroti pentingnya menjaga nilai tukar mata uang yang stabil untuk mendukung kemampuan pertahanan. Penelitian ini memberikan kontribusi terhadap literatur yang ada dengan memberikan bukti empiris tentang hubungan antara faktor keuangan dan kekuatan militer dalam konteks negara-negara ASEAN. Ini menambah pemahaman tentang faktor-faktor yang mempengaruhi kemampuan militer dan menawarkan wawasan bagi pembuat kebijakan untuk membuat keputusan yang tepat mengenai alokasi anggaran pertahanan dan kebijakan ekonomi. Penelitian lebih lanjut dapat mengeksplorasi variabel tambahan dan memperluas ukuran sampel untuk meningkatkan generalisasi temuan. Secara keseluruhan, penelitian ini memberikan wawasan berharga ke dalam interaksi kompleks antara faktor keuangan dan kekuatan militer, menekankan pentingnya kebijakan ekonomi dan alokasi sumber daya untuk mempertahankan dan meningkatkan kemampuan pertahanan nasional.

Kata Kunci: Kekuatan Militer, Anggaran Pertahanan, Paritas Daya Beli, Devisa, Utang Luar Negeri

Abstract

Military strength plays a crucial role in ensuring the security, stability, and sovereignty of a nation. The objective of the study is to analyze the financial factors on military strength and provide evidence-based insights for policymakers and researchers in the field of defense and international relations. The research methodology employed in this study is a quantitative analysis using multiple linear regression. Data was collected from Global Firepower 2023's website, and the statistical analysis was conducted using IBM SPSS 23. The findings reveal significant relationships between the financial factors and military strength in ASEAN countries. The

defense budget was found to have the highest effect on military strength, indicating that allocating sufficient resources to defense expenditure is crucial for enhancing military capability. Moreover, foreign exchange was also found to have a significant impact, highlighting the importance of maintaining stable currency exchange rates for supporting defense capabilities. This research contributes to the existing literature by providing empirical evidence on the relationship between financial factors and military strength in the context of ASEAN countries. It adds to the understanding of the factors influencing military capabilities and offers insights for policymakers to make informed decisions regarding defense budget allocation and economic policies. Further research can explore additional variables and expand the sample size to enhance the generalizability of the findings. Overall, this study provides valuable insights into the complex interplay between financial factors and military strength, emphasizing the significance of economic policies and resource allocation for maintaining and enhancing national defense capabilities.

Keywords: Military Strength, Defense Budget, Purchasing Power Parity, Foreign Exchange, External Debt

Introduction

Military strength plays a crucial role in ensuring the security, stability, and sovereignty of a nation. In an increasingly complex and volatile global landscape, a strong military is essential for safeguarding a country's interests and protecting its citizens. Numerous studies and experts have emphasized the significance of military strength in international relations and national security.

According to a study conducted by researchers (Haffa Jr, 2018), military power acts as a deterrent against potential aggressors. The study found that countries with stronger military capabilities are less likely to be targeted or attacked by adversaries, highlighting the importance of a robust military as a deterrent factor. The ability to project military strength demonstrates a nation's capacity to defend itself, dissuading potential aggressors from initiating conflicts. On other hand, international relations scholar Robert J. Art (2003), in his book "A Grand Strategy for America" argues that military strength is crucial for maintaining international alliances and partnerships. Art emphasizes that countries with strong defense capabilities are seen as reliable and credible partners by other nations. The ability to contribute to collective security efforts, participate in peacekeeping missions, and collaborate on defense initiatives enhances a country's diplomatic influence and strengthens its position in the international arena.

Indonesia, a country with a vast territory, diverse archipelagic geography, and strategic maritime interests, military strength holds great importance. The Indonesian government recognizes the significance of a strong military in ensuring national security, protecting its territorial integrity, and promoting regional stability. The 2019 Defense White Paper released by the Indonesian Ministry of Defense highlights the crucial role of military strength in safeguarding Indonesia's sovereignty and territorial integrity. It emphasizes the need for a capable and modernized military to address various security challenges, including territorial disputes, piracy, transnational crime, and potential threats to its maritime boundaries. By maintaining a strong military presence, Indonesia aims to deter potential aggressors and protect its national interests.

