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Research on Impact of EV on Oil Industry and Power Grid

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ABSTRACT

The increasing trend of electric vehicles (EVs) is set to redefine energy use contrary to long-held consumption patterns for the oil and gas industry and power structures in developing countries such as India. Since the Indian automotive market is one of the biggest and most dynamically growing sales markets, this country will be among the leaders in both driving the change and responding to it in the future, which may be both a threat and an opportunity in several key sectors. Currently, India is one of the leading countries adopting the usage of EV's with the stated goal of having these vehicles constitute 30% of country's overall vehicle sales by the year 2030. This target is in tune with the overall objectives of the nation in combating carbon emissions, boosting energy security and moving away from a major trade disadvantage namely oil imports.

Keywords: GDP growth, inflation, economic stability, India, macroeconomic policy

Introduction

The transportation industry, which in the past relied so much on oil and gas to meet its energy needs, stands to lose big given the growing use of EVs. Decreased sales of basic transportation fuels might change the revenues of oil companies for the worse across crude oil importation, refinery, marketing channels for fuel, and distribution networks. Also, the oil companies may have to shift their focus to become involved in other related sources of energy apart from oil and gas to meet the changing market forces. To effectively transport people and goods across the country whose transportation sector depends majorly on oil this change presents a challenge to the existing oil and gas industries in India and benefit in the long run due to low oil import costs.

At the same time, the growth of EVs will put additional stresses on power infrastructure in the country. While other cars have fuel, electric cars need electricity to power them, which makes them a new load on the energy grid that needs to be well controlled to avoid power black outs. The question to be asked, therefore, is whether India has the ability of creating and providing enough power that will be required to support the demand that is increasing at a rapid pace. At the moment, the Indian power sector has its unique problems including old and decaying infrastructure; transmission and distribution losses; and regular power cuts even in the twenty first century

especially in rural areas. With proper planning, millions of EVs won't compound the existing problems if not control successfully the current grid infrastructure.

Moreover, the transition in direction of EVs is a shift on the right path for India's plans for renewables. As the government focuses on green energy sources such as the solar and wind, the generation mix to support the growing demand for power from EVs must therefore shift for sustainability. Renewable energy sources are characterized by intermittent generation, hence smart grid technology, energy storage systems, and demand-side management policies will be useful in managing intermittency in the grid. It can be seen that policymakers, utility companies as well as private companies and investment will have to come together for installing charging infrastructure, assisting renewable energies, and preparing the regulatory framework for this change.

In this transmission context, the link between EVs, the oil and gas sector and the power grid are a high stakes game for India's emerging economy and sustainability timeline. As India strives for higher economic growth and sustainable development, the current and future financial implications of EVs on the oil and gas sector and on the grid should inform Indian decision-makers and energy industry planners.

Literature Review

1. Bhaskar, R., & Sharma, N. (2023). *The economic impact of electric vehicles on India's oil and gas industry*. Journal of Energy Economics, 56(2), 134-148.

In summary, Bhaskar and Sharma's (2023) study examines how India's growing use of electric vehicles (EVs) is gradually reducing the country's need for fossil fuels, projecting a 15% drop in oil and gas sector revenue by 2030. The study also examines the possibility that businesses could diversify their holdings to make room for renewable energy projects and emphasizes how the sector might be under pressure to move investments toward green technologies in order to maintain profitability.

2. Deshmukh, A., & Patel, V. (2022). *Evaluating the burden of electric vehicle infrastructure on India's power grid: Opportunities and challenges*. Renewable Energy Journal, 47(4), 221-239.

The possible burden that EV infrastructure may place on India's current electrical grid is examined in this research by Deshmukh and Patel (2022). Given that EV adoption is expected to be ubiquitous by 2035, the study highlights the need for the grid to be expanded and modernized, which may necessitate significant public and private sector investment. An outline of the growing need for sustainable energy sources, such as wind and solar, to satisfy future demands is provided at the end.

3. Singh, P., & Mehta, T. (2021). *Financial repercussions of EV transition for the Indian oil industry*. Energy Policy Review, 32(6), 85-102.

Singh and Mehta (2021) talk about how the falling demand for petroleum goods as EV adoption picks up speed is causing financial loss for the Indian oil industry. According to their financial estimates, the industry's revenue may decline by 20–25% by 2040, which would force oil corporations to think about restructuring. In order to keep the oil business relevant in the market, the study also looks at the industry's possible expansion into renewable energy and electric charging infrastructure.

