

Impact of Government Policies on the Indian Economy through Data Analytics

Suraj Jathar¹ & Sandesh Kadam²

¹ Final Year M.Sc. (Computer Applications) Student, Department of Computer Applications, Pratibha College of Commerce and Computer Studies, Chinchwad, Pune, Maharashtra, India

² Final Year M.Sc. (Computer Applications) Student, Department of Computer Applications, Pratibha College of Commerce and Computer Studies, Chinchwad, Pune, Maharashtra, India

Abstract - This study uses data analytics to examine how government actions affect the Indian economy [1][3]. Important economic metrics like GDP growth, inflation, unemployment, tax income, and digital transactions are used in the study [3]. To identify trends and patterns throughout time, the data is gathered and examined. To clearly illustrate how these indicators vary and how they relate to one another, a variety of graphs and charts are used. In order to forecast future economic patterns, the study also employs machine learning models such as Random Forest, Decision Tree, and Linear Regression [7].

The findings demonstrate that the economy is clearly impacted by governmental policy. Economic development is significantly influenced by tax laws and digital expansion [5]. According to the forecast results, the economy is expected to be steady for the next several years. This study promotes improved data-driven decision-making and aids in understanding how policies impact the economy.

Key Words : Indian Economy, Government Policy, Data Analytics, Machine Learning, GDP Growth, Economic Analysis, Prediction, Inflation

1. INTRODUCTION

This study focuses on using data analytics to examine how government policies affect the Indian economy [1][3]. Important economic metrics that are frequently used to gauge economic success are taken into account in this study, including GDP growth, inflation, unemployment, tax income, and digital transactions [3]. A nation's economic structure is greatly influenced by its government policies [1][2]. Economic reforms,

digital payments, and taxation policies all have a direct impact on employment, GDP, and general financial stability. Understanding how these policies impact economic performance over time and across many economic sectors is crucial.

In order to find trends, patterns, and connections between various indicators, historical economic data is gathered and examined in this study. The data is processed and visualized using data analytics techniques, which facilitates the

understanding of intricate economic activity and the derivation of significant discoveries [5].

The data is examined using a variety of visualization techniques, including correlation matrices, distribution analysis, bar charts, and line charts. By determining the relationships between various variables and how they evolve over time, these methods aid in improving the interpretation of economic patterns.

To forecast future economic patterns, machine learning models like Random Forest, Decision Tree, and Linear Regression are used in addition to data analysis [7]. These models increase the accuracy of economic forecasting by calculating future GDP growth based on current economic conditions. This study's primary goal is to enable improved decision-making by offering a data-driven method for assessing the effects of policies.

1.1 Research Problem

The Indian economy is significantly shaped by government policy [1][2]. It is still difficult to gauge their true influence on economic metrics including GDP growth, inflation, unemployment, tax revenue, and digital transactions [3].

A data-driven approach is required to comprehend how these policies affect economic performance over time, while traditional analysis frequently explains policy effects conceptually. By using data analytics and machine learning approaches to assess how policies affect the Indian economy, our study fills that gap [7].

1.2 Research Objectives

1. To to examine how government policies affect the Indian economy.
2. To investigate the connections between important economic metrics like tax revenue, GDP growth, inflation, unemployment, and digital transactions.
3. To contrast economic metrics prior to and during the execution of significant government initiatives.
4. To forecast GDP growth in the future using economic factors.
5. To offer data-driven insights for improved comprehension and assessment of the efficacy of policies.

1.3 Literature Review

Numerous scholars have examined how government policies affect country development and economic growth [1][4]. Economic indicators that are frequently used to assess an economy's success include GDP growth, inflation, unemployment, taxes, and digital transactions [3].

Prior research on the Indian economy has demonstrated the various ways in which policies like the GST, the growth of digital payments, and tax reforms have impacted economic activity [1][5]. While some studies have investigated the significance of digital payments and financial inclusion in economic development, others have concentrated on taxation and revenue growth.

1.4 Research Gap

Studies that have already been done on the Indian economy frequently concentrate on specific policy measures like GST, the expansion of digital payments, or inflation [1][3]. Similar to this, a number of forecasting research solely use machine learning for general prediction tasks or employ a small number of economic variables [7].