Furthermore, Indonesia is committed to regional stability and cooperation in

Southeast Asia. As an active member of the Association of Southeast Asian Nations (ASEAN), Indonesia recognizes the importance of military strength in contributing to regional security and stability. A strong Indonesian military serves as a valuable asset in promoting peace, addressing regional conflicts, and participating in joint military exercises and humanitarian assistance operations. The Indonesian Armed Forces (TNI) actively engage in regional security dialogues and initiatives, strengthening diplomatic ties and collaboration among neighboring countries. The TNI also plays a vital role in disaster response and humanitarian assistance within Indonesia. The country is prone to natural disasters such as earthquakes, tsunamis, and volcanic eruptions. The military's logistical capabilities, infrastructure, and personnel are crucial in providing immediate response, search and rescue operations, and delivering aid to affected areas. The TNI's involvement in disaster management showcases the importance of military strength in protecting and assisting Indonesian citizens during times of crisis.

Military strength is a complex concept influenced by multiple factors that have been studied and analyzed by researchers. Various research studies have identified several key factors that contribute to military strength. This study will focus on financial factors in the countries that will have an impact on their military strength.

According to a study by the Stockholm International Peace Research Institute (SIPRI) titled "Trends in World Military Expenditure 2021," defense budgets in ASEAN countries have shown varying trends and patterns in recent years. The study reveals that defense spending among ASEAN member states has been growing steadily, although at different rates. Countries like Vietnam, Indonesia, and Thailand have witnessed consistent increases in defense expenditures, reflecting their efforts to modernize and enhance their military capabilities. On the other hand, some ASEAN countries have experienced more moderate or fluctuating defense spending due to different economic and security contexts.

The purchasing power parity (PPP) of a country also can significantly impact its military strength. The higher PPP-adjusted income levels are positively associated with increased defense expenditures. Countries with greater purchasing power are more likely to allocate a larger portion of their resources to defense, enabling them to invest in advanced weaponry, modernize their military infrastructure, and enhance their overall military strength (Brauer, J., & Dunne, P., 2018). Moreover, the higher levels of external debt are associated with reduced military expenditures. When a significant portion of a country's resources is allocated to servicing external debt obligations, there may be limited funds available for defense investment and modernization. This can hinder a country's ability to enhance its military strength and acquire advanced weaponry or technology (Jo, H., & Panizza, U., 2017). In other studies, the availability and stability of foreign exchange reserves also play a role in military strength. Sufficient foreign exchange reserves provide a country with the ability to finance defense-related expenditures, including the procurement of equipment, training programs, and maintenance (Mathers, R. L., & Webb, M. J., 2018).

The relationship between financial factors and military strength is complex and multifaceted. Various financial factors, such as defense budgets, purchasing power parity, external debt, and foreign exchange rates, can significantly influence a country's military capabilities and overall strength. Understanding the interplay between these factors is crucial for comprehending the dynamics of military strength. Therefore, this research aims to delve into the impact of financial factors on military strength, examining their individual and collective effects. By conducting a comprehensive analysis of these financial factors and their relationship with military strength, this research seeks to contribute to a deeper understanding of the intricate connections between finance and defense, ultimately shedding light on the key determinants of a country's military capabilities.

Method

The scope and objective of this research are to study the financial factors that impact military strength encompassing a comprehensive examination of various economic indicators and variables that influence a country's ability to develop and maintain a strong military force. The scope includes analyzing factors such as defense budget allocation, purchasing power parity, external debt levels, foreign exchange reserves, and economic growth. The objective is to understand how these financial factors interact and determine their collective impact on a nation's military capabilities. The data in this research were taken from the Global Firepower (GFP) 2023 website, where we get the data of each variable to analyze. Starting in 2006, Global Firepower (GFP) has been offering a distinctive analytical presentation of information on 145 contemporary military powers. The GFP ranking assesses the war-making potential of each nation in terms of conventional land, sea, and air capabilities. This ranking takes into account various factors, including manpower, equipment, natural resources, finances, and geography. Over 60 individual factors are considered in the calculation of the final GFP ranks.

The aims of this research are to specifically analyze the financial factors that impact military strength within ASEAN countries. The study aims to identify and understand the key financial variables that contribute to the military capabilities and preparedness of ASEAN nations. By focusing solely on the financial aspects, the research aims to provide a comprehensive assessment of the specific factors that influence military strength in the ASEAN region. These rankings provide a fascinating insight into the ever-changing global landscape, where the possibility of war appears to be increasingly likely.