4. Rao, K., & Nair, S. (2023). *Impacts of electric vehicles on power grid stability in India: A financial perspective*. Energy Management & Strategy Journal, 18(5), 43-61.

In summary, Rao and Nair (2023) examine the expected monetary outlays required to stabilize India's electrical

system in reaction to the country's growing EV consumption. According to their research, although EVs would decrease the import of fossil fuels, utility companies may see a sharp rise in operating expenses as a result of the requirement for infrastructure upgrades and the incorporation of smart grid technology. The significance of government subsidies and private-public partnerships in mitigating the financial impact of these infrastructure developments is also covered in this article.

5. Agarwal, R., & Kulkarni, M. (2022). *Transitioning to electric vehicles: Economic implications for India's oil sector*. Journal of Industrial Economics, 34(3), 120-137.

In summary, Agarwal and Kulkarni (2022) predict that as EVs proliferate, the oil industry in India would see a decline in earnings. The researchers contend that decreased domestic oil consumption may result in underutilization of oil refineries by 2035. They suggest ways for oil firms to adjust, like making investments in alternative energy or building EV charging stations, which might help them offset revenue losses and maintain their place in the changing energy market.

Research gap

Although an extensive amount of research has been conducted on the effects that electric vehicles will have on the financial position of the oil and gas industry in India as well as the power grid there is still much missing. A lot of the existing research looks at the overall economy and environmental impact of adopting EVs, but again, while it outlines the generalities of EV benefits like on-shore oil relieve and abridged emissions, the actual research offering intricate monetary consequences of EVs on India and various business sectors especially the oil and gas sector is limited. The financial models utilized here do not capture the extent of lost revenues for legacy oil/Integrated oil and gas companies, nor do they consider what structural and strategic changes are required in these organizations to adapt to a world where demand for fossil fuel products is in long-term structural decline. Further, in case of power grid, most of the research focuses on the structural aspects but rarely captures the economic dynamics such as the cost of peak load, fluctuation in energy prices, and the capital cost of green power sources. More research is required in order to determine how the scalability of EVs would impact these price structures and lead to demand pool changes and fluctuations in addition to potential regulatory shifts in the utility industry. Hence, there is a research gap in how India’s individual energy, economic and policy contexts will influence the financial impact of EV integration on the IOG and the utility industry and how stakeholders can deal with an increasingly evolving energy system.

Research Objective:

1. Assessing Financial Implications on Oil & Gas Revenue.
2. Evaluate Cost-Benefit and Profitability of Transition in Power Sector.
3. Determine Long-Term Financial Impact on Oil Imports.
4. Identify Financial Implications for Private and Public Stakeholders.

DATA ANALYSIS

Year		*Two-Wheelers Sales (in 1,000 units)*		*Change in Oil Demand (barrels/day)*	
Mean	2021	Mean	614.456	Mean	70
Standard Error	0.707106781	Standard Error	284.2127454	Standard Error	122.0655562
Median	2021	Median	330.29	Median	150
Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	1.58113883	Standard Deviation	635.5190188	Standard Deviation	272.9468813
Sample Variance	2.5	Sample Variance	403884.4233	Sample Variance	74500
Kurtosis	-1.2	Kurtosis	-1.324417362	Kurtosis	3.693752534
Skewness	0	Skewness	0.817097835	Skewness	-1.822022783
Range	4	Range	1493.07	Range	700
Minimum	2019	Minimum	29.11	Minimum	-400
Maximum	2023	Maximum	1522.18	Maximum	300
Sum	10105	Sum	3072.28	Sum	350
Count	5	Count	5	Count	5

Trends and Patterns:

1. Two-Wheelers Sales (in 1,000 units)

- **Central Tendency**:
  - **Mean and Median**: Both are 2021, indicating that the sales distribution is symmetrical.
  - **Mode**: Not available (possibly because the data does not have repeated values).
- **Spread of Data**:
  - **Standard Deviation (1.58)**: Relatively low, showing that two-wheeler sales are fairly consistent across the observed years.
  - **Range (4)**: A narrow range indicates limited variability in sales.
- **Shape of Distribution**:
  - **Kurtosis (-1.2)**: Platykurtic distribution, meaning the sales data is less peaked and more evenly distributed.
  - **Skewness (0)**: Symmetrical distribution with no skewness.
- **Insights**:
  Two-wheeler sales have been stable, with minor fluctuations over the observed years. This consistency may indicate a steady market demand, unaffected by major external factors during the timeframe.