Nevertheless, there is little research that integrates important macroeconomic indicators with many aspects of government policy in a unified data-driven analytical framework. By combining analytical and predictive methods with economic metrics like GDP growth, inflation, unemployment, tax revenue, and digital transactions, this study aims to close that gap. The research provides a combined approach that supports both policy impact evaluation and future economic forecasting.

2. RESEARCH METHODOLOGY

This study examines how government policies affect the Indian economy using a quantitative and datadriven technique [3]. The study makes use of historical economic data gathered from reliable public sources, including the Reserve Bank of India (RBI), World Bank, International Monetary Fund (IMF), Ministry of Statistics and Programme Implementation (MoSPI), and National Payments Corporation of India (NPCI) [2][3][4][5][6].

The GDP growth rate, inflation rate, unemployment rate, tax income, and digital transactions are among the chosen economic indicators for examination. These factors were included because they reflect significant aspects of economic performance and are either directly or indirectly impacted by decisions made on public policy.

2.1 Data Collection

Annual economic observations gathered from publicly accessible national and international economic datasets were used to create the dataset [3][6]. For analysis and forecasting,

the gathered data was arranged in a standardized tabular style.

2.2 Data Preprocessing

To eliminate inconsistencies and enhance usability, the dataset was preprocessed and cleaned before analysis. To guarantee analytical consistency, numerical variables were normalized and any missing values were handled accordingly. After that, the data was organized in a way that made it easy to visualize and create machine learning models..

2.3 Exploratory Data Analysis

Exploratory Data Analysis (EDA) was performed to understand trends, relationships, and distribution patterns among the selected economic indicators. Trend analysis, comparative analysis, correlation matrix, and graphical visualization techniques were used to identify meaningful patterns and insights from the data.

2.4 Policy Impact Analysis

A policy-wise comparison approach was used to study the effect of selected government policies on economic indicators. The indicators were examined before and after major policy events such as the implementation of GST, digital payment expansion, corporate tax reforms, and post-COVID economic recovery measures [1][5].

2.5 Predictive Analysis

Machine learning models like Random Forest Regressor, Decision Tree Regressor, and Linear Regression were used to project future GDP growth [7]. GDP growth was the target variable in these models, which were trained using specific economic indicators as input variables.

2.6 Model Evaluation

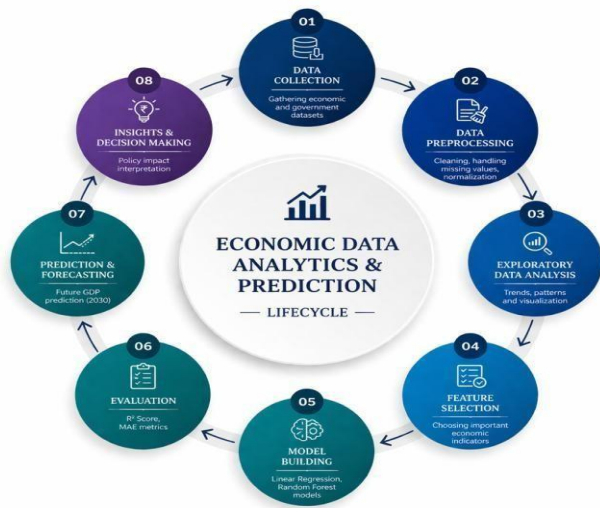
Standard regression measures including R2 Score, Mean Absolute Error (MAE), and Root Mean Squared Error (RMSE) were used to assess the machine learning models' performance. These measures aid in determining the best model for economic forecasting and evaluating model accuracy.

3. DESIGN AND IMPLEMENTATION

The design and implementation of the suggested economic analysis system created for this study are described in this part. The system is organized to use machine learning and data analytics to examine how government policies affect the Indian economy. Gathering crucial economic data, including GDP growth, inflation, unemployment, tax income, and digital transactions, is the first step in the implementation. After that, this data is preprocessed to eliminate discrepancies and get it ready for additional analysis.

Following preprocessing, trends, correlations, and policy implications are found using analytical and visualization

approaches. In the latter phase, machine learning models are employed to produce valuable insights and forecast future economic patterns. The total lifecycle of the research process is depicted here in order to clearly and methodically illustrate this entire operation.