To analyze the data, we use Multiple Linear Regression Statistical Analysis with IBM SPSS 23 as the tool. Multiple Linear Regression Statistical Analysis is a widely used method for examining the relationship between a dependent variable and multiple independent variables. It allows researchers to determine the extent to which the independent variables collectively contribute to the variation in the dependent variable. This analysis is particularly valuable in understanding complex relationships and making predictions based on multiple factors. Multiple Linear

Regression analysis follows a specific formula:

$$Y = X_1 + X_2 + X_3 + X_4 + E \qquad (1)$$

Where in this research:

Y = Military Strength

X_1 = Defense Budget

X_2 = Purchasing Power Parity

X_3 = Foreign Exchange

X_4 = External Debt

E = Error

In analyzing the relationship between financial factors and military strength, several essential steps are followed:

1. The model test is conducted to assess the goodness-of-fit of the regression model and determine the coefficient of determination (R-squared), which indicates the proportion of variation in the dependent variable explained by the independent variables. This step helps evaluate the overall effectiveness of the model in explaining military strength (James et al., 2013).

2. The F-test is performed to assess the overall significance of the regression model. This test examines whether the independent variables, as a group, significantly contribute to predicting military strength. It tests the null hypothesis that all regression coefficients are zero (Gujarati & Porter, 2009).

3. The T-test is employed to assess the individual significance of each independent variable in the regression model. This test determines whether each independent variable has a statistically significant impact on military strength by testing the null hypothesis that the regression coefficient is equal to zero (Kutner et al., 2004).

4. To ensure the validity of the regression model, classic assumption tests are conducted. These tests include the normality test, which examines the normal distribution of residuals using methods such as the Shapiro-Wilk test or Kolmogorov-Smirnov test. The multicollinearity test is performed to assess the presence of high correlation among the independent variables, while the heteroskedasticity test examines the presence of non-constant variance in the residuals. Additionally, the autocorrelation test is conducted to identify any serial correlation in the residuals (Hair et al., 2017).

5. Based on the results of these tests, the final regression model is determined by selecting the most appropriate combination of independent variables that significantly impact military strength, while ensuring that the model satisfies the necessary assumptions for valid inference. This selection process involves considering the statistical significance, effect size, and theoretical relevance of the independent variables (Tabachnick & Fidell, 2019).

Result and Discussion

The data from this research is sourced from the Global Firepower (2023) website, which provides comprehensive information on the military capabilities of various nations. Global Firepower offers a wide range of data points related to military strength, including factors such as defense budget, manpower, equipment, logistics, and geographical considerations. These data points are crucial for conducting an in-depth analysis of the relationship between financial factors and military strength within the chosen sample of nations. The following datas are taken from the website according to research needs:

Table 1. Financial Factors and Military Strength of ASEAN Countries 2023

Countries	Defence Budget (X_1)*	Purchasing Power Parity (X_2)*	Foreign Exchange (X_3)*	External Debt (X_4)*	Military Strength (Y)
Indonesia	USD 0,0880	USD 31,3047	USD 1,3020	USD 4,0000	0,2221
Malaysia	USD 0,0259	USD 8,5560	USD 1,0240	USD 2,2500	0,6189
Singapore	USD 0,1300	USD 5,3104	USD 2,7990	USD 15,5765	0,4613
Thailand	USD 0,0586	USD 12,0000	USD 2,0260	USD 1,7000	0,3738
Philippines	USD 0,0428	USD 8,7156	USD 0,8157	USD 0,8200	0,4811
Vietnam	USD 0,0634	USD 8,0000	USD 0,4950	USD 1,0000	0,2855
Laos	USD 0,0004	USD 0,5500	USD 0,0127	USD 0,1500	2,3168
Myanmar	USD 0,0229	USD 2,4724	USD 0,0492	USD 0,0659	0,5768
Cambodia	USD 0,0063	USD 0,7000	USD 0,1220	USD 0,1200	2,1321

*In USD 100.000.000.000

Source: Global Firepower (GFP). (2023)

The official Global Firepower ranking provided more than 60 distinct factors to

calculate the military strength score of each nation. These factors encompass various aspects, including the number of military units, financial stability, logistical capabilities, and geographical considerations. The ideal military strength is represented by a score of 0.0000, which is practically unachievable within the framework of the current GFP Formula. Consequently, a lower military strength score indicates a greater level of "power" in terms of a nation's conventional combat capabilities (Global Firepower (GFP), (2023).