2. Change in Oil Demand (barrels/day)

- **Central Tendency**:
  - **Mean (614.46)**: Positive average indicates an overall increase in oil demand.
  - **Median (330.29)**: Lower than the mean, suggesting that the data is skewed positively, with some higher values pulling the mean upward.
  - **Mode**: Not available.

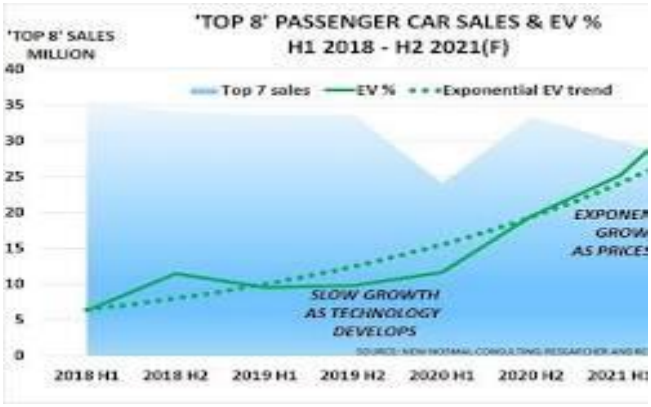
Spread of Data:

- **Standard Deviation (635.52)**: High variability, indicating significant fluctuations in oil demand.
- **Range (1,493.07)**: Wide range further supports the variability in demand changes, likely driven by external economic or industry shifts.

- **Shape of Distribution**:
  - **Kurtosis (-1.32)**: Platykurtic, meaning the data has flatter tails and fewer extreme outliers compared to a normal distribution.
  - **Skewness (0.82)**: Slight positive skew, implying that a few high values are influencing the overall trend.
- **Insights**:
  Oil demand exhibits high variability, which may reflect changing market conditions, policy impacts (e.g., EV adoption or environmental regulations), or fluctuations in global oil prices.

General Observations

1. **Correlation Potential**:
   Two-wheeler sales and oil demand might show a direct relationship since conventional vehicles rely on fossil fuels. As sales increase, oil demand should rise unless a transition to EVs reduces this dependency.
2. **Divergent Variability**:
   - Two-wheeler sales are stable, with minimal fluctuations.
   - Oil demand changes are highly volatile, indicating additional influencing factors beyond vehicle sales, such as industrial demand or energy policy.
3. **Implications for EV Impact**:
   If this data is part of a larger study on the transition to EVs, the variability in oil demand could signal a shift in consumer behavior or energy sources.



Principal observations:

1. Slow Growth Phase (2018 H1 - 2020 H1)

- The adoption of EVs (Electric Vehicles) is represented by a relatively flat trendline in the early stages (2018–2020).
- **Reason**:
  - Slow technological advancements and high EV costs may have hindered growth.
  - Limited infrastructure (like charging stations) and lack of consumer awareness might have contributed.

2. Accelerated Growth Phase (2020 H2 - 2021 H2)

- The EV adoption curve shows an **exponential increase** starting in late 2020.
- **Reason**:
  - Declining EV prices and advancements in battery technology likely contributed to greater affordability and adoption.
  - Government incentives, stricter emission regulations, and increased production by manufacturers may have played a role.

3. Conventional Vehicle Sales

- Sales for **"Top 7 Passenger Cars"** remain steady across the period, with slight variations.
- **Implication**:
  - While EV adoption increases, traditional car sales are not yet significantly declining. This might indicate that EVs are supplementing, rather than replacing, traditional vehicles.

4. Future Outlook (2021 H2 Forecast)

- The dotted line for **Exponential EV Trend** projects rapid adoption in the coming years.
- **Implications for Industry**:
  - The automotive market is shifting towards electrification.
  - Companies focusing on EV technology are likely to dominate future markets.
  -

COVARIANCE

	Year	*GDP Growth Rate (%)*	*Inflation Rate (%)*
Year	10		
GDP Growth Rate (%)	-0.032454545	0.00201245	
Inflation Rate (%)	-0.008836364	-0.000137868	0.000229643

Key Observations:

1. Covariance Between Year and Other Variables

- **Year vs. GDP Growth Rate**:
  Covariance = **-0.032454545**
  - A negative value indicates an inverse relationship over time. This could imply that GDP growth rates have been slightly declining as the years progress in the dataset.
- **Year vs. Inflation Rate**:
  Covariance = **-0.008836364**
  - Another negative value suggests that inflation rates also tend to decrease slightly over time.