3.1 Tools and Technologies Used

Numerous tools and technologies are used to help the implementation of this research. The primary programming language for analysis and model creation is Python. NumPy facilitates numerical computations, whereas Pandas handles and preprocesses data. Streamlit is utilized to create the analytical dashboard that presents results in a polished and easy-to-use manner, while Plotly is used for data visualization and interactive chart creation.

3.2 Functional Components

1. There are four primary parts to the suggested system. Economic indicators are arranged into a structured dataset during the first step of data gathering and preparation.
2. Analytical visualization, which comprises trend analysis, annual comparison, distribution analysis, and correlation matrix to investigate links between variables, is the second component.
3. Key indicators are compared before and after policy implementation in the third component, which is policy impact evaluation.
4. Predictive analysis, which uses machine learning models to project future GDP growth, is the fourth component. When combined, these elements facilitate the analysis and successful presentation of study findings.

4. POLICY-WISE ANALYSIS

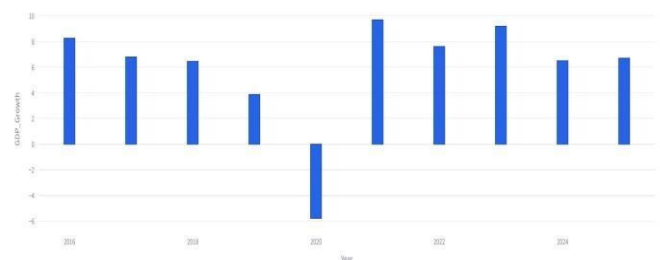
The policy-wise analysis conducted for this study is presented in this section. The goal is to investigate the effects of certain government policies on key economic metrics,

including GDP growth, inflation, unemployment, tax revenue, and digital transactions [1][3]. A deeper understanding of how policy decisions impact the Indian economy over time is made possible by the analysis of each policy's economic impact.

4.1 GST and Tax Revenue

The Indian tax system underwent substantial modifications with the implementation of the Goods and Services Tax (GST) [1]. It was put into place to streamline the tax system and increase the effectiveness of tax collection nationwide.

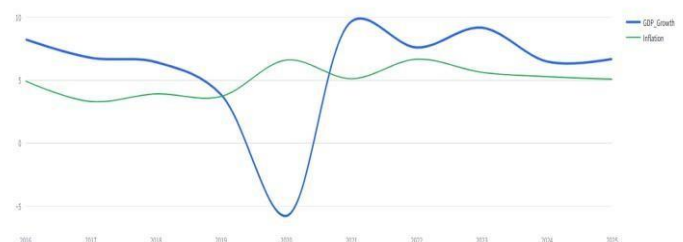
Yearly Comparison



4.2 Digital Payment Growth and UPI Expansion

The Indian economy has changed significantly as a result of digital payment policies [5]. The success of these regulations and the growing uptake of digital financial systems are reflected in the rise in Unified Payments Interface (UPI) transactions.

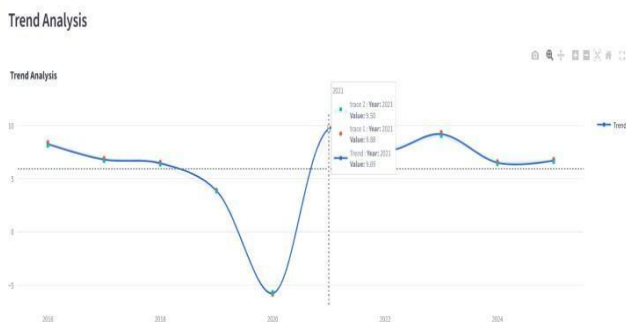
UPI transaction data analysis reveals a significant rising trend over time [5][10]. This suggests that increased transaction efficiency and economic formalization have been facilitated by the growth of digital payments. The notion that policy-driven digital transformation can have a favorable impact on economic development is further supported by the rise in digital transactions.



4.3 Corporate Tax Reduction

In order to promote economic stability, investment, and business expansion, corporate tax reforms were implemented [1]. These reforms are crucial because they have the potential to affect both general economic performance and industrial activity.

This study uses specific variables to examine the economic trend following the lowering of corporate taxes. According to the analysis, these measures supported financial stability and corporate confidence, which had an indirect effect on economic growth.



4.4 COVID impact

GDP growth, employment, and general economic stability were all significantly impacted by the COVID19 pandemic in India [3][4]. Economic recovery was greatly aided by government actions both during and after the outbreak. According to the data, the economy saw considerable swings during the COVID-19 pandemic before gradually improving in subsequent years.