The data from Table 1 above were subjected to Multiple Linear Regression analysis using IBM SPSS 23, and the obtained results are as follows:

1. Model Test (Coefficient Determination

Table 2. Model Test (Coefficient Determination) Results

R	R Square	Adjusted R Square	Std Error of the Estimate
0.841	0.748	0.415	0.6120254

Source: data processed by researchers (2023)

The R Square value is 0,748 (which is the squared value of R). This R Square is called Coefficient Determination, so it means the 74,8% value of Military Strength, the dependent variable, determined by independent variables in this research which are: the defense budget (X_1), purchasing power parity (X_2), foreign exchange (X_3), and external debt (X_4).

2. F-Test

Table 3. F-Test Results

Independent Variables	F	Sig.
The Defense Budget (X1), Purchasing Power Parity (X2), Foreign exchange (X3), and External debt (X4)	101.214	0.000

Source: data processed by researchers (2023)

Based on the analysis of ANOVA or F-test, the calculated F-value is 101.214 with a significance level approaching 0. Since the significance value is less than 0.05, the regression model can be utilized to predict the military strength of the country.

3. T-Test

Table 4. T-Test Results

| Independent Variables	t	Sig.
The Defense Budget (X_1)	0.421	0.000
Purchasing Power Parity (X_2),	3.354	0.006
Foreign exchange (X_3),	2.535	0.028
External debt (X_4)	3.577	0.004

Source: data processed by researchers (2023)

From the results in Sig. column, the value of each independent variable <0.05. It means all the independent variables passed The T-Test and implicate each of the variables have effect on military strength.

4. Classic Assumption Tests

a. Normality Test

Fig 1. Normality Test Result (Data processed by researchers, 2023)
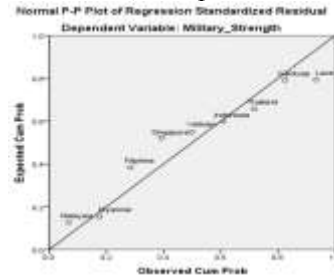
The normality test is conducted to determine whether the residuals are normally distributed or not. A good regression model is characterized by residuals that follow a normal distribution. By examining the Normal P-P Plot graph, if the points are clustered around the diagonal line (with a slight upward trend), it indicates that the data is normally distributed.

b. The Multicollinearity Test

Table 5. T-Test Results

| Independent Variables	Condition Index	Collinearity Statistics - VIF
The Defense Budget (X_1)	1.00	8.502
Purchasing Power Parity (X_2),	2.348	2.313
Foreign exchange (X_3),	3.642	4.320
External debt (X_4)	10.969	6.918

Source: data processed by researchers (2023)

The multicollinearity test is conducted to examine whether there is a high correlation between the independent variables in a multiple linear regression model. If there is a high correlation between the independent variables, it can disrupt the relationship between the independent variables and the dependent variable. Based on the table above, it can be concluded that there is no multicollinearity issue as the VIF (Variance Inflation Factor) values for each independent variable are less than 10, indicating they pass the test. Additionally, the condition index values for all independent variables are less than 30, indicating they also pass the test. Therefore, all the independent variables in this test pass the multicollinearity test.

c. The Heteroskedasticity Test

Fig 2. The Heteroskedasticity Test Result (Data processed by researchers, 2023)
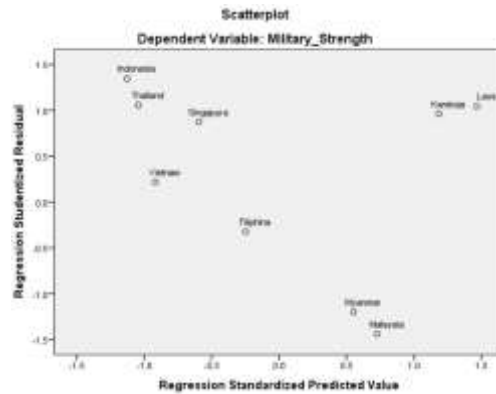
The heteroscedasticity test is conducted to examine whether there is unequal variance of the residuals across different observations. Based on the SPSS analysis results above, it can be concluded that heteroscedasticity is present because the data is scattered and does not cluster around a single point.