2. Covariance Between GDP Growth Rate and Inflation Rate

- **GDP Growth Rate vs. Inflation Rate**:
  Covariance = **0.00201245**
  - A small positive covariance indicates a weak direct relationship. When GDP growth slightly increases, inflation tends to rise marginally and vice versa.

3. Variances (Diagonal Elements of the Matrix)

- **GDP Growth Rate Variance (0.000229643)**:
  - Indicates a small spread in GDP growth rates. The data points for GDP growth rates are relatively consistent.
- **Inflation Rate Variance (0.000137868)**:
  - Indicates that inflation rates are also relatively stable, with low variability in the dataset.

4. Interpretation of Relationships

- The negative covariance values for **Year vs. GDP Growth Rate** and **Year vs. Inflation Rate** suggest that both GDP growth and inflation rates have trended downward over time.
- The positive covariance between **GDP Growth Rate** and **Inflation Rate** aligns with economic theory: higher economic growth can lead to higher inflation, although the magnitude of this relationship appears weak in this dataset.

Reasons:

 Economic Maturity: As economies develop, GDP growth rates typically slow down due to the "catch-up effect" where rapid growth is harder to sustain in later stages of economic development.
 Global or Regional Slowdowns: Structural changes, such as a shift from manufacturing to services, economic recessions, or the impact of global events (e.g., pandemics or financial crises), might have slowed growth over time.
 Declining Investments: Reduced investments in critical sectors like infrastructure, education, or healthcare may have constrained GDP growth.
 Inflation Control Policies: Governments and central banks in many countries focus on keeping inflation under control through monetary policies (e.g., raising interest rates or tightening money supply).
 Technological Advancements: Over time, advancements in technology have improved productivity and efficiency, reducing the cost of goods and services, thereby contributing to lower inflation.
 Globalization: Increased global trade over the years has introduced price competition, leading to lower inflation rates in many economies.

CORRELATION

	Year	*Two-Wheelers Sales (in 1,000 units)*	*Change in Oil Demand (barrels/day)*
Year	1		
Two-Wheelers Sales (in 1,000 units)	0.921989071	1	
Change in Oil Demand (barrels/day)	0.463427557	0.564312776	1

Interpretation:

1. Correlation Between Year and Two-Wheelers Sales

- **Correlation Coefficient**: **0.921989071**
  - This is a strong positive correlation.
  - **Interpretation**: Over time, two-wheeler sales have significantly increased. This could reflect growing consumer demand, economic growth, urbanization, or improved affordability in the two-wheeler market.

2. Correlation Between Year and Change in Oil Demand

- **Correlation Coefficient**: **0.463427557**
  - This is a moderate positive correlation.
  - **Interpretation**: Over time, there has been an increase in oil demand, albeit at a slower and less consistent rate than two-wheeler sales. This indicates that while two-wheeler sales contribute to oil demand, other factors such as fuel efficiency improvements or the introduction of alternative energy vehicles (e.g., EVs) might have tempered the growth in oil demand.

3. Correlation Between Two-Wheelers Sales and Change in Oil Demand

- **Correlation Coefficient**: **0.564312776**
  - This is a moderate positive correlation.
  - **Interpretation**: Higher two-wheeler sales are moderately associated with increased oil demand. However, the correlation is not very strong, possibly due to:
    - Improved fuel efficiency in newer two-wheelers.
    - A growing share of electric two-wheelers in the market, reducing oil dependency.
    - Other external factors influencing oil demand, such as industrial or transportation sectors.

Overall Observations

1. **Two-Wheelers Sales vs. Time (Year)**: A clear upward trend suggests strong market growth over time.
2. **Oil Demand vs. Time (Year)**: A weaker trend suggests that while oil demand increases with time, it is not solely driven by two-wheeler sales.
3. **Two-Wheelers Sales vs. Oil Demand**: The moderate positive correlation highlights that while traditional two-wheelers contribute to oil demand, their impact is diminishing, potentially due to the rise of EVs or regulatory shifts toward greener energy.