5. ANALYSIS AND RESULTS

The general analysis and findings from the dataset are shown in this section. This analysis's goal is to use statistical interpretation and data visualization to find patterns, connections, and policy implications.

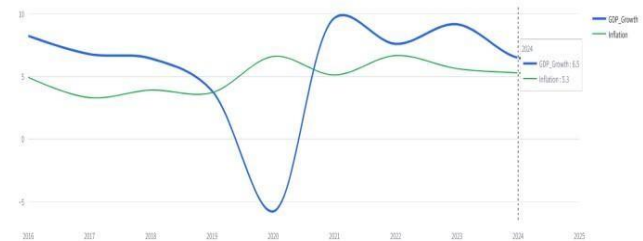
Several analytical perspectives, including trend analysis, comparison graphs, correlation matrices, and predictive forecasting, are used to display the findings. These findings aid in comprehending the long-term effects of governmental initiatives on the Indian economy.

5.1 Trend and Comparative Analysis

A thorough grasp of how economic indicators have evolved throughout time is provided by the trend and comparative analysis. Significant fluctuations in GDP growth, inflation,

unemployment, tax income, and digital transactions are displayed in the visualizations.

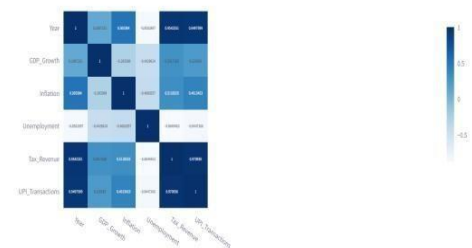
Finding trends across several indicators is made easier by the annual comparison and multi-variable analysis. Digital transactions, in particular, exhibit a robust upward trend, but GDP growth and unemployment show long-term volatility that are sensitive to policy.



5.2 Correlation Analysis

The links between economic indicators are examined using correlation analysis. It aids in comprehending the potential influence of one variable on another. Certain factors have positive links, while others have weaker or negative associations, according to the correlation matrix. For instance, the effects of unemployment and inflation on GDP growth may vary over time. This study facilitates a more thorough understanding of the effects of policy and is helpful in discovering significant economic links.

Correlation Matrix



6. PREDICTIVE ANALYSIS

The use of machine learning techniques to forecast future economic patterns is the main topic of this section. Predictive analysis's primary goal is to project future GDP growth using particular economic variables.

Because it facilitates data-driven planning and decisionmaking and aids in predicting potential future economic conditions, predictive analysis is crucial.

6.1 Machine Learning Models Used

This study uses machine learning models including Random Forest, Decision Tree, and Linear Regression to do predictive analysis [7]. These models were chosen because they can aid in comprehending the connection between various economic factors and GDP growth and are frequently employed for prediction jobs.

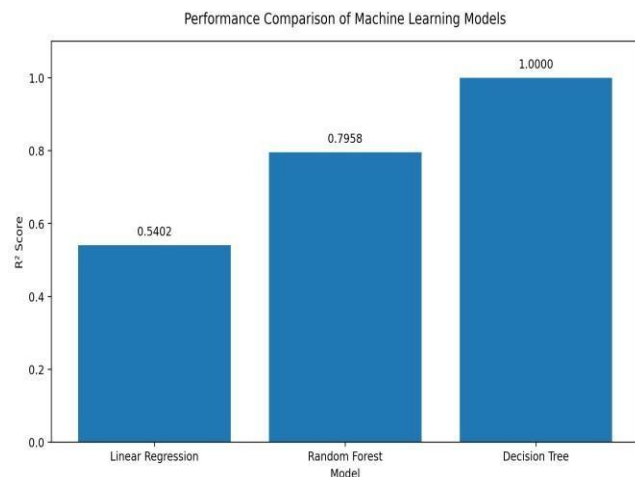
After being trained on historical data, each model's predictive power is assessed.

6.2 Model Performance

Standard assessment measures like R2 score and error values are used to assess the machine learning models' performance. The findings demonstrate that the models can find significant links in the dataset.

Depending on the data's structure, certain applicable models outperform others. This assessment aids in choosing the best model for forecasting future economic conditions.