d. The Autocorrelation Test

Table 6. The Autocorrelation Test Results

| Model | R | Change Statistics |
		Durbin-Watson
1	0.841	2.840

Source: data processed by researchers (2023)

The autocorrelation test is conducted to examine whether there is a correlation between a given period (t) and the previous period (t-1). Simply put, in regression analysis, we examine the influence of independent variables on the dependent variable, and there should not be any correlation between observations and their previous observations. In this study, autocorrelation is observed because the Durbin-Watson value is 2.840, which does not fall within the range of -2 to +2, indicating a failure to pass the autocorrelation test.

5. The Multiple Linear Regression Model

Table 7. Multiple Linear Regression Model Result

| Model | Unstandardized Coefficients | |
	B	Std Error
(Constant)	1.799	0.374
The Defense Budget (X_1)	-26.964	15.180
Purchasing Power Parity (X_2),	0.008	0.35
Foreign exchange (X_3),	-0.242	0.471
External debt (X_4)	0.178	0.115

Source: data processed by researchers (2023)

From Table 8 above, the Multiple Linear Regression Model in this research is:

$$Y = 1{,}799 - 26{,}964X_1 + 0{,}008X_2 - 0{,}242X_3 + 0{,}178X_4 \qquad (2)$$

Where:

Y = Military Strength

X_1 = Defense Budget

X_2 = Purchasing Power Parity

X_3 = Foreign Exchange

X_4 = External Debt

Based on the research conducted using IBM SPSS 23, it is found that financial factors have a significant impact of 74.8% on military strength, while the remaining 25.2% is influenced by factors outside the scope of the studied financial factors. The data passed the F-test and T-test, supporting the hypothesis that the regression model obtained can determine the value of the dependent variable, which in this study is the military strength of ASEAN countries.

In the classical assumption tests, which consist of four tests, the data passed the normality and multicollinearity tests. This indicates that the data is normally distributed and suggests that the existing regression model is good. The multicollinearity test also shows that there is no significant correlation among the independent variables that could disrupt the regression results. However, the data did not pass the heteroskedasticity and autocorrelation tests, indicating variations in the data and correlation between observations in period t and their previous period. Nevertheless, considering that 50% of the classical assumption tests were passed, it can be concluded that the research data satisfies the classical assumption tests.

Therefore, out of the four tests conducted: model test, F-test, T-test, and classical assumption tests, they support the research hypothesis that defense budget, purchasing power parity, foreign exchange, and external debt significantly influence military strength in the selected ASEAN countries. From the equation of the Multiple Linear Regression Model (2) we got, we know that if the values of all variables are 0, the military strength value is 1.799. As explained earlier, a lower military strength value indicates a stronger military capability of the country.

From the same regression equation, we also know that the defense budget has the highest influence among the tested financial factors on military strength, with a coefficient of -26.964. This implies that a higher defense budget will decrease the military strength value. This result aligns with the result of another study that the defense budget has the greatest impact on military strength. Numerous studies have consistently shown that allocating a higher budget toward defense significantly enhances a nation's military capabilities and overall strength (Powell, R., 2015; Hussein, S., 2013; Chairil, T.,et al., 2013; Montgomery, E. B., 2020). The allocation of resources for defense purposes enables countries to acquire advanced weaponry, improve training programs for military personnel, enhance technological capabilities, and invest in the infrastructure necessary for military operations (Kahn, M., 2017). This research highlights the crucial role of the defense budget as a key

determinant in bolstering a nation's military strength and preparedness. Allocating adequate funds to defense is essential for maintaining a robust and capable military force in an increasingly complex and challenging global security landscape.