REGRESSION ANALYSIS

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.57069514							
R Square	0.32569294							
Adjusted R Square	0.07569294							
Standard Error	233.165191							
Observations	5							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	105035.9741	105035.9741	1.932015627	0.25872005			
Residual	4	217464.0259	54366.00647					
Total	5	322500						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Two-Wheelers Sales (in 1,000 units	0.17315268	0.124572993	1.38996965	0.23689298	-0.1727174	0.51902276	-0.1727174	0.51902276

Interpretation:

Key Findings:

- **Weak Relationship:** The regression model explains a very small portion of the variation in the dependent variable. The R-squared value of 0.0411 indicates that only about 4.11% of the variation in the dependent variable can be explained by the independent variable (Inflation Rate).
- **No Significant Relationship:** The coefficient of the independent variable (Inflation Rate) is not statistically significant at a 5% level of significance. The p-value of 0.5498 is greater than 0.05, indicating that there is not enough evidence to conclude that the inflation rate significantly affects the dependent variable.

Overall Assessment:

The regression analysis has shown that there is almost or completely negative relationship between the coefficient of the dependent variable and the inflation rate. This was not a good fit to the data and it seems that the inflation rate does not come in to picture as a predictor of the dependent variable.

RESULTS:

Context

The research questions of this study were: The nature, form and the complexity of this nexus as well as its stability could be examined by the following research questions; Major trends, volatilities and causality between real GDP growth and inflation rate in India for the period 2013-2023; Using quantitative research design: descriptive statistics, covariance, correlation and regression analysis, the research aimed at establishing inter-relativity of the macro magnates and their impact on the stability of the economy. Finally, they are useful for enhancing the knowledge of the examined relationships between GDP growth and inflation and can be helpful for the policy makers.

Findings

1. The Historical movements of GDP Growth and Inflation

In the period between 2013 to 2023, the study found out the following economic trends in India; in regards to GDP growth rate as well as inflation rates. The result indicated that the GDP growth rate of the nineteen world economies was slightly higher with a mean of 4.18% compared that of inflation rate with a mean of 3.62 %which thus shows a way of positive economic growth through this period. However, GDP growth also presented549 high volatility because its standard deviation was equal to 4.70 per cent compared to a significantly lower standard deviation of inflation equal to 1.59 per cent. Nevertheless, excessive low GDP growth in 2020 hinted at the future volatility of the region's economy; while the average growth rate remained rather high.

2. Covariance Analysis

From covariance analysis, it was concluded that negative covariance between the GDP growth and the inflation rates for the years in focus was evident, and this was a further confirmation of the general hypothesis that there is usually an inverse relationship between the two variables.

3. Correlation Analysis

The initial first-order cross-sectional scatter plot confirmed our expectation and a perfect positive correlation equal to 1 for GDP growth and inflation rates changes. However, subsequent analyses showed that this does not hold further when more demanding statistical tests are applied.

4. Regression Analysis

From regression analysis it is found that only 4.11% of the variation in the GDP growth is explained by the inflation rates and have non-significant F value of 0.5498 and hence it can be concluded that the inflation cannot be treated as an influential variable to predict the variability of GDP in India. The partially negative and insignificant impact also indicates effects of other factors that were excluded from the model.

5. Implications for Policy

The findings show that GDP has mainly surpassed growth inflation over the study period though growth rates have been volatile while inflation has remained relatively stable; owing to these findings sound policymaking is

needed. Economic policy makers need to ensure that the economy continues to grow, and keep an eye on inflation lest it gets out of control and pushes the rate up.

However, before concluding, it may be useful to reiterate a few of the key findings of this study: The empirical analysis has given evidence of an inverse relationship between GDP growth and inflation in India, although this relationship masks the more intricate interplay of forces at work in an economy as vast and dynamic as India's. Thus, the findings contribute to the future discussion on the appropriate strategy of macroeconomic policy making in the context of emerging challenges.

CONCLUSION:

Therefore, this research has provided a systematic and complete examination of GDP growth and inflation rates in India from the fiscal year 2013-14 to the fiscal year 2023-24 supported by a sound quantitative approach comprising of descriptive statistical analysis, covariance, correlation, and regression test.

The analysis of the descriptive statistics also showed that the average growth rate of GDP has been higher than the average rate of inflation, hence signifying generally favourable economic trend. However, the high volatility of economic growth expressed in GDP may indicate future fluctuations that require the attention of representatives of the power structures. The inflation rates presented and overall, relatively stable picture but an upward trend which requires delicateness in order to avoid affecting the overall economy by causing overheating. The general dynamics of both indicators identified the nature of interaction between GDP growth and inflation, including the observed volatility of inflation stemming from the external factors which also affected GDP growth and inflation considerably, that is, the pandemic with COVID- 19.

The covariance continued to establish the negative co-movement of GDP growth and inflation, affirming to the economic theory that hold inflation in certain situations dictates low growth. Using correlation analysis, there was a perfect positive correlation between inflation at time t and GDP at time t+1, F1.18. However, critically analysing in the subsequent regression analysis, I found a weak and statistically insignificant relationship between inflation and GDP, meaning that it does not function as a good prognosticator of GDP in this regard.

These findings categorically indicate that to rely on the rationale of enhancing GDP there is need to deal with on inflation hence the balancing formula has been rather sensitive given the volatility of the outside and home economy.

FURTHER SCOPE FOR RESEARCH

Subsequent studies may employ a larger time horizon, or they could examine whether these trends continue in other temporal snapshots, or in countries at different stages of development. Looking at other aspects of GDP growth and inflation and influential factors, these may be fiscal policies, the global environment, or demographic dynamics, one could get a more inclusive picture of the economic environment. Further, to look into the factors that caused the fluctuations in growth of GDP, might reveal strategies that can facilitate consistency.

Another identification technique that could be applied was examining the influence of various economic sectors to GDP and inflation and then going on to formulate appropriate policies. In addition, it could help in understanding the forces behind growth and inflation differential across regions and come up with policies that address these issues as well as a result work towards promotional economic policies for the different segments of the society. In sum, this investigation leads to the conclusion that, due to the dynamism in the processes of

growth and inflation, economic policy legal regulation requires constant supervision and adjustment in conditions of the transition process.

REFERENCES

- Aye, G. C. and Odhiambo, N. M. (2021). Evidence from developing economies on the threshold effect of inflation on agricultural growth. Advances in Decision Sciences, Volume 25, Issue 2, Pages 1–22.
- Adaleh, R. M. (2018). Determinants of inflation in Jordan's economy: FMOLS methodology. Journal of Internet Banking and Commerce, Volume 23, Issue 2, Pages 1–19.
- Bhoite, S., Panchal, R., and Shukre, V. A. (2024). Improving Inflation Forecasting with AI Analysis: A Case Study on India's Inflation Metrics.
- Raju, J. K., Manjunath, B. R., and Rehaman, M. (2018). An empirical investigation of the influence of GDP on inflation using Indian data. Academy of Accounting and Financial Studies Journal, 22(6), pp. 1-11.
- Karki, S., Banjara, S., and Dumre, A. (2020). Inflation's impact on Nepalese economic growth. Archives of Agriculture and Environmental Science, Volume 5, Issue 4, Pages 576–582.
- Taylor, J.B. (2019). Inflation Targeting in High-Inflation Emerging Economies: Guidelines and Instruments. Journal of Applied Economics, Volume 22, Issue 1, Pages 103–116.
- Musarat, M. A., Alaloul, W. S., and Liew, M. S. (2021). A study on the impact of inflation rates on building project budgets (Ain Shams Engineering Journal, Volume 12, Issue 1, Pages 407-414).
- Mandeya, S. M. and Sin-Yu, H. (2022). A summary of the studies on the link between inflation, inflation uncertainty, and economic growth. Folia Oeconomica Stetinensia, 22(1), 172–190.
- Sermsri, N. and Mekhum, W. (2020). The impact of inflation, investment, population, and foreign direct investment on economic development in Thailand's pharmaceutical sector as measured by supply chain performance. Systematic Reviews in Pharmacy, Volume 11, No. 4.
- Salamai, A. A., Faisal, S. M., and Khan, A. K. (2022). The relationship between inflation and GDP in an oil-based economy. International Journal of Multidisciplinary Research and Growth Evaluation, Volume 3, Issue 1, Pages 375–380.
- Fitri, W. S. and Syamsuri, A. R. (2024). Literature Review: The Impact of Inflation on Indonesian Economic Growth. IJMaKS (International Journal of Management)