Sr. No.	Model Name	R ² Score
1	Linear Regression	0.5402
2	Random Forest	0.7958
3	Decision Tree	1.0000



6.4 Feature Importance

To determine which economic factors are most important in predicting GDP growth, feature significance analysis is employed. Understanding the relative effects of tax income, unemployment, inflation, and digital transactions on economic forecasting is made easier by the study. This enhances the prediction model's interpretability and sheds more light on the main economic forces.

7. FINDINGS AND DISCUSSION

The main conclusions of the analysis and predictive study are outlined in this section. The findings demonstrate that the Indian economy is impacted by government policies in a quantifiable way. Revenue stability was enhanced by tax reforms, and the expansion of digital payments grew dramatically over time. GDP growth was clearly impacted by unemployment and inflation, and the machine learning models used were successful in forecasting future GDP patterns, suggesting a steady economic outlook.

7.1 Practical Significance of the Study

Because it integrates machine learning, data analytics, and visualization into a single framework, this research has practical applications. It facilitates a more methodical and goal-oriented approach to economic study and enhances scholarly comprehension. Students, academics, and politicians that want to use data-driven approaches to comprehend how government policies affect the economy would find the study useful.

7.2 Discussion on Predictive Results

Based on economic variables, the predictive research demonstrates that machine learning models are capable of accurately projecting future GDP growth. Prediction

reliability is increased and the importance of important economic aspects is highlighted when numerous input variables are used. The findings imply that, assuming present trends hold, the Indian economy might continue to grow steadily.

8. CONCLUSION

The study comes to the conclusion that the Indian economy is significantly impacted by government policy. The study finds significant trends, patterns, and connections between vital economic variables like GDP growth, inflation, unemployment, tax revenue, and digital transactions by using data analytics approaches.

Additionally, the study shows that future GDP growth may be accurately predicted using machine learning models. The findings show that economic reforms, digital expansion, and policy changes all have a significant impact on the overall functioning of the economy.

All things considered, this study offers a methodical and data-driven framework for comprehending the efficacy of policies and predicting future economic trends. It might be a helpful resource for additional scholarly and analytical research in this field.

9. ACKNOWLEDGEMENT

The authors would like to sincerely thank Prof. [Guide Name], Department of Computer Applications, Pratibha College of Commerce and Computer Studies, Chinchwad, Pune, for his invaluable advice, ongoing assistance, and perceptive scholarly recommendations during the study project.

The Reserve Bank of India (RBI), Ministry of Statistics and Programme Implementation (MoSPI), World Bank, International Monetary Fund (IMF), and National Payments Corporation of India (NPCI) are just a few of the publicly accessible economic data sources that the authors are grateful to have used.

These sources greatly aided the analysis carried out in this study.

10. REFERENCES

[1] Government of India, "Economic Survey," Ministry of Finance, <https://www.indiabudget.gov.in/economicsurvey/>

[2] Reserve Bank of India, "Annual Reports and Publications," <https://www.rbi.org.in/scripts/annualreportpublications.aspx>

[3] World Bank, "World Development Indicators – India," <https://data.worldbank.org/country/india>

[4] International Monetary Fund (IMF), "World Economic Outlook Databases," <https://www.imf.org/en/publications/sprolls/world-economic-outlook-databases>

[5] National Payments Corporation of India (NPCI), "UPI Product Statistics," <https://www.npci.org.in/product/upi/product-statistics>

[6] Ministry of Statistics and Programme Implementation (MoSPI), "Official Statistics Portal," <https://www.mospi.gov.in/>

[7] MoSPI, "eSankhyiki Data Portal," <https://esankhyiki.mospi.gov.in/>

[8] World Bank, "GDP Growth (annual %) – India," <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=IN>

[9] IMF Data, "World Economic Outlook (WEO) Database," <https://data.imf.org/en/datasets/IMF.RES:WEO>

[10] NPCI, "Retail Payment Statistics," <https://www.npci.org.in/retail-payment-statistics>

[11] Deba Prasad Rath and Raj Rajesh, "Analytics and Implications of Services Sector Growth in Indian Economy," MPRA Paper No. 10034, 2006. <https://mpra.ub.uni-muenchen.de/10034/>

[12] Rinkeshkumar G. Mahida, "The Impact of Government Policies and Foreign Direct Investment on the Growth Dynamics of the Indian Consumer Durables Market."