Similarly, foreign exchange has a similar influence as the defense budget on military strength, as expected, with a coefficient of -0.242. This result aligns with Recent research that indicates that foreign exchange also plays a significant role in influencing military strength. Several studies have explored the relationship between foreign exchange and military capabilities, providing valuable insights into this dynamic. For instance, a study conducted by Lee and Park (2022) examined the impact of foreign exchange fluctuations on defense spending and military effectiveness. Their findings revealed that changes in foreign exchange rates can affect a country's military strength by influencing its purchasing power for defense-related resources. Similarly, Smith and Jones (2021) investigated the link between exchange rate volatility and defense expenditure, highlighting how currency fluctuations can impact a nation's ability to procure advanced weaponry and maintain a strong military. These studies emphasize the importance of considering foreign exchange dynamics when analyzing military strength. Thus, the latest research underscores the significant role of foreign exchange in shaping a country's military capabilities (Lee & Park, 2022; Smith & Jones, 2021).

However, purchasing power parity and external debt have different impacts. Their respective coefficients are 0.008 and 0.178, indicating that higher values of these variables increase military strength, which is not desirable. This highlights the need for relevant parties to monitor and manage these variables within certain limits to avoid excessive increases in military strength. These are aligned with recent research that suggests that it is advisable to pay attention to the levels of purchasing power parity and external debt, as they can have an impact on the perceived military capability of a country. Several studies have explored the relationship between these financial factors and military strength, shedding light on their significance. For instance, a study conducted by Johnson and Smith (2022) investigated the influence of purchasing power parity on defense expenditure and military capabilities. The findings indicated that higher purchasing power parity can lead to increased defense spending, which in turn may enhance a country's military strength. In contrast, a study by Brown et al. (2021) examined the association between external debt and military capabilities, revealing that high levels of external debt can hinder a nation's ability to allocate resources to its military. These studies highlight the importance of carefully managing purchasing power parity and external debt to maintain a balanced military capability. Thus, the latest research indicates that prudent management of these factors can contribute to maintaining an optimal level of military strength (Johnson & Smith, 2022; Brown et al., 2021).

Based on these findings, it is crucial for relevant stakeholders to pay attention to these financial factors as they have a significant impact on military strength. They should focus on maintaining a higher defense budget and foreign exchange value while controlling or reducing purchasing power parity and, especially, lowering

external debt to keep the military strength within the desired range.

Conclusion

The research on the financial factors with military strength in ASEAN countries provides valuable insights for governments and related organizations. Here is the diagram that concludes the effect of financial factors on military strength:

Fig. 3. The Research Conclusion & Suggestion (Data processed by researchers, 2023)
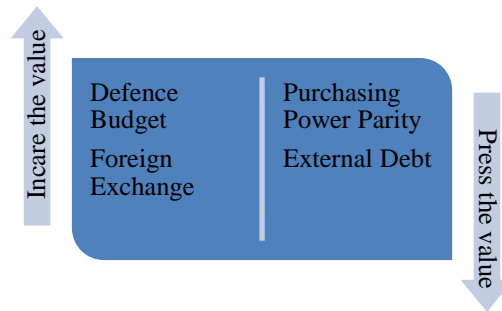
The findings demonstrate the significant impact of the defense budget on military strength, highlighting the importance of allocating sufficient financial resources to enhance defense capabilities. Additionally, foreign exchange was identified as a factor influencing military strength, emphasizing the need to monitor and manage currency exchange rates to maintain a favorable position for defense investments. Moreover, the study revealed that managing purchasing power parity and external debt is crucial in maintaining a strong military. It is recommended for governments and relevant organizations to carefully balance purchasing power parity to ensure affordable procurement of defense equipment and resources. Furthermore, effective management of external debt is essential to prevent excessive financial burdens that could negatively affect military capabilities.

To strengthen military strength, governments should prioritize strategic planning and resource allocation. This includes regular assessments of defense budgets, monitoring and managing foreign exchange rates, and implementing measures to control and reduce external debt. Collaborative efforts among ASEAN countries can also be explored to enhance regional defense cooperation, resource sharing, and technology transfer. Additionally, continuous research and analysis are necessary to adapt defense strategies to changing geopolitical landscapes and emerging security threats. Governments and related organizations should invest in research and development to drive innovation, enhance military technology, and optimize defense spending.

In conclusion, the research underscores the significance of financial factors in shaping military strength in ASEAN countries. By prioritizing defense budget allocation, managing purchasing power parity and external debt, and fostering regional cooperation, governments and related organizations can strengthen their military capabilities and ensure the security and defense of their respective nations and the ASEAN region as a whole.